LEGAL EXPERT SYSTEMS

by Graham Jefferson *

> Not until a machine can write a sonnet or compose a concerto because of thoughts and emotions felt, and not by the chance fall of symbols, could we say that machine equals brain - that is, not only write it but know that it had written it. No mechanism could feel pleasure at its successes, grief when its valves fuse, be warmed by flattery, be made miserable by its mistakes, be charmed by sex, be angry or depressed when it cannot get what it wants.
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> G Jefferson,
> 'The Mind of Mechanical Man',
> (1949) I *British medical Journal* 1105, 1110.

> In his *Autobiography* (written in 1939) Collingwood discussed what he called, 'the modern pretence that psychology can deal with what once were called the problems of logic and ethics, and the modern claim of psychology to be a science of mind'. His conclusion was that 'it is what "phrenology" was in the early nineteenth century, and astrology and alchemy in the Middle Ages and the sixteenth century: the fashionable scientific fraud of the age'. This is what 'legal expert systems' have become today.
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> R N Moles,
> *Definition and Rule in Legal Theory* (1987) 271.

INTRODUCTION

The topic of Artificial Intelligence arouses more emotion than any other in the field of computer science. The idea that machines could be made to think upsets people. This has been exacerbated by the grand claims of early AI developers and science fiction portrayals of robots. Because no-one has produced an undeniably intelligent machine and no-one has proved that such a task is impossible, the debate remains speculative as well as heated.

Talk of applying Artificial Intelligence to the law necessarily raises the temperature of the debate if only because the law is seen as more closely tied to notions of humanity and morality than hard sciences like chemistry and biology. However, the Commonwealth Departments of Tax,

Customs, Immigration, Social Security and Veteran's Affairs are developing machines on the fringe of Artificial Intelligence to help in their administration. These Expert Systems are designed to give the same answers to questions as human experts. It is proposed that these machines will assist departmental staff in a variety of tasks, some of them involving legal decisions.

The aim of this paper is to avoid the emotion surrounding the Artificial Intelligence debate and as an alternative, present a common sense appraisal of the possible uses of Expert Systems technology in the law. Philosophical controversies cannot be avoided but, it is my thesis that they are largely irrelevant and serve only to obscure a rational assessment of what Legal Expert Systems can offer society.

In examining how Legal Expert Systems might be used, their operational limitations must be kept in mind. These limitations are tied to the difficulty of simulating thought processes and the relative youth of computer science. Before looking at some prototype Legal Expert Systems, a brief examination of how computers and Artificial Intelligence developed proves useful.

CHAPTER ONE

THE EMERGENCE OF EXPERT SYSTEMS

The development of Expert Systems (ES)[1] needs to be seen in the context of computer science generally. The emergence of modern computers occurred in the late 1940s so the field is relatively young. However, in the time since the first digital computer[2] a great deal of progress has been made. Computers in the 1980s are much smaller and much faster than their ancestors. Software has evolved from hardwiring circuits into sophisticated programming languages. The influence of this new science in society is complete. Few people in the developed world could claim not to be affected by advances made in computer science.

At the forefront of academic research within computer science is the pursuit of Artificial Intelligence (AI).[3] In crude terms, AI researchers are

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1 Hereafter ES. Singular or plural depending upon context.

2 ENIAC was built in 1945 at the University of Pennsylvania. It weighed 30 tons, took up 1500 square feet of floor space and contained 19,000 vacuum tubes.

3 Hereafter AI. The term 'Artificial Intelligence' was coined by John McCarthy in 1956 for a conference called "The Dartmouth Summer Research Project on Artificial Intelligence". Then, as today, the phrase was subject to a variety of interpretations but, in the absence of better descriptions, it has persisted.

'making computers smart'.[4] A very large number of experiments fall under the umbrella of AI but, for the purposes of this discussion, it is only important to know that AI scientists are trying to develop programs that exhibit intelligent behaviour.

Expert Systems technology is a limb of AI research that seeks to implement human reasoning processes within problem solving programs. Unlike other experiments in AI, ES work interactively with their users. This difference should become clearer following a brief historical discussion of AI.

AI and Expert Systems: A Brief History.

The seeds of modern software were planted in the nineteenth century with George Boole's attempt to formalise reasoning using a logic system. Boolean logic, at its simplest, is an algebra capable of mapping reasoning processes by the use of basic operators such as AND, OR and NOT. Modern computers represent and manipulate information by combining Boolean algebra and binary numbers.

Charles Babbage is generally credited with building the first item of computer hardware. Although he never finished his Analytical Engine[5], the notion of mechanising problem solving started a trend. It was not until advances in electronics, most notably the invention of the vacuum tube, that large and reasonably efficient problem solving 'engines' could be built.

In the late 1940s a number of universities produced electronic machines capable of performing simple arithmetic using Boolean operations. At first, these devices were of academic interest only. Later, the potential processing power of computers was seen as useful in business, science and inevitably, defence. Interest in computers increased and the machines became smaller as programming techniques developed.

Computers were solving problems but, were they 'thinking'? Early philosophers contemplated whether thought could be a mechanical process. Computers provided a way to test the theory. Could it be possible that a machine might 'think' in the way that a human being does? This question necessarily involves a discussion of what it is that defines intelligence.

One of the earliest and most influential papers in this area was published by the English mathematician Alan Turing.[6] Turing felt that the question of whether machines could be said to think was 'too

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[4] R Trappl, *Impacts of Artificial Intelligence* (1986) 5.

[5] Babbage worked on the Engine from 1828 to 1839 while Professor of Mathematics at Cambridge.

[6] A M Turing, 'Computing Machinery and Intelligence" (1950) LIX *Mind* 433.

meaningless to deserve discussion'.[7] His test of intelligence was what he called the 'imitation game'. The rules of the game call for three participants, a male, a female, and an interrogator, to be isolated in separate rooms. The interrogator attempts to discover the sex of the other two by written questions and answers. The male must persuade the interrogator he is the female while the female indicates her true sex. Turing felt that a machine's capacity to play the male or the female role in the imitation game would be a meaningful test of intelligence. Whether this is correct is still hotly disputed.

Implicit in the Turing test is the notion that intelligence need not involve consciousness. The results are important, not the underlying processes. This concept of intelligence without consciousness has become an article of faith among AI engineers.[8] Most computer scientists would shy away from claiming that the production of a conscious machine is imminent, but many believe the development of intelligent machines is well under way.

Early attempts at AI took the form of game playing programs. It was felt that mastering game skills would necessarily incorporate some of the fundamentals of intelligent behaviour. The game subject to the most investigation was chess.[9] Success with chess programs did not come as easily as anticipated but, by 1973 there were programs providing internationally rated masters with challenging games.[10] Results with backgammon have been even more impressive.[11]

The practical uses for game playing machines are limited and research within AI now extends well beyond games. AI has grown to encompass

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7 *Ibid* 442.

8 'While Artificial Intelligence is concerned with the general behaviour that goes along with intelligence, it is not committed to any particular way of producing the results (and in particular the methods may not be those that people use)." E Charniak, *Introduction to Artificial Intelligence* (1985).

9 In 1950 Claude Shannon said chess provided a challenge where 'the problem is sharply defined, both in the allowed operations (the moves of chess) and in the ultimate goal (checkmate). It is neither so simple as to be trivial nor too difficult for satisfactory solution". C E Shannon, 'A Chess Playing Machine', (1950) *Scientific American*, February 48.

10 A L Zobrist and F R Carlson, 'An Advice-Taking Chess Computer', (1973) *Scientific American*, June 93.

11 In July 1979 BKG 9.8 defeated Luigi Villa, the Backgammon World Champion, by seven games to one. Although backgammon is a game that relies to some extent upon the roll of a dice, mastery of the game requires skill and the capacity to assess situations several moves in advance. The program's author believes 'BKG 9.8 does well more by positional judgment than by brute calculation. This means that it plays backgammon much as human experts do'. H Berliner, 'Computer Backgammon' (1980) *Scientific American*, June 54.

three broad categories of investigation: robotics[12]. natural language systems[13] and expert systems. Smaller areas of research including artificial vision and speech recognition[14] may accurately be labelled AI but fall outside these more commercially successful groups.[15]

The third category, ES, is the most expansive and the focus of our attention. The ideal ES is a computer program that can 'handle real world, complex problems requiring an expert's interpretation'.[16] To answer difficult questions an ES must have some representation of the relevant body of knowledge.[17] It must be able to apply that knowledge to the particular problem and reason out a solution.[18] These are the salient features of all ES but specific implementations vary greatly.[19]

The results from ES are encouraging to AI proponents. The DENDRAL project, designed in 1965, helps chemists infer the molecular structure of molecules from mass spectrometry data. That program is now more proficient in the field than its creator and most human experts. Similarly, MYCIN diagnoses blood based infectious diseases with greater accuracy than human pathologists.[20] Other ES have provided good results in oil well log analysis and VLSI (Very Large Scale Integration) computer architecture design.

