Modelling Case Law Dynamics with Dialogue Moves

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Abstract. In this paper we describe a set of dialogue moves which can be used to give a procedure which supports reasoning with legal rules derived from cases as described by Levi. The moves are illustrated with an extended example.

Keywords. legal case based reasoning, evolution of case law, argumentation.

1. Introduction

In [10] we discussed the way case law develops as new cases arise. Our account was broadly based on [12]. In this paper we take the ideas further, and provide a more precise account of our proposed mechanism, in the form of a set of dialogue moves. When a case is presented, the current understanding of the domain will be expressed as one or more rules, based on the previous decisions. If the case is governed by the existing rules, that will provide a reason to decide in accordance with them. The other party will then propose a counter argument based on a modification of the rules, which should favour the other side, while being, as far as possible, consistent with previous decisions. If the counter argument is accepted, this refined understanding of the law will be expressed using the modification. In this way the theory may be reconstructed in the light of the new case to express an improved understanding.

We will first set out the machinery of our model, and the set of dialogue moves we have developed. These moves will then be applied to an example based on the fictional area of law described in [10]. The applicability to real cases was illustrated by the discussions in [10] of the thread of cases from [12] and some US 4th Amendment cases.

2. Elements of the Model

Throughout this paper we will give illustrations based on the example of [10], a fictitious welfare benefit, called *Independence Allowance* (IA). IA is paid to enable a measure of financial independence to those who are not expected to work. There may be other conditions (such as residence), but the idea that those not expected

Table 1. Factual Predicates. Sentence is a prison sentence: for non-prisoners it will be 0. If not yet entered workforce, value for entered workforce is age +1

Predicate	Domain	Predicate	Domain
Age	0-130	Apprentice	Yes,No
Sentence	0-30	Absence	0-130
Current Education	Primary, Secondary, College, University, No	Entered Workforce	12-130

Table 2. Factors for Independence Allowance. Vague factors have an upper and lower bound.

Factor	Rule
Infant	Age < 5
Child	Age < 16(low)/19(high)
PrimarySchoolchild	Current Education is Primary
Schoolchild	Current Education in {Primary, Secondary, College}
AgeofConsent	Age ≥ 16
Minor	Age ≥ 18
BelowSchoolLeavingAge	Age < 19
Young Adult	Age ≥ 18 AND Age < 30(low)/35(high)
Elderly	Age ≥ 60(low)/80(high)
Pensionable	Age ≥ 66
DeemedRetired	Age ≥ 72
Prisoner	Sentence > 0
Short Stay Prisoner	Sentence < 1
Full Time Education (FTE)	Current Education in {Primary, Secondary, College, University}
Continuing FTE	Current Education in {Primary, Secondary, College, University} AND Entered Workforce > Age
Apprenticed	Apprentice = True
AbsenceDegree	Moderate if Absence/Age > 0.5: Substantial if Absence/Age > 0.8

to work deserve some income is the prime motivation for the benefit. The cases used in [10], plus some additional cases are given in Table 3 in section 4 where the example is thoroughly worked through.

As with HYPO [3], we represent cases as a set of facts. Facts are predicates of arity 1, and the domains may be boolean, an enumerated set of values, or a specified numeric range. The facts used in our example are shown in Table 1.

These predicates can be mapped to factors using simple rules as shown in Table 2. These factors are intended to pick out potentially legally significant patterns of fact. For non-boolean facts we follow [13], so that where we have a dimension such as age or education, the factors identify points or ranges on that dimension. Some factors, like *child*, may lack precise bounds.

A rule will comprise an antecedent, which will be a set of factors, and a consequent, which will be a *positive* outcome, and sets of positive exceptions and negative exceptions. Positive exceptions are those with a positive outcome despite the antecedent not being satisfied, and negative exceptions are those with a negative outcome despite the antecedent being satisfied. Each exception will be a set of factors.

$$\text{Rule} = \langle Antecedent, \{PosExceptions\}, \{NegExceptions\}, Outcome \rangle$$

The initial rule for IA is: **R1**: $< [Child(X)], [], [], Pay >$. The variable in Child indicates that there has been no decision as to whether the low or the high bound should be used.

