Knowledge Criteria for the Evaluation of Legal Beliefs

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Abstract

In this paper, we describe an evaluation framework for legal information systems. The framework is based on knowledge criteria. We distinguish four belief types, *viz.* perceptual beliefs, testimonial beliefs, inferential beliefs, and interpretative beliefs. Beliefs of these types can be transformed into knowledge by the fulfilment of knowledge criteria. The knowledge criteria examined are truth, justification proper, reliability, consistency, and coherence. There is a hierarchy among these criteria. We will show that beliefs, depending on the type they belong to, become knowledge by applying different subsets of these criteria. Two legal information systems are evaluated using this framework. Results are presented and two conclusions are drawn. Finally, further research on legal knowledge criteria is suggested.

1 Introduction

So far two issues have attracted too little attention in the field of AI and law. They are the assessment of legal beliefs (when can a belief be qualified as knowledge) and the application of this assessment to legal information systems.

When a person is convinced of some fact, (s)he holds a belief. For instance, if Bill is convinced that his sister committed a murder, he holds such a belief. The content of the belief is 'my sister committed a murder'. This belief need not be knowledge. If Bill's sister did not commit a murder at all, we are not inclined to call Bill's belief knowledge. To become knowledge, his belief should, among other things, reflect what actually happened. The criteria we employ to determine whether some belief is knowledge are called knowledge criteria. There are two types of knowledge criteria: definitional criteria and recognition criteria. Definitional criteria indicate how a belief is defined. Recognition criteria indicate how we actually find out whether a belief is knowledge. We focus on definitional criteria.

The question what transforms a belief into a piece of knowledge often remains unanswered in the realm of legal information systems. Reichgelt (1991, p. 3) states that the plain use of a knowledge-representation language does not imply that the information written down in that language

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qualifies as knowledge in a philosophical sense. So, knowledge representation is not directly related to the fulfilment of knowledge criteria per se; from our point of view it should therefore be called belief representation. In this paper, we claim that the question what transforms a belief into a piece of knowledge is relevant, because (1) legal information systems contain represented legal beliefs, *i.e.*, they contain representations of beliefs about positive law, interpretations, systematisations, legally relevant facts and so forth, and (2) we want to be able to qualify these beliefs under certain conditions as knowledge, since mere beliefs do not have sufficient bearing on their object. To put it in other words: beliefs should reflect 'legal reality'.

The employment of knowledge criteria is assumed to fill the gap between belief and knowledge. We concentrate on five knowledge criteria. Depending on the content (*i.e.*, the type of belief) a subset of the five criteria qualifies, when fulfilled, beliefs as knowledge. These criteria identify characteristics of beliefs. Since we focus on definitional criteria, our (general) definition may diverge from the demands actually imposed on beliefs in the legal domain.

The goal of adopting definitional criteria is to employ them as an evaluation means for legal information systems. Two systems are taken as pilots. Their belief content is subjected to our knowledge criteria. Since we distinguish four different belief types, we deal with four corresponding sets of knowledge criteria. We have investigated the impact of the fulfilment of knowledge criteria on the two legal information systems.

The main research question partially answered in this paper is: how can we use knowledge criteria to evaluate the task of a legal information system? Section 2 provides an overview of the five criteria employed in our definition of legal knowledge. In section 3, we discuss the two pilots and we evaluate the tasks of these systems according to the knowledge criteria employed. Finally, section 4 provides conclusions and some suggestions for further research.

2 Knowledge qualification

Ryle (1949, p. 25 ff.) distinguishes between two types of knowledge: (1) knowledge to perform intelligent skills (knowing how or procedural knowledge) and (2) knowledge about what is the case (knowing that or declarative knowledge). We discuss only the latter type of knowledge, and accordingly, only declarative beliefs. In our research, we start distinguishing five knowledge criteria: truth, justification proper, reliability, consistency, and coherence. This is not exhaustive, but it suffices our goal, *i.e.*, constructing a framework for the evaluation of legal information systems. After discussing the individual knowledge criteria, we show how the criteria relate to each other, *i.e.*, that there is a hierarchy among them.

