A model of the development of distinctions in case law

John Henderson and Trevor Bench-Capon
LIAL – Legal Informatics at Liverpool, Department of Computer Science,
The University of Liverpool, Liverpool, UK

Abstract. In this paper we put forward a way of modelling reasoning with cases as it is described by writers such as Levi. This style of reasoning concentrates on finding and refining particular distinctions amongst cases which bear on the outcome. It thus contrasts with work such as HYPO in which such distinctions are the product of initial analysis of the domain, and so come already fixed. We provide a detailed walk through of a specific example to show how a legal distinction can develop, assuming initially the availability of a limited ontology and then show how a richer ontology can be used to capture increased subtlety of argument.

1. Introduction

In this paper we attempt to describe and model a type of analogy which we believe is commonly used in legal reasoning. The basic purpose of the mechanism is to find a feature within the facts in a set of cases by which that set can be divided into two subsets. One of those subsets contains all the cases that exhibit the feature, the other those cases where the feature is absent. Ideally, all the cases in each subset will share the same outcome (for example, all the cases in the first subset are decided in favour of the claimant), although, in practice, there will be exceptions. We refer to such a feature as a *distinction,* and the idea is that considering this distinction in relation to a case is a useful part of reasoning about the decision that should be made. Broadly the reasoning process is that described in Levi [1], and our account is also informed by the discussion of [1] in Smith [2].

The mechanism consists of a method that identifies the similarity between the facts in two cases and a method for combining similarities between more than two cases into a single composite similarity.

We will use a running example in the paper. The example is based on the following simplification of reality. Each case in the example concerns the same single question and contains a single fact. The legal question in the example arises out of a fictional rule of common law which states that whether or not a person owes a duty of care to others depends on the job that person does. For example, under the fictional rule a racing tipster does not owe a duty of care but an investment adviser does. All cases are considered to be of equal authority (ie there is nor priority rules between them).

The example will be based on 14 cases, in each of which the defendant has a different occupation. Table 1 lists the cases with their outcomes. The question need not be stated as it is the same in every case**,** namely whether a duty of care was owed.

In section 2 we give a brief explanation of the mechanism**,** try to give some foundation for our model, and discuss how one could use it to construct an *ex post* rule, once all the cases have been decided. In section 3 we show how this analogy mechanism

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could be used as the cases are presented to develop the distinctions which appear in the *ex post* rule dynamically as the cases are decided. Both sections 2 and 3 make use of an abstraction hierarchy-like ontology, of the kind of which Wordnet [3] provides the best known example. We use a simplified example ontology of our own as illustration. In section 4 we consider what can be done with a richer ontology, of the sort that CYC [4] exemplifies. We assume that such an ontology will contain facets to identify *discriminating* and *prototypical* attributes of classes, along the lines of [5]. Again for illustration of the mechanism we use our own ontology fragment, tailored for the example and with no pretence to correctness.

Table 1: Cases showing Occupations and Outcomes

CaseNo.	Fact	Outcome
C1	Accountant	P
C2	Clerk	D
C3	Solicitor	P
C4	General Practitioner	D
C5	Nurse	D
C6	Lecturer	P
C7	Caretaker	D
C8	Security Guard	D
C9	School Teacher	P
C10	Builder	P
C11	Banker	P
C12	Homeopath	D
C13	Consultant	P
C14	Barrister	D

2. Analogy in our Model

The analogy mechanism we propose finds a similarity between cases which is asserted to be a *ground* for analogy between them. The analogy can then be expressed as a general rule, giving the grounds of the analogy as its antecedent and one outcome (ie, either 'claimant' or 'defendant') as its consequent. This rule is, however, defeasible, and the group of analogous cases so defined will contain exceptions (ie, cases that have an outcome that is the opposite to that given by following the rule). An analogy between these exceptions is then found, and the rule grounding the analogy between these exceptions can be used to refine the general rule by including the negation of its antecedent as an additional term in the antecedent of the original rule. Since "analogy" has been given a variety of interpretations, we will begin by making precise what we mean by it.

