BUILDING AN INTESTATE SUCCESSION ADVISER: COMPARTMENTALISATION AND CREATIVITY IN DECISION SUPPORT SYSTEMS

by

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Abstract

This article describes a practical working expert system in the domain of Scottish intestate succession law (SUCC), built using the rule based shell CRYSTAL (Intelligent Environments, UK) running in a PC environment, and used as a tutoring aid for Scots law students at Edinburgh University. Particular problems in expert system methodology suggested by the implementation of SUCC are analysed, especially the problems of compartmentalising a knowledge domain and how far to include in the knowledge base those aspects of the real world which act as pragmatic context to a legal area. Some general conclusions on the possible application of expert system technology to legal creativity are drawn.

1. Introduction

Mr McConnell, a prosperous businessman, dies on the 13th December by foolishly walking out into the path of a motor car proceeding in excess of the speed limit along Leith Walk. Even more unfortunately, he dies without making a will, having been of the opinion there was plenty of time yet for such considerations. Mr McConnell is a domiciled Scotsman and dies leaving a wife and two children. What shares in his estate will they take under the Scots law of intestate succession? Will anyone else benefit?

The Intestate Succession Adviser is a computer program which was built by the writer to solve problems of the type above, ie the distribution of the estate of a deceased person who has died without leaving a valid will which applies to the whole of his estate. The program deals only with the Scots law of intestate succession which is to be found primarily in the Succession (Sc) Act 1964, and differs considerably from the system found in England. This paper attempts to explain why this domain was seen as suitable both from a pragmatic and a philosophical perspective for the development of a so-called "expert system" or decision support system, and examines certain features of the implementation of the domain which proved unexpected.

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2. Characteristics of Legal Domain

The characteristic expertise of the Scottish succession rules lies in understanding several interconnected elements. First, there are not one but three distinct types of right which arise out of the deceased's estate. Secondly, these rights rank, so that prior rights are exacted from the estate before legal rights and the latter before free estate rights. Thirdly, these rights are not exacted evenly from the estate as a uniform whole, but are taken differently from different aspects of the estate (eg the matrimonial home) and from the heritage (immoveable) and moveable portions of the estate. There is therefore a need for a certain methodology to be followed in working out the intestate succession calculation: some rights must always take precedence over other rights; the value of some rights is dependent on whether other rights are taken; and heritage and moveables must be tallied separately until a certain point in the problem.

The example above may help clarify. Suppose Mr McConnell died leaving a house in joint title whose net value after paying off the mortgage was £150,000 and net moveables of £70,000, which include £10,000 of household contents. His widow takes the first slice of the cake in the form of an assortment of rights known as "prior rights". These give her the right to (a) the deceased's share in the matrimonial home (£75,000, but reduced to a statutory maximum of £65,000), (b) the deceased's share in the furniture and plenishings of the home (£10,000), and (c) a certain financial right (cash sum) from the estate with which she is in theory able to continue to maintain herself in the home just as she did before her husband died (here, £21,000). The policy of the legislation is clear but the details, shaped by the complexities of life, are not. For example, it is thought inequitable for a widow (or widower - the provisions apply without sex discrimination) to do well just because the matrimonial home is particularly opulent. So there are cash limits on the house and plenishings right. (But there are no minima where the house was, say, particularly under-furnished.) The financial right varies depending on whether there are children to consider. There are problems of two-home couples to consider, and so forth. The financial right is also not entirely straightforward to calculate since it must be derived according to the rules rateably from the heritage and moveables remaining at that stage of the game.

This last point is particularly significant because the second stage of the distribution on intestacy involves the extracting of "legal rights" from the estate, which are rights only exigible from moveables not heritage. (The reason for this is that legal rights date from an early stage of development in Scots succession law when heritage was controlled by feudal law and only moveables descended according to civil law[1].) So the portion of the estate that goes into the legal rights kitty varies from estate to estate according to its particular make-up and not always in accordance with what might be seen as common sense or equity. Legal rights can be claimed by the surviving spouse of the deceased and the children (including representatives of any

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1 See Meston, M.C. The Succession (Scotland) Act 1964 (W. Green & Son, 1982), 3rd edn, which sketches the history of legal rights in chapter 1.

children who pre-decease), and can be disclaimed, which can be advantageous where the alternative is to claim a legacy.

