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ALICE in Cyberland: Computer Support for Lawyers in a Global Economy

Burkhard Schafer,
Law Lecturer
University of Edinburgh

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1. Introduction

An often-quoted bonmot identifies the PC as an ideal solution - once we found the problem it is the solution for. The same could be said with some justification about AI and Law. Legal expert systems should be the ideal tool to solve all sorts of problems of the criminal and civil justice system - if we would only know which ones. The hopes of 'strong AI', the replacement of legal experts in their field of expertise, has been unsuccessful so far - with the exception of some highly specialised applications for those field of law which traditionally rely heavily on mathematical calculations, such as tax and social security law. As a consequence, research in AI tried to identify useful applications where the human competitor is for one reason or the other not a highly trained expert in the field herself. Two avenues in particular were explored: the use of intelligent tutoring programmes for legal education and decision support in knowledge intensive situations. Here a lawyer needs rapid access to extra-legal information, or information about a field of law for which she is not an expert. In both situations, the user is also a learner, the computer's primary function becomes one of making the user more informed and competitive, not to replace her. From a 'doer', the computer becomes a 'teacher'.

However, the original strategy to make these systems as competent in their mastery of legal knowledge continued, and lack of proper understanding of the legal reasoning process is still quoted as the most significant obstacle for successful legal AI. (see e.g., Aikenhead 2000). And most of the technical refinements proposed still see it as their main task to model more accurately the legal reasoning process, and the main arguments for or against a specific logic (e.g. default logic vs. predicate circumscription) are their similarity to the process of legal argumentation (see e.g. Haage 1997). Short, the focus in legal AI research continues to be on the system, not the user side. This is in a way understandable enough, after all, it is the unquestioned dogma of higher education that the best experts in the field are also the most appropriate teachers. Learning is imitating from the best.

This paper will firstly propose a new field of application for legal information/expert systems. Secondly, and as a result of this reorientation, it will deviate from the orthodoxy in legal AI in arguing that if computers are not used to replace, but to inform lawyers, much more attention need to be paid to the processes prompted on the user side, This can even mean to offer systematically 'worse' advice/tuition than the best legal knowledge in the field available.

Richard Susskind has argued that future for legal expert systems would be to advice lawyers on fields of law which are not their primary expertise (Susskind 1993). However, in legal practice, relevant examples are less easy to come by than one might think. The way legal education and indeed legal systems are structured means that situations in which, say, a family lawyer needs substantially more international law than the bits and pieces covered by his legal education seem to be rare - especially in those legal systems which insist on a comprehensive legal education without much specialisation. There is however one field in legal practice where even the most experienced lawyer is hardly better off than the first year student. International private law cases require quite often a minimal knowledge of a foreign legal system, without the possibility (or indeed the need) for a lawyer to become an expert for the foreign jurisdiction in question. A rough and ready introduction to the essentials, restricted to the knowledge required for the case at hand, will suffice. Traditional tutoring systems however don't accommodate users with previous legal knowledge. But as we will see, a little bit of knowledge can be a dangerous thing, both a help and a hindrance. Ideally, good computer-support system should make use of any pre-knowledge of the user, but also be sensitive to problems preconceptions - i.e. prejudices - on the user side might cause.

Globalisation of the economy and the resulting inter-linkage of legal systems will make this scenario more and more the norm rather than the exception. The internet provides in principle the possibility for almost unrestricted information about foreign jurisdictions, but again, information retrieval systems are typically not designed with a comparative law environment in mind. This would have to reach a balance between the conceptual pre-conception of the user and the conception of the foreign system accessed, effectively dealing with two sets of expert knowledge. ALICE, the African Law Information Centre is an ontology based project under development at Edinburgh University which brings together legal AI and comparative law to develop a platform which will enable lawyers from African jurisdictions to co-ordinate and harmonise their efforts to protect the environment. It tries to bring together insights from comparative law, legal AI and automatic translation. This paper describes the crucial parameters for such a system and outlines the formal solution for some of the problems identified by research in comparative law.

2. The Legal Background

ALICE is a collaborative project between Edinburgh University and the Centre for Legal Studies, Mauritius, acting as a 'gatekeeper' for African jurisdictions in general. A first intended application will concern the activities of the Indian Ocean Commission, a regional governmental organisation of which Mauritius, the Comores, Madagascar, Reunion and the Seychelles are members. Co-operation is sought in the areas of agriculture, marine fisheries and the conservation of natural resources and ecosystems. Its major activity so far has been the Regional Environment Programme, which not only seeks to carry out environmental audits and to establish information systems at national and regional level to support the implementation of sustainable management plans, but also to communicate the project itself to the public and to raise awareness for environmental issues in the member states. In addition, it includes a proposal for a legally binding regional instrument on integrated coastal zone management (Sinatambu, Gündling 1994). An information system for the natural science side of this project is already under consideration, ALICE however would deal specifically with the problem of legal harmonisation. If successful, the ALICE methodology would be made available to co-ordinate even more ambitious attempts to co-ordinate proposals for legal harmonisation, involving a higher number of African jurisdictions.