First consider an analogy between a pair of situations. One will be the *source* situation, about which all features are known. The other will be the *target* situation, about which only some features are known. We must first identify some similarity between the corresponding features of the two situations which are known. What is it to find a similarity between corresponding features? Our idea is that two features are similar if they have a common ancestor in an abstraction hierarchy. To reach this common ancestor it may be necessary to go through several abstraction steps. For example, a lion is analogous to a tiger because they are both wild cats, to a domestic tabby because they are both cats, to a dog because they are both mammals, to a parrot because they are both animals, to a tree because they are both living things and to a stone because they are both physical objects. A lion is thus closely analogous to a tiger because only a single abstraction step is required, but only distantly to a stone where (in the abstraction hierarchy as conceived here) there are six

abstraction steps. The common ancestor we call the *ground* of the analogy: thus the ground of the analogy between lions and tigers is that they are wild cats, between lions and stones that they are physical objects. If we regard the similarity as being sufficiently close, we then transfer the known values of the source situation to the corresponding features of the target situation whose values are unknown.

Suppose we are trying to use the analogy to find the value of some unknown feature, of the target situation, say disposition. Our source situation is that lions have a fierce disposition. Given a target situation with an unknown animal or thing, we can use the analogy to lions to say that a target situation with the same ground will also have a fierce disposition. This argument can be encapsulated as a rule of the form "*If ground then disposition fierce*"; here, for tigers, "*if wild cat then disposition fierce*", and, for stones, "*if physical object then disposition fierce*". Obviously the closer the analogy the more plausible the rule.

Similarly with two legal cases: here the source situation is the precedent case, the target situation is the new, undecided, case**,** the known features are the facts of the two cases and the unknown feature is the outcome of the new case.

To illustrate the method for combining similarities, we will consider analogy between a group of cases, some with a decision for the plaintiff, and some for the defendant. We believe that there are two approaches to generating the single similarity from a mixed set of cases. The first is 'top down' in which a general rule is asserted for a whole subset of cases and then refined by finding an exception and an exception to the exception etc, until the facts of all the precedent cases have been subsumed into the single similarity. The second is 'bottom up' in which a rule is asserted to cover two cases and then extended one case at a time until all the cases in the set are subsumed. In this paper we illustrate the top down approach**.**

Consider an abstraction *A* that will cover some subset of these cases. This subset can be said to be analogous with respect to A. Suppose that c is the number of cases, s_A is the number of cases in the subset with A as a common ancestor, c_p is the number of cases for the plaintiff, c_d is the number of cases for the defendant, s_{Ap} the number of cases for the plaintiff in the subset and s_{Ad} the number of cases for the defendant in the subset. Let us suppose we are trying to find an analogy for pro-plaintiff cases. Now A is the ideal ground for such an analogy if $s_{Ad} = 0$ and $s_{Ap} = c_p$. There is, however, unlikely to be such an A: typically the subset will contain some pro-defendant cases, and miss some pro-plaintiff cases. So let us introduce two measures, which we will term *coverage* and *precision*. Coverage is intended to express the ability of A to explain a decision in favour of the plaintiff, and will be the proportion of pro-plaintiff cases "caught" by A. Thus:

Coverage = s_{Ap} / c_p .

Precision is intended to represent the degree of confidence in the analogy and is given by the proportion of cases in the subset which are pro-plaintiff. Thus:

Precision = s_{Ap} / s_A.

In the ideal case both coverage and precision will be equal to 1. Typically also there will be a trade-off; moving up an abstraction step from A to A' is likely to both increase coverage and decrease precision. Our aim therefore will be to choose an A such that coverage is high enough for the analogy to be worth making, while precision is high enough to make the analogy useful. As a rule of thumb we will attempt to maximise coverage, subject to some threshold on precision. Any precision below 0.5 is clearly too low: we would be wrong more often that we were right. Something about two thirds seems a likely minimum for precision.

