Whatever Happened to Hypotheticals?

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ABSTRACT

In the early days of AI and Law, the use of hypotheticals - imaginary cases constructed to test or explore a particular point - was seen as an important part of legal reasoning. Hypotheticals, have however, attracted increasingly less interest, and have hardly been seen for a decade or more. In this short paper we discuss why hypotheticals disappeared, and the need to reintroduce them if a comprehensive account of reasoning with legal cases is to be produced. The paper includes a discussion of how hypotheticals can be deployed within a recent framework of argumentation schemes describing reasoning with legal cases.

CCS CONCEPTS

• **Applied computing → Law**.

KEYWORDS

Reasoning with cases, factors, dimensions, hypotheticals, argumentation schemes

1 INTRODUCTION

In a very early paper [23] Edwina Rissland identified the use of hypothetical cases as an important aspect of legal reasoning:

> "hypothetical cases are used to explore doctrines and approaches, and to uncover students' assumptions and biases. Hypotheticals are also important in legal scholarship and in legal codification"

This interest persisted when she began work with her PhD student, Kevin Ashley, exploring reasoning with legal cases in the US Trade Secrets domain. The project was even named *HYPO*, showing the importance they placed on hypotheticals. In the first ICAIL paper on HYPO [25] the generation of hypotheticals was seen as a central function of the program because relevant "cases and their ramifications must be thoroughly explored for weaknesses and hidden, particularly adverse, surprises, for instance by posing telling hypotheticals". In his book [2], Ashley identified three ways of

attacking a cited precedent: distinguishing the current case from the precedent, citing counter examples and posing hypotheticals. Despite this early emphasis, and even though HYPO is one of the most influential systems in AI and Law[1] and reasoning with legal cases has attracted sustained interest [6], the topic of hypotheticals has subsequently received comparatively little attention.

The immediate successor of HYPO was the CATO system, developed by Ashley with his PhD student Vincent Aleven [1]. That system identified a number of argument moves for use in arguing about legal cases. The focus of that project was on distinguishing and there were moves to distinguish a case and to downplay and emphasise distinctions. There was also a move for posing a counter example, but no move to represent an attack using an hypothetical. Rissland did continue to work on hypotheticals [24], but in her follow up project to HYPO with David Skalak, CABARET [27], hypotheticals received a much reduced emphasis "Occasionally these arguments involve the creation of hypothetical cases, if real cases are not available to meet the requirements of the argument form." Thus their role is very much diminished: they are ascribed no distinctive role, acting merely as a second best if no real case is available.

Hypotheticals were revived by Ashley and colleagues in the LARGO project [4], [3] which was specifically designed to help "students learn skills of legal reasoning with hypotheticals by analyzing oral arguments before the US Supreme Court." This work inspired an account based on argumentation schemes [11] which was in turn critiqued in [16]. Since 2010, however, there has been little or nothing further on the use of hypotheticals in legal argument. So why did hypotheticals lose the central role that they had in the infancy of AI and Law?

2 ROLE OF HYPOTHETICALS: PROCESS MODEL PERSPECTIVE

The role of hypotheticals in legal reasoning is set out in [3] using a process model which described "the relationships between an advocate's proposed test for deciding a case or issue, the facts of the hypothetical and of the case to be decided, and the often conflicting legal principles and policies underlying the issue."

The proposed process model of hypothetical argument (PMHA) comprised three moves:

(1) Propose test for proponent for deciding the current fact situation (cfs);

(2) Pose hypothetical for interlocutor to probe if proposed test is too broad (narrow);

(3) Respond for proponent to interlocutor's hypothetical example.

Three responses were possible to the claim that the test is too broad.

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[1] The HYPO book [2] had 1003 citations on Google scholar on April 19th 2023.

- *keep* the test: arguing that both the proposed situation and the hypothetical should have the same result;
- *modify* the test: argue that the proposed situation and the hypothetical should have different results and narrow the test to exclude the hypothetical;
- *abandon* the test: propose a different test.