2.1 Five knowledge criteria

In this subsection, we provide a necessarily brief characterisation of five knowledge criteria. This characterisation is meant to account for the interrelationship and the use of these criteria.

The first knowledge criterion is truth. The truth criterion adopted here is correspondence truth (*cf.* Devitt 1991): if the content of a belief means that a certain state of affairs exists, and the state of affairs does indeed

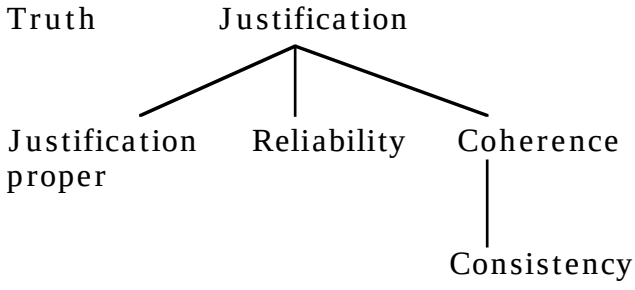
exist, then the belief is true. Thus, if Bettie Curry believes that Bill Clinton was in the bathroom next to the Oval Office at 11 p.m., 18 July 1997, this belief is true if Bill Clinton was indeed in that bathroom at that time.

The second knowledge criterion is justification proper. The application to a belief amounts to giving sufficient reasons for that belief, and, if necessary, reasons for those reasons (cf. Pollock 1986). The term justification itself is reserved as a denominator for a set of knowledge criteria, including justification proper. Between a reason and a belief, there is a supportive relation. This means that the reason sustains the belief. For instance: the belief that Bill Clinton had a sexual relationship with Monica Lewinsky is supported by the reason that Monica Lewinsky testified she had such a relationship with him.

The third knowledge criterion is reliability. According to Goldman (1979), the justification of a belief depends on the reliability of the mechanism that forms it. The human cognitive system, for instance, is such a mechanism. If the mechanism is reliable, and if it thus tends to yield correct beliefs, the resulting beliefs are justified (*ibid.*). A belief like 'Bill Clinton was in his bathroom at 11 p.m. on August 23, 1998' is thus deemed to be partly justified if a person – say, Bettie Curry – who generally gives correct accounts of what happened, produces it.

The fourth knowledge criterion is consistency. This is a logical criterion. It says that two beliefs may not logically exclude each other. If one belief says that Clinton committed perjury and another belief says he did not, they are not consistent with each other.

Coherence is the fifth knowledge criterion. Coherence often implies consistency, but in this paper, we clearly distinguish between them, although we recognise their relation as given in Schema 1. Coherence is a measure that indicates to what extent the content of a belief is linked to the contents of other beliefs. In addition, coherence includes logical (deductive and inductive) implication relations between the evaluated belief and the other beliefs (*cf.* Kirkham 1992, p. 104). For instance, if we have many different witnesses stating that Bill Clinton committed perjury, these statements tend to cohere with each other. If, however, those statements partially contradict each other, they lose coherence. For an extensive overview of the definitions given for knowledge criteria, we refer to Audi (1993), Chisholm (1966), Goldman (1986), and Pollock (1986).



Schema 1. Relations among knowledge criteria

The interaction among knowledge criteria becomes more clear when we introduce a hierarchical organisation for them. In our definitional concept of knowledge, truth and justification are placed at the top next to each other. Justification comprises three subcriteria, *viz.* justification proper (*i.e.*, providing reasons), reliability, and coherence. Consistency is

a subcriterion of coherence. Justification proper and coherence are related, in that providing reasons (justification proper) for some belief also establishes logical support between the reason and the belief, which may increase coherence among beliefs. But it should be noted that justification proper applies to individual beliefs and regards the content of reasons for those beliefs, while coherence applies to sets of beliefs, and regards the nature of the relations among those beliefs. The hierarchy of knowledge criteria is depicted in Schema 1.