3. Procedure

After the first case has been decided, the *ratio* of that case will offer a reason (as in the *reason model* of [13]) why the case was so decided. From this reason a rule can be derived, to be applied to future cases. This reason will be more general than the particular facts of the case and the terms used as the reason factor might be vague like *child*, or precise (at a given time) like *minor*, currently legally set at 18. In the case of the vague terms the appropriate bound may be disputed, so that it may be controversial whether the rule applies or not.

Given a rule, a new case will either satisfy the rule (or fall under a positive exception), or fall under a negative exception, or the rule may be inapplicable. If it does satisfy the rule or a positive exception that will be an argument for the positive side; if it satisfies a negative exception that will be an argument for the negative side. If no rule is applicable there is a "negation as failure" argument for the negative side, resulting from the burden of proof being on the positive side. Although following the rule would apply the existing theory, the theory must be reconsidered in the light of the new case. There will therefore be a number of ways to respond by proposing modifications to the theory. We will now describe the responses and the rebuttals of these responses for each of the four situations. This gives a three-ply argumentation structure, which is commonly used in legal reasoning with cases, e.g. HYPO [3] and CATO [2].

3.1. First Ply

There are four possible moves here, two for the claimant and two against:

- ApplyRule(R). This can be played if there is a rule R for which the antecedent is satisfied by the new case. It argues for a positive outcome.
- ApplyPosException(R,E,V). This can be played if there is a rule R with a positive exception E which is satisfied by the new case. V is the value [7] promoted by the exception. It argues for a positive outcome.
- ApplyNegException(R,N,V). This can be played if there is a rule R with a negative exception N which is satisfied by the new case. Again V is the value promoted by the exception. It argues for a negative outcome.
- NoRule. This can be played if there is no rule for which the antecedent is satisfied by the new case. It argues for a negative outcome.

3.2. Second Ply

The responses here will depend on the move made in the first ply.

3.2.1. ApplyRule, ApplyPosException and ApplyNegExcaption

There are a number of possible replies. The same replies can be used for all three of these first ply moves.

- DoesNotApply(Rule/PosException/NegException,Factor,NewFactor,Value). This can be used if a factor in the rule/positive exception/negative exception is vague, and the case falls within the "penumbra of doubt" [9]. The respondent will propose a replacement *NewFactor* falling within the range of *Factor*, but such that the rule/positive exception/negative exception no longer applies. Value is the social value that would be promoted by adopting the new factor.
- ProposeException(Factor,Value). This is used if there is a factor in the new case not present in the previous cases to which the rule applied. It proposes that factor as a negative exception for ApplyRule and ApplyPosException and as a new positive exception for ApplyNegExcaption. Value suggests a social purpose which would be advanced by adopting the exception.
- Narrow(Rule/PosException/NegException, Factor, NewFactor, Value). This prevents the rule/positive exception/negative exception from applying by proposing to replace *Factor* with *NewFactor* in the antecedent/positive exception/negative exception. *NewFactor* may be a smaller range of the same dimension as *Factor*, or require an additional fact to hold, (e.g relacing *FTE* with *Continuing FTE* from Table 2). It is argued that the narrowing would serve some social purpose, *Value*.
- Broaden(NegException,Factor,NewFactor,Value). For ApplyRule this enables a negative exception to apply by broadening a factor in that negative exception. *NewFactor* may be a larger range of the same dimension as *Factor*, or remove a fact from the definition of *Factor*. It is argued that the broadening would serve some social purpose, Value.

3.2.2. NoRule

ProposeException and *Broaden* can also be used here, and there are two new moves.

- ProposeException(Rule,Factor,Value). This can be used if there a factor in the new case which was not present in the previous cases, to enable the rule to apply even though the antecedent is not satisfied. It proposes *Factor* as a positive exception. It differs from new rule, in that the case is seen as an exception, rather than as a new, distinguished, group of cases.
- Broaden({Rule,PosException}, Factor,NewFactor): This enables a rule or positive exception to apply by broadening a factor in the antecedent/positive exception. *NewFactor* may be a larger range of the same dimension as *Factor*, or remove a fact from the definition of *Factor*.
- Analogy(Rule,Factor1,Factor2,Similarities): This contends that, on the basis of some similarities, a new factor, *Factor1*, is sufficiently analogous to an existing factor in the rule, *Factor2*, that they should be treated the same.
- NewRule(Antecedent,Value): This argues that a new rule is required for cases of this type. *Value* suggests a social purpose which would be advanced by recognising the new type. As for all rules the outcome is positive.