The attempt to harmonise transborder legal co-operation requires at least:

- 1) a shared understanding of the subject matter in need for regulation;
- 2) for each participating state, an understanding of the legal framework of each other state;
- 3) at each step of the formulation of the proposal, a *shared* understanding of the meaning and the effects of the agreed harmonised regulation.

It is in particular the second requirement that makes the use of computer technology, and particularly internet based technology, a promising field of application.

Environmental law is a field of law that overlaps a number of law subjects, as e.g. delict, criminal law and administrative law.

To enable a lawyer from system X to properly understand the environmental law of system Y, therefore requires often much more than merely an expert in a well-defined field 'environmental law'. It might well be the case that environmental regulation in system X are primarily based on administrative law, our X-lawyer therefore most likely an expert in public law. System Y might well achieve the same results with private law instruments, and in addition to the specific regulations pertaining to the protection of the environment, our X lawyer will need a more general introduction into the private law of Y. Already, we face an organisational problem of collecting the necessary expert knowledge. Things get even worse. Inviting simply the best legal experts of X and Y to a conference will often not achieve the desired results - in addition to their individual knowledge of their own legal system these experts also need to communicate their expertise reliably and efficiently to lawyers from a different legal system, with systematically different preconceptions. Furthermore, they ideally also know enough of the target system to understand likely problems and to anticipate misunderstandings. In our two country example, even this might just be possible. Ideally, we now need a 'bi-legal' delict law expert from X who understands sufficiently the delict law of Y, an administrative lawyer from X who understands the administrative law of Y, etc..

Obviously, with an increasing number of legal systems involved, the problem grows exponentially, and we would already need 25 bi-legal experts for all relevant fields of law. Add the necessary experts in economics and natural science typical for environmental problems, and the co-ordination of the necessary expertise becomes a nightmare.

Comparative law has become in recent years acutely aware of the problems encountered when communicating legal knowledge to lawyers from a different legal culture. In particular the work of Legrand and Samuel has highlighted the complex cognitive responses which we encounter when trying to engage with a foreign legal system. (Legrand 1996, 1998, Samuel 1997). Comparative law is probably the only field of legal research which has (more or less) systematically tried to address the question of how we react to the exposure of legal knowledge from a cognitive point of view. It provides therefore ideal material for the sort of paradigmatic shift in legal AI indicated above, allowing to refocus our research on the side of the recipient of legal knowledge. To summarise a very long story, we can say that legal education provides us with a typical 'legal mentality' (Legrand), a conceptual framework and a legal heuristic for problem solving which is typical for each legal system.

New knowledge is interpreted against this background of perceived conceptual and heuristic mechanism, constructing a 'systematic misunderstanding' (Samuel) of the foreign legal system, which ideally can be refined in a dialectical process (Puchalska-Tych, Salter 1996), adjusting the rough and ready first impression by a subsequent process of investigation and adjustment.

Secondly, knowledge of legal norms alone will normally be insufficient. The legal mentalities

typical for each legal system represent a 'way of life', a cultural context which is to some extent creating a degree of incommensurability between legal systems.

For our example, this means at least that different legal systems will shape their response to environmental problems in a way typical to their perception and understanding of 'the environment'. If your main problem is desertification, your environment law will look different from a system which is primarily concerned with coastal management or the protection of rainforests. If you live in Austria, your perception of the problem of whaling will be different from someone in Norway.

However cultural contextualisation goes deeper, and Legrand, in a sceptical inference, concludes that only someone prepared to emerge totally in a different culture can properly understand its legal system - someone who has never visited the Louvre, or read Zola will never understand French copyright law. While we share the concern for the importance of cultural context for cross-system legal hermeneutics, we think that computer solution are ideally posited to answer all the requirements uncovered in comparative law. Or, from a philosophical point of view, where he follows Wittgenstein, we follow Davidson in our understanding of abstract concepts and their role for reaching understanding: a necessary, but crude tool for a dynamic process labelled by Davidson 'radical interpretation', and maybe more aptly summarised as 'be bold to be wrong' (Davidson 1974, 1993, 1994).

In what follows, we will look at some of the features which we would request as a result from an efficient legal information system targeted at lawyers from varying jurisdictions, and highlight some of the candidates for formal solutions to these problems.

3. Theoretical background: Grounding legal discourse

Below, I will discuss in some detail two projects developed in philosophy, HIS and *Project Archelogos*, which provide case studies for several of the techniques we intend to use, for very similar purposes. They are attempts to address one part of the problem ALICE faces for legal interpretation - interpretation across cultural borders is a knowledge intensive activity, and their main contribution is to provide access to the required information. Before examining the more technical questions, it is necessary to provide a more 'phenomenological' account of the legal decision making process in cross-border problems, and also the resulting underlying theoretical assumptions for our project.