Unfortunately, the application of ES technology to the social sciences, particularly the law, has not been successful. A fundamental problem in applying ES to non-science fields is that the reasoning processes used rely less upon rules of logic than intuitive human responses. Description of

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12 Robotics has wide application in manufacturing industries where the capacity of machines to work long hours with extreme accuracy in hostile environments justifies the huge investment required to establish an automated plant line.

13 Natural language systems attempt to understand, produce or process languages like English. Because of the complexities and relative lack of strict rules in natural language, successes have been modest. Basic machine translation systems exist but these tend to be limited to word by word methods. More sophisticated programs have been used to make summaries of texts, in some cases drawing quite subtle inferences from events. SYRUS, a system designed by Schank, searched UPI wire services for information about the then US Secretary for State, Cyrus Vance. It correctly inferred from the fact that Vance had dined with Menachem Begin on several occasions that their wives had met.

14 S E Levinson and M Y Liberman, 'Speech Recognition by Computer', (1981) *Scientific American* April 56.

15 R Trappl, *Impacts of Artificial Intelligence* (1986) 6.

16 S Weiss & C Kulikowski, FIA Practical Guide to Designing Expert Systems (1984) 1.

17 This is stored in a database of concepts called a Knowledge Base.

18 A large piece of software known as an Inference Engine performs this task.

19 Lack of space prevents a more complete operational definition of ES. See generally: G Greenleaf, 'The Computer as a Robot Lawyer', Paper delivered to the 26th Australian Legal Convention, Sydney 13-18 August 1989.

20 R Trappl, *Impacts of Artificial Intelligence* (1986) 6.

these responses is difficult and the determination of hard and fast principles is virtually impossible. Our knowledge of the brain is limited.[21]

Before examining the potential applications of ES technology to the law it is essential to realise the extent that Information Technology (IT)[22] has penetrated the law already. At several levels the efficiency and reliability of computers has been integrated into our usually conservative legal profession.

Word processors are found in all modern offices; law firms, courts and universities are no exception. Large commercial firms have extended the utility of word processors by storing templates of their more frequently used documents within word processing databases.[23] Automated text retrieval systems like CLIRS and LEXIS are now essential research tools for organisations that can afford them. In 1986 the Attorney General's Department introduced automated case management systems for the Federal Court and the Administrative Appeals Tribunal.[24] Deputy Secretary of the Commonwealth Attorney General's Department, Len Glare, suggest that further developments might include jury management systems and automated administration of budgeting and accounts.[25]

The technology in use at present is conventional. While performing vase administrative chores, it fails to assist in the execution of any process demanding intelligence. ES technology, to which we now turn our attention, attempts to supplement the processing power of conventional IT with a capacity to perform 'intelligent' tasks. Whereas a text retrieval device could be used to gather all the relevant cases dealing with nervous shock, an ES might help a lawyer determine that nervous shock is an issue in the case. The distinction here is critical. A retrieval system returns raw legal data in the form of text. An ES attempts to embody knowledge about that data; to understand the text.

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21 Studies in neuroscience and cognitive psychology reveal that information is processed by the brain at incredible speeds. Moreover, it appears that the brain is physically organised so as to make information processing more efficient. Parts of the brain that deal with vision information are physically different to those that process sound or taste information. This difference in physical structure indicates that the brain's 'hardware' performs a preliminary information processing function. See: J Schwartz, 'The New Connectionism: Developing Relationships Between Neuroscience and Artificial Intelligence', (1988) *Daedalus*, Winter 123.

22 Hereafter IT.

23 Blake Dawson Waldron of Sydney spent one and a half million dollars upgrading their word processing and document facilities in 1987.

24 Other significant court based computer systems include the Registry system for the Family Court, the PROMIS system in the NT Supreme Court and the COURTNET system operating in NSW.

25 For a more complete discussion of IT within the law see: L Glare, 'Computers in the Courts', in *Papers to the 24th Annual Legal Convention* (1986) 326.

CHAPTER TWO

LEGAL EXPERT SYSTEMS

Introduction

As mentioned earlier, the successes of ES like MYCIN and DENDRAL have not yet been reproduced with respect to the law. Whether this is because Legal Expert System (LES)[26] architects have been too ambitious or because the task itself is too difficult remains to be seen. In any event, examination of the state of the art is useful because it exposes some of the problems associated with developing LES and highlights the variety of approaches adopted to deal with those problems.

As far back as 1959 it was argued that IT could and should be applied to the social sciences, particularly the law.[27] Dr. Lucien Mehl envisaged two types of legal machine; an information (retrieval) machine and a consultation (judgment) machine.[28] Mehl's machines were to be a response to the impending information revolution. He saw little difference between the two machines over and above the fact that 'the consultation machine will give an exact answer to the questions put to it. Whereas the information machine will only supply a set of items of information bearing on the problem.'[29]

Computing technology was in its infancy and Mehl's analysis was necessarily speculative. No specific legal domain within which his machines might operate was defined. Indeed, Mehl argued the real worth of a legal machine would lie in its capacity to deal with 'any questions put to it over a vast field of law ... A machine covering the whole field of law would be simpler and less cumbersome than a series of machines handling separate legal sectors.'[30] Nevertheless, Mehl felt that the application of machines to the evaluation of facts would be excessively complex. In a conclusion resting strongly on intuition he claims the evaluation of facts antecedent to legal argument will remain the domain of human minds if

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[26] Hereafter LES. LES have been defined as 'computerised methods of providing advice on how the law applies to a particular person's problem. The system obtains details of the problem from the user, and gives advice on what the legal consequences are'. 'The DATALEX Legal Expert Systems Project and the Applications of Artificial Intelligence to the Law' in Current Topics (1987) 61 *Australian Law Journal* 161.

[27] L Mehl, 'Automation in the Legal World: From the Machine Processing of Legal Information to the Law Machine' in *Mechanisation of Thought Processes* (1959) 755.

[28] His justification for introduction of these machines was a concern that 'Homo Sapiens is in fact exposed to the risk of being overwhelmed by the vast accumulation of knowledge'. L Mehl, 'Automation in the Legal World: From the Machine processing of legal Information to the law Machine' in *Mechanisation of Thought Processes* (1959) 755, 757.

[29] *Ibid* 759.

[30] *Ibid* 768.

only because 'the factual world often defies pure (rational) analysis'.[31] This statement is early acknowledgment of a significant problem for LES designers. Capturing the meaning of words and defining legal concepts in formal models is difficult.

Examples of Legal Expert Systems

Some of Dr. Mehl's prophecies have come to pass; the information revolution has overwhelmed, and text retrieval machines are in use throughout the legal profession. However, Mehl's judgment machine is still a long way off. Attempts to build judgment machines[32] generally take one of two basic approaches. The first is to extract generally applicable rules from the law and apply those rules to a problem - a rule based approach. The second is to model the argumentation process used by lawyers.

One of the earliest working attempts at a LES was JUDITH.[33] Developed by Popp and Schlink, this system purported to model German negligence law using an hierarchical model. Negligence was broken down into a series of secondary concepts such as breach of duty, contributory negligence and remoteness. These lower concepts were further reduced, breach of duty being separated into tertiary concepts such as standard of care and statutory duty.

This process of 'reasoning downwards'[34] eventually terminates at one of two types of premise. The first is one the user will easily recognize, such as the statutory duty an employer would owe to an employee. The second involves an 'open ended'[35] problem like whether persons of diminished responsibility can voluntarily assume risk. In this situation JUDITH ceases to be useful and traditional methods of legal analysis must be pursued. Presumably, JUDITH's utility is its capacity to present a simplified picture of the law by leading the user through the hierarchy of concepts.

Popp and Schlink acknowledge JUDITH reflects a 'concept of law ... that regards the law as a heirarchy of norms, in which norms, norm elements, or norm categories of lower generality sum up to those of higher generality'.[36] However, the authors are evasive as to the source of this model. On the one hand they describe their model of negligence as clearly falling within a German Pandectist system, on the other they warn

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31 *Ibid* 778.