3.3. Third Ply

Each of these responses can be met with rebuttals.

To rebut *DoesNotApply* the rebutter needs to justify the higher bound. Therefore a different *NewFactor*, which will include the current case, can be proposed.

- RuleDoesApply(Factor,NewFactor2,Value2). Where *NewFactor2* is an alternative replacement for *Factor*, which does include the new case. *Value2* is the social value promoted by adopting the proposed new factor, and it is argued to be preferred to the value promoted by the factor proposed in the response.

For those depending on a value *ProposeException*, *Narrow*, *Broaden* and *NewRule*, the rebuttal will turn on the desirability of promoting the value. A rebuttal can therefore deny that it does promote this value, or put forward a preferred value which the exception would demote.

- NoPromotion(Factor,Value): The proposed exception would not promote the desired value.existing positive
- Demotion(Factor,Value2): The proposed exception would demote *Value2*, which is preferred to the value promoted by adopting the exception.

For *NewRule* and *ProposedException* there is an additional rebuttal, based on precedents. If existing negative instances satisfy the proposed rule or positive instances contain the proposed exception, precedential constraint [11] excludes the proposed exception.

- Precedent(Rule/Exception,C): The proposed rule or exception was not applied in a precedent case, C.

When the response involves broadening or narrowing, an alternative rebuttal will contend that the proposed movement is too great to be acceptable.

- TooGreat(Factor,NewFactor). *NewFactor* would entail too great a movement and so *Factor* should continue to be used.

The final response is *Analogy*. To rebut this move, it is necessary to cite differences which make the proposed analogy unacceptable.

- NoAnalogy(Factor1,Factor2,Differences). *Differences* are the differences between the proposed new factor and the existing factor.

For example, if *father* was proposed as an analogy to *mother*, gender would be a difference, and might or might not be considered significant,

3.4. Resolution

After three plies, as in the US Supreme Court, a decision has to be made whether to stay with the original rule or to accept the modification. This will be a matter of for argument, as in the Justices' Conference stage in the Supreme Court process [1]. Modelling these arguments is, however, outside the scope of this paper, which is intended to describe the public proceedings. The nature of the decision will depend on the type of the rebuttal. *RuleDoesApply*, *NoPromotion*, and *Demotion*,

all turn on a value judgement ([6] and [8]). Here the judges much choose which purpose or value they wish to promote. The preferred values are intended to reflect what [12] called the "common ideas of society", and may change over time, enabling the law to adapt to changing social attitudes.

Precedent is a powerful rebuttal and should, given a strict interpretation of *stare decisis*, normally succeed. Sometimes, however, precedents are not followed or overruled. Sometimes this is simply because the precedent is too old and no longer represents the "common ideas of society", or it may be that the precedent is anomalous and conflicts with a large body of other precedents, or perhaps a new value, not considered in the precedent, has subsequently emerged. In either case the judge must decide whether there are sufficient grounds to disregard the precedent. The discussion in [10] gives examples from both Levi's negligence cases and the US Fourth Amendment cases where a precedent is not followed.

TooGreat requires the judge to consider whether the proposed broadening or narrowing is too great a step to be acceptable, even if permitted by precedents [13]. Here the judge must come to a view on what seems appropriate. It might be argued that value judgements are also in play here, but we will not consider this here.

Finally, *NoAnalogy* requires the judge to decide whether the similarities or the differences are more persuasive in the context of the case. A discussion of these matters can be found in [5]. Again it might be argued that value judgements are also in play here.

It is at the resolution stage that the three types of argument often associated with [12] and discussed in [10], namely logical similarity, bright line and floodgates, can be seen. Logical similarity is key in deciding whether an analogy holds, but is also used in determining whether a broading or narrowing is too great: does there remain a logical similarity between the old factor and the new factor? Bright line is particularly associated with disputes as to whether a rule applies or not since there the existing factor is vague, but it is also a consideration in broadening and narrowing: which proposal provides the better bright line? Floodgates is essentially the justification for deciding that a proposed broading or narrowing is too great.