Similar responses, *mutatis mutandis*, can be given if it is claimed that the test is too narrow.

This work, like [24], clearly suggests that the use of hypotheticals in the Supreme Court is associated with the Oral Argument stage, and that they are used to refine tests. The tests can be used to establish the factors that will be used to resolve an issue, or the facts needed to establish the presence of a factor. These tests are established in Oral Argument, and the accepted tests applied by the judges when giving their opinion on the case.

3 DELIBERATION, JUSTIFICATION AND EXPLANATION

The argumentation used in Oral Argument is of a different character from that used by the justices in writing their opinions. In the former the counsel for the parties are attempting to establish that their client should win and so propose, defend and refine tests that are favourable to their client. These tests are critiqued by the justices, often using hypotheticals, to establish which tests they will apply in their decision. In contrast the justice's opinions are written with the tests already selected and the decision already made, and thus have the character of a *justification* rather than a *deliberation*. This distinction is rather blurred in AI which tends to talk of *explanation* [5] for both. Increasingly, however, the explanations are seen as relating to a decision already made. This is certainly true in the case of the currently popular systems based on machine learning approaches (e.g. [18]), where the explanation may be entirely independent of the means used to arrive at the decision [20]. This focus on justification, with a consequent emphasis on the opinions rather than the oral arguments, has contributed greatly to the disappearance of hypotheticals from AI and Law.

If we consider California v Carney 71 U.S. 386 (1985), the example case in [24], [11] and [16], we find the following holding:

> When a vehicle is being used on the highways or is capable of such use and is found stationary in a place not regularly used for residential purposes, the two justifications for the vehicle exception come into play.

This simply states the test that emerged from the oral hearings which determined that the vehicle in the case was, despite being a motor home, subject to the automobile exception, as described in [24]. Thus in the justification the rule tends to be *stated* rather than *argued for*. This is apparent also in the widely used Issue-Rule-Application-Conclusion (IRAC) method [7], where the rule and its application are used to explain the decision, with no explanation of why the rule itself should be used.

Thus hypotheticals form part of the process of identifying the appropriate tests and reaching a decision, rather than justifying those tests and that decision. As AI and Law systems have moved to a focus on justification, hypotheticals have faded out of the picture.

4 LAYERS OF LEGAL REASONING

As argued in [10] and [15], deciding a legal case involves a sequence of stages:

- accepting facts on the basis of the evidence
- ascribing factors on the basis of the facts
- resolving the issues on the basis of the factors
- deciding the outcome of the basis of the issues

Different systems consider different stages. The legislation as logic program approach of [26] restricted itself to the move from issues to outcome, and did not consider the factors required to resolve questions of open texture. HYPO [25] first moved from facts to dimensions, and later [2] from dimensions to factors favouring particular parties. CATO [1] moved up a level, starting with factors and using them to resolve issues. IBP [14] added the layer above, using a logical model to determine the outcomes in terms of issues resolved using factors. The move from evidence to facts was addressed by Bex and colleagues (e.g. [13]). Formalisations of precedential reasoning such as [17] move straight from factors to outcome, skipping over issues, as do the value based theories of [12]. Machine learning approaches such as [18] leap straight from facts to outcome, without using factors or issues. Of all these approaches, only HYPO addresses the move from facts to factors where hypotheticals are mostly found. The decline in systems addressing this stage explains the loss of interest in hypotheticals.

As noted above in HYPO we can make three kinds of attack on an argument based on a precedent: drawing a distinction, citing a counterfactual and posing an hypothetical. But in CATO, there were only two kinds of attacks: distinctions and counterexamples. This has been followed in subsequent work such as [21]. Why this change? The answer lies in the move from representing cases in terms of their facts, to be used to determine their position on *dimensions*, to representing cases as bundles of *factors*. Whereas a dimension may favour either side, depending on the point at which the case lies, a factor can only provide a reason to decide for one particular side.

