Argument Schemes for Factor Ascription

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Abstract. Reasoning with legal cases by balancing factors (reasons to decide for and against the disputing parties) is a two stage process: first the factors must be ascribed and then these reasons for and against weighed to reach a decision. While the task of determining which set of reasons is stronger has received much attention, the task of factor ascription has not. Here we present a set of argument schemes for factor ascription, illustrated with a detailed example.

Keywords. argument schemes, explanation, factors, legal reasoning

1. Introduction

Reasoning with legal cases provides a paradigmatic example of reasoning involving the weighing of reasons for and against to come to a conclusion which will be consistent with decisions made in the past. It is a central feature of legal reasoning, and as such has been central to the study of AI and Law. The most successful approach has been to use factors, which were introduced in CATO [2] as a development from the dimensions introduced in HYPO [22]. Further developments are described in [5], and the most recent has been a summary of formalisations of this approach [18]. Such reasoning has received recent attention in [13] as a way of explaining in the output of approaches using machine learning techniques to predict the outcomes of legal cases, such as [1] and [17]. The same techniques have also been used to explain classifications from machine learning systems in areas other than law [19].

Since [2], cases have been represented as sets of factors. Factors are stereotypical patterns of facts which offer a reason to decide for one or other of the parties to the dispute. Once cases are available in terms of factors, the reasoning becomes a matter of deciding which set of reasons is the stronger, given the need to be consistent with the preferences expressed in previous cases (the legal principle of stare decisis). Argumentation about a new case then typically involves the exchange of moves (shown in italics in the bullets below) structured in the form of a three-ply dialogue, as originated in HYPO:

- Plaintiff cites a favourable precedent case with factors in common with the current case;
- Defendant replies either by citing an unfavourable case with factors in common with the current case (counter example) or distinguishes the case, by pointing to factors favourable to the defendant in the current case but not in the precedent, or factors favourable to the plaintiff in the precedent but not the current case;

1Often the strength of a reason is seen in terms of the social values it promotes or demotes [10].
Plaintiff rebuts by *distinguishing* the counter examples, or by down playing the distinctions by finding a factor to *substitute* for the missing favourable factor or *cancel* the unfavourable factor.

This three ply structure corresponds to the use of argument schemes as introduced by Walton [24], with the proposal of an argument scheme (*cite*) being answered with critical questions (*counter example* and *distinguish*), which are in turn responded to (*distinguish, substitute and cancel*). This style of argument has been formalised as a set of argument schemes in [20], and used to explain the output of machine learning systems in [19].

In order to reason with factors, however, factors must be ascribed to the cases. Reasoning with legal precedents is a two stage process, in which *first* factors are ascribed to cases and *then* weighed to see whether the reasons for the defendant or the plaintiff are the stronger (see e.g. [12] and [8]). Both these stages may be the subject of argument: it may not be clear whether or not a factor should be ascribed on the basis of the facts.

Moreover, precedents guide the ascription of factors. Whilst the systems which look back to Cato see precedents as determining preferences between sets of factors (e.g. [16]), some precedents are concerned with whether or not a factor should be ascribed: once the factors are ascribed, the balance between them is obvious. For example, in the domain used by Cato, US Trade Secrets – where cases cover the misappropriation (or not) of a trade secret – in the case of *Arco Industries Corp. v. Chemcast Corp (1980)* all the factors favoured the defendant, and so, once the factors had been ascribed, the case was entirely clear cut. The plaintiff had, however, argued that certain factors favourable to him *should* be ascribed, but his arguments were rejected: in particular the court rejected the argument that the defendant’s product was identical to the plaintiff’s, setting a precedent for how similar the products needed to be for the purposes of this factor. Similarly in *Technicon Data Systems Corp. v. Curtis 1000, Inc (1984)*, the case turned on whether or not the information was reverse engineerable. The court held that, given the time the defendant had expended on attempting to reverse engineer the information, the factor should not be ascribed. In doing so the Court set a precedent for how much effort precluded reverse engineerability. As a case where a disputed factor was held to be present, it was held in *Space Aero Products Co. v. R.E. Darling Co (1965)*, that former employees who had acquired the information in the course of their employment were in a confidential relationship with the employer, even if they had signed no explicit non-disclosure agreement, again setting a precedent for future cases. Thus while some precedents guide preferences between factors, others, termed *ascription* precedents in [8], guide the ascription of factors.