If precision and coverage are acceptable we will get a rule, R1, "*If A then plaintiff*", which will be defeasible to the extent of the pro-defendant cases covered by the rule. Next consider the subset caught by A.

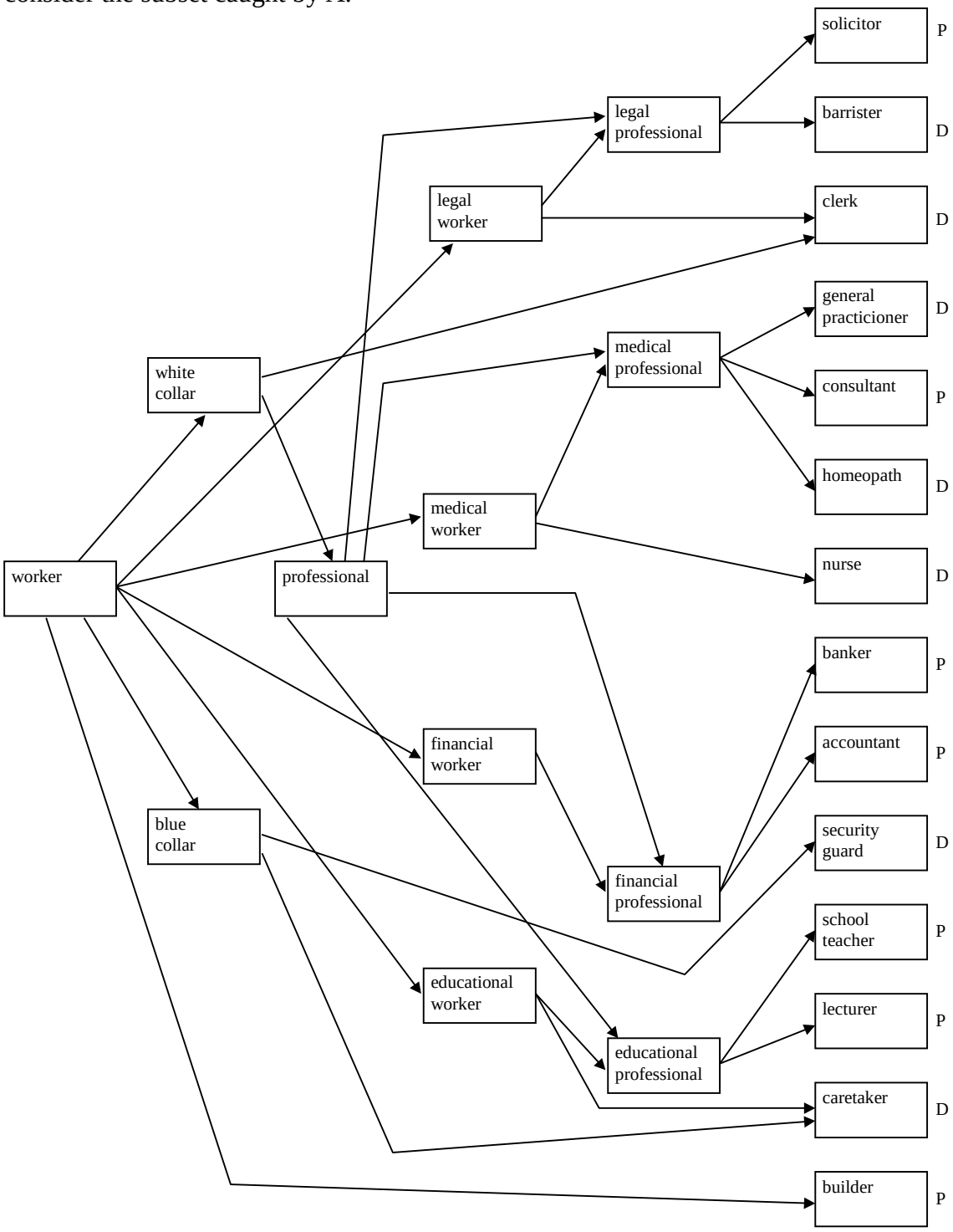

Figure 1: Sample abstraction hierarchy and outcomes

We now look for an analogy between the exceptions to R1 in this subset. That is we attempt to find a specialisation of A, B, such that the coverage and precision of the pro-defendant cases in the subset generated by B is acceptable. This will give us a modification of R1, R2, *"If A and not B then plaintiff*".