32 In 1987 Susskind identified 19 prototype LES: R Susskind, Legal Expert Systems (1987) 258.

33 W G Popp & B Schlink, 'JUDITH, A Computer Program to Advise Lawyers in Reasoning a Case', (1975) 15 *Jurimetrics Journal* 303.

34 *Ibid* 305.

35 *Ibid* 305.

36 *Ibid* 313.

not 'to over-emphasise the impact of German legal theory and legal history on JUDITH'.[37]

L Thorne McCarty's TAXMAN[38] takes a different approach in modelling a chapter of the American Internal Revenue Code of 1954. Rather than directing the user through a descending hierarchy of legal concepts, TAXMAN attempts a complete legal analysis of certain corporate situations. 'Given a "description" of the "facts" of a corporate reorganisation case, it [TAXMAN] can develop an "analysis" of these facts in terms of several legal "concepts".'[39]

To produce a 'description' human experts map the actual facts of the case into a format TAXMAN can understand.[40] Once this evaluation of facts is complete, TAXMAN matches the 'description' against generic models of corporate reorganisations stored within its Knowledge Base. The case is categorised accordingly. Implicit in this process is the assumption that both the models of the particular facts and the generic models within TAXMAN accurately reflect legal reality:

> Unless the concepts of corporate reorganisation law can, at least, in principle, be incorporated into these description and analysis mechanisms, this general characterisation is vacuous. It is therefore important to demonstrate that at least some of the concepts of corporate reorganisation law can be represented within the current paradigm of semantic information processing, to show in some detail how they can be represented within this paradigm, and thus to show by inference how the existing program can be expanded to handle problems of substantially greater complexity.[41]

McCarty then shows that TAXMAN reaches the same result as the court in the case of *United States v Phellis.*[42]

Leaving the validity of this test to one side, it is obvious that a substantial component of legal analysis is the recognition of what facts are relevant and in what way they are relevant. TAXMAN delegates a significant part of its legal analysis by relying upon human experts to evaluate facts. Furthermore, McCarty found certain reorganisation

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37 *Id.*

38 L T McCarty, 'Reflections on TAXMAN: An Experiment in Artificial Intelligence and Legal Reasoning', (1976) 90 *Harvard Law Review* 837.

39 *Ibid* 838.

40 Dr Mehl's intuitive prediction regarding the feasibility of automated evaluation of facts comes to mind here.

41 L T McCarty, 'Reflections on TAXMAN: An Experiment in Artificial Intelligence and Legal Reasoning' (1976) 90 *Harvard Law Review* 837, 868.

42 27 US 156.

situations too difficult to model. His problem was with semantically vague definitions similar to JUDITH's open ended premises.

This problem of open ended concepts, also referred to as 'open texture', is endemic in law and language generally. The concept of 'excise' has no definite meaning within the constitution.[43] Whether a tax can be called an excise has been the source of much High Court litigation.[44] Similarly, the word 'fast' carries a variety of meanings. Even when referring to speed, 'fast' denotes different things to different people. Encapsulating these differences is a recurrent problem for AI engineers, particularly in disciplines so dependant upon the meaning of words as law.

Formalising legal concepts is something McCarty recognizes as at the heart of developing LES. TAXMAN's weaknesses stem from the fact 'that the current TAXMAN paradigm fails to capture many of the significant facts about the structure of legal concepts and the process of legal reasoning'.[45]

The DATALEX[46] project is an Australian attempt to build a LES in a domain governed exclusively by case law. As such it departs from the rule based approach of the systems examined so far. Tyree chose the field of chattel recovery for his research 'not only because the domain is entirely defined by the case law and because it is small, but also because it is far from simple'.[47] Attacking a complicated area of case law presents a solid test for FINDER, Tyree's solution machine.

Tyree's method is interesting in that it carries a degree of similarity to intuitive models of legal reasoning not evident in the rule based approaches. Instead of distilling formal premises from cases and statutes, human experts are used to identify attributes upon which the decisions in the leading cases turned. Attributes receive a statistical weighting depending on how they appear across the cases. Each leading case is then loaded into the Knowledge Base with a score for each of its attributes.

When a user wishes to see how a particular problem situation might be resolved, the attributes for that problem are loaded into FINDER. Using

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43 The Commonwealth Constitution Act (62 & 63 Victoria) Ch 12 s 90.

44 *Peterswald v Bartley* (1904) 1 CLR 497, *Parton v Milk Board* (Vic) (1949) 80 CLR 229, *Dickenson's Arcade Pty Ltd v Tasmania* (1974) 80 CLR 177, *Hematite Petroleum Pty Ltd v Victoria* (1983) 151 CLR 599.

45 L T McCarty, 'Reflections on TAXMAN: An Experiment in Artificial Intelligence and Legal Reasoning', (1976) 90 *Harvard Law Review* 837, 893.

46 A Tyree, G Greenleaf & A Mowbray, 'Legal Reasoning: The Problem of Precedent' in J S Gero & R Stanton (eds) *Artificial Intelligence Developments and Applications* (1987) 231.

47 *Ibid* 233.

sophisticated statistical algorithms[48] a closest match between the problem case and knowledge base cases is found. This case is known as the 'nearest neighbour'. Next, the closest match with an opposite result to the nearest neighbour is found - the 'nearest other'. FINDER compares and contrasts the attributes of the problem case, the nearest neighbour and the nearest other in the draft opinion it produces.

Great emphasis is placed on the match with the nearest neighbour. Where that match is dubious or where the statistical difference between the nearest neighbour and the nearest other is small, the case is on the statistical borderline. In such a situation the user is notified that the case is 'difficult', possibly requiring further research. Depending upon the quality of the opinion, the user can adopt it as sufficient or use it as a basis for further research. FINDER provides a conclusion for its user but its value is as a tool that lawyers can use to get a feel for the issues in a case. By comparing and contrasting the salient features of the leading cases it performs a function remarkably close to argument by analogy, a common legal technique.

Equipping the user with the best possible information is also a goal of the most recent LES we shall examine, the Social Security Expert System (SSES).[49] SSES is described as 'a large scale software package on social security law'.[50] The system was developed by Peter Johnson, a lawyer, and David Mead, a software engineer. SSES was built with help from staff at the Welfare Rights and Legal Centre, a free community legal service in Canberra. Its function is to help lawyers and para-legal staff prepare applications for social security benefits. The system is also designed to assist in the preparation of substantial appeal documents.

Regulation of Social Security in Australia is by means of a massive and highly complex statute.[51] SSES uses a language interpreter which incorporates that legislation into the system's Knowledge Base. SSES uses the Knowledge Base representation of the legislation to produce questions that form the basis of an interview with the applicant. The questions substantially reflect the text of the Act. An applicant's answers are used to assess the following matters: entitlement to the full range of social security payments, the rate of payment which a person should receive, grounds of appeal against adverse decisions, and legal issues arising from adverse decisions or likely to arise in claiming entitlements.

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48 This is not the first time mathematics has been used to model judicial processes. Reed Lawlor attempted to build linear functions mapping the particular reasons behind judges decisions. See generally: R Lawlor, 'Computer Analysis of Judicial Decisions' in B Niblett (ed), *Computer Science and Law* (1980) 219.

49 Hereafter SSES.

50 P Johnson & D Mead, 'The Social Security Expert System', Unpublished pamphlet.

51 *Social Security Act* 1949 (Cth). Hereafter 'the Act'.

SSES is not designed to replace the person conducting the interview but it can improve the quality of that person's work. To this end, the user has ready access to all provisions of the Act (updated to include amendments), all relevant administrative guide-lines, selections of expert commentary and extracts from AAT, Federal Court and High Court decisions. Sections of current texts are also available. In short, the system stores all the material a lawyer or benefit assessor might need to deal with a particular case.

By representing the Act as a series of questions, SSES removes the need to regularly refer to the legislation. This makes it easier for the user to focus attention on the special characteristics of the applicant's case. At the same time SSES's methodical approach insures that details common to all applications are not overlooked.

SSES is the least ambitious attempt at automating legal reasoning we have examined. Nonetheless, implicit in its development are assumptions regarding the nature of the law. The very act of encoding social security legislation calls for certain interpretative judgments to be made on the part of the system architects. This inevitably imposes some model of the law on the project. However, unlike TAXMAN and FINDER, SSES does not attempt to resolve open texture problems. Words and phrases found in the Act appear in the questions SSES asks. The user is responsible for answers to those questions and the legal decisions implicit in determining the meaning of various words and phrases.[52] In this sense ultimate interpretative control lies with the user rather than the system designers.