Once we are working in terms of factors, we have already decided which party is favoured on a particular dimension. The only hypothetical that could be posed would be to include a factor not present and claim that it would change the outcome. But such a hypothetical counterexample would immediately fall foul of a attack using a distinction, and so be easily rebutted. Once we have reached the stage of factors, and take a fixed set of factors as given and their ascription to cases as given, any role for hypotheticals has already been exhausted, since they are used to challenge moves from facts to factors. As indicated by the title of [24], dimensions play a crucial role here.

So let us consider how dimensions enable the move from facts to factors. A dimension can be considered as a range with the most pro-plaintiff value at one end and the most pro-defendant value at the other. In the simplest case. the factors derive from a single dimension. We will consider that case first.

4.1 Factors deriving from one dimension

Precedent cases will occupy a particular point on each applicable dimension and the opinion in that case will indicate which side (if any) is favoured by that particular point. If a side is favoured,
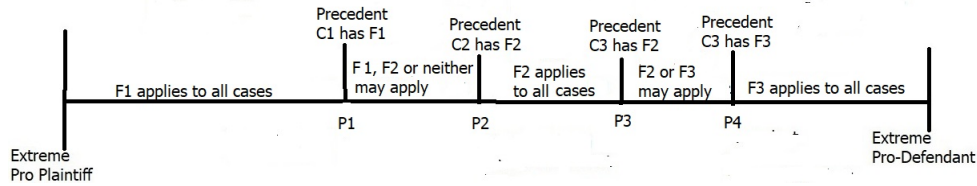
Figure 1: Dimension with three factors; F1 is pro-plaintiff, F2 is weakly pro-defendant and F3 is strongly pro-defendant. P1-4 are points on the dimension occupied by the precedents C1-4. F1 is present in C1, F2 in C2 and C3 and F3 in C4. The factors applicable in ranges P1-P2 and P2-P3 are not determined by C1-4.

that will mean that some factor for that side is present in the case. Note that there may be several factors for a given side, of different strengths, derived from a single dimension. Some points on the dimension may be not yet determined. An example dimension is shown in Figure 1.

Now consider the case of factors deriving from two dimensions.

4.2　Factors deriving from Two dimensions
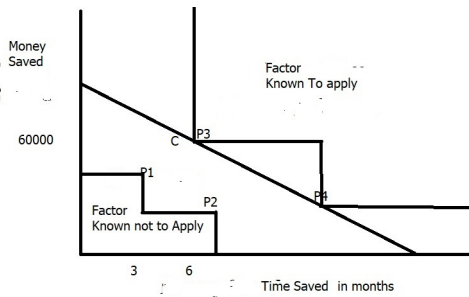
Figure 2: Competitive advantage. P1 and P2 correspond to precedents where the factor did not apply and P3 and P4 to precedents where it did. Here, the proposed line is drawn to minimise the applicability of the factor and exclude C.

In some cases we need to consider more that one dimension to establish whether or not a factor is present in a case. The example from CATO is F8, *CompetetiveAdvantage*, which depends on both the time and the costs saved by the use of the information. Here the precedents on the relevant dimensions delimit an *area* where the factor does, and does not apply, rather than the *range* that was the case for a single dimension. We may fit a line to the precedents to extrapolate from them and argue that the factor should apply or not apply to a new case. An example is shown in Figure 2.

4.3　The Need for Hypotheticals

The substantial body of work on reasoning with cases [6] means that we now have an excellent understanding of the moves from factors to issues and from issues to outcomes. However, the need to also model the stage at which factors are ascribed has not gone away. In [8] it was argued that not all precedents have the same role: while some do indicate preferences between factors used to resolve issues, the use found in [1] and [17], other precedents concern whether a factor applies to a case or not, and so bound the ranges

the factors occupy on their dimension. The move from facts to factors was further explored in [19].

One way of modelling a reasoning process is as a set of argumentation schemes. This was done for the move from factors to outcomes in [21]. A set of schemes to move from facts to factors was proposed in [9]. A set of schemes to address all the stages, facts to factors, factors to issues and issues to outcomes, was proposed in [10]. In the next section we will look at how hypotheticals can be incorporated within this framework.