4. Independence Allowance Example

In this section we will apply the moves described above to the example of [10]. This example was a series of cases relating to a fictitious welfare benefit, *Independence Allowance* (IA), paid to enable a measure of financial independence to those who are not expected to work. We will use the cases used in [10], plus some additional cases as shown in Table 3. The idea is to reconstruct the sequence of cases in terms of our dialogue game. Some explanation of the moves is provided in italics.

The initial case C1 was decided for the claimant giving rise to the intial rule R1 *Pay if child*. Once we have a rule the dialogue procedure can be used.

C2: First Ply: No Rule: *the rule does not apply to a 40 year old.*
Second Ply: Broaden(Age,R1.Child,Not Elderly):
Third Ply: TooGreat(Child,Not Elderly):

Table 3. Facts for all IA Cases.

Case	Age	Prisoner	FTE	Apprentice	Entered	Absence	Payable
C1	4	0	No	No	5	0	Yes
C2	40	0	No	No	16	0	No
C3	12	0	Secondary	No	13	0	Yes
C4	30	0	No	No	16	0	No
C5	9	0	Primary	No	10	0	Yes
C6	27	0	No	No	18	0	No
C7	17	0	College	No	18	0	Yes
C8	90	0	No	No	14	0	Yes
C8a	67	0	No	No	16	0	Yes
C9	20	0	University	No	21	0	Yes
C9a	35	0	University	No	16	0	No
C10	67	3	No	No	16	0	No
C11	80	0	No	No	14	75	No
C12	16	0	Secondary	No	17	13	Yes
C13	19	0	No	Yes	18	0	No
C14	70	0	No	No	14	40	No
C15	68	0.25	No	No	16	0	Yes
C16	2	0	No	No	3	0	No

Decision: Rebuttal succeeds. R1 does not apply. Do not Pay

C3: First Ply: ApplyRule(R1): *the rule applies to a 12 year old.*
Second Ply: Narrow(R1.Child,Infant): *C1 was an infant.*
Third Ply: TooGreat(Child,Infant):
Decision: Rebuttal succeeds. R1 applies. Pay

C4 and C6 are similar to C2 with attempts to broaden Child to high and low values of *YoungAdult* rejected as too great. C5 is similar to C3 with an attempt to narrow Child to *PrimarySchoolChild* rejected as too great. C7, however, produces a need to clarify *Child*, since the case falls in an area of uncertainty.

C7: First Ply: ApplyRule(R1): *interpreting child broadly.*
Second Ply: DoesNotApply(Child,AgeOfConsent,SelfReliance): *The upper bound of child is too high: C1 was an infant, C3 was at secondary school.*
Third Ply: RuleDoesApply(Child,BelowSchoolLeavingAge,NotExpectedWork):
Decision: Rebuttal succeeds. Rule is modified. Pay. *BelowSchoolLeavingAge provides a better bright line since it relates to expectations regarding work.*
Rule becomes **R1a**: pay if BelowSchoolLeavingAge.

C8 introduces a second rule, which is modified in C8a.

C8: First Ply: No Rule: *the rule does not apply to a 90 year old.*
Second Ply: NewRule(Elderly,NotExpectedWork):
Third Ply: Demotion(Elderly,Expense):
Decision: Rebuttal fails. New rule established. Pay. *It is considered that paying this group who are not expected to work is worth the expense.*
New Rule **R2**: pay if elderly.

C8a: First Ply: ApplyRule(R2): *the rule applies to a 67 year old.*
Second Ply: DoesNotApply(R2),DeemedRetirement,ExpectedWork) *C8 was above deemed retirement age.*
Third Ply: RuleDoesApply(Elderly,Pensionable,NotExpectedWork):
Decision: Rebuttal succeeds. R2b Modified. Pay *The decision turns on the age at which people cease to be expected to work.*
Rule becomes **R2b**: pay if Pensionable.

C9 introduces a positive exception, which is modified in C9a.

C9: First Ply: No Rule: *neither rule applies to a 20 year old.*
Second Ply: ProposeException(R1,FTE,NotExpectedWork):
Third Ply: Demotion(FTE,Enterprise):
Decision: Rebuttal fails. Exception established. Pay.
Rule becomes **R1b**: pay if BelowSchoolLeavingAge or FTE.