Thus the explanation of an outcome in terms of the factors pro and con, and the preferences between them, may not be enough: an explanation of why the factors are considered present (or absent) may be what is needed.

In this paper we present a set of argument schemes to justify factor ascription. Our contribution is the articulation of four new schemes and their critical questions that demonstrate how factors can be ascribed, to enable the second stage of reasoning with legal cases to be undertaken. The new schemes complement the set presented previously in [20] to now provide full coverage of both stages of the process described earlier: this enables a complete explanation of both stages of the decision that was not previously available. Use and effectiveness of the schemes is demonstrated by walking through a detailed example.
Section 2 identifies different ways of ascribing factors, giving rise to different schemes to provide justification. Section 3 presents schemes for each of these types, with an extended example following in Section 4 and concluding remarks in Section 5.

2. Types of Factor Ascription

Factors are ascribed on the basis of facts. But the relationship between factors and facts is not always straightforward, since the cases exhibit an enormous variety of facts, which need to be mapped into a relatively small set of factors.

The most straightforward case is where the facts licence the ascription of the factor through an ordinary understanding of the words involved. Thus, in the often discussed wild animals property law cases introduced in [11] – where the cases concerned determining when an individual can be deemed to possess (or not) a wild animal being pursued – one factor was whether those involved were pursuing their livelihoods. In one case Keeble v Hickeringill (1707) 103 ER 1127, Keeble rented a pond frequented by ducks which he regularly shot and sold at market. In another Young v Hitchens (1844) 115 ER 228, Young was a professional fisherman looking for fish in his trawler. Both are clearly pursuing their livelihoods. In contrast, in Pierson v Post (1805) 3 Cai. R. 175, Post was hunting a fox in pursuit of pleasure: fox hunting played no part in his professional activities. No special judgement, or knowledge of past cases, is needed to ascribe the factor. In these cases there are no issues as to extent: either the plaintiff was pursuing his livelihood or he was not.

But things are not always so simple: often the ascription of the factor does require knowledge of past cases. In HYPO [3], in the domain of US Trade Secrets Law, facts are used to position the case on a set of dimensions. One such dimension is SecurityMeasures, which relates to the steps taken by plaintiffs to protect their information. The measures taken in any given case will be very different. Moreover, the rigour of the measures will vary greatly: at one end of the dimension no measures will have been taken, which will be a reason to find for the defendant. At the other end, the very rigorous measures taken will be a reason to find for the plaintiff. Thus the dimension gives rise to two factors, one for each side, depending on the nature of the measures taken in the particular case. Between them there may be a neutral range in which neither side is favoured and no factor is applicable. At one end we have the pro-defendant factor NoSecurityMeasures, and at the other end the pro-plaintiff factor, AdequateSecurityMeasures. At some point on the dimension the measures will be sufficient to be no longer a reason to find for the defendant. At some, possibly later, point the measures will be sufficiently strong to be a reason to find for the plaintiff. These points are not a matter of ordinary language, but are determined in the context of actual cases, and dependent on past decisions. These points were discussed by Rigoni [21], who termed them switching points. SecurityMeasures has two factors: a pro-defendant factor, followed by a neutral range, followed by a pro-plaintiff factor. Other dimensions may differ. Some map to only one factor with the rest of the range neutral. Others may map to more than one factor for a given side: in Trade Secrets DisclosuresToOutsiders has a neutral range followed by a pro-plaintiff factor representing a significant number of disclosures, followed by a stronger pro-plaintiff

2Keeble v Hickeringill (1707) 103 ER 1127
3Young v Hitchens (1844) 115 ER 228
4Pierson v Post (1805) 3 Cai. R. 175, 2 Am. Dec. 264
factor if the information has been put into the public domain. For all factors of this type we have a dimension with ranges in which the factors that are applicable are demarcated by switching points constrained by precedents.