5　ROLE OF HYPOTHETICALS: ARGUMENTATION PERSPECTIVE

Argument schemes were provided in [10] for each of the three stages that take place after the facts are established: factor ascription, issue resolution and outcome determination. Not all of the schemes in [10] lend themselves to hypotheticals. For example, many factors do not relate to true dimensions, but rather correspond to a boolean fact (ten of the thirteen dimensions in [2] were of this sort), so that whether they apply or not is clear from the facts, and the scheme for such factors offers no scope for hypotheticals. In this section we will discuss those schemes from [10], which do offer potential for the use of hypotheticals.

5.1　Switching Point Scheme

An argument scheme for considering whether or not a factor relating to a single dimension is present was given in [9]. The notion of a *switching point*, a point on a dimension where a factor starts or ceases to apply, comes from [22].

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

This scheme has 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 [1] there are two pro-defendant factors on the disclosures dimension, *DisclosedToOutsiders* and the stronger *DisclosedInPublicForum*.

SCQ2: This may be posed 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, P2, 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.

Consider Figure 1 and suppose that the current case falls between $P1$ and $P2$ on the dimension. Either side may use the scheme to argue that neither F1 nor F2 applies. But if a side needs the factor, then it can use SCQ2 to argue that it *does* apply. This question can be posed using a hypothetical. Suppose the dimension in question is *Security-Measures-Adopted*, as modelled in [2] where the range of the dimension is:

- Minimal measures
- Access to premises controlled
- Restrictions on entry to visitors
- Restrictions on entry to employees
- Product marked confidential
- Employee Trade Secrets Programme exists
- Restrictions on hardcopy release
- Employee non-disclosure agreements.

In CATO [1] two factors relate to this dimension, F6, *SecurityMeasures* and F18, *NoSecurityMeasures*. Suppose that the factor had been held not to apply where the access was merely controlled ($P1$), and to apply when the product was marked confidential ($P2$). Suppose that in the current case employee entry had been restricted, and the plaintiff cites a precedent in which neither factor applied. On the basis of the factors, no distinction can be made. However, the defendant can use SCQ2 to *argue* that the factor F18, *NoSecurityMeasures*, should apply. Such argument could be presented using a hypothetical:

> Even if visitor entry had been restricted, this would not represent adequate security measures. So we cannot regard controlled access to premises as the criterion for F18. And if restricting visitor access is insufficient, why should restricting employee access be any different? So, F18, should apply, and the precedent is distinguished.

Such an argument has no more than persuasive force: the idea is simply to cast doubt on the firmness of the bound established by $P1$, and open up the possibility that the factor does apply.

A stronger use of hypotheticals is also possible. Suppose that in the current case it had been visitor access that was restricted rather than employee access. Now a possible argument using an hypothetical is:

> Even if employee entry had been restricted, this would not represent adequate security measures. Even more so is restricting visitor access insufficient, So, F18, should apply, and the precedent is distinguished.

Here *if* is accepted that the factor applies in the hypothetical case, then it *must* be accepted that it applies in the current case. The risk, however, is that the gap between the precedent and the hypothetical will be considered too broad, and the hypothetical will be rejected.

This scheme can also be used in cases falling between P3 and P4, to determine whether F2 or F3 applies.

5.2 Trade Off Scheme

A second argument scheme given in [9] to which hypotheticals may be relevant is the *Trade Off Scheme*, where the factor derives from two dimensions:

Trade Off Scheme

Precedents Premise: $P_1...P_n$ are precedent cases in which factor F is present.

Locations Premise: Precedent $P_i \in \{P_1.., P_n\}$ has locations D_{1_i} and D_{2_i} 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: For all i: $a.D_{1_i} + b.D_{2_i} + c \geq 0$

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 $a.D_{1_{n+1}} + b.D_{2_{n+1}} + c < (\geq) 0$?*. 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.