C9a: First Ply: ApplyPosException(R1,FTE,NotExpectedWork):
Second Ply: Narrow(R1b,FTE,Continuing FTE, ExpectedWork): *Once they have entered the labour force they are expected to work.*
Third Ply: NoPromotion(Continuing FTE, ExpectedWork):*If in FTE, continuing or not, not expected to work.*
Decision: Rebuttal fails. Exception modified. Don't Pay.
Rule becomes **R1c**: pay if BelowSchoolLeavingAge or Continuing FTE.

C10 and C11 introduce negative exceptions to R2a. C12 fails to establish a similar exception for R1c.

C10: First Ply: ApplyRule(R2): *the rule applies to a 67 year old.*
Second Ply: ProposeException(R2a,Prisoner,CannotUse) *Prisoners cannot make use of the benefit.*
Third Ply: Demotion(Prisoner,NotExpectedWork):
Decision: Rebuttal succeeds. Exception established. Pay.
Rule becomes **R2b**: pay if Pensionable unless Prisoner.

C11: First Ply: ApplyRule(R2): *the rule applies to a 80 year old.*
Second Ply: ProposeException(R2a,AbsenceDegree(Substantial),Undeserving) *People who have not worked in this country do not deserve the benefit.*
Third Ply: NoPromotion(SubstantialAbsence,Undeserving): *Merit depends on current circumstances not past history.*
Decision: Rebuttal fails. Exception established. Don't Pay.
Rule becomes **R2c**: pay if Pensionable unless Prisoner or AbsenceDegree(Substantial).

C12: First Ply: ApplyRule(R1c): *the rule applies to a 16 year old.*
Second Ply: ProposeException(R2a,AbsenceDegree(Substantial),Undeserving) *People who have not lived in this country do not deserve the benefit.*
Third Ply: NoPromotion(AbsenceDegree(Substantial),Undeserving):*Minors have no choice where they live.*
Decision: Rebuttal succeeds. R1b applies. Pay,

C13 uses an analogy, C14 attempts to narrow an exception and C15 broadens one. Finally C16 attempts to use a precedent, but it is held to be too old.

C13: First Ply: NoRule: *the claimant is not in continuing FTE and not pensionable.*
Second Ply: Analogy(R2a,Apprentice,ContinuingFTE,Learning) *Apprentices are engaged in learning.*
Third Ply: NoAnalogy(R2a,Apprentice,ContinuingFTE,Paid) :*Apprentices are paid.*
Decision: Rebuttal Succeeds. R1b does not apply: Don't Pay.

C14: First Ply: ApplyNegException(R2b,Prisoner,CannotUse):
Second Ply: Narrow(R2a,Prisoner,ShortStayPrisoner,Simplicity) *It is not worth cancelling and reinstating the benefit for a short period. Moreover the crime was not very serious.*
Third Ply: Demotion(ShortStayPrisoner,CannotUse): *Even short stay prisoners cannot use the benefit.*
Decision: Rebuttal succeeds. R2b Negative Exception applies: Don't Pay.

C15: First Ply: applyRule(R2b).
Second Ply: Broaden(AbsenceDegree(Substantial), AbsenceDegree(Moderate), Undeserving) *Even a moderate absence makes the claimant undeserving.*
Third Ply: NoPromotion(AbsenceDegree(Moderate),Undeserving) :*A moderate absence allows sufficient contribution.*
Decision: Rebuttal fails. R2b Negative Exception modified: Don't Pay.
Rule: **R2c**: pay if Pensionable unless prisoner or AbsenceDegree(Substantial) or AbsenceDegree(Moderate).

C16: First Ply: ApplyRule(R1b): *the rule applies to a 2 year old.*
Second Ply: ProposeException(R1b,Infant,CannotUse) *An infant can make no use of the benefit.*
Third Ply: Precedent(Infant, C1). *In C1 the benefit was paid to an infant.*
Decision: Rebuttal fails. Exception established. Don't Pay.
Rule becomes **R1c**: pay if BelowSchoolLeavingAge or Continuing FTE unless Infant.