Conclusions

Today there are dozens of machines 'playing' good chess and some very effective ES operating in scientific fields. The application of computing technology to the law has gone little beyond 'dumb' text retrieval machines. As is the case with much of the history of AI, the ambitious claims of early developers have given way to more refined and highly focussed attempts to apply AI techniques to particular fields of knowledge. Contrary to Dr Mehl's prediction, LES designers have focussed their efforts on small domains within the law.

That the few examples of LES we have looked at represent as many different approaches to the problem is not surprising. Development of a usefully intelligent LES is clearly a non trivial task. If there is a consistent

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[52] An hypothetical example involving rent assistance might be helpful. The Act provides for rent assistance to certain people living in 'rented accommodation'. SSES would handle this provision by asking if the applicant is living in 'rented accommodation'. If the applicant is living in a caravan park, the user (benefit assessor) must determine whether this falls within the Act's definition of rented accommodation. SSES has commentaries and case law to assist in the decision but it is the benefit assessor that must decide the issue.

theme within our brief chronological study it is a lowering of 'sights' and, perhaps, a growing comprehension of the difficulty of applying AI to a field as conceptually dependant upon the vagaries of language as law.

Dr Mehl's conviction that once the 'facts' had been established a machine could perform the argumentation represents an inherently mechanistic view of that process of argumentation. TAXMAN attempted something of this sort. However, in implementing that approach McCarty uncovered problems unforeseen by Mehl. How is the law to be represented within a machine? How do you deal with open texture? JUDITH, TAXMAN and SSES essentially defer resolution of open texture problems to the user. Presumably, open texture maps the boundaries of utility for rule based models.

Not all LES have avoided open texture. The user of FINDER is guided to possible resolutions of open texture situations by sophisticated quasi-statistical analysis. However, it might be argued that FINDER really only confronts open texture at the allocation of attributes stage, a process performed by human experts.

The methodological diversity of LES architects is mirrored in the variety of domains chosen. Although Dr. Mehl argued that more might be less, subsequent LES projects have focussed on sub-domains within the law, and generally small sub-domains at that.

Our examples have mostly dealt with statute law. The reasons for this are clear. A statute is an expression of the rules within a particular domain and, although subject to interpretation by courts, represents an ostensibly clear statement of those rules. Reduction of statutes to formal models should be less complicated than reduction of case based law. For LES designers pursuing a rule based approach the statute books are inviting. Nonetheless, reduction of any legal concept to a formal model involves a process of simplification. It must also involve articulation of some belief or opinion about those concepts. The reduction of legal concepts 'omits details, by design, which in many contexts might by crucial; and so, by design, it will always be inadequate in some respects'.[53]

In the following section I will address some of the problems raised by these inevitable inadequacies. But, I hope to show that the jurisprudential basis for attacking these inadequacies is weak and that, practically speaking, the inadequacies present in formal models of legal concepts should not act to prevent the use of ES technology within the law.

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[53] L T McCarty, 'Reflections on TAXMAN: An Experiment in Artificial Intelligence and Legal Reasoning' (1976) 90 *Harvard Law Review* 837, 841.

CHAPTER THREE

JURISPRUDENCE: A LUDDITE DISCIPLINE?

Before attempting to build a model of legal reasoning it would seem sensible to ask two questions. The first must be what it is that legal reasoning involves. Once this is discovered one must ask whether it is possible to imitate that process using computers. That the examples of LES we examined do not follow this intuitive approach is surprising. If one assumes that philosophy and legal theory examine these questions, the attitude of LES designers appears almost complacent. Indeed, Richard Susskind believes that LES engineers have failed to exploit 'the wealth of jurisprudential resources that are available and indeed invaluable for the would be scholar or builder of expert systems in law'.[54]

However, while most philosophers devote little attention to the question of what physical processes lie at the base of reasoning there are some that have a great deal to say about the impossibility of imitating those processes by machine. This also seems surprising.

For the purposes of this discussion it will be necessary to briefly discuss some general philosophical objections to AI. An examination of specific objects to the application of AI within the law follows. Finally, we look at what legal reasoning might actually entail. Consistent with the literature, we look at the second question first and the first question second.

Some General Objections to AI

Attempts to reproduce human thought processes imply mechanistic views of thought. Long before the presence of finite state machines[55], Descartes challenged this mechanical view of the mind:

> For while reason is a universal instrument which can be used in all sorts of situations the organs of a machine have to be arranged in a particular way for each particular action. From this it follows that it is morally (i.e. practically) impossible that there should be enough different devices in a machine to make it behave in all the occurrences of life as our reason makes us behave.[56]

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54 R Susskind, 'Expert Systems in Law: A Jurisprudential Approach to Artificial Intelligence and Legal Reasoning', (1986) 49 *Modern Law Review* 168.

55 Finite state machines possess a limited number of memory locations. There is a consequential limit to the information that such a machine can store. Modern computers are finite state machines.

56 R Descartes, *Discourses* (1637) 36 quoted in H Dreyfus, *What Computers Can't Do: A Critique of Artificial Reason* (1972) 147.

There is something frightening in the notion of machines being able to reason as humans, particularly in a Cartesian context of existence. But this is a moral consideration, not a practical evidence of impossibility.

It is possible that Goedel's Incompleteness Theorem provides a practical limit to machine intelligence. Goedel's theorem states that any consistent formal logic system will be imperfect. In the case of LES this means there will be certain legal questions the system is physically incapable of processing. The difficulty is that there is no way of knowing which questions will confound a particular system. Alan Turing met this problem with the response that while a particular machine might not be able to answer a particular question it will be able to answer all other questions.[57] Consequently, 'there would be no question of triumphing simultaneously over all machines'.[58] Goedel's theorem should be treated with caution. It does not prove that machines cannot solve problems, only that they cannot solve certain problems. Turing makes the further point that no one has proved human minds to be free of the limitations contemplated by Goedel.[59]

Unlike the Incompleteness Theorem, the vast majority of arguments against the development of AI are motivated from moral stand-points rather than practical realities. One of the most vehement and consistent critics of AI is Hubert Dreyfus. In his book, *What Computers Can't Do*[60], Dreyfus posits four basic objections to the notion that machines will ever be able to reason. The first is an attack on the biological assumption that the brain operates as a finite state machine. If, as Dreyfus suggests, the synaptic activity of the mind is not discrete and there are graded levels of response, a discrete state model of that system must be fundamentally flawed. His next point questions whether human psychological processes are heuristic in manner. How could a machine based on formal models mirror what might be wonderfully non deterministic events? Dreyfus' third argument relates to epistemological problems encountered in selecting particular knowledge models for machine implementation. The final objection is perhaps the most fundamental. Dreyfus states that the AI engineer's belief that the world is a system capable of description by deterministic data must be ontologically flawed. In crude terms, it seems that Dreyfus believes the very notion of AI to imply a view of existence so wrong as to make pursuit of AI nonsensical.[61]

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57 A M Turing, 'Computing Machinery and Intelligence', (1950) LIX *Mind* 433.

58 *Ibid* 445.

59 'No legal system of formal rules ... could be consistent and complete in itself at the same time, that is, if it claimed to contain its own justification within itself as a legal system': T F Torrance, *Judicial Law and Physical Law* (1982) 45.

60 H Dreyfus, *What Computers Can't Do: A Critique of Artificial Reason* (1972).

61 'The AI community and Dreyfus enjoy a relation of strong mutual antagonism. It is important to have people like Dreyfus around even if you find them very irritating.' D Hofstadter, *Goedel, Escher, Bach: An Eternal Golden Braid* (1979) 748.

The classic AI response to these arguments is found in Turing's article on machine intelligence.[62] Essentially, Turing argues that objections to AI and proofs of impossibility put forward by opponents to AI misconstrue its goals. When it is appreciated that the fundamental objective of AI is not the reproduction of human reasoning processes but the *results* of those processes, Dreyfus' arguments lose significance. The emphasis is on results, the external manifestations of intelligence, rather than the mechanisms behind that intelligence. This is the whole point of Turing's imitation game.

Consequently, the quite plausible contention that machines will never reproduce human thought processes becomes largely irrelevant. The results of the imitation game do not reveal the identity of the participants any more than the results of a particular logical or intuitive reasoning process reveal the method adopted to solve the problem. To carry the argument to its logical, if not emotional conclusion, it is not possible to say that TAXMAN, when characterising a reorganisation process within its domain, does not employ the reasoning techniques used by a tax law specialist. Until we know what techniques a tax law specialist uses, we can only say that it is unlikely TAXMAN uses those same processes.