2.2 Legal knowledge

In this subsection we focus on the application of knowledge criteria in the legal domain. We attempt to answer two questions: (1) which types of belief are employed in the legal domain? (2) to what extent can the five knowledge criteria be applied to legal beliefs? We distinguish four types of legal beliefs. They are based on the different *sources* of legal belief. Sources of belief in general are discussed in Audi (1998). The typology given here is loosely based on Audi's typology of belief sources, which consists of perception, memory, consciousness, reason, and testimony.

The first belief type consists of perceptual beliefs. These beliefs are formed by our perceptual experience. For instance, Bettie sees President Clinton walking by, and therefore she believes that President Clinton is walking by. The second type consists of testimonial beliefs. These beliefs are inferred from indirect perceptual evidence. In a newspaper, Monica reads that President Clinton visited The Netherlands. Therefore she believes that President Clinton visited The Netherlands. The third type consists of inferential beliefs. These beliefs are formed by some algorithmic inference procedure: the result of a deductive or an inductive inference constitutes an inferential belief. For instance, when President Clinton has had a relationship with every woman he kissed in public up till now, we may infer inductively that he has a relationship with the next woman we see him kiss in public. The fourth type consists of interpretative beliefs. These beliefs are interpretations of evidence. For instance, Newt sees President Clinton patting on the shoulder of an accompanying young woman, and therefore Newt believes that Clinton has some kind of affective relation with her.

The distinction between the four belief types is rather vague; indeed some beliefs can be classified as belonging to more than one type. Still, we distinguish four types of belief since applying the same set of knowledge criteria to all legal beliefs means that some criteria are inappropriate for some beliefs. For instance, a uniform procedure would impose criteria, such as truth, on beliefs that are not fit for them (*e.g.*, truth applied on interpretative beliefs). The four types correspond to four routes of acquiring beliefs: through direct perceptual evidence, testimony, inference, and interpretation. This ends the answer to the first question.

In the following, we establish to what extent the criteria can be used for the four belief types. For the classification of belief types and the accompanying knowledge criteria, we provide only a brief explanation. The interested reader is referred to Mommers (forthcoming).

First, to turn perceptual beliefs into knowledge, we need truth, justification proper, reliability, and consistency. After Gettier (1963) had pointed out that justified true belief is not necessarily knowledge, Goldman (1976) introduced the criterion of reliability as a solution to that problem. Since

reliability on itself is also not sufficient to transform a belief into knowledge, the criteria are combined. Moreover, consistency is added. Inconsistency of perceptual beliefs would mean there is an inconsistency in reality, and this possibility is rejected for the 'physical' part of the world (not, beforehand, for the institutional reality).

Second, testimonial beliefs become knowledge if they comply with the same criteria, namely truth, justification proper, reliability, and consistency. Testimonial beliefs are only indirectly formed by the belief-producing perceptual mechanism; they are also influenced by the reliability of the source of testimony (the person, institution, or system telling that something is the case). Thus, the reliability of the belief source, as well as the reliability of the person, institution, or system acquiring the belief, should be assessed. The reliability measures should both meet a certain value in order to be able to transform a testimonial belief into knowledge. The other criteria apply in roughly the same way as with perceptual beliefs.

Third, for inferential beliefs, we need truth, justification proper, reliability, and consistency as well. The truth of an inferential belief may not only depend on its correspondence with reality, but also on the type of inference made. The truth of an inferential belief formed by deduction, for instance, depends on the truth of the premises on which the deduction is performed. The justification proper of an inferential belief may be given through the reasons given for the premises on which the belief is based, or through giving reasons for the belief itself. The reliability of an inferential belief depends on the reliability of the type of inference applied, and the reliability of the premises. Consistency applies to inferential beliefs in the same way as it does to other beliefs.