We can now consider the coverage and precision of the complement of B with respect to A. Coverage will have decreased to the extent that B has caught pro-plaintiff cases, but precision will have increased. We can then repeat this process by finding an analogy for the pro-plaintiff cases caught by B, say C, and get a further modification of the rule, R3, *"If A and not (B and not C) then plaintiff*". This will increase the coverage and precision for the subset A – (B – C).

Let us consider a example. Figure 1 shows a sample abstraction hierarchy for the occupations and outcomes of Table 1. We can calculate the coverage and precision of each node in the hierarchy and produce Table 2. All leaf nodes will have coverage of 0.143 and precision of 1, where the decision was for the plaintiff and 0 and 0 otherwise.

Table 2: Precision and coverage for non leaf nodes in Figure 1

Subset (A)	c	c_p	s_a	s_{ap}	coverage	Precision
worker	14	7	14	7	1	0.5
Blue collar	14	7	2	0	0	0
White collar	14	7	10	6	0.857	0.6
professional	14	7	9	6	0.857	0.667
legal	14	7	3	1	0.143	0.333
Medical	14	7	4	2	0.286	0.5
Financial	14	7	3	1	0.143	0.333
Education	14	7	3	2	0.286	0.667
Legal prof	14	7	2	1	0.143	0.5
Medical prof	14	7	3	1	0.143	0.333
Fin. Prof	14	7	2	2	0.286	1
Ed prof	14	7	2	2	0.286	1

What is the best ground for analogy here? In order to get complete coverage we must abstract as far as worker: but precision is then only 0.5. Since a rule based on an analogy with such precision is wrong as often as it is right, this may be taken as unacceptably low. White collar and professional have the same, reasonably high coverage, but the precision of the latter is better at 0.667. So let us take professional as our initial ground, and our first defeasible rule as "*If professional then plaintiff*".

Within professional there are three exceptions to this rule. If we now try to ground an analogy giving these exceptions we get the results in Table 3. Here the pro-defendant leaf nodes will have coverage of 0.333 and precision of 1 and the others 0 and 0.

Table 3: Precision and coverage for non-leaf nodes with professional as root

Subset (A)	coverage	Precision
Professional	1	0.333
Legal prof	0.333	0.5
Medical prof	0.667	0.667
Financial Prof	0	0
Education Prof	0	0

The most useful ground here is medical professional, which has acceptable coverage and precision. We can thus modify our rule to "*If professional and not medical professional then plaintiff*" The coverage for this rule remains 0.857, but the precision is now increased to 0.857.

Overall, there remain three exceptions: the pro-plaintiff builder and the pro-plaintiff consultant, who is an exception to our exception, and the pro-defendant barrister who remains an exception to our rule. These cases must be treated as *sui generis*, since the lowest abstraction is too abstract in the case of the builder, and the first available abstraction already used for the other side in the case of the consultant. We therefore add these specific exceptions to our rule to get the final form of our rule: "*If builder or (professional and not (barrister or (medical professional and not consultant)), then plaintiff*". Although a little complicated, this is the most economical description of the situation of Figure 1.

3. Developing the Distinction With an Abstraction Hierarchy

Section 2 describes the situation *post hoc*, when all decisions are known. But we are interested in the *development* of such distinctions. Let us therefore consider how such a situation might develop case by case.