This raises a very important point in the debate regarding the potential use of LES. If a machine can present results indistinguishable to those of human practitioners, is it important that those results might not flow from identical reasoning processes?

Jurisprudence: A Spectrum of Opinions

Because computers are deterministic machines they must represent concepts by means of formal models. 'There can be no informal models which are mysteriously formalised into a computer model.'[63] As we saw with TAXMAN, the act of reducing legal concepts to formal models presents serious problems to the LES architect. Indeed, the assumption that a formal model, once derived, is an accurate representation of a particular legal concept is by no means certain. Serious jurisprudential issues are involved in this innocent assumption. Although the debate in this area is beyond the scope of this paper, a brief examination of the topic is required. Can legal concepts be represented by formal models? Does jurisprudence provide an answer?

The logical starting point in this analysis is the work of theorists who feel that the law operates in a formal and deterministic fashion. A philosophy of this type provides obvious theoretical support to the

62 A M Turing, 'Computing Machinery and Intelligence' (1950) LIX *Mind* 433.

63 P Leith 'The Emperor's New Expert System' (1987) 50 *Modern Law Review* 128, 131.

activities of LES engineers and, to a limited extent, the work of the 'positivist' school in jurisprudence assists.[64]

H L A Hart, perhaps the best known of the positivists, presents a sophisticated analysis of the law. The vast majority of law is straightforward and capable of reduction to 'rules'. Within this core of straightforward cases Hart appears to accept that deductive reasoning is possible. However, in the difficult cases there lies a penumbra of doubt where rules no longer operate deterministically and extra-legal factors become relevant to the reasoning process. 'If a penumbra of uncertainty must surround all legal rules, then their application to specific cases in the penumbral area cannot be a matter of logical deduction ... In this area man cannot live by deduction alone.'[65] The penumbra is the realm of open texture. The presence of open texture problems avoids a complete legal formalism but leaves the majority of law reducible to formal models. To return to our example LES then, the question of whether living in a caravan is subsumed by the Social Security Act's definition of rented accommodation is a question that could be said to lie within Hart's penumbra of doubt. TAXMAN can be seen as a LES that straddled Hart's core and penumbra in that McCarty found certain reorganisation situations beyond analysis.

According to Harris, MacCormick also finds a place for deductive reasoning in some cases.[66] There is support for Harris's argument in MacCormick's statement, 'since legal reasoning is a form of thought it must be logical i.e. must conform to the laws of logic on pain of being irrational and self contradictory'.[67]

The LES engineer would draw comfort from the positivist stance. Although positivism says little about what the rules of law are at any given time and less about how one would decant those rules from cases and statutes, it does indicate a basically formal structure to the law. Unfortunately, the comfort for LES engineers found in positivism is not found elsewhere in jurisprudence.

Dworkin believes the law is more than rules. He supplements rules with principles that might be described as standards lending weight to particular choices in the reasoning process. The presence of principles means that a judge cannot discover what rules apply by means of any amoral test.[68] However, Richard Susskind claims that Dworkin's analysis

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64 Positivist is used in this sense to denote writers like Hart and MacCormick who express faith in the usefulness of rules within law.

65 H L A Hart, 'Positivism and the Separation of Laws and Morals' in H L A Hart (ed), *Essays in Jurisprudence and Philosophy* (1983) 63.

66 J W Harris, *Legal Philosophies* (1980) 199.

67 N MacCormick, *Legal Reasoning and Legal Theory* (1978) 40.

68 J W Harris, *Legal Philosophies* (1980) 177.

is not practically different to Hart's in easy cases.[69] 'In easy cases legal rights can be deduced, in something close to a syllogistic fashion, from propositions reported in books that are available to the public, and even more readily available to lawyers the public can hire.'[70]

Further still from positivism are Austin and, more recently, Moles. As realists[71] they see the law as inseparably tied to questions of morality and ethics. Legal decisions and legal reasoning are not to be seen as applications of objective rules to fact situations but subjective analyses of legal, ethical and moral situations. Consequently, a legal decision is an intimately human function; discretionary, and to some extent arbitrary.

That this human element operates across the whole range of law and not just in the difficult cases can be seen from Moles' criticism of TAXMAN. 'McCarty appears not to appreciate that "corporations", "securities", "properties", "dividends" and so on are not subsumed "beneath the law" but are each the product of complex legal analysis.' It seems, according to Moles, that the dog in The Dog Act is a legal concept incapable of reduction to objective rules.

This view of the law as part of the 'vast organic whole'[72] only poses trouble for the LES engineer when tied to the assumption that machines are not able to work with vast organic wholes in the way that humans do. This assumption appeals intuitively and Moles carries it to its logical (*sic*) conclusion. 'Judgments are involved at every stage of the legal process and machines cannot make judgments.'[73]

Moles' intuitive assumption gains empirical credibility from the modest success of prototype LES. The work of Phillip Leith, a Queen's University colleague, is particularly supportive. Leith developed ELI in an attempt to automate British social security legislation relating to the payment of special benefits. He built the system in the faith that 'the law and legislation could be represented as relatively simple (if sometimes verbose) rules'.[74] As Leith indicates, his faith was that of the positivist.[75] However, after using ELI for four years Leith is critical of attempts to automate by means of 'clear rules'. His conclusion is that use of formal rules is not likely to result in successful LES. 'To me [Leith], the

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69 R Susskind, *Legal Expert Systems* (1987) 173.

70 R M Dworkin, *Taking Rights Seriously* (1977) 337 quoted in R Susskind, *Legal Expert Systems* (1987) 173.

71 This label is used not in the Platonic sense nor in the sense of American realists, but to denote jurisprudes that see legal decisions as basically moral judgments. As opponents of positivism the phrase 'negativists' might be more apt.

72 *Ibid* 271.

73 *Id.*

74 P Leith, 'Clear Rules and Expert Systems' in A Martino & F S Natali (eds) *Automated Analysis of Legal Texts* (1985) 661.

75 *Ibid* 661.

existence of the rule depends on the personal view of the judge positing that rule - it is created, discussed, manipulated by the judge as an abstract concept ... it has no concrete like which leads to it being spotted automatically by any number of judges.'[76]

Like Moles, Leith sees the problem of locating rules as generic to the law. 'There is no difference between any judicial interpretation of legal rules, whether they arise from tort, contract or commercial or corporate matters. The problem of finding the clear legal rule in any of these areas is insurmountable, my [Leith's] argument states, because there is no clear rule which cannot be overruled, forgotten or created by the judiciary.'[77]

While Leith rejects the strict positivist analysis, his empirical work falls short of concluding that machines cannot make judgments. His loss of faith is in relation to a rule based approach not in relation to the task of automating legal reasoning. The prognosis at the end of the ILI analysis is that empirical research into what human legal reasoning entails and adoption of non deterministic programming methods might produce better results.[78]

Leith's experience indicates that research into automating legal reasoning could be useful to jurisprudence as a method of testing the relative strengths of competing legal models. McCarty argued that while the great debates in jurisprudence were connected with problems regarding the use of abstract concepts the 'jurisprudential literature is notoriously imprecise'.[79] To specify legal models for machines 'requires a degree of explicitness about the structure of those concepts that has never previously been attempted'.[80] Once those concepts are embodied in a LES they may be tested in hypothetical fact situations free from the trauma and cost of the real legal system. 'Used in this fashion, the computer is the most powerful tool for expressing formal theories and spinning out their consequences that has every been devised.'[81]

What is Legal Reasoning?

Turning to the question of what it is that might be called legal reasoning, one's intuitions suggest a variety of answers. It seems unlikely that one model or approach to legal reasoning should exist. That public servants processing social security applications employ the same reasoning processes, albeit in a more restricted domain, as High Court judges seems

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[76] *Ibid* 671. It might be suggested that absence of 'concrete life' has not prevented the concept of infinity from playing a substantial role in mathematics.

[77] *Ibid* 671.

[78] *Ibid* 677-678.

[79] L T McCarty, 'Reflections on TAXMAN: An Experiment in Artificial Intelligence and Legal Reasoning' (1976) 90 *Harvard Law Review* 837, 840.