Fourth, for interpretative beliefs, we need justification proper and coherence. It is seldom possible to apply the truth criterion to interpretative beliefs, as interpretations do not *correspond* to states of affairs in reality. Instead, they sometimes *establish* states of affairs in reality. For instance, in case a judge forms an interpretative belief in the Lewinsky case, and the judgement is that Clinton is guilty of committing perjury, the judge establishes an institutional fact. True statements can be made about such facts. The coherence criterion imposes constraints on relations among beliefs. It replaces the external criterion of correspondence. Coherence itself only concerns relations among beliefs, not their relation with reality. In table 1, we list the criteria that qualify four types of belief as knowledge.

Type of legal belief	**Knowledge criteria**
Perceptual beliefs	Truth, narrow justification, reliability, consistency
Testimonial beliefs	Truth, narrow justification, reliability, consistency
Inferential beliefs	Truth, narrow justification, reliability, consistency
Interpretative beliefs	Narrow justification, coherence

Table 1 Criteria qualifying beliefs as knowledge

We now turn to some additional comments on the applicability of knowledge criteria to legal beliefs (discussed above), compared to the applicability of such criteria to regular beliefs.

The notion of correspondence truth explained above can be applied to beliefs in the legal domain by an adjustment. This adjustment regards the nature of reality in the definition of correspondence truth. Correspondence

truth is defined with respect to sentences. Whether a sentence is true or false depends on the content of the sentence, the way this sentence refers to reality, and the way reality is structured (*cf.* Devitt 1991). To accommodate legal beliefs we have to acknowledge that reality is partly structured by humans. But as these structures still become part of reality, we can make true or false statements about them.
The criterion of justification proper can be applied to legal beliefs in the same way as they are applied to beliefs in general. Of course, the nature of the reasons provided partly depends on the type of legal belief concerned and the specific legal demands imposed. Interpretative beliefs tend to require more reasons for their justification proper than, for instance, perceptual beliefs. Also, demands regarding the content and structure of reasons for legal beliefs are sometimes regulated by the legal system.

Just as justification proper, the way reliability is used in assessing legal beliefs may be subject to legal regulations regarding the reliability of people or other agents. For instance, the reliability of expert witnesses with respect to special classes of beliefs may be deemed higher than their reliability with respect to other beliefs.

The application of consistency as a knowledge criterion means that beliefs should be consistent with each other. Otherwise, their inconsistency, combined with their truth, would mean that there is an inconsistency in the world. In case of interpretative beliefs, the consistency demand on itself does not apply. It is, however, often an implicit demand of the coherence criterion. Two different interpretations of the same event (or rule) may exist simultaneously without there being a reason why these interpretations should not be both knowledge.

In our view, coherence is only relevant with respect to the evaluation of interpretative beliefs. Coherence, however, applies to *sets* of beliefs, and these sets may contain other than interpretative beliefs. The criterion is not defined univocally among distinct authors. The definitions have in common that the number and nature of relations among beliefs constitute a degree of coherence (*cf.* for instance Brouwer 1994, and Peczenik 1989, p. 178-179).

The hierarchy among knowledge criteria introduced in subsection 2.1 is employed in the same way when dealing with legal beliefs. Note that our selection of knowledge criteria for the four types of legal belief enables us to specify all legal knowledge as true and justified, except for interpretative beliefs which can only be specified as justified. The justification criterion, on its turn, is filled in with different subcriteria (justification proper, reliability, coherence). This ends the answer to the second question.

3 Assessment of two legal information systems

A possible way to evaluate the contents of a legal information system is to take a closer look at the nature of the beliefs incorporated in the systems. In this section, we investigate how the application of the knowledge criteria influences the assessment of the task of a legal information system, when we assume that beliefs are indeed subject to the requirement of becoming knowledge. We assess two legal information systems, ESM and IvS. They represent two categories of systems: the first category makes decisions with the help of stored information and information supplied from the outside; the second category helps the users to make a decision by supplying information.

ESM (ExpertSysteem voor het Milieuvergunningenrecht/expert system for environmental permit law) is a system of the former category. The primary goal of ESM is to provide the user with a reconstruction of the decision process underlying the issuing of permits in environmental law. The user asks the system to provide a conclusion, given a set of data, and (s)he can ask the system to justify that conclusion by showing the underlying rules and facts. IvS (Informatievoorziening voor Straftoemeting/supportive system for sentencing) is a system of the latter category. The goal of IvS is to make transparent the current sentencing practice in order to help the judges determine a sentence in an individual case. As a direct consequence, the system is meant to reduce dissimilarities in sentences when similar circumstances apply. For the specific tasks of both systems, we refer to De Vey Mestdagh (1997) and Oskamp (1998) respectively.