A third type of ascription arises when a pair of dimensions need to be considered together, because one may trade off against the other so that we need to strike a balance between them. For example, as discussed in [9], in the US Fourth Amendment which protects against unreasonable search, the privacy of the citizen must be balanced against the exigency of the need to enforce the law. If the life of the President is thought to be under threat, privacy will be respected less than if we are dealing with a minor offence. Neither exigency nor privacy can provide a reason to decide the case by themselves: they must be considered together. Thus the factor is something like SufficientRespectforPrivacyGivenExigency, and we can picture the dimensions as the x- and y-axes and precedents determining a line separating the area where the factor applies from where it does not, as discussed in [7] and [6]. Again, this line will be constrained by previous decisions as to the appliability of the factor. A diagram for the worked example is given in Figure 1.

The fourth type of justification we will consider is analogy. Here the problem is not whether the extent of some aspect of a case is sufficient, and so it could be a case for ordinary interpretation, but the facts do not allow the ascription of the factor on an ordinary interpretation, and so it is argued that the factor should be ascribed on the basis of an analogy between the situations. Analogy has often been seen as determining a relation between whole cases, as in [25] and [23]. We, however, argue that the analogy is rather between particular aspects of the case. In Steven’s prime example in [23] the (hypothetical) case turns on whether a kindergarten teacher should be considered sufficiently analogous to the mother in the case of Dillon v Legg[5] to receive compensation for witnessing an injury to a child. In Dillon it was held that one factor was whether the victim and the emotional sufferer had “a close relationship”[6]. The case turns on the point because the other pro-claimant factors are in place, and so all that is at issue is whether being a kindergarten teacher enables the factor CloseRelationship, introduced to describe the mother-son relation, to be applied. In ordinary language most people would not say that a kindergarten teacher had a close relationship of this sort to the child, but Stevens argues that there is a possible analogy to be drawn on the basis that both love the child. In our opinion this analogy is too tenuous, but a similar analogy might succeed in the case of a more intimate non-blood relationship such as a wet nurse. Walton’s key example is the well known Popov v Hayashi case[7], in which there was a dispute over the ownership of a potentially valuable baseball, hit by Barry Bonds to set a home run record. Here the analogy is not with a particular case, but with the body of cases including Pierson, Keeble and Young discussed above, by drawing an analogy to a baseball hit out of the ball park and the wild animals of those cases[8]. Here what is at stake is the ascription of the factors relating to the quarry: once these factors have been ascribed, Popov can then be argued about with the other wild animals cases as precedents.

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5Dillon v Legg 68 Cal. 2d 728 (1968).
6The Court had been deliberately vague, saying that it “cannot now predetermine the defendant’s obligation in every situation by a fixed category; no immutable rule can establish the extent of that obligation for every circumstance in the future.” It is quite normal for a Court to use a term which is clearly satisfied in the current case, but leave more precise lines to be drawn later.
3. Argumentation Schemes For Factor Ascription

In this section we will provide an argumentation scheme for the ascription of each of the types of factor discussed in the previous section.

3.1. Ordinary Meaning Scheme

The most straightforward scheme is where the facts of the case justify the ascription of a factor, on a ordinary interpretation of the terms involved.

**Ordinary Meaning Scheme**

Facts Premise: Facts $a_1...a_n$ are true in Case $C_1$

Usage Premise: As $F$ is ordinarily understood, $a_1...a_n$ are sufficient for Factor $F$ to be considered present in $C_1$

Conclusion: $F$ is present in $C_1$

The following is a set of critical questions to enable the scheme’s components to be questioned:

**MCQ1**: Does $a_1...a_n$ really justify the ascription of $F$? There might be some additional fact which is needed. For example we might require that the activity be sufficiently remunerative if it to be considered the person’s livelihood.

**MCQ2**: Does some other fact, $b$, provide an exception which prevents the ascription of $F$? There might be some unusual feature in the situation which should prevent ascription. For example suppose a duck hunter takes a pot shot at a fox. Though out pursuing his livelihood, hunting that particular quarry is not really part of that pursuit.

**MCQ3**: Do other facts $b_1...b_n$ justify the ascription of factor $F_2$, which is incompatible with $F$? For example if the person concerned was trespassing, then they might be considered to be engaged in an activity such as poaching, which would not be considered earning a livelihood.