In philosophy, the need to interpret texts from foreign or past cultures, in a way, corresponds on the application side to a typical international private law problem:

When, say, analysing whether a marriage according to the foreign system Y should be recognised by the legal system X, the X-lawyer will first try to understand the concept of Y-marriage against his own conceptual scheme. If the two are sufficiently similar, then this partial understanding will suffice. The act to 'identify' Y-marriage and X-marriage is ultimately a pragmatic decision, and should not be mistaken for a statement of semantic synonymy. Understanding can and will remain partial. (Quine 1990, 1988, Davidson 1994, 1993, Cole 1985)

This gives the first indication of what we meant above when arguing that sometimes, systematically wrong advice can be preferable to a perfect information. There will always be some features of the foreign legal concept, which distinguishes it from the domestic system of the user. Presented with that information, our fictitious lawyer would always deny the recognition of the foreign legal act, international private law would cease as a subject. Conversely this means that it dependence on the concrete task at hand, and the role our user is playing in the proceedings, which information is

relevant and should be provided. If the task is to deny the re-cognition of the foreign marriage, any facts which distinguish the two concepts could be helpful.

Returning to our example:

If, and only if, the two concepts are not even superficially similar, X will want to ask further questions, for instance on the religious system of Y, the history of its concept of marriage, or its attitude towards sexuality. In this process, X's conceptual vocabulary does either not change at all, or is enriched by some of the vocabulary of Y. But the core legal vocabulary of X, his own legal concepts, remain unchanged.

While a necessary part of the application intended here, our problem is considerably more complex. Not only should it facilitate the understanding of one legal system in the vocabulary of another, but the participants should ultimately agree on a shared meaning, establish common ground, and therefore, with necessity, adjust their own legal vocabulary in the process (Gaerdenfors, 1993, Hutchins 1995, Tels 1996).

So, ALICE will have to juggle not with once conceptual scheme, or two, but with several schemata which in addition may change over time.

In our two-country example, we have the conceptual schemes X and Y, and an emerging, agreed scheme Z. As Z emerges over time as a result of the dialogue between X and Y, the conceptual schemata of X and Y change, as a result of their exposure, both to each other, and the emerging 'harmonised' law Z (for a computational version of similar processes see Steels, 1997, and also Clark and Gibbs, 1986).

A notion of common ground has been central to recent developments in linguistics and computational work on interaction in dialogues. In particular, Clark's work on grounding made it possible to gain new insights into a whole range of linguistic phenomena, from the way speakers develop through pragmatic interaction, a shared vocabulary, and elimination of misunderstandings, to more general theories of language change and language acquisition (Clark, 1996). Meaning in this approach becomes essentially a dynamic attribute of utterances.

As a conversation progresses, a common ground emerges. This gave rise to a number of studies which emphasised the interaction of culture, meaning, and understanding (Wertsch, 1985). Cultures are understood as the set of assumptions which need not be questioned any longer. New information is processed against this cultural background. Unlike Legrand, this does not in any way rule out the possibility of transcending cultural boundaries. On the contrary, presuppositions are seen to play a crucial role in the process of agreeing shared meanings between speakers who initially were using contradictory conceptual schemes (Cole, 1985, Harnard, 1990, Balkenius, 1996).

Clark argued that conversations are controlled by co-ordinated pragmatic strategies. After each contribution, the partners in the dialogue try to satisfy the grounding criterion - contributor and recipient of new information mutually believe that the partner understood what the contributor meant relative to their own purpose. The strategies which enable the emergence of a common ground are both normative and descriptive, in the sense of 'best practice'.

Humans do empirically employ strategies as for instance explicitly acknowledging that they understood a contribution by a dialogue partner, but computer simulation can also show that these strategies are indeed efficient, necessary and sufficient to create purpose-relative understanding. As a result, they have been used with great success for instance to design automatic feedback for computer assisted languages learning, the computer taking 'turns' in the way a natural speaker would (Davies and Poesio, 1998)

Loganalysis and *Elenchos*, discussed in more detail below, use similar 'prompts' or feedbacks by the computer to simulate communication and facilitate learning, but neither of them is based on a theory of co-operative knowledge acquisition, and while the 'moves' of the computer in *Elenchos* have a similar dialogue logic as those used for the implementation of Clark's work, they are motivated by semantic validity and not pragmatic effectiveness. Clark's research made an important contribution to our understanding of second language acquisition, and the changes of conceptual frameworks when exposed to stimuli from a different (cultural) context (Labov, 1994). Since it is a fundamental assumption of the ALICE project that comparative legal research and international private law problem-solving is sufficiently similar to second language acquisition. Computer implementation of Clark's theory for computer assisted learning will play an important role.

ALICE should facilitate the communication between human actors to achieve a shared goal. Recent applications of Clark's theory provide some of the parameters and technical solutions for this task (see e.g. Kraus, Fussell, 1990, Clark, Gibbs 1986).

Clark's theory also plays a more fundamental role, in giving a theoretical account of the processes involved. Computer modelling of the interaction in dialogues shows that this process is indeed a sufficient basis for reaching a form of 'pragmatic understanding'. Or put differently, conceptual distinctions and classifications can emerge through a process of negotiation and adjustment which is aided, not undermined by the preconceived ideas of its participants (Langely, 1987, Billman, 1988, Steels, 1997b) Prejudices, ultimately, constitute cultures *and* transgress them (Allport, 1954, Winters, 2000). As a result, these simulations hint at a notion of legal harmonisation and cross-border legal understanding which is very different from the current discussion in comparative law and the theory of legal integration.