Suppose the first case (C1) that comes to judgement involves an accountant. Obviously as yet no distinction is available, and the case is argued on its merits. The case is found for the plaintiff. The next case (C2) involves a lawyers clerk. If the plaintiff wishes to make use of an analogy with C1, he will search for the closest common ancestor of accountant and clerk, which is white collar worker. The defendant has no previous case to draw on, but will argue again on some intrinsic merits. This case is found for the defendant, effectively denying that white collar worker is the distinction which is relevant to the outcome. Let the next case C3 involve a solicitor. This time both sides have a possible analogy: the plaintiff can argue that the solicitor is a professional, as in C1, and the defendant that the solicitor is a legal worker as in C2. When C3 is found for the plaintiff, the distinction of professional emerges as potentially important. C4 involves a general practitioner. The plaintiff will rely on professional to ground an analogy with C1 and C3. The defendant cannot draw an analogy because the lowest common ancestor with clerk, which is worker, because this is an abstraction from professional, the ground of the plaintiff's analogy. So the defendant must argue that a general practitioner is an exceptional kind of professional. C4 is found for the defendant. C5 involves a nurse. Here the plaintiff has no better analogy than worker, whereas the defendant can put forward medical worker. C5 is found for the defendant. C6 involves a lecturer. The plaintiff draws the analogy of professional with C1 and C3, whereas the defendant has no closer analogy. The plaintiff wins here. By this time the distinction of professional, argued in C1, C3 and C4, and given support from C2 has become important. Now when C7, involving a school caretaker arises, while the plaintiff analogises C6 on the ground that both are educational workers, the defendant can use the whole body of cases to argue that the fact that the caretaker is *not* a professional supports the defendant's case. Although there is no analogy for the defendant, the absence of the plaintiff's best analogy is a useful argument. When C7 is found for the defendant, the distinction "professional" is becoming rather solid. This argument is reinforced in C8, when a case involving a security guard is found for the defendant, and C9, involving a school teacher, where the plaintiff analogies professional with C1, C3 and C6, C6 also supplying an *a fortiori* argument grounded in both being education professionals. The distinction is then challenged, however, when C10, concerning a builder is found for the plaintiff. Here the "not a professional" argument of the defendant is rejected, a builder being seen as a special case. Professional should now be seen as a "sufficient with exceptions" condition, but not a necessary one. This view is supported in C11, involving a banker, where the professional, *a fortiori* a financial professional is found for the plaintiff. In C12, concerning an homeopath, the plaintiff argues on the standard grounds of

professional, but the defendant can analogise to C4, on the grounds that both are medical professionals. This helps to establish medical professional as an important distinction amongst professionals, providing an exception to the general rule about professionals. C13, the consultant, however, shows that this has its own exceptions, when the case is found for the plaintiff. The final case, C14, with a barrister, provides another exception to the general rule when it is found for the defendant, despite the professional analogy, and even though the defendant has to argue that a barrister is a special case.

The procedure is summarised in Table 4.

Table 4: Develop of "professional" as a distinction in our example

Case No.	Fact	Plaintiff's Analogy	Plaintiff's Cases	Excep-tions	Defendant's Analogy	Defendant's Cases	Excep-tions	Out-come
C1	Accountant	None	None	None	None	None	None	P
C2	Clerk	White collar	C1	none	None	None	none	D
C3	Solicitor	Professional	C1	none	Legal Worker	C2	none	P
C4	General Practitioner	Professional	C1,C3	none	None	None	none	D
C5	Nurse	None	None	none	Medical Worker	C4	none	D
C6	Lecturer	Professional	C1,C3	C4	None	None	none	P
C7	Caretaker	Education Worker	C6	none	Not Professional	C1,C2,C3, C5, C6	C4	D
C8	Security Guard	Financial Worker	C1	none	Not Professional	C1,C2,C3, C5, C6, C7	C4	D
C9	School Teacher	(Education) Professional	C1, C3,C6	C4	None	None	none	P
C10	Builder	None	None	none	Not Professional	C1,C2,C3, C5,C6, C7, C8,C9	C4	P
C11	Banker	(Financial) Professional	C1,C3,C6, C9	C4	None	None	none	P
C12	Homeopath	Professional	C1,C3,C6, C9, C11	C4	Medical Worker	C4,C5	none	D
C13	Consultant	None	none	none	Medical Worker	C4,C5, C12	none	P
C14	Barrister	Professional	C1,C3,C6, C9, C11, C13	C4, C5	None	None	none	D