[80] *Id.*

[81] *Id.*

absurd. It would be surprising if barristers, as advocates, treat legal issues in the same way as judges in their impartial arbiter capacity. Common sense dictates that the processes of legal reasoning applied by an individual must differ depending upon the role of the individual within the system. Indeed, the view that law at some level is inseparably connected to moral and ethical issues implies that treatment of the law must become a subjective endeavour, particularly at the appellate stage.

Given the intensity of debate between various schools of jurisprudence regarding the nature of law there is a notable absence of empirical studies into the reasoning processes adopted by legal practitioners.

A study conducted in the United States examined the processes of reasoning used by magistrates in local courts.[82] Using techniques drawn from cognitive psychology and linguistics, qualitative studies of magistrates' oral judgments were made. The researchers concluded that their study revealed five basic classes of judge, each class representing different approaches to their jobs and the process of legal reasoning. 'Depending on the judge a litigant draws, informal justice may mean mediation, enforced compromise, apologetic application of legal norms, authoritative decision making spiced with social commentary or constant attention to points of procedure.'[83] This diversity of approach led Conley and O'Barr to conclude that 'there is no such thing as the process of informal justice. It is, rather, a broad range of different processes, with the difference deriving in significant part from the role perceptions of those who administer it.'[84]

Diversity of approach in legal reasoning is not limited to lower courts. Paterson's study of the Law Lords[85] revealed marked differences of approach, particularly in balancing individual justice against judicial certainty. 'When justice and certainty conflict, some Law Lords, for example Lords Diplock, Pearce, Salmon and Denning, consider they have a tendency to favour flexibility and justice, others, for example Lords Cross, Guest, Pearson and Upjohn have admitted to a tendency in the opposite direction, while the bulk of the remainder endeavour to strike a balance between the two expectations.'[86] This absence of uniformity naturally extends to the standards applied in resolving matters on the borderline. As Lord Cross confesses, 'everybody has got their own standards of what is fair and just and desirable. The trouble is that people, of course, differ very much as to what these are!'[87]

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82 J M Conley & W O'Barr, 'Fundamentals of Jurisprudence: An Ethnography of Judicial Decision Making in Informal Courts' (1988) 66 *North Caroline Law Review* 467.

83 *Ibid* 504.

84 *Ibid* 506.

85 A Paterson, *The Law Lords* (1982).

86 *Ibid* 199.

87 *Id.*

Conley and O'Barr see their results as highlighting a methodological fault in jurisprudence:

> Traditionally, jurisprudence has worked from the top down by imposing theoretical constructs on the law and arguing their merits on an abstract level. This approach to questions about the nature of the law has promoted a counter-productive dichotomy, in evidence throughout the legal world, between theorising and empirical research. We suggest that our findings are literally fundamental to jurisprudence in that they demonstrate the utility of studying the nature of the law from the ground up.[88]

This alleged weakness with jurisprudential methodology must undermine Susskind's faith in jurisprudential resources. Although he argues 'jurisprudence can and ought to supply the models of law and legal reasoning that are required for computerised implementation in the process of building all expert systems in law'[89], the details for those models are somewhat elusive. Susskind's personal approach requires a consensual model that 'clashes as little as possible with the ruling theories'.[90] Surely, such a model, 'culled from that harmony'[91], will accurately represent no jurisprudential theory other than Susskind's own. Is it then any better or any worse than a model derived from a results oriented drive to build a working LES?

Could it be that jurisprudence provides little real assistance to the LES engineer? If the positivists are 'correct', the bulk of the law is reducible to rules capable of integration within a LES, but a component of the law is not. If the realists are 'correct' talk of rules is meaningless and the task confronting the LES engineer is that of reducing human discretion and subjectivity to formal models. In any event, neither view provides real guidance as to what mechanisms underlie legal reasoning. If the assumption that legal reasoning is an umbrella phrase covering a multitude of divergent processes is correct, the wealth of jurisprudential material is of little practical significance.

In the absence of definitive or widely accepted models of what legal reasoning is, criticism of a model purely on the ground that it fails to conform to the dogma of a particular jurisprudential school seems unfair. Perhaps Tyree best expresses the sentiments of LWA architects here:

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88 J M Conley and W O'Barr, 'Fundamentals of Jurisprudence: An Ethnography of Judicial Decision Making in Informal Courts' (1988) 66 *North Caroline Law Review* 467, 506.

89 R Susskind, 'Expert Systems in Law: A Jurisprudential Approach to Artificial Intelligence and Legal Reasoning' (1986) 49 *Modern Law Review* 168, 182.

90 *Ibid* 184.

91 *Id.*

> Our view is that we do not know how a lawyer deals with the precedent problem, so any method which produces results which are in accordance with the results reached by a human expert must be a contender until a better procedure is found or until we learn more about the way the human expert really functions.[92]

CHAPTER FOUR

SOME POSSIBLE USES FOR LES

Purely philosophical opposition to LES has obscured sensible investigation of their potential. By pouring scorn on what might be developed, critics ignore possible applications of the current technology. Three basic uses for LES have been proposed: use of LES as judges, use as assistants to advocates, and use as administrative tools. Any discussion of potential uses for LES must presuppose that the system is able to do the task assigned. A LES should not replace a judge if it could not replace the judge. Building a LES that could act as a judge requires construction of machine capable of reproducing the results of human reasoning very accurately. This is bound to be harder than building a machine capable of assisting with social security applications. But, even if the judge could be replaced, is it desirable that the judge should be replaced? In the following section the relative merits of the three proposed applications will be assessed.

LES as Judges

One of the few people advocating replacement of judges by machines is Anthony D'Amato.[93] D'Amato acknowledges that judges do more than interpret the law but his faith in the ability of LES to replace judges lies in his analysis of what judicial decision making involves. D'Amato asks 'is human judgment just a euphemism for arbitrariness, discretion or bias?'[94] When a judge 'develops the law' is he or she not attempting to avoid a situation where strict application of the law, in the judge's mind, would lead to a result he or she sees as unjust? If this is the case, what we witness is exercise of some prejudice or bias, albeit for motives acceptable to the community at large. It is this exercise of judgment that Moles would claim to be beyond imitation by a machine.

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92 A Tyree, G Greenleaf & A Mowbray, 'Legal Reasoning: The Problems of Precedent' in J S Gero and R Stanton (eds), *Artificial Intelligence Developments and Applications* (1987) 231, 240.

93 A D'Amato, 'Can/Should Computers Replace Judges?' (1977) 11 *Georgia Law Review* 1277.

94 *Ibid* 1281.

The argument that machines could not exercise judgment as human judges do is met by D'Amato with the response that LES could be programmed to exhibit prejudices and arbitrariness.[95] The decisions of those machines would reflect their prejudices. The advantage of the machine prejudice is that it can be controlled and manipulated in a way that human prejudices cannot. A machine could be designed to favour sickly pensioners in the same way that some judges might, but it is highly unlikely that anyone would design a machine to decide against people on the basis of their skin colour. The important point for D'Amato is that the machine's bias would be apparent for all to see and more likely than not to conform to widely accepted notions of morality and fairness. At base he argues, what is wrong with accepting machine simulated prejudices we can define and control when every day we trust the decisions of human judges that turn on subjective elements we have no hope of ever fully defining?[96] 'Judgments are involved at every stage of the legal process'[97] but surely Moles would accept that some judgments are made for better reasons than others.

If possible, such a machine could be incorporated into our legal system and made subject to all the appeal processes that exist today. The decisions moreover, would come more quickly and more cheaply than we could hope to achieve with ageing humans.

The great obstacle to this utopian image is at first a small doubt. However, that doubt quickly grows to a serious concern when one considers that delegation of judicial responsibility is effectively abrogation of society's conscience. It might be argued that the most important role of judges, particularly those at the appellate level, is their enunciation of mores through control of individual behaviour. Landmark decisions like *Donoghue v Stevenson*[98], *Roe v Wade*[99], and even the Dams Case[100] represent much more than bland interpretations of law. They acknowledge, if not generate, significant developments that necessarily reflect the values of our society. As 'big' decisions they must be made by humans. The great objection to judgment machines is that delegation of our ultimate moral responsibilities to machines runs the risk of

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[95] *Ibid* 1279. ES can be built to weight factors like infirmity, age, poverty, etc. and depending on the cumulative weight of those extra-legal factors alter an otherwise impartial interpretation of the law.

[96] The law has evolved to rely upon the subjective discretion of judges. One need only cite the rules of procedure regarding extension of time limits and rules of evidence regarding the admissibility of confessions as examples where problems are resolved by judicial discretion.