It is understanding reached without a hierarchical structure or the presupposition of a 'dominant' conceptual scheme. Prejudice and cultural expectations turn out to facilitate rather than obstruct understanding, as they provide a modifiable starting point for the dialectical process of establishing common ground. While opponents and proponents of legal harmonisation often assume that harmonisation means identical understanding of the agreed legal vocabulary, (Legrand, 1996), the notion of common ground is sufficiently 'weak' to explain understanding despite remaining differences.

I discussed the potential of computer modelling of bargaining games for the emergence of harmonised legal orders in detail elsewhere (Schafer, Bankowski 2000) For our purpose, it is important to bear in mind that it is possible to model on a computer potential usages of ALICE, making the system more robust than a merely empirical trial and error study. Again, it points towards expert systems who do not have all the answers in advance, but systems which reach gradually better understanding through interaction with the user.

I want to conclude this part with a short outline on how theory of grounding and models of co-operative problems solving might be translated into ALICE.

At its most basic level, ALICE will have a similar form to that of the open law project at the University of Harvard. Open law is essentially a website which invites legal experts to help drafting proposals for law reform or law suits for civil rights cases. The resulting legislation or legal action emerges out of the non-hierarchical co-operation of the participants, who can propose changes to the text, or attach comments and questions via hyperlinks. Similarly, ALICE will have at its core a document with intentionally vaguely defined 'subject headers' (e.g. 'liability of hazardous chemicals') with 'world knowledge' links to help the user understand the problem for which legal regulation is sought, e.g. links to scientific texts. Users can then propose formulations, make changes to previous proposals, or attach comments on how a specific formulation would be understood in their legal context. These comments lead again to sites providing, in decreasing relevance, world knowledge that helps understanding the comment.

Schematically:

Figure 1: How ALICE could be used to work out a problem

When adding information to the system, or when navigating through the links to solve a particular problem, the user will be assisted by prompts by the computer. In this example the task is to agree on a legal regulation concerning liability for damages caused by the release of genetically modified food into the environment. Those sides agreed on imposing strict liability. However, and unknown to them, strict liability has a systematically different meaning in their relative legal cultures. As long as this does not cause any concrete problems however, this partial understanding is sufficient, and they can say to have agreed on the relevant regulation, but if a problem emerges, either side can question the meaning attributed to strict liability by the other side. Once the question is raised, the common ground has to be re-established. This will only be the case if both sides have no further questions.

Back to the example:

Y asked X what he means by strict liability. X then uses legal advice, for instance from a textbook. At this point, Y can agree, agree to disagree, or continue to question X on the meaning of strict liability. Only in the last case, he is then referred to further explanations, for instance the leading case. Again, he can now decide that he has now a sufficient understanding of the legal meaning attributed to strict liability in the foreign jurisdiction, and of the basis of this, renegotiate the legal regulations on GM food, or else, he can request further information.

In our example, it might turn out that the difference between the two jurisdictions was historically caused by a small difference in the cultural background, say a different attitude to domestic animals. Having an industrial economy, damages caused by animals were so rare that it seemed unproblematic to leave the loss always with the owner. Provided with this background information, Y can decide that the difference is after all immaterial for the case at hand. In this case, they can decide to retain the original formulation, despite the difference in interpretation discovered in the process (Clark, Gibbs, 1986). Harmonising laws need not mean to superimpose one identical meaning for all participating jurisdictions. Or they can decide to introduce an explicit definition of strict liability, which however exempts damages caused by animals. Either way, common ground has been re-established. During this process, the computer remembers that there is still an open problem, a conceptual mismatch (Visser, Bench-Capon, 1998) and advises other users accordingly.

Conversely, in deciding a concrete case on the basis of the agreed formulation, the user would be guided from the text to more detailed explanations until she decides that for this purpose, she has gained sufficient understanding. The common technique in automatic translation is to provide user profiles, based on past experience with individual users. To some extent, this has also been the feature of *Elenchos*.

Let's assume that both sides in our example agreed on the formulation proposed initially, that is imposing strict liability without qualification, but bearing in mind that the two jurisdictions might interpret the relevant clause differently. In our case, this interaction would result in two different profiles, one for the typical X-lawyer, one for the typical Y lawyer.

An X lawyer, searching for information which relates to his own jurisdiction only would not automatically be provided with any additional information. However, if he has to solve the problem which has a connection to the jurisdiction of Y, the system would automatically remind him of the potential for problems. Initially, it is assumed that ALICE will have predefined profiles, which rank for instance legal systems according to their remoteness. The user would identify himself for instance as coming from a common-law jurisdiction, and receive additional informative prompts if and only if he has to deal with a civilian jurisdiction. At a later stage, we will experiment with profiles for individual users.

4. Related Projects

Comparative law is obviously not the only subject that deals with the interpretation of texts from a different cultural context, and philosophy in particular has recently discovered the usefulness of computers and the internet to assist researchers in the interpretation of texts from a different cultural context. ALICE will build on the experience of two projects in particular, the *Elenchos*-study within the 'Project Archelogos' at Edinburgh University, and HSI (Hermeneutics, Semiotics, Informatics) at the Technical University Chemnitz.