3.1 Application of knowledge criteria

Below, we discuss how the task of a legal information system can be evaluated in terms of knowledge criteria. First, we examine what types of belief a system contains. Then we examine whether the knowledge criteria employed for those types of belief apply.

ESM

ESM contains testimonial beliefs about facts and interpretative beliefs about interpretations of regulations in environmental law. The task of ESM is to provide answers in specific cases about the applicability of regulations to facts. The inference process consists of performing deduction on a limited set of premises. But to perform deduction on a set of premises, one has to establish the truth of those premises. If one of the premises is an interpretative belief, we may not be able to establish its truth. When we cannot establish a truth value for one of the premises, performing deduction becomes rather questionable.

Justification proper is an important function of ESM. It is attained by clarifying the rules by which inferences are made, and by showing the data used for the inferences. This type of justification proper, called deductive justification (MacCormick 1978, p. 19), only concerns the actual inferences made. It neither confirms the data, nor the principles on the basis of which the inferences are made. The assumption in ESM is that the data stored in the system and given by the user, together with the rules applied on these data, are sufficiently justified.

ESM does not affect the fulfilment of the reliability criterion for beliefs stored in the system. Moreover, it contains no perceptual beliefs, to which the criterion applies. Yet, the reliability criterion is relevant in the following sense. It applies to the perceptual beliefs that form the basis for the testimonial beliefs stored in the system. If these perceptual beliefs are not gained in a reliable way, one may doubt the truth of the corresponding testimonial beliefs.

An assumption of the theory behind ESM is that consistency of its data is not presupposed. In first order predicate logic inconsistency of premises leads to the possibility of deriving any conclusion. The introduction of the notion of reasonable inference allows the system to make inferences from consistent subsets of premises, under the condition that these subsets contain all axioms of the theory. The system applies rules to facts. Most of the rules and facts are supplied by the system itself. The application of rules to

facts amounts to making logical inferences. By performing logical inferences on rules and facts, conclusions are drawn. The logical connections among rules, facts, and conclusions, which are made explicit by performing inferential procedures, help to make visible the coherence among beliefs. ESM thus increases the visibility of the coherence among beliefs stored in the system.

IvS

The user of IvS must make a sentencing decision. With the help of the information provided by the selection function, (s)he finds cases similar to the current one. The task of IvS is to help its user form an interpretative belief about the sentence to be imposed.

Truth within IvS mainly holds with respect to testimonial beliefs on sanctions imposed in the past. The way the models constituting IvS are built prevents it from being amenable to truth. Building a system like IvS is largely a modelling activity instead of a representation activity. Not the way the world objectively is, but the way a part of reality can be constructed for a specific task is relevant. The determination of facts and factors relevant for sentencing, their values, and the preference relations among them, partly depend on the individual opinions of judges and the builder of the system. Insofar as these facts and factors are generally agreed upon or established in the law, they can be regarded as institutional facts. If this is the case, it is possible to apply the criterion of truth to beliefs about them. It then may be possible to qualify these beliefs as perceptual beliefs or testimonial beliefs.

IvS is chiefly a means of providing justification proper. It gives support for some view, *i.e.*, reasons that have been given before to justify a decision on a sanction. To give support, it provides data that may influence the judge's opinion. There are hardly any formal demands on the justification proper of sentences. To improve the equality of sentencing, the builders of IvS demand that the quality of reasons given for those sentences be increased. Those reasons help the user of the system to assess why a specific sentence has been imposed in the past. Thus, the system contains interpretative beliefs regarding the reasons given for previously imposed sentences. This helps the user to determine a sentence in the present case.

Reliability of perceptual beliefs is not influenced by