Here hypotheticals can be used when posing TCQ2. In Figure 2 the line has been drawn so as to minimise the area in which the factor applies, consistent with the precedents. Thus hypotheticals could be posed to suggest that the line should be drawn less tightly to $P3$ and $P4$. As with the single dimension, the hypothetical can be stronger, so that if accepted it will force the acceptance of the current case, or less strong, where it merely casts doubt on the suggested bound and so opens up the possibility that the factor applies.

For an example, consider Figure 2. Suppose that in the current case we had a time saving of five months and financial saving $60,000 as opposed to the six months and $60,000 of $P3$. If it was argued that the factor did not apply we could pose TCQ2 using an hypothetical as follows:

> Given that $60,000 was saved, even if only three months had been saved, that would have been sufficient. Even more so, therefore, the five months in the present case.

5.3 Introducing a New Factor

A third role of hypotheticals is to identify a new factor that needs to be considered. This applies at the level of resolving issues in terms of factors. The argumentation scheme for this stage in [10] is:

Citation Scheme (C): *Factor Premise*: Case C has plaintiff factors F_p and defendant factors F_d in common with precedent P

Precedent Premise: Issue I was resolved for the plaintiff (defendant) in P

Conclusion: Issue I should be resolved for the plaintiff (defendant) in C

There are four critical questions associated with this scheme:

CCQ1: *Counterexample*: Is there another precedent P' with factors in common with C in which the issues was resolved for the defendant (plaintiff)?

CCQ2: *Distinction*: Is there a factor present in only the case or the precedent which weakens the case for the plaintiff (defendant)?

CCQ3: *Factor Not Present*: Is one of the factors f not in fact present in the case?

CCQ4: *Additional Factor*: Is there an additional weakening factor f' present in the new case?

The relevant critical question is CCQ4. Here the hypothetical is used to identify a factor not identified from the current analysis of precedents, but which can be use to distinguish the current case from the cited precedent. The new factor may be on a different dimension, or a weaker factor on the same dimension.

As an example, in a number of Trade Secrets cases[2] it is established that F21, *KnewInformationConfidential*, is preferred to F1, *DisclosureInNegotiations*.

Suppose we have a precedent, call it *LooseLips*, with F1, but where it had not been made clear that the information was confidential. Suppose also that F21 had not yet been identified as a factor. Now if we have a new case, call it *Careful*, with F1, but where the information was known to be confidential, we could argue against the citation of *LooseLips* for the defendant using a hypothetical.

> In both *LooseLips* and *Careful*, the plaintiff disclosed the information in negotiations with the defendant. Suppose, however, that in *LooseLips*, the plaintiff had stressed that the information was confidential. Would not the subsequent use of the information by the defendant have constituted a breach of confidence, resulting in that case being found for the plaintiff? And in *Careful*, the plaintiff did indeed stress the confidentiality of the information.

Accepting the hypothetical means that we can accept F21 as a factor, and so distinguish *Careful* from *LooseLips*

6 CONCLUDING REMARKS

In the early days of AI and Law, hypotheticals were seen as an important part of legal reasoning. Their use was described and in HYPO dimensions were developed as a mechanism to allow them to be posed. Hypotheticals were concerned with the critique of proposed tests and as such as deployed in reaching a decision. In later years, however, focus, moved away from this deliberative stage, and began to construe explanation as the *justification* of an outcome, rather than of how that outcome was reached. The emphasis on outcome rather than the means of getting there is taken to its extreme in the current crop of machine learning based approaches (e.g. [18]).

But although they have fallen out of favour in AI and Law, hypotheticals continue to be used in legal reasoning and a comprehensive account of such reasoning requires that they be modelled. They

are especially important in areas where there are relatively few precedents and so factors amd their boundaries are not yet fully established.

We have taken a recent account of legal reasoning in terms of argument schemes which model the process from facts to outcome and shown how hypotheticals can be deployed in this framework.

We hope that in so doing we will revive interest in the computational modelling of this important and interesting aspect of legal reasoning.

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