C1 is an old precedent. Also the value judgement used here, preferring CannotUse, was made in C10. C14 upholds the importance of CannotUse which was not considered in C1. Not following a precedent because an argument was not advanced in that precedent is found in *US v Ross* which does not follow *Robbins v California* as discussed in [10].

5. Concluding Remarks

In section 4 we worked through an example which exercised all the moves proposed in section 3. The question now arises as to the feasibility of automating the procedure. The first ply is straightforward: checking where a rule or exception applies is simple. The second ply is a little less straightforward. If a rule is applied, identifying a factor with questionable bounds, or factors that would represent a narrowing or broadening to exclude or include the case is straightforward. What is less so is identifying the rationale for these modifications. Similarly identifying

a factor that *could* serve as an exception is easy, but whether the propopsal would be sensible or not requires some genuine understanding of the domain. In the IA example, *prisoner* made sense as a negative exception to R2, but would have made no sense as a positive exception to R1. The same is true when replying to a *NoRule* move. Exceptions, broadenings and factors that would provide useful analogies or antecedents to new rules can be identified, but some semantic understanding is required to judge whether it would be worth advancing them. In the third ply, whether there is a factor that would include the new case to allow *RuleDoesApply* is easy. Similarly discovering a precedent is not a problem. However, identifying differences for *NoAnalogy*, or that a value is not promoted or demoted requires a proper understanding of the terms [5]. That a broadening or narrowing is too great can always be argued, but judgement is required to form a view as to whether the claim is likely to be successful.

Thus two kinds of knowledge are required: knowledge about the rules, cases and background factors is precise and can be used to automatically suggest legally possible moves. Selecting the best move and assessing its worth, however, require a far deeper understanding of the domain, of a sort that would require a comprehensive ontology of the sort described in [4]. As is argued in [5] it would probably never be worth the effort to build such an ontology, even if it were feasible. Fortunately such an ontology already exists in the heads of lawyers. This suggests that the proposed system should be designed as a support system, making suggestions as to the possible moves, which then require selection and justification with values by the user. This still does not address the "private" argumentation as to which arguments should be advanced and accepted, which we leave to future work.

References

[1] L Al-Abdulkarim, K Atkinson, and T Bench-Capon. From oral hearing to opinion in the US Supreme Court. In *Proceedings of JURIX 2013*, pages 1–10, 2013.

[2] V. Aleven. *Teaching case-based argumentation through a model and examples*. PhD thesis, University of Pittsburgh, 1997.

[3] K Ashley. *Modeling legal arguments: Reasoning with cases and hypotheticals*. MIT press, Cambridge, Mass., 1990.

[4] K Ashley. Ontological requirements for analogical, teleological, and hypothetical legal reasoning. In *Proceedings of the 12th ICAIL*, pages 1–10. ACM, 2009.

[5] K Atkinson and T Bench-Capon. Reasoning with legal cases: Analogy or rule application? In *Proceedings of the 17th ICAIL*, pages 12–21, 2019.

[6] T Bench-Capon, K Atkinson, and A Chorley. Persuasion and value in legal argument. *Journal of Logic and Computation*, 15(6):1075–1097, 2005.

[7] Trevor Bench-Capon and Katie Atkinson. Abstract argumentation and values. In G Simari and I Rahwan, editors, *Argumentation in Artificial Intelligence*, pages 45–64. Springer, 2009.

[8] M Grabmair. *Modeling Purposive Legal Argumentation and Case Outcome Prediction using Argument Schemes in the Value Judgment Formalism*. PhD thesis, University of Pittsburgh, 2016.

[9] H L A Hart. *The Concept of Law*. Oxford University Press, 1961.

[10] J Henderson and T Bench-Capon. Describing the development of case law. In *Proceedings of the 17th ICAIL*, pages 32–41. ACM, 2019.

[11] J Horty and T Bench-Capon. A factor-based definition of precedential constraint. *Artificial Intelligence and Law*, 20(2):181–214, 2012.

[12] E Levi. An introduction to legal reasoning. *The University of Chicago Law Review*, 15(3):501–574, 1948.

[13] A Rigoni. Representing dimensions within the reason model of precedent. *Artificial Intelligence and Law*, 26(1):1–22, 2018.