Finally if any estate remains after the prior and legal rights are taken then what remains (the "free estate") is distributed among the first surviving class of relatives on a list of ranked relatives, headed by the children. Thus if, for example, a brother or sister of Mr McConnell were to ask what they would gain from the estate, the problem would be trivial if there were children - they would get nothing - but if there were no children the whole question of the rights of the widow would have to be examined before the rights of the sibling could be established.

The Succession Adviser was conceived as a tutoring aid for students, who often find the intestacy domain deceptively simple and tend to learn to deal with it in a rather ritualistic (and therefore easily unsettled) fashion. The point perhaps that is most under-appreciated is that while each possible permutation of the distribution of the estate is relatively simple, the number of ways in which the outcome may be varied by the differing characteristics of the estate and the surviving family is not. The purpose of the Adviser was to make the required methodology explicit to students of property law by formalising the operation of the rules of the domain in the form of a rule-based deductive computer program.

The program was written over a fairly short development period using a simple "expert system" shell, CRYSTAL (c. Intelligent Environments, Richmond, Surrey) which is rule based and provides a backward-chaining inference engine, churning simple propositional logic. (CRYSTAL is one of the best known expert system shells on the UK PC-based market and is widely known in legal computing as the system used by Susskind and Capper to build the Latent Damage System[2].) CRYSTAL provided a pleasant and flexible user interface and considerably minimised the programming effort that would have been necessary to have generated the Succession Adviser from scratch.

The intestate succession area was regarded as suitable for implementation in computable form because it was believed the domain was one which although syntactically complex and of social and legal significance was nonetheless semantically clear, and that therefore the difficulties typically found when modelling legal norms for implementation in decision support systems would not be applicable here. These difficulties are well documented in the literature: pre-eminent among them are the problems of open texture in the Hartian sense, arising from the inherent fuzziness of many legal concepts, and the problem of extracting legal rules from a common law which is not formalised as legislative rules are, is dynamic and is at worst internally contradictory.

However, the domain of intestate succession seemed peculiarly unafflicted by the open texture problem. This was partially due to the fact that while policy considerations (as we have seen above) informed the

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2 Capper P. and Susskind R. *Latent Damage Law: The Expert System* (1988, Butterworths).

development of the law, the law itself is primarily expressed in terms of concrete objects and actors with clear, almost mathematically phrased relationships between them. Concepts like children, parent, estate are apparently matters of clear fact. This is of course not true; but the most obvious areas of fuzziness (does a child include an adopted child, a step-child?) are comprehensively dealt with in the statute. There is little room for judicial discretion or play for concepts that are inherently opposed to formalisation in boolean logic such as reasonableness and intention. (There are of course still a few problems, such as the definition of "heirlooms" in the Act which is couched, rather oddly, in deontic terms[3]). In many ways, the domain seemed akin to an area such as tax law, where expert knowledge is required to deal with the complexity of the law (and its relationship to a computational problem) but not primarily to deal with semantic or policy-oriented problems. (See McCarty[4] on the suitability of tax law for expert systems development.) To adopt Susskind's paraphrase of Hart, the domain seemed to be one where the difficulties for the lawyer lie in "clear cases of an expert domain"[5] ie where cases arise frequently which while posing no real problems of semantic interpretation still demand expert knowledge and strategy to solve.

Another promising aspect of the domain was that unusually for a core area of private law, the rules largely derived from a single statute which was unusually devoid of interpretative case law. Since the Act has been in force almost twenty years, we appeared genuinely to be dealing with a domain where statutory rules operated efficiently without need for case-law exposition, as opposed to a piece of new legislation where case-law has not yet accrued; here typically ambiguities and lacunae do exist but are simply yet to be exposed, and hopefully plugged, by the advent of contentious cases. (An alternative explanation for the lack of case-law however might be that almost by definition intestate estates do not contain a great deal of money - otherwise a valid will would have been commissioned - and therefore do not repay contentious litigation. (The only reported case[6], in fact, is one where winning the case did make for relatively substantial financial gain for the litigant.)