Two things to note here are:

- The simplicity of the algorithm used: the arguments are founded on finding a common ancestor with some case(s) to which a particular side wishes to analogise the current case. If no suitable analogy can be found, we argue that the current case is an exception.
- The ability of this simple model to capture the development of a legal concept as described in, e.g. [1] We begin with no distinction, find a distinction after a false start, establish the distinction to the extent it can be treated almost as if it were a necessary condition, so that its absence is an argument for the other side, and then find the distinction less and less adequate as exceptions proliferate. This is exactly the phenomenon described in [1] and [2].

This account thus has an appealing simplicity and can account for the broad phenomena in which we are interested. There are, however, defects.

- We cannot explain why a distinction is thought to be important;
- We cannot explain why the exceptions are exceptions.

Without this the arguments are a little sparse, and we cannot predict when a case will be found to be an exception: we can argue only in terms of very general categories. In the next section we will consider the arguments that could be mounted if we assume the availability not simply of a simple hypernym/hyponym hierarchy such as Wordnet might provide, but a richer ontology, best currently exemplified by CYC, but in general the subject of a good deal of current investigation.

4. Using A Richer Ontology

In this section we consider what we can do if we suppose the simple hierarchy of Figure 1 to be a richer ontology including:

- Attributes possessed by a given class;
- Possible values taken by those attributes for members of that class;
- Values for some of those attributes taken by a *prototypical* member of that class (often specified as cancellable default values);
- *Discriminating* attributes of values for attributes which differentiate a class from its siblings.

The last two features are discussed and motivated in [5]. In the context of such a richer ontology, we can see the use of a class name as a shorthand for a set of attributes and/or values associated with that class. An informal example of prototypical and discriminating attributes can be given by reference to birds. A prototypical bird can fly; but we recognise that there are exceptional birds which cannot fly. Therefore we can base an argument in general about birds being capable of flight, but would not wish to use it when talking about certain particular classes on birds for which this is cancelled; ostriches, penguins, kiwis and the like. Discriminating attributes are, for example the long neck and long legs which sets ostriches apart from other birds, which might be thought to contribute to their inability to fly.

Our idea is that we need to explain both why membership of a class can form the ground for a good analogy in terms of some discriminating or prototypical attributes of that class; and to explain exceptions in terms of either the cancellation of prototypical attributes, or else in terms of the particular discriminating attributes of the exceptional class.

Table 5 shows the classes in the abstraction hierarchy of Figure 1 with a selection of discriminating and prototypical attributes. No claims are made for the accuracy of this ontology: it is for illustration only.

The idea here is that the ground for an analogy will typically be explained by reference to the discriminating attributes and the prototypical attributes. Exceptions may be based either on the cancellation of some key prototypical attribute, or a discriminating attribute of the exceptional class.

Let us revisit the case by case scenario of the last section with these attributes available.

C1 dealt with an accountant and was found for the plaintiff.

C2 concerned a legal clerk. The plaintiff offers an analogy grounded in white collar worker: this would be justified by arguing that the advice of workers by brain was to be relied upon. The defendant could, however argue that the possession of a professional qualification had been important in C1; also that the employment relation where the

accountant was employed by the client mattered. The defendant succeeded: in so doing both a discriminating attribute and a prototypical attribute of professional have been seen as important features of C1.

Table 5: Some discriminating, prototypical and cancelled attributes for classes. Terms preceded by # refer to classes elsewhere in the ontology.