4.1 HSI

HSI started as a colloquium organised by Ferdinand Fellmann, at the University of Chemnitz. Its aim is to:

'develop alternative methods for the understanding of texts, and to address the shortcomings of traditional hermeneutics through developments in computer technology' (Rolf 1998).

For our purpose, the most important aspect of this research is its attempt to start with an investigation of the concept of 'understanding' and its cognitive implications. This will lead to a pragmatic and operational notion of understanding which can be supported efficiently through the use of computer technology. This emphasis on the notion of understanding rather than knowledge representation or argumentation mirrors the shift indicated above.

Two of the findings of this research group will be directly relevant for ALICE. The first concerns the importance of 'background knowledge' for the interpretative task. Fellmann uses as example the task of interpreting Goethe's *Werther*, which requires an understanding of the knowledge available to the author and his average reader regarding e.g. sociology and psychology. Not in the sense of an objective account of the social conditions of the 18th century, but as an account of the subjective knowledge of the historical author.

For comparative law, these concerns are expressed by Legrand, who draws our attention to the need of a cultural background knowledge that transcends the information provided by the legal text. Again, this knowledge will typically be 'subjective' in the sense described here. If we want to understand, say, certain developments in the English law of real property, we can not measure it against a yardstick of 'objective' knowledge of the economic conditions of the 19th century - this would be Mattei's economic approach to comparative law - but we need to understand the economic knowledge and philosophy of 19th century England which would have informed judiciary and Parliament.

For research in comparative law, and even more, for concrete legislative projects based on findings from comparative law, this poses a serious problem. Since potentially, the most minor detail of e.g. 19th century culture might be necessary to properly understand a particular piece of legislation, the amount of knowledge required to co-ordinate the cross-border understanding of several jurisdictions presupposes the availability of such huge amounts of specialist expert knowledge that for mere reasons of logistics, the traditional methods of conferences and edited books for the acquisition and dissemination of it becomes infeasible. This has been indeed the experience of our collaborators from Mauritius.

Internet based systems offer an ideal solution to this problem. HTML allows to 'annotate' the legal provisions with 'interpretative' links to relevant sites, representing the collective world knowledge or 'horizon' for the interpretative effort. While it will be an obvious (and technically unproblematic)

requirement for ALICE to be Internet-based, most of the 'blue sky research' associated with the project will develop techniques to deal with the unwelcome side effect of this solution, i.e. attempts to reduce the available knowledge to those parts which are relevant for a given query or problem.

A second, and more unusual, element of HSI is its idea that the interpretative act is not only supported by a (hidden) computer programme, but indeed means writing one (Fellmann 1999). ALICE will to a certain extent reflect this insight. While its users will not directly be asked to 'write codes', they will have the possibility not only to add to the database, but also to access the formal representation of this information, and to rearrange directly the structure ('ontology') of the knowledge represented.

4.2 Project Archelogos

The author's own experience with computer aided interpretation originated in his involvement with the *Elenchos*-project at the Department of Philosophy at Edinburgh University. *Elenchos* is a sub-study of *Project Archelogos*, which, while older and developed independently from HSI, can be seen as one of the most developed application for a computer-supported textual interpretation (Schafer, 2000).

Archelogos itself is primarily a 'dumb' database, with arguments of Platonic dialogues as objects, restructured by experts on Plato using a methodology which emphasises the logical structure of the arguments (Scaltsas, 1997). Hyperlinks link philosophical propositions to their supporting premises, allowing the reader to navigate through the internal structure of an argument. In addition, and here *Archelogos* comes closer to HSI, researchers are able to navigate from the original Platonic texts to various, often contradictory interpretations found in the secondary literature. These again are linked to comments on the validity of this argumentation by other scholars, and indeed back to the war with the Platonic text if a commentator supports his interpretation through a cross-reference to other textual passages.

From the beginning, the idea behind *Archelogos* was to use this material for teaching purposes, to help students appreciate the logical structure of philosophical arguments. *LogAnalysis* was a first study within the *Archelogos* frame to use the collected data for interactive tutorials. It has been specifically designed and created for university and advanced high school students. It provides an *Archelogos*-type of argument analysis, but also much more in terms of philosophical instruction in contemporary and classical Philosophy for the student. In order to attract the student's interest and provide the background for the philosophy of Plato it also contains a substantial cultural archive about the philosophy and the culture of the times that the dialogue was written. Again, this feature corresponds to the requirement of contextual background knowledge identified in HIS and in comparative law. ALICE will consequently use a similar multi-medial approach to annotate information. But unlike *Elenchos*, users will be able to create direct links to information they consider of interest, marking the move from a passive system to a dynamic one, and so addressing the problem of organising the necessary expert knowledge, identified above as one of the obstacles in the process of discussing legal harmonisation.