[97] R N Moles, *Definition and Rule in Legal Theory* (1987) 271.

[98] [1932] AC 562.

[99] 402 US 940.

[100] *Commonwealth v Tasmania* (1983) 46 ALR 625.

'condemning one's self to impoverishment of thought, to desiccation of the spirit'.[101]

LES as Tools for Advocates

If we reject use of LES in a judicial capacity, the next obvious sight for the technology is as an advocate's assistant. Even relatively simple LES could act as invaluable tools for barristers and solicitors. By leading practitioners to the crux of the matter, by indicating what issues are straightforward and what issues require deep research, a great deal of preliminary work might be avoided. Naturally, a LES is unlikely to assist a real expert, but few practitioners are expert in more than one sphere of law. A LES would be immeasurably useful to non-expert practitioners and the expert operating in alien territory. Tyree suggests that FINDER would be helpful to practitioners not familiar in the law of chattel recovery in much the same way as a good text.[102] However, FINDER narrows the field of research in a manner not possible with the best tables of contents. The savings commensurate with use of a system like this must eventually pass through to the client, a factor likely to increase the desirability of LES.

LES also make economic sense as advocacy research tools for para-legal and non-legal users. In fact, Tyree believes the most compelling sites for LES are small legal offices and neighbourhood legal centres.[103] The resources of these facilities are often stretched precariously thin. A case in point is the Welfare Rights and Legal Centre in Canberra, for whom SSES was designed. Although the centre employs legal practitioners, it also relies on non-legal staff to assist in quasi-legal work. SSES was designed to be used by untrained staff to reduce the workload of solicitors. In this way a LES vastly improves the efficiency of available human resources.

Quality control becomes an important issue for LES used by people without legal knowledge. A trained lawyer is likely to know when the advice from a LES is poor. The same might not be the case for an untrained or para-legal user. As Tyree points out, well defined systems of entry and practice impose certain minimum levels of competence on the legal profession. 'How can we establish that an ES meets some minimum level of competence?'[104] The issue is well summarised by Chris Reynolds:

> There will be good well designed systems which do a good job for all concerned. There will be bad systems, designed

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101 L Mehl, 'Automation in the Legal World: From the Machine processing of Legal Information to the Law Machine' in *Mechanisation of Thought Processes* (1959) 755, 778.

102 A Tyree, 'Will Justice Fall to Bits?' (1986) *Current Affairs Bulletin* March 13, 16.

103 *Id.*

104 *Ibid* 18.

> either by zealous academics with their heads in the clouds or by charlatans who have climbed on the ES bandwagon merely to make a fast buck. Some systems will help the community at large; others will be used to maximise the profits of the few.[105]

The advice from bad systems will rebound on the unfortunate client. In this context a 'user beware' philosophy is clearly inadequate.

When economic imperatives enter the fray it becomes clear that, apart from replacing high charging legal experts, the ideal use of LES technology is in an environment where large numbers of relatively simple legal problems are encountered. I hope to show in the next section that the most obvious and economically compelling use of LES technology is in the public administration sector. As assistants to bureaucrats performing quasi-legal functions LES have a potentially brilliant future.

Use of LES in Administration

The focus of our discussion so far has been on the traditional court system. This is understandable. Our notions of legal reasoning are largely the result of analyses of case law. Jurisprudence focusses attention on appellate processes and judge made law. This means traditional conceptions of the legal system stem from practice oriented approaches, a belief that the law is what lawyers do. However, a vast number of legal decisions are made in the course of public administration. Bureaucracy is an inherently legal process albeit subordinate to the Executive, Legislature and Judiciary.

The introduction of administrative review bodies like the Administrative Appeals Tribunal (AAT) and Social Security Appeals Tribunal (SSAT) indicates that our bureaucracy is less than perfect. It was the view of the Kerr Report that 'The basic fault of the entire structure [of judicial review] is however, that review cannot as a general rule ... be obtained on the merits - and this is usually what the aggrieved citizen is seeking'.[106] This suggests that prior to the new administrative law not only were decision making processes prone to error but the methods of review for those decisions inadequate.

The AAT and SSAT provide review of decisions on their merits. It has been said that their introduction was an attempt to provide checks on individual decisions as well as improving the general quality of decisions making within the bureaucracy. Opinions will differ about the importance of the system's twin objectives, but for some 'the second function must take priority when it comes to evaluating the success of the

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105 C Reynolds, 'Your Life in Their Disks' (1989) *New Scientist* 27 May 47.

106 Parliamentary Paper No 144 of 1971 para 58.

administrative review system'.[107] A LES along the lines of SSES, used as an assistant to administrative decision makers, provides a powerful means of ensuring that second objective is maintained.

Social security law is an ideal domain for LES because of the large number of applications and the many combinations of benefit available.[108] There are open texture problems within social security law. However, a significant number of applications are reasonably straightforward, turning on questions of objective fact. Where an applicant fits into a category that might require special considerations the LES could indicate what factors are relevant but it is not proposed that the LES decide the matter. Ultimate responsibility for the decisions should lie with the assessor. The aim of using LES in this capacity is not to reduce the role of assessors but to improve their efficiency.

The advantages to this use of LES technology are numerous. Although there are no LES in public administration at present, the Departments of Veterans' Affairs, Tax, Immigration and Social Security are developing them. Indeed, the Veterans' Affairs machine, developed from the SSES shell, has been running on a trial basis since November 1989.[109]

Economic arguments for introducing ES into the Public Service are strong. Conventional IT is already used in the Public Service to handle the growth of Information resulting from an increasingly complex bureaucracy. Large sums of money are saved by use of automated office machinery. LES can reduce staff hours spent processing applications and reduce research time thereby increasing the number of applicants that can be dealt with by benefit assessors. The cost savings are obvious.[110]

Beyond the economic analysis are less tangible but fundamentally more important advantages in the use of LES within an administrative framework. These benefits lie in the potential effect a LES might have on the quality of decisions made.

While it is acknowledged that the law must accommodate the particular facts and peculiarities of all cases the need for consistency in decisions of like facts is also important. Discretion and prejudice might

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107 T Carney, 'Resisting Welfare Rights', 128 *Legal Services Bulletin* 266.

108 A number of LES have been built in the area of social security law. Examples include the Inverclyde Project: D Du Deau, 'Selecting Welfare benefits by Computer' in B Niblett (ed) *Computer Science and Law* (1980) 183 and ELI: P Leith, 'Clear Rules and Expert Systems' in A Martino & F S Natali (eds), *Automated Analysis of Legal Texts* (1985) 661.

109 Interview with Belinda Burgess of the Veterans' Affairs Expert System (VAES) Team on 3 August 1989.

110 Interview with Belinda Burgess of the Veterans' Affairs Expert System (VAES) Team on 3 August 1989. See generally: VAES Team, 'Proposal for Initial Use of STATUTE in the Department of Veterans' Affairs' section 7.

lie at the heart of all law, but a legal system seen to exhibit prejudices openly would surely lose credibility. It could be argued that the very presence of an appellate process within our law is an attempt to ensure that the balance between individual justice and consistency of decisions is not distorted by the bias of particular judges.

The mechanism by which social security is governed is extremely susceptible to the operation of personal and institutionalised bias. Legislation enacted by Parliament is regulated through massive administrative networks. Statutes are open to re-interpretation, in the form of delegated legislation and departmental guide-lines, before their eventual application. Although Minister's regulations have an obvious legislative base, 'a vast amount of the guide-lines have no explicit statutory base, and are simply promulgated in the interest of those who administer the statute'.[111] Manuals are designed to assist staff with interpreting the complexities of the Act. 'Because DSS has always relied on a comparatively junior work-force with limited experience, these Manuals have acquired more authority than the legislation under which the Department operates.'[112] Moreover, Departmental guidelines are unlikely to be regularly updated with the result that they 'rarely reflect, and often contradict, AAT decisions'.[113]

The resulting body of law; legislation, delegated legislation, guide-lines and manuals is then interpreted by a departmental official in assessing an applicant's benefit. Quite often the official has little legal training. The bulk and complexity of the British social security law has 'led to inconsistent awards being made in apparently similar cases, and to officers and tribunal members alike giving rein to their own personal prejudices in making awards and deciding appeals'.[114] The effect of this bias is surely exacerbated by workload pressures and the relative inexperience of benefits assessors that 'push front-line administrators towards simple, precise and rigid rules'.[115] The result is a contradiction between what is intended by Parliament and what occurs. 'This contradiction results in sharply different treatment of those DSS clients who exercise their review rights and the much larger group who do not appeal.'[116]

The disturbing conclusion here is that legislation enacted by democratically elected representatives is corrupted by institutionalised processes of interpretation and the subconscious bias of clerical staff employed to supervise the legislation. This conclusion is difficult to square with the rule of law. Hayek describes the rule of law as the notion

111 P Bayne, 'Guidance and Judicial Review' (1988) 62 *Australian Law Journal* 383.

112 T Carney, 'Resisting Welfare Rights' 128 *Legal Services Bulletin* 266, 267.

113 *Ibid* 266.