These assessments of the domain largely proved correct. It did indeed prove to be the case during the implementation phase that no serious problems arose concerning the issues of open texture, and case law currently remains notable only for its absence from the domain. However there are more aspects to the task of engineering expertise than these, including problems to which there is less attention in the documented projects of

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3 Section 8(6)(a) - "heirloom" in relation to an intestate estate means any article which has associations with the intestate's family of such a nature and extent that it ought to pass to some member of that family other than the surviving spouse of the intestate.

4 "The TAXMAN Project: towards a cognitive theory of legal argument" in Niblett *Computer Science and the Law* (1980, Cambridge University Press).

5 Susskind R. *Expert Systems in Law* (1987, Clarendon Press), pp 244-245.

6 Kerr, Petitioner 1968 SLT (Sh Ct) 61.

computers and law. We shall now consider in some detail two problems which arose in implementation in relation to (a) the preliminary compartmentalisation of the domain and (b) the pragmatic context in which the rules were likely to operate.

3. Compartmentalisation

Compartmentalisation has been identified as a desirable attribute for a domain which can be successfully translated to an expert system[7]. In a rule-based system especially, it is essential that a defined limitation can be placed on the area which is to be formalised so that within these limits the structure can be seen and/or imposed which can be represented in the typical decision-tree form. If the area becomes an unbounded network rather than a delimited tree then it will be impossible for inference to be carried out[8]. The problem is also one of simple pragmatism: the McConnell example which began this paper, for example, disclosed not only "core" issues to do with intestacy but also a peripheral issue of whether the relatives might have a claim in delict which could be considered as an item in the deceased's estate. It would be impossible for the Adviser to contain sufficient expertise to deal with all such arising questions. Most definitions of expert systems take it as a simple assumption that the domain must be and can be self-contained[9]. However the experience during the implementation stage here was that this was not a trivial assumption even in an apparently favourable domain.

Intestate succession seemed at first to be an obviously delimited area - the Succession (Sc) Act 1964 in its standard edition is only 17 pages long (not all of this exclusively to do with intestate succession) and as previously mentioned, the case law is minimal. However the first act of the system has to be to separate cases of testacy from those to which it applies, namely, intestate deaths. Intestacy results not only where there is no will but, of course, also where there is a will which for some formal or substantive reason is invalid, either wholly or partially, or simplest of all, does not deal with all the property in the estate. But this leads to the difficulty of stating positively, and comprehensively, what processes might result in any portion of the estate falling into intestacy. Some of these are obvious - eg lack of formality in execution; invalidity of particular legacies due to (for example)

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7 Capper, P. and Susskind, R. *Latent Damage Law - The Expert System* (Butterworths, 1988).

8 Many researchers feel one of the strengths of modelling a legal domain within a hypertext-type system rather than a traditional rule decision-tree is that compartmentalisation need no longer be an issue, and that law can thus be modelled as an organic and expansionist network rather than in arbitrarily defined boxes. See for example the work of Eve Wilson, representative of which is "A Guide to JUSTUS: an overview of a hypertext legal database" in Proceedings of the 5th BILETA Conference, Warwick, 1990. Other researchers more anecdotally suggest however that hypertext involves its own risks of losing the user in "hyperspace" eg Leith P. "Towards Software for Lawyering" 1991 Computers and Law 8.

9 Waterman (in Waterman, *A Guide to Expert Systems* (1986, Addison-Wesley)) cites the very narrow domain of expertise of expert systems as one of their "inherent limitations".

ademption[10] (factual), vagueness (a problem of open texture) or rule of public policy (a problem of defeasibility); essential invalidity of a will which excludes legal rights of surviving spouse and children. However an expert system, unlike a book, is put in this instance in the position of having to enumerate all its exceptions rather than of being able to state a single rule; in other words, the positive legal state of intestacy, which a human expert could recognise without difficulty, can only be regarded by the rule-based program as a collection of exceptional circumstances. Intestacy, which seemed at first glance to be one half of a simple dualism, will or no will, turns out instead to be a concept of uncertain content. It seems in strict theory that a system that deals with the domain of intestacy must in fact deal with the whole of the laws of validity of testate provisions as well. (In real life, the system fudges this issue by throwing itself on the discretion of the user, aided by the system in help mode.)