Class Name	Discriminating Attribute/value	Prototypical Attribute/value	Cancelled Attribute/value
White Collar	Works-by(brain)		
Blue Collar	Works-by(hand)		
Professional	Professional-qualification(#qual)	Employed-by(client)	
Educational Worker	Works-in(education)	Employed-by (educational-institution)	
Financial Worker	Works-in(finance)	Employed-by (financial-institution)	
Medical Worker	Works-in(medicine)	Employed-by (National Health Service)	
Legal Worker	Works-in(law)	Employed-by(Legal-Firm)	
Education Professional	Promotes(scholarship)		Employed-by(client)
Medical Professional	Promotes(health)		Employed-by(client)
Financial Professional	Promotes(wealth)		Employed-by (financial-institution)
Legal Professional	Promotes(Rule of law)		Employed-by(Legal-Firm)
Solicitor	Professional-qualification(#sol)		
Barrister	Professional-qualification(#bar)	Employed-by (solicitor)	Employed-by(client)
Clerk	Professional-qualification(none)		
General Practitioner	Professional-qualification(#med)		
Consultant	Professional-qualification(#med); Specialism(#field)	Employed-by(client)	Employed-by (National Health Service)
Homeopath	Professional-qualification(unofficial);	Employed-by (client)	Employed-by (National Health Service)
Nurse	Vocational-Qualification(#nursing)		
Banker	Professional-qualification(#banking);		
Accountant	Professional-qualification (#accountancy)		
Security Guard	Job description (guard)		
Lecturer	Employed-by (#university)		Employed-by(client)
School Teacher	Employed-by(#school)		Employed-by(client)
Caretaker	Job description(caretaker)		
Builder	Vocational-Qualification(#building); Employed-by(client)		

C3 involves a solicitor. A solicitor is a standard professional, and this is the ground of the analogy with C1. C2 can also be cited in support, since the argument of C2 effectively urged an analogy with professional in order to dispute the analogy with white collar worker.

C4 concerns a general practitioner. This time the analogy with professional failed. An argument here could have been based on employment by a Government agency, the National Health Service (NHS), rather than by the client as in C1 and C3. Here a prototypical attribute of professional has been cancelled.

C5 where a nurse was involved can be analogised to C4 through medical worker. Again the employer is the NHS. This was found for the defendant suggesting that this prototypical attribute of medical worker, involving as it does the cancellation of a prototypical attribute of professional, is important.

In C6 we encounter a lecturer. The plaintiff has an analogy with professional, the defendant has none. But the defendant could argue that the analogy should fail, because as in C4, a prototypical attribute of lecturer is cancelled. In fact the case is found for the plaintiff. Perhaps in the judgement some stress is placed on the duty of lecturers to promote scholarship (a discriminating attribute of education professionals) which should make them particularly careful when giving advice, and which discriminates them from medical workers.

In C7 we have a school caretaker. The defendant relies on not being a professional; the plaintiff on an analogy with C6, grounded in education worker. The latter is rejected; note that the discriminating and prototypical attributes do not match those advanced in successful plaintiff cases. Indeed the discriminating attribute of educational workers, their employer, was used against the plaintiff in C6.

C8 the security guard, although a financial worker, and so analogous to C1, is settled for the defendant in a similar fashion to C7.

By the time we reach the school teacher in C9, professional is quite well established, with its discriminating feature of a professional qualification quite firm, and the prototypical *employed by client* having also played a role, particularly in considering exceptions. That the latter is indeed cancelled for the school teacher is a point for the defence, but the analogy with the lecturer in C6 is held to defeat it. Note here that it is really the *a fortiori* argument that is decisive.

In C10 we have a builder and the defendant confidently relies on the builder not being a professional. Here, however, the plaintiff draws attention to the discriminating attributes of a builder which make him look akin to a professional: he is employed by the client, and has a vocational qualification which can be held as a substitute for the professional qualification. C5, the other case with a vocational qualification*, which was not considered at the time*, can be distinguished by the employment relationship. This retrospective revaluation of previous arguments is identified as important in [2]. The plaintiff's arguments were persuasive.

In C11 we have a banker. This is on all fours with C1: no attributes are cancelled. The defendants argument that the banking qualification is unlike the accountancy qualification can be rejected – we could even cite C10 to support such a rejection, since if even vocational qualifications can suffice, the banking qualification looks very acceptable.