3.2. Switching Point Scheme

The next scheme is based on Rigoni’s notion of a switching point [21]. If we consider a dimension with a factor favouring the plaintiff at one end and a factor favouring the defendant at the other, there will be points (possibly the same) at which one factor ceases to apply and the other factor begins to apply. These are the *switching points*. Thus given a precedent more favourable on the dimension than the new case, we can say that the factor applies to the new case. Similarly, if the new case is less favourable, we can argue that the factor does not apply. We can use this notion as the basis of an argumentation scheme:

**Switching Point Scheme**

Precedent Premise: $P_1$ is a precedent with location $L_1$ on dimension $D$ at which factor $F$ is present.

Case Premise: $C_1$ is a case with $L_2$ on dimension $D$

Party Premise: $F$ favours the plaintiff (defendant)

Value Premise: $L_2$ is more (less) favourable to the plaintiff (defendant) than $L_1$

Conclusion: $F$ applies (does not apply) to $C_1$
We can question an instantiation of this scheme with the following critical questions:

**SCQ1:** Is \( L_2 \) so much more favorable that a different factor applies? For example in the US Trade Secret domain of \[2\] there are two pro-defendant factors on the disclosures dimension, \textit{DisclosedToOutsiders} and the stronger \textit{DisclosedInPublicForum}.

**SCQ2:** When arguing that the factor does not apply because \( L_2 \) is less favourable: Is \( L_2 \) sufficiently close to \( L_1 \) that the same factor applies? It is possible that \( P_1 \) does not precisely identify the switching point, and that \( C_1 \) may become a new precedent for the factor, giving a more generous switching point.

**SCQ3:** Is there another precedent, \( P_2 \), which can ground an instantiation of the switching point scheme to give an argument that the factor does not (does) apply? It may be that some additional information is needed to say which precedent should apply.

### 3.3. Trade Off Scheme

The next scheme concerns trade-offs between two dimensions, as described in \[6\]. For example in the US Fourth Amendment domain there is a trade-off between being able to enforce the law and respect for privacy \[9\]. The factor involves balancing these two concerns and is something like “Sufficient respect for privacy while enabling enforcement”. The idea in \[6\] is that a line, e.g. \( a.D_1 + b.D_2 + c = 0 \), can be fitted to the precedents \[8\], separating the pro-plaintiff and pro-defendant regions of the case space. In the equation \( a \) and \( b \) are the coefficients of the variables \( D_1 \) and \( D_2 \), representing the values on the two dimensions. This determines the gradient of the line which indicates how much more \( D_1 \) is need to compensate for less \( D_2 \), and \( c \) is a constant showing where the line crosses the axes given these coefficients.

### Trade Off Scheme

**Precedents Premise:** \( P_1...P_n \) are precedent cases in which factor \( F \) is present.

**Locations Premise:** Precedent \( P_i \in \{P_1...P_n\} \) have locations \( D_{1i} \) and \( D_{2i} \) for dimensions \( D_1 \) and \( D_2 \), 

**Case Premise:** \( C_1 \) is a case with \( L_1 \) on dimension \( D_1 \) and \( L_2 \) on dimension \( D_2 \)

**Line Premise:** All \( a.D_1 + b.D_2 + c \geq 0 \)

**Point Premise:** \( a.L_1 + b.L_2 + c \geq (>) 0 \)

**Conclusion:** \( F \) applies (does not apply) to \( C_1 \)

For this scheme we have the following key critical questions;

**TCQ1:** Is there a counter example, a precedent, \( P_{n+1} \), such that \( a.D_{1n+1} + b.D_{2n+1} + c < (\geq) 0 \)? There might be a precedent which does not fit the line.

**TCQ2:** Can the line be drawn less (more) tightly? If the precedents are not precisely on the line the constant \( c \) could be adjusted to lower (raise) the line to allow (disallow) more cases to qualify unless this created a counter example.

\[8\] Of course more complicated curves can be used, but a straight line is the simplest.
There are a number of schemes for analogy in the literature. Different schemes are given in [26], [25] and [23]. Here we give one tailored to our need to analogise between aspects of cases rather than cases as a whole.

**Analogy Scheme**

- **Base Premise:** A situation \( S_1 \) is described in precedent \( P_1 \).
- **Derived Premise:** Factor \( F \) is plausibly ascribed to \( P_1 \) on the basis of \( S_1 \).
- **Case Premise:** Case \( C_1 \) contains situation \( S_2 \)
- **Similarity Premise:** As it relates to \( F \), situation \( S_2 \) is similar to situation \( S_1 \).
- **Conclusion:** Factor \( F \) is plausibly ascribed to \( C_1 \).