The special destination problem

One example of this type of difficulty is of particular note. In Scots law, property can be bequeathed to person or persons not by a will but by a quasi-testamentary device known as a special destination. Such a destination is usually found as a clause in the written title to heritable property governing its passage on the death of the owner. If the property is still in the hands of the owner on death then it will pass on that event to the person(s) named in the clause and will not form part of the intestate estate even where the deceased otherwise dies without testamentary provision[11].

The paradigm special destination is where the matrimonial home is taken in joint title by husband A and wife B with a destination clause in the title "to A and B and the survivor" (known as a survivorship destination). This implies a contract between A and B that on the death of one, his or her half will pass to the other. There is obviously scope for conflict here between the assumed right of a testator to leave his property to whom he wishes by writing a legacy into his will and the automatic transfer of the half-share of the property imposed on death by the special destination in the title. This conflict is resolved by complex rules which decide who is empowered to revoke ("evacuate") a special destination in their will and leave their portion of the property instead to their named heirs - rules in other words which determine when there is no contractual reliance between the parties and therefore no bar on breaching the destination. This is regarded as a difficult and problematic area of law, with much muddied case law, and is currently under review by the Scottish Law Commission[12]. However it might reasonably be expected not to be the problem of the builder of an intestate succession system who assumes with relief that if there is no will, the destination will operate without problems, while if there is a will, any conflict can fairly be characterised as a problem outside the law of intestacy.

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10 Ademption occurs when the object of a legacy has been sold after the execution of the will but before the death of the testator.

11 See Macdonald, R. *An Introduction to the Scots Law of Succession* (W. Green & Son, 1990).

12 Report on Succession (Scot Law Com No 124, 1990), Part VI.

In fact, however, a worst of all world's scenario can be devised in which the problem becomes both one of interpretation of the case-law concerning whether there has been a valid evacuation of a special destination, and one of applying the rules of intestacy. Suppose A and B, a married couple, own a house in joint title with a special destination clause in the title "to A and B and the survivor of them", as in the paradigm above. A and B therefore each own a pro indiviso half share of the house; during lifetime each can sell or gift this half to a third party without the other's consent. But what is the situation on death? Say husband A paid the whole of the price for the house. From *Perrett's Trs* 1909 SC 522 and *Hay's Trs* 1951 SC 329, it appears that in these special circumstances there is no implied contract between A and B to follow the destination, and not to evacuate it, and A has a valid power to evacuate the destination - although only from his half of the house. So A, thus advised by his lawyer, leaves his half of the house in his will to his friend X. Unfortunately, X dies before A. By the law of testacy then, when A dies, the legacy to X lapses. Who gets A's share of the house?

There are two possibilities. Either there has been a valid evacuation of the destination, under current case-law which appears to base the entitlement to a power to evacuate on the grounds of who financially contributed to the purchase of the property - in which case there has simply been an ordinary case of lapse of legacy (due to X's death) and the half-share of the house will fall either to A's residuary legatee, if any, or if there is none, into intestacy. (And hence into the ambit of the Intestacy Adviser.)

Alternatively, an argument could be envisaged that there has indeed been no valid evacuation of the special destination - that in fact, not only is there a requirement of exclusive funding of the purchase of the property as prerequisite for a power to evacuate, as signposted by the current cases, but there is also another requirement, of a living third party to receive the diverted legacy. Or as MacCormick puts it[13], the previous conditions for a power to evacuate were no more than "presumptively sufficient" conditions of the legal consequence in question. Such an argument might be given authority by the Scottish policy argument that in areas of uncertain interpretation of the law of wills, the testator's intention should be the guiding principle, in which case could the testator not be assumed to have only preferred the claim of the specified third party X to that of his wife B who would otherwise have taken? In other words, while he might want X to inherit rather than B, if he had known X would die before him then he would have been happy to leave the special destination to operate in his wife's favour.

Such an argument, one might feel, would be enormously bolstered if the situation were that A had indeed left no residuary legatee so that if A's claim failed, the house-share would fall into intestacy. Given the strength of another policy argument, the Scottish presumption against intestacy, there would then be a good case for arguing that a special destination could only be validly evacuated on death in favour of a living and indicated legatee.

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13 "Defeasibility", Esprit Working Group paper on Fundamentals of Legal Reasoning, Edinburgh, July, 1991.