114 J. Harlow, 'Social Security, Discretion and Computers' (1981) 44 *Modern Law Review* 546.

115 T Carney, 'Resisting Welfare Rights' 128 *Legal Services Bulletin* 266, 267.

116 *Ibid* 266.

that 'government in all its actions is bound by rules fixed and announced before hand - rules which make it possible to foresee with fair certainty how the authority will use its coercive powers in given circumstances, and to plan one's individual affairs on the basis of that knowledge'.[117] It is hard to describe a government as 'bound by rules announced' when those rules are applied by individuals 'giving rein to their own personal prejudices'. This dichotomy between what is enacted and what is actually applied is surely repulsive to a Westminster system of government.

More cynical observers might see this dichotomy as just another fault in using a Westminster system in the 1980s. However, it is both possible and desirable to reduce the effect of 'non legislative' discretions. Tribunals and courts of review have already been introduced as a method of correcting mistakes after the fact. LES, as described earlier, are an approach that attempts to prevent the mistakes being made in the first place.

A LES would focus the assessor on the facts of the case at hand, regularly prompting the officer with questions regarding the applicant's position. The methodical approach that a LES follows removes the need for the assessor to regularly interpret arcane passes of legislation. Although the legislation and other material would always be available for assessment of unique or difficult cases, a LES is effectively applying the statute to the applicant. It would be possible for regulations and even departmental guidelines to be incorporated into the LES but the personal bias of the assessor is excluded. As with the current system, the final decision is that of the assessor. However use of a LES ensures that the assessor's decisions are made within a more closely defined context. As such it presents a unique opportunity to re-establish the rule of law in administrative decision making.

Not all the faults of the social security system are the result of prejudice. Harlow points out that studies in the UK reveal 'more than 1 in 10 of all decisions involving supplementary benefits are incorrect and that the mistakes are often due to the complexity of the law'.[118] A LES that reduces legislation to a series of directly relevant questions must go some way to addressing this problem. The position may not be identical in Australia, but a similar re-evaluation of approach seems equally well justified. As in the UK, 'the real challenge lies not in the provision of elaborate appeals machinery but in getting the decision right the first time'.[119]

The wisdom of this approach is that of preventative medicine in favour of curative medicine. Unfortunately, not all the victims of bad

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117 F A Hayek, *The Road to Serfdom*, (1944) 44.

118 J Harlow, 'Social Security, Discretion and Computers' (1981) 44 *Modern Law Review* 546, 553.

119 *Id.*

administrative decisions make it to the clinic. The AAT only receives appeals where the aggrieved party recognizes their right to appeal and has the resources to pursue the matter. A LES would impose checks on *every* case.

Criticisms of this hypothetical use of LES fall into two broad categories. The first is a concern that the LES accurately reflect the statute or body of law it is meant to represent. The second class turns on the incapacity of machines to be innovative. Ostensibly more fundamental, this criticism is a misconception of the envisaged use of LES and the processes of the law.

Producing a LES that correctly interprets the law by asking the right questions is a difficult task. However, the SSES shows that complex legislation can be reduced to a series of questions as long as no attempt to resolve open texture is made. Naturally, an interpretation of the law is adopted by the people who program the LES. But, their judgment is easily checked by examining how the system performs on a series of test applications. Furthermore, the final and most important act of legal reasoning occurs when the assessor responds to the system's question. That decision is still subject to an appeal mechanism. Mistakes occur in the present administrative system but 'by centralising the rules on a computer, the result is that every similar case throughout the country is handled in the same incorrect way, and that errors could hurt large numbers of people'.[120] The development of the LES at the Department of Veterans' Affairs shows that a great deal of care is being taken to avoid such mistakes.

A number of commentators argue that use of LES will restrict the flexibility of decision makers and restrict innovation within the law. Goebal and Schmalz[121] claim that users of LES will become subconsciously restricted in their exercise of discretion. Du Feau agrees to an extent. However, this problem is only relevant to a LES that attempts to resolve discretionary questions. A system that merely indicates to the assessor what factors are relevant in the exercise of a discretion is unlikely to limit the use of that discretion. Indeed, the LES is likely to remind the assessor of factors that might otherwise be overlooked.

It is similarly unlikely that use of a LES at the first stage of the administrative process will reduce development of the law. Generally, it

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120 C Reynolds, 'Your Life in Their Disks' (1989) *New Scientist* 27 May 47.

121 J Goebal and R Schmalz, 'Problems in Applying Legal Expert Systems in Legal Practice' in A Martino & F S Natali (eds) *Automated Analysis of Legal Texts* (1986) 613, 616.

122 D Du Feau, 'Selecting Welfare Benefits by Computer' in B Niblett (ed), *Computer Science and Law* (1980) 183.

is appellate courts that are responsible for development of doctrine. The proposal here is not for use of LES in an appellate capacity.

CONCLUSION

The dangers of introducing legal thinking machines are largely avoided by the use of LES as purely administrative tools. As part of the administrative system, the LES is subject to all the internal and appellate checks that currently operate. Moreover, a system that defers resolution of 'open texture' problems to its user avoids the trap of imposing some view of the law upon that user. 'Difficult' issues are still resolved by humans, albeit within a more restricted discretionary context. Use of expert system technology in this way is relatively non-contentious.

The reason this implementation is non-contentious is that it skirts around the very difficult task of reproducing human thought processes. Can a machine that ignores the hard questions be said to reason in any sense of the word? Purists in the field would say not. Processes of legal reasoning are most difficult to defend in the resolution of hard cases. As yet, the LES engineer, like the legal theorist, has been unable to solve this problem.

Does this mean that the pursuit of AI, particularly in the law, is a 'fool's errand'?[123] Perhaps not. History indicates that expansive declarations of impossibility tend to be ill founded. Humans regularly travel in excess of 50 miles an hour. Humans have walked on the moon. Indeed, the dream of alchemists to convert lead into gold, although not commercially viable, is now possible using nuclear fusion. Given that computers have only been around for 40 years it may be rash to rigidly define their utility so early in the piece.

Even if the sceptics turn out to be correct, dismissing AI obscures the great benefits that lie in artificially 'dim-witted' programs. In the sphere of law these benefits are significant.

Attempting to model legal reasoning must provide insight into the mechanisms at the base of that process. Keith, McCarty and Susskind all concluded this. 'Even if our formalisms will always be inadequate in one or more respects, the process of constructing and modifying these formalisms, if carefully done, should itself be a source of insight and understanding.'[124]

The potential economic benefits of ES are myriad. As we have seen, the Commonwealth public service is investing large sums of money in the

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123 R N Moles, *Definition and Rule in Legal Theory* (1987) 270.

124 L T McCarty, 'Reflections on TAXMAN: An Experiment in Artificial Intelligence and Legal Reasoning', 90 *Harvard Law Review* 837, 893.

development of ES to be used as administrative tools. From November 1989 the Department of Veterans' Affairs' machine has assisted in the evaluation of veterans' benefits and other quasi-legal functions. Productivity increases are expected from the increased through-put of applicant information, the speeding up of research work and a reduction in administrative chores undertaken by human workers. Industrial benefits will include multi-skilling, greater staff mobility and more complete client staff relationships.

A better understanding of legal reasoning and improved administrative efficiency justify the use of LES by themselves. But, the great potential of LES lies in their capacity to affect the way that administrative decisions are made. This result goes to the very heart of the law. By removing the effects of institutionalised and individual bias, a LES can restore the rule of law to the administrative sector. Responsible government rests on the accountability of Parliament to the people through the courts. However, courts are impotent as bodies of review when citizens fail to pursue the review process.

A LES will provide a check on each and every case decided. To focus on the internal aspects of law, the physical processes that underlie decisions, as a ground for rejecting LES, ignores their real worth. LES represents a 'silicon' opportunity to enforce a fundamental norm of our legal system - the rule of law.