The following set of critical questions is based on the account given in [26] for the basic scheme for argument from analogy.

**ACQ1:** Are there respects in which \( P_1 \) and \( C_1 \) are different that would tend to undermine the force of the similarity with respect to \( F \)? For example, the kindergarten teacher has a transient relationship, whereas the maternal relation is permanent.

**ACQ2:** Is the similarity sufficient for \( F \) to be ascribed? The love felt by a kindergarten teacher might not be considered to have the same quality as mother-love.

**ACQ3:** Is there some other precedent \( P_2 \) that is also similar to \( C_1 \), but in which \( F \) was not ascribed? Suppose there was a precedent with a nanny, where the relationship was not considered sufficiently close.

In the next section we will give an extended example to show these schemes in action.

### 4. Change of Domicile Example

Our example will be based on the example used in [15]. The idea is that a person has applied for a change of fiscal domicile, for tax purposes. A decision will be taken in the light of the particular facts of the case, which will be very varied as people have many different reasons for changing country, and many different ways of arranging their lives as they transition from one place to another. We will suppose the following facts are relevant. Some will be **dimensional**, the particular fact representing a point on a dimension, while others will be **Boolean**.

- **Absence:** The length of absence (dimensional).
- **IncomeSource:** The percentage of income earned abroad (dimensional).
- **Spouse:** Whether there are family connections with the new country. For example the spouse may be a national of that country (Boolean).
- **Age:** The age of the person concerned (dimensional).
- **Dwelling:** Whether links with the old country had been maintained. For example a house may still be owned there (Boolean).

From these we can form the following factors. The dimensional facts will give rise to **switching point** and **trade off** factors. Boolean factors may be argued for either on the basis of a literal interpretation or an analogy. The conflicting principles are that tax should be paid where income is earned, but that tax should be paid where benefits are
Table 1. Facts of Example Cases

<table>
<thead>
<tr>
<th>Case</th>
<th>Absence</th>
<th>IncomeSource</th>
<th>Spouse</th>
<th>Age</th>
<th>Dwelling</th>
</tr>
</thead>
<tbody>
<tr>
<td>LowPay</td>
<td>48</td>
<td>20</td>
<td>No</td>
<td>35</td>
<td>Timeshare</td>
</tr>
<tr>
<td>HighPay</td>
<td>6</td>
<td>100</td>
<td>No</td>
<td>17</td>
<td>No</td>
</tr>
<tr>
<td>Married</td>
<td>36</td>
<td>60</td>
<td>Spouse</td>
<td>26</td>
<td>No</td>
</tr>
<tr>
<td>Owner</td>
<td>60</td>
<td>20</td>
<td>No</td>
<td>48</td>
<td>House</td>
</tr>
<tr>
<td>NewCase1</td>
<td>54</td>
<td>20</td>
<td>Spouse</td>
<td>66</td>
<td>Caravan</td>
</tr>
<tr>
<td>NewCase2</td>
<td>36</td>
<td>60</td>
<td>Partner</td>
<td>18</td>
<td>No</td>
</tr>
</tbody>
</table>

Table 2. Factors Present In Precedent Cases

<table>
<thead>
<tr>
<th>Case</th>
<th>F1 suff</th>
<th>F2 Insuff</th>
<th>F3 Family</th>
<th>F4 Working</th>
<th>F5 Minor</th>
<th>Links</th>
</tr>
</thead>
<tbody>
<tr>
<td>LowPay</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HighPay</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Owner</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

received, and so the current domicile should receive tax until the connection has been severed by prolonged absence and abandoning other connections.

F1 **SufficientAbsence.** This will mean that the absence is sufficient with respect to the amount of income earned abroad. This is a trade off factor. In general, the higher the percentage earned abroad the shorter the absence required. The factor will favour change.

F2 **InsufficientAbsence.** If the absence is not sufficient, this can mean that a pro *noChange* factor is present.

F3 **Family.** There are close family ties with the new country. This favours change. Here there is no corresponding *noChange* factor: lacking family ties is no reason to decide for *noChange*.