The instance given is interesting as a practical example of the type of case where it can not easily be discerned whether a policy argument is being used to provide an extra condition for a legal consequence or as a defeasance of a claim based on a set of legal conditions which had already been met. The situation is comparable to that in the *Connor*[14] case discussed by MacCormick[15]. In *Connor*, a woman applied for a widow's pension on the grounds that her husband was dead. The unusual circumstance about the case was that the husband was dead because his wife had killed him. In interpreting the pensions legislation, the court found that the principle that the law will not uphold rights arising directly out of criminal acts should apply and that therefore the widow was not a satisfactory claimant, although there was nothing explicit in the pensions legislation to warn her of this. There is a problem here of whether in formalising this new "rule" to treat the issue as raising another pre-condition to the vesting of a right not previously contemplated, or whether to treat it as an exceptional case in which the already vested right is defeated or perhaps will not be enforced. For the expert system builder, the problem is a pressing and practical one since it indicates that no rule is ever "safe" in the sense that its definition may only be fully revealed by the presence of an unprecedented set of facts, and thus that no system can ever aspire to be a complete formalisation of the domain. (I consider in the concluding section what the positive aspects of this state of affairs may be for legal creativity.)

4. Pragmatic Context of Rules

It is now a truism in the field of legal expert systems that almost all formally drafted rules, however apparently clear, do not in themselves represent unambiguous legal norms, but will have a penumbra of uncertainty which can only be resolved by reference to the legal context in which they operate, embracing such factors as lawyers' assumptions, policy arguments, social context etc. Leith sums this argument well in his paper of 1986[16], reminding us that "legal rules are objects of discourse, not objects with a concrete nature which we can mysteriously formalise and 'find' in the legislation or the weekly law reports".

In the intestate succession domain, it was hoped that, at least in a system aimed at students and not intending to be or support an adjudicator, problems of context in law would not be abundant. However, several problems were found in the implementation process, with particular reference to the way in which the law would be applied in practice so as to maximise the benefit from the legislation which the heirs would take.

The negative-valued "right" problem

In order to 'debug' the system, it was run during the building process with figures inserted for all kinds of composition of estate, however unlikely.

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14 R v. National Insurance Commissioner ex p. Connor [1981] All ER 770.

15 *Supra.*

16 Leith, P. "Fundamental Errors in Legal Logic Programming" (1986) 29 Computer Journal 545.

One combination involved a deceased spouse leaving an estate composed of a matrimonial home burdened by a mortgage greater than its current value (perhaps as a result of re-mortgaging) and an amount of moveables greater than £33,000. The effect of this on running the system was that the surviving spouse took the negative value of the house (ie the debt) which was then "added" to her financial provision settlement of £21,000 - so that her net sum was less than it would have been had she not had the "right" to her spouse's relevant interest in the matrimonial home. This also had controversial effects upon the calculation of the spouse's financial right in the estate which is calculated by reference to the ratio of the heritage and the movables in the estate at that stage of the calculation: the strict mathematical effect of a negative heritage value was that the spouse took more from the moveables than she would have done if the heritage value had been zero - to the detriment of the children of the deceased who take their rights in moveable estate after the spouse has taken hers.

It might be thought that a purposive interpretation of the statute would be possible so as to exclude this ambiguity; however the words of the statute seem sufficiently clear to discourage if not a judge then certainly the constitutionally unauthorised builder of an educational system. Section 8(1) of the 1964 Act clearly puts an upper monetary limit on the dwelling house right (of £65,000) but is silent on a lower limit; it might again be thought that the "relevant interest" of the deceased which is taken excludes a negative-valued interest by common sense but s 8(5)(d) clearly states that a "relevant interest" in relation to a dwelling house means "the interest therein of an owner...subject in either case to any heritable debt secured over the interest".

In the real world context the practical solution to this is for the spouse to disclaim the dwelling house right. But there is no mention of the right to disclaim in the statute - it is merely inferred from common legal usage. Again this poses the question whether every formalisation of the law relating to the conferring of a right, and its legal consequences, must also deal with the converse ie the legal consequences of the disclaiming of that right - and perhaps also the requirements for an entitlement to disclaim. (For example, the dwelling house right in question is conferred by s 8 of the 1964 statute and is intrinsically bound up with the right in the furnishings of the house also conferred by that section. The statute gives no guidance whether it would be competent to disclaim the dwelling house right and take the furnishings right, which would be financially worthwhile in the situation above.)