However, even *LogAnalysis* remained relatively 'dumb'. Feedback was limited, and students were confined to static representation of the Platonic arguments and a predefined set of questions and answers. However, it is able, within limits, to check if the student has properly understood the text at hand. If 'unconvinced', it will prompt further elucidations from the user, or provide further information. A similar quasi-dialogue in ALICE will allow, again severely limited, checks of understanding by the system. Where the likelihood of misunderstandings has been identified beforehand, ALICE will ask leading questions and, if the answers are mistaken, provide further information.

LogAnalysis links the various arguments from the primary text to several, often contradictory interpretations in the secondary literature. This corresponds in ALICE to the idea that a primary text, the agreed treaties, has links to the various interpretation it receives in the participating jurisdictions.

Elenchos, an expert system for Plato's political and legal philosophy, tries to incorporate a more dynamic and 'intelligent' use of the material. (see the *Archelogos* webpage) Its original brief was intentionally wide: To investigate the potential of expert system technology to offer both students and academic philosophers an optimised use of the *Archelogos* database. The result was a dialogue game not dissimilar to dialogue based expert systems for legal education. It allows students to have a (partially open ended) 'discussion' with the computer which represent the Platonic argument for democracy. The user will be able to question the system, force it to justify its answers, and can challenge it with (limited) counter-arguments. The user can also choose pre-formulated counter-arguments (for or against democracy) derived from the subsequent philosophical discussion, challenging e.g. Plato with an argument typical for Rawls or Nozick. The brief for *Elenchos* was wide:

To develop a model for the presentation of European cultural heritage in text using innovative artificial intelligence techniques so that the European cultural heritage will be accessible to both specialists and non-experts.

The inclusion of both specialists and non-specialists was of specific significance for ALICE. It turned out that certain features of the programme caused problems for the specialists only. Students typical struggle with the content of the text, but are prepared to take the information at face value. For them, the feedback mechanism was satisfactorily reliable. i.e., we were able to foresee correctly likely problems and difficulties. Experts however would often mis-construct the question, or, in a rather diffuse sense, feel unable to answer it, and left feeling unhappy with the way the question was posed (see also on this Isaac, Clark, 1987) .

In these cases, there was typically a disagreement with the argument structure chosen by the project-designers, and the prior conceptualisation of the expert. Different ontologies and conceptualisations of user and system can result for instance in presupposition failure, both in the sense that a question posed by the computer carries a presupposition not shared by the user, or a presupposition of the user not being represented in the system's ontology. As a problem, this again mirrors the situation we face in cross-border legal studies - it is possible to educate any student in any legal system, but once the conceptual scheme pertaining in a given system is learned, the acquisition of a second system is fraught with problems.

Elenchos uses two strategies to deal with this problem: firstly, we encounter again 'user-profiles'-the system learns from the answers the user is giving in a dialogue game, and can adjust the 'difficulty' level, e.g. by displaying more or less additional information and background knowledge, or by more or less elliptical argument structures. This reflects the positive side of pre-knowledge; the expert user will get easily bored, and won't need information he considers as trivial. 'The obvious goes without saying', and as long as this does not cause problems, the pragmatic solution is to restrict again the amount of information provided.

When pre-knowledge gives rise to misunderstanding, instruments are needed to re-establish the lost common ground. In *Elenchos*, this happens by allowing the expert user access to the formal deep-structure, where she can:

- a) see explicitly the conceptual choices made by the system designers; and
- b) can alter these conceptualisations by providing alternative models.

In the *Elenchos* example, she can for instance change the status of a proposition X from 'supporting

proposition Y' to 'is supported by proposition Y' if she disagrees with our analysis of the argument structure.

We will discuss a short legal example for ALICE below, after we have discussed the nature of this 'formal deep structure'. However, we should note already here that this is indeed the core of ALICE - the ability to deal with more than one conceptualisation at the same time is the one distinguishing feature of all the applications we have intended, from abstract research in comparative law, to the solving of IPL problems, to the design of unified legal frameworks which replace national legislation.

5. Modelling agreement and misunderstanding

Clark's research and its further development in the theory of grounding and computer modelling of the emergence of understanding forms the theoretical foundations of ALICE. Little has been said so far however about the technical solutions which corresponds to the findings of this approach. Concluding, I want to give a short outlook at two formal approaches in particular which not only seem to match most closely the theoretical requirements following from research in grounding and the theoretical work on comparative law, but which also show avenues for overcoming some of the problems encountered in HIS and Project *Archeologos*.

5.1 Active logic

'Active logic' is the name of a family of inference engines developed at the University of Maryland by, amongst others, Don Perlis (Gurney, Perlis, Purang, 1995) The distinguishing feature is that they incorporate a history of their own reasoning as they run, making them more flexible than traditional AI systems and therefore more suitable for commonsense reasoning.

Common sense agents are defined as:

'people who are not necessarily very good at any particular task but who are able to maintain a focus, an assessment of what the task or topic is, or that is has changed, or that it is not clear, that help is needed, that the task should be given up etc. A familiar human setting is that of trying to follow an expert discourse, or one in a foreign language, and missing in a lot of the details'.

Already this definition coincides obviously with the scenario ALICE has to deal with. Typically, lawyers representing one country will listen to the expertise provided by the colleagues from the other participating member states. Initially, they will rather crudely try to understand the new information within their own conceptual framework, adjusting as they progress, and eliminating initial mistakes in light of new evidence.