C12 involves a homeopath. In the earlier model this seemed to be on all fours with C4. On our current analysis, however, it is more of a problem. The homeopath is employed by the client, and so is more like a prototypical professional than a prototypical medical worker, so the basis of excepting medical workers goes. Since this was found for the defendant, we must assume that the unofficial nature of the professional qualification excludes the homeopath from the *legal* (as opposed to the standard) notion of professional.

In contrast C10 brought builders within the legal concept, although outside the "ordinary language" concept.

C13, however, with a consultant, is found for the plaintiff. This time the professional qualification is impeccable, and the cancellation of the prototypical attribute of the medical worker, destroys the analogy the defendant wished to make.

Finally, in C14 we have a barrister. The barrister is employed by a solicitor and so the prototypical attribute from professional is cancelled. This appears to be enough to find for the defendant, although some other discriminating features of barrister involving their ancient privileges may have played a part.

What the above shows is that the situation when attributes and values are considered becomes much more complex, and we are able to model much more subtle arguments. Finding a determinate algorithm for such cases may well be impossible, since the attributes to which one wishes to draw attention will be determined by content as well as syntax. However, we can identify some possible moves, which hold out good prospects for identifying potential arguments which could be advanced for user approval. Informal characterisations of these moves linked to above discussion are:

1. When advancing a ground for an analogy, discriminating and prototypical attributes can be used to flesh out the argument. Thus the discriminating and prototypical attributes should be suggested as possible points of emphasis. (C2, C3,C5, C6, C11)
2. When advancing the ground for an analogy backing an exception to an existing distinction, prototypical attributes which are cancelled are particularly important. Where the cancellation is also a discriminating attribute of the ground the importance is increased. (C4, C5).
3. When disputing an analogy a possible move is to find a less abstract term which is a good ground for an analogy for one's opponent, but which does not cover the current case. Discriminating and prototypical attributes of that less abstract term may be used for emphasis. (C2)
4. When claiming that the current case is a special case, cancelled prototypical attributes of the general ground are most useful. Failing that one must rely on discriminating attributes of the current case. (C13, C14).
5. Finding a good analogy for opposing cases which does not apply to the current case. (C7, C8).
6. Analogising to a line of reasoning. Because medical worker was an exception, educational worker should also be an exception, since both cancel a prototypical attribute of professional. (C6).
7. Advancing a less abstract term a fortiori: discriminating and prototypical attributes of the less abstract term may be helpful. (C9)
8. Where the values of attributes are themselves terms in the ontology, analogies can be sought amongst them. In the above it is the analogy between the qualification of the builder and a professional that turns C10, and the disanalogy between the qualification of the homeopath and the other professionals that defeats the plaintiff in C12.

5. Summary

In this paper we have put forward a way of modelling reasoning with cases as it is described in works such as [1]. This style of reasoning concentrates on finding and refining particular distinctions amongst cases which bear on the outcome. The dynamic aspects of the development of these distinctions through decisions on a succession of cases is particularly important. This dynamic aspect provides a contrast with work such as HYPO

[6] in which such distinctions are fixed as the product of initial analysis of a set of decided cases. The notion of a life cycle of a distinction, in which it first emerges as past cases are viewed in the light of their successors, becomes solid, and capable of being used to argue against a position when it is absent, and then breaks down as exceptions arise, is emphasised in [1] and [2], and is well modelled in our approach.

We have informally discussed our approach assuming the availability of a sparse ontology and a richer one. While the sparse ontology models the distinction without explaining it, use of the richer ontology allows us to generate some quite sophisticated arguments intended to explain why the distinction is found important, and why specific cases might be treated as exceptions.

Future work will attempt to provide a proof of concept through an implementation of the model. We have a prototype implementation which models the first case and are currently developing one which can use the richer ontology. When this is complete we will experiment with it to attempt to firm up the heuristics sketched the last section. Our belief is that the resulting system will generate sophisticated and realistic arguments which reflect this important style of legal reasoning.

References

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