5. Conclusion

Building a legal decision support system of any kind reveals that the difficulties of legal formalisation are not merely philosophical but essentially pragmatic. Even a system such as the Intestate Succession Adviser, built in what seemed the least ambiguous of areas and using a relatively unsophisticated tool, raises many problems of interpretation. But the implementation process also reveals that the problem of formalising law is a two-edged sword; it is indescribably difficult, but it is also a fertile source of legal creativity. Many types of system, like the intestate succession adviser and the Latent Damage System, act as a sort of legal fruit machine; they conjugate all possible permutations of the legal rules in the domain with all possible combinations of facts and in the end they produce the legal

consequences as results, some predictable, some unexpected, some undesirable. It is not argued that these all represent, as it were, legal truths - these will not all be how the law will be decided, though there will probably be a statistical certainty that these are how some cases - the clearest, with the least complications of policy and context - would be decided. But this uncertainty of outcome is not necessarily a bad thing. It means it is quite likely that with current technology we can never conceive of a computerised judge without human (probably human legally-trained) assistance. But this is purely to look on computerised systems as replacements for judges. They are far better seen as tools for an adversarial system, as generators of arguments for potential pursuers or defenders[17].

The paper above gives examples of two areas where the comprehensive coverage of the domain produced by running the system engendered two examples of legal argument, even in a domain which appeared so settled and unambiguous that it has generated only one case of significance since its coming into force. These were generated by giving as input highly unusual sets of facts. It could be postulated that if a legal rule is seen as acting on all possible relevant facts so as to produce a set of all possible legal consequences, then there is a broad middle band of the most usual facts where the most predictable results will occur; while the more extreme facts will produce less predictable results. So the predictability of the application of the rule could be mapped as a U-curve. In this metaphorical landscape, I would argue that expert systems are highly useful tools for trying to map where legal difficulties may arise near the far ends of the U-curve. They act rather as a common law judge does, trying a rule for absurdity against instantiated examples, only faster and more frequently (but, of course, without human intelligence to interpret what follows from the results!) The system is not able to judge what the desirability of the results flowing from the unusual facts set will be. But it can alert the legal user/builder to the exact area of difficulty so that human legal reasoning and creativity can then be used to create new rules which can be built into the system where necessary. In this way, every consultation is a step to a better system.

On the contrary though there will be occasions in any domain landscape where the problem is not the application of the legal rule to unexpected facts, nor even the unexpected involvement of a super-eminent principle or policy argument triggered by unusual facts in the case profile, but where the problem is the classic "hard case" - where two applicable legal rules which could both be expected to apply, clash. There is little a rule based legal support system can do at this juncture except turn for assistance either

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17 The Alvey-DHSS Demonstrator project, which ran from 1984 to 1989 explicitly recognised as one of its specifications that different systems would need to be designed, sharing only a common database, for adjudicators, policy makers and claimants. See Bench-Capon, T. (ed.) *Knowledge Based Systems and Legal Applications* (Academic Press, 1991).

to a human legal user, or, more problematic but perhaps more hopeful for the AI judge of the future, to the techniques of case-based reasoning[18].

There is no doubt that very many difficult problems remain to be solved before the current level of legal applications aspire even tentatively to the level of "artificial intelligence". But perhaps some consolation should be taken from the possibility that, harnessed as a tool to human intelligence, these systems can be used as generators for human legal creativity. To borrow from Ronald Staudt, himself borrowing from Papert, the father of the educational computer language LOGO, they can be "invitations to legal mind-storms"[19]. That is an attractive invitation to be taken up by legal philosophers and legal educators alike.

[Edinburgh, July 1991

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18 Very simplistically, case-based reasoning involves deriving answers to a consultation from analysis of decided instances (in the legal domain, actual or hypothetical cases) rather than from the churning of pre-formalised rules. There is research going on into systems which turn to case-based reasoning when rules run out or are incapable of reaching a solution: see eg the review of the field in Sanders, K. "Representing and Reasoning about Open-textured Predicates", Proceedings of the 3rd International Conference on Artificial Intelligence and Law, Oxford, 1991.

19 Staudt, R.W. "Legal M