F4 **WorkingAge.** If a person is of working age, this favours no change.

F5 **Minor.** If a person is a minor, this favours change, since minors are held to have no control of their domicile. Note, however, that being retired is neutral: thus, some points on the age dimension are neutral.

F6 **Links.** This is a Boolean factor favouring *noChange*. It applies if the claimant has maintained links such as property in the old country.

We now consider a set of precedent cases, with facts as shown in Table 1. The factors ascribed to the four precedent cases are shown in Table 2. We are now presented with a new case, NewCase1, with facts as shown in Table 1.

We now consider how these factors should be ascribed to NewCase1. First we will consider the income/absence trade off.

### 4.1. Trade Off Between Absence and Income Percentage

*NewCase1* has the same amount of income as the unfavourable *LowPay* and the favourable *Owner*. But the length of absence is midway between the two. So argument is required. Suppose first that the advocate of no change wishes to argue that F1, **SufficientAbsence** does not apply. He can draw a line separating the favourable from the
unfavourable precedents as shown in Figure 1. The line shown is $3 \times \text{income} + 5 \times \text{absence} - 360 = 0$. We can now instantiate the TradeOff scheme.

**Precedents Premise:** Married and Owner are precedent cases in which factor SufficientAbsence is present.  
**Locations Premise:** These precedents have locations (36,60) and (60,20) on the absence and income dimensions.  
**Case Premise:** NewCase1 has location (54,20)  
**Line Premise:** For Married and Owner $3 \times \text{income} + 5 \times \text{absence} - 360 \geq 0$  
**Point Premise:** $3 \times 20 + 5 \times 54 - 360 = -30$ and $-30 < 0$  
**Conclusion:** SufficientAbsence does not apply to NewCase1

We can now consider how we might challenge this argument. In HighPay, we have a negative value for $3 \times 100 + 5 \times 6 - 360$, and yet it was held that SufficientAbsence applied to HighPay. This counter example to the Line Premise allows us to pose TCQ1. The proponent would likely argue that the relationship is not linear for extreme values, as shown in Figure 1, so that 100% income will mean that any absence is sufficient. The court would have to decide whether this rebuttal was effective, or whether NewCase1 should also be included in SufficientAbsence.

The line in Figure 1 has been drawn very tightly on the precedents, and so there is scope for challenging this argument with TCQ2. If the constant factor is reduced to 330, NewCase1 would now lie on the line, and the two precedents would remain included, while the counterexample LowPay would remain excluded. This would have the additional strength of including HighPay with no need to make it a special case, and so represents a powerful challenge. A rebuttal would have to argue in terms of the values promoted: that the new line does not give enough weight to the claims of the current domicile.

### 4.2. Switching Point on Age Dimension

The factors for which this is the argument scheme are WorkingAge and Minor. Let us first consider NewCase1. Here a proponent of no change would instantiate the scheme using Owner.

**Precedent Premise:** Owner is a precedent with location 48 on dimension Age at which factor WorkingAge is present.
Case Premise: \textit{NewCase1} is a case with 66 on dimension \textit{Age}.
Party Premise: \textit{WorkingAge} favours no change.
Value Premise: 66 is more favourable to no change than 48
Conclusion: \textit{WorkingAge} applies to \textit{NewCase1}.

But we can pose critical questions against this, knowing that beyond \textit{WorkingAge} on the \textit{Age} dimension is a neutral area for the retired. So one can pose SCQ1, arguing that the difference between 66 and 48 is sufficiently great that we have entered the neutral range. We have no precedents setting the switching point here: if the court decides that a person of 66 should be considered retired so that \textit{WorkingAge} does not apply, \textit{NewCase1} will become a precedent putting an upper bound on \textit{WorkingAge}.

The other two critical questions do not apply to \textit{NewCase1}, so now consider \textit{NewCase2}. Here \textit{HighPay} can be used as a precedent to argue that \textit{Minor} does not apply.

Precedent Premise: \textit{HighPay} is a precedent with location 17 on dimension \textit{Age} at which factor \textit{Minor} is present.
Case Premise: \textit{NewCase2} is a case with 18 on dimension \textit{Age}.
Party Premise: \textit{Minor} favours change.
Value Premise: 18 is less favourable to change than 17
Conclusion: \textit{Minor} does not apply to \textit{NewCase2}.