Traditional AI systems showed a lack of flexibility in the face of nonsense, contradictions, and conceptual mismatch. According to the *active logics* group, this mistake is the result of the inability of traditional systems to use the knowledge they have to recover from their mistakes. Recovery from mistakes is a separate process from reasoning about the world and therefore cannot make use the power of the inference machine and its world knowledge (Perlis, Purang Andersen, 1998).

Active logic on the other hand is able to reason about its own believes and mistakes in the same way it reasons about the external word. Intended applications in particular are misidentifications, contradictions, context shifts, new words, new meaning for old words, and believe revisions. Again, most of these problems will be encountered by people engaged in the process of negotiating a new harmonised legal order. Initially, they will encounter new words describing legal concepts of a foreign jurisdiction, which they might misidentify at first, only to realise the initial 'mistake' if this

initial hypothesis results in contradictions.(this is what Salter described as the dialectical procedure of comparative law). `Mistakes' can be tolerated, and are indeed `encouraged', if this does not result in the breakdown of communication. (Perlis, Purang, 1996) Eventually, once the new legal text is agreed, it might well use concepts which also can be found in the legal systems of the participating countries, but with a changed meaning. In return, the new supra-national law will feed back into the participating legal systems, changing the meanings of the concepts which gave originally rise to it. (Schafer, Bankowski, 2000) .

Some of the things Alice has to do, and active logic promises to offer, are:

- * Noting and resolving identification error;
- * Noting and resolving contradictions;
- * Learning new words and new meanings for old words.

A particularly advanced application for *active logic* is the problem of presuppositions. Starting, as we did, with the emphasis on the user and his problems, the *active logic* group noted that the standard solution of *Prolog*, to interpret failure as negation will often result in presupposition errors. Presuppositions, as we noted above, play a crucial role as a source of understanding and misunderstanding alike. The user used to the conceptual frame of his legal system will typically assume that the foreign legal system has equivalent concepts and ideas. Initially, as a hypothesis, this assumption is necessary and indeed helpful. Only if these presuppositions or prejudices fail will we run into trouble if we are not flexible enough to adjust the initial assumption.

Traditional expert systems were rather inflexible in this regard. When for instance sending a query whether a specific judgement relies on the notion of the precautionary principle, the traditional database would interpret the failure to recognise this concept simply as a negative sentence: `no, the precautionary principle was not used', but it would not automatically alert the user that the precautionary principle does indeed not even exist in the jurisdiction in question. *Active logic* is able to make this distinction and therefore offers an important contribution to the avoidance of culturally induced misunderstandings (Gurney, Perlis, Purang, 1997).

5.2 Formal ontologies

While the inference engine will make use of *active logic*, the even more important question for ALICE is how to represent the legal information. In the same way as the emerging theory of grounding provides an interdisciplinary exchange where computer science, comparative law, linguistics, and cognitive science come from very different directions to the identification of similar problems and solutions, so does the emerging field of formal ontologies.

I argued for the importance of formal ontologies for comparative law and questions of legal harmonisation in detail elsewhere (Schafer 1998). For our purposes here, it is sufficient to note that most of the traditional applications of formal ontologies have a direct bearing on most of the problems discussed here. Uschold (Uschold, Gruninger, 1996), for instance, writes in his introductory text:

People, organisations, software systems must communicate between and among themselves. However, due to different needs and background contexts, there can be widely varying viewpoints and assumptions regarding what is essentially the same subject matter. Each uses different jargon, each may have differing, overlapping and/or mismatched concepts, structures and methods. The consequent lack of shared understanding leads to poor communication within and between these peoples and their organisations. The way to solve these problems is to reduce or eliminate

conceptual confusion and come to a shared understanding. Such an understanding can function as a unifying framework for the different viewpoints.

Ontologies are particularly helpful in situations where a computer application requires the use of multiple categorisations. This is in practice frequently the case. The new expert system to support courts in deciding the likelihood of re-offending of offenders for instance will receive information from social services, the police, the prison system and psychologists. All of them will use computer systems with embedded conceptual assumptions which might or might not be compatible with those used by the other services. Ontologies serve to make these assumptions explicit by identifying the logical connections between elements across models of the system.

The focus on shared understanding, which we have already encountered in Clark's work, is by no means coincidental. Simon Winter's paper on expectation and meaning, which informed much of the discussion above, cites for instance, the 'part- whole relation', as one of the global properties of lexica which are a prerequisite for establishing common ground, a universally shared expectation. Part-whole relations are then again at the very heart of many systems of formal ontologies, most notably mereology.

The process of legal harmonisation then can be seen as ontological engineering, the establishing of a shared understanding of some domain of interest. The vocabulary of the emerging legal text and the ontology it implies (i.e., its semantic) functions as an inter-lingua.

If we remember the analysis of the necessary steps which precede an agreement of the new treatise, we will note that two stages can be distinguished. The first consists in understanding, as much as possible and necessary, the legal framework of the other participating countries. Secondly, to agree on the basis of this understanding a new legal framework, the harmonised law. The first stage corresponds what in ontology oriented programming would be called ontology based information gathering, the second is similar to the process of ontological integration (Vimercati, Montanari, Vincini, 1998). Here, a new standard (for instance on metatags for webpages) is agreed, which retains as much as possible of the original, heterogeneous and localised conceptualisations, so as to be better able to deal with the data inherited from them. Quite often, these new standards will have the form of an explicit agreement (see e.g. Benjamins, Fensel, 1998).

Ontologies are sufficiently flexible to deal with both stages of the negotiation process. The first, establishing shared understanding, employs what Guarino called 'fine grained ontologies', i.e. ontologies which axiomatically describe the intended models in a very precise way (Guarino, 1998). For the newly created legal text, a coarse grained ontology is sufficient, as this allows the participating countries, within certain parameters, to see the harmonised law as natural extension of their own legal system - even if these systems would contradict each other. This, highly desirable, result is due to the fact that coarse grained ontologies underspecify their intended models and are therefore only suitable as means of communication if there is at least some shared understanding of what these models should look like.

To choose ontologies as means of representing the legal conceptualisations of the participating lawyers, and to integrate them into a new, 'harmonised' ontology, has a number of consequences for the project:

Firstly, it means that the legal provisions in question are not represented as sentences, but as objects. Law is seen not a system of rules, but as a network of relations between objects, e.g. the (formal structure of) a contract object and an 'environment object', linked through a formal relation.

Secondly, the emphasis is on the semantics, not the syntax of the texts. HIS introduced the idea that writing a small programme should be part of the interpretative process. However, these programmes were understood syntactically. The original text found a syntactic representation in a logic based

computer language, which in turn was manipulated to produce an interpretation. It seemed difficult, if not impossible, to bridge the gap between these syntactic rewriting operations, and the semantical dimension of the text (Fellman,2000). Since ALICE chooses from the beginning a semantic approach to represent the natural language law texts, this gap does not arise.

Thirdly, ontological representations can be easily transformed into graphical images. The user therefore will not write code, but simply move around symbols and boxes. No logical or computer training will therefore be necessary

I refer the reader for a more detailed understanding of ontologies to the burgeoning literature in this field. However, a small example might be helpful to understand the potential of this methodology.

Johansen and Wohed (1998) discuss an ontology based deontic specification pattern to classify legal documents and facilitate information retrieval. Similar structures will be used by ALICE to represent the underlying conceptualisation, the 'meaning' of the legal texts. One structure they introduce is a deontic object tree, which represents top level ontological relations in a legal domain. One of the nodes of this tree (the representation of the formally introduced 'specificity-relation') distinguishes between revocable and non-revocable obligation (objects). Revocable obligations can be subdivided into those which are revocable by both parties, and those which are revocable by only one party. An example for the latter, in Sweden, is citizenship.

The resulting tree looks therefore like this:

```

obligations
  revocable irrevocable
    by all by only one party
      citizenship

```

Figure 2: Semantic tree of citizenship

However, lawyers from Germany or Greece are used to a system in which citizenship cannot be revoked. In the discussion with the Swedish colleague, this can be the cause for misunderstanding, and ontological mismatch (Visser, Bench Capon, 1998) Once the reason for the problem is understood, the German lawyer can select the citizenship box and move it to right branch of the tree. ALICE then creates an alternative ontology and keeps a record of this is the potential problem. Again German lawyers would not normally be informed about this conceptual distinction by ALICE as long as they do not deal with a legal system that adopts the Swedish conceptualisation.

Another example. Lawyers from civilian jurisdictions are used to three branches of courts, civil, criminal, and administrative. English and Scots lawyers however do not distinguish in procedural law between private law and administrative law cases. A French lawyer might want to know if there are any decisions by the administrative courts in England on the precautionary principle. Environmental issues typically would be dealt with in France by an administrative court. If using ALICE, the *active logic* inference engine would insure that in this case, he receives an intelligent and supportive feedback. He would be informed that his query was unsuccessful not because English administrative courts do not recognise the precautionary principle but because there are no designated administrative courts in England. He could then access the ontology which represents the

English court system. Its binary divide between private and criminal courts could then be extended by a third branch. This branch could then lead via a hyperlink to supporting texts which would help the user to understand:

a) why the two ontologies differ; and

b) which of the two branches from the English system comes closest to the third branch in the civilian system, allowing a sufficient, if ultimately faulty understanding.

6. Summary

Findings in comparative law on the methodological assumptions of cross-cultural legal understanding mirror closely findings in the theory of grounding. The convergence of results and problems from comparative law, linguistics, cognitive and computer science make it promising to use computer implemented solutions to problems developed by the latter to overcome perceived shortcomings of the former. Alice, using results from similar systems developed in philosophy, will explore in particular the possibility to develop an ontology based expert system which combines a range of technical solutions to minimise the danger of misunderstanding and to maximise the availability of expertise to people engaged in the process of creating transactional legal treaties. If successful, legal AI would have finally identified a field with considerable growth prospectus, and a considerable advantage over its human competitors.

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