Here we can pose SCQ2. We can argue that 18 is sufficiently close to 17 that \textit{Minor} can also be taken to apply the \textit{NewCase2}, raising the lower bound on the switching point for this factor. This could be supported by also posing SCQ3, using \textit{Married} to argue that \textit{WorkingAge} does not apply to \textit{NewCase2}. The decision on the court could be made on the basis of the value concerned, namely the autonomy of the person with respect to place of residence of a person of that age, or by considering other legislation in the two jurisdictions concerning the age of majority.

4.3. Ordinary Meaning Scheme

We now turn to the Ordinary Meaning Scheme. Consider here \textit{NewCase1}, where the applicant has a spouse of the other nationality.

Facts Premise: Applicant has a spouse of the appropriate nationality in \textit{NewCase1}.
Usage Premise: As ordinarily understood, spouse justifies the ascription of \textit{Family}, which requires a close family tie.
Conclusion: \textit{Family} is present in \textit{NewCase1}.

Since spouse is a paradigmatic close family tie, the only possibility of arguing against this is to find an exception, and pose MCQ2. For example if the couple were legally separated this would provide a possible reason to withhold the factor.

For the other critical questions, consider \textit{NewCase2}. Here we have a partner, but no legal marriage, yet a partnership might well be considered effectively the same as a formal marriage. However, it is possible that additional conditions could be suggested using MCQ1. For example it could be argued that to be treated equally with marriage there should be some evidence of permanence, such as the relationship having existed for a significant period of time. For MCQ3 it might be possible to point to another concept such as \textit{cohabitee}, which is treated differently from a spouse with regard to, e.g. inheritance and welfare benefits. Here it could be argued that a partner is more readily seen under this concept than as a spouse.
4.4. Analogy Scheme

We will discuss the analogy scheme and its relation to the Links factor, specifically whether a dwelling had been maintained in the country of origin, with Owner as the precedent. While the caravan in NewCase1 would not be interpreted as a dwelling in the ordinary meaning of the word, it could be argued that there is a sufficient analogy to allow the Links factor to apply.

**Base Premise:** A house in the country of origin is present in Owner.

**Derived Premise:** Links is plausibly ascribed to Owner on the basis of the retained house.

**Case Premise:** In NewCase1 a caravan in the country of origin has been retained.

**Similarity Premise:** As it relates to Links, a caravan is similar to a house since they can both be used to live in.

**Conclusion:** Links is plausibly ascribed NewCase1.

This analogy can, of course, be questioned. Using ACQ1, it could be argued that there are significant differences between a house and a caravan, such as mobility and that the latter is used typically as a second home for short stays. ACQ2 is similar, but whereas ACQ1 could be answered by suggesting that the other caravans were in use as permanent dwellings, ACQ2 suggests that the similarity is still insufficient. For example that given the disparity in cost between retaining a house and a caravan, the caravan did not demonstrate a big enough commitment to qualify for ascription of the Links factor. Finally, for ACQ3 we can point to LowPay, where it was held that a Timeshare was not enough to ascribe the Links factor. This would allow the argument that the Timeshare is a better analogy for a caravan than a house.

5. Concluding Remarks

A full explanation of a decision in a legal case requires not only an indication of why one set of factors was preferred over another, as in [20], but also why these reasons were considered applicable to the case, and why others were not. To enable this kind of explanation we have provided a set of argumentation schemes for factor ascription. We have identified different kinds of factors, which require different kinds of justification. One key aspect is whether the factor is derived from a dimension or a Boolean attribute. Another is whether aspects of the case trade off against one another. We have identified four schemes, and their associated critical questions to enable critical discussion in the manner of [24], which can be deployed as a three ply dialogue as advocated in HYPO [22]. When coupled with the schemes of [20], a complete explanation of the reasoning in legal cases is enabled. We propose that these schemes could be used as in [19] to give a full explanation of the output of a machine learning prediction system, both in law and in other domains.

We have illustrated the schemes with an extended example, based on one in [15], but in future work we will analyse an actual body of case law using these schemes. One possibility would be US Trade Secrets, allowing comparison with a range of other work [5]. We anticipate that this may require us to expand our initial set of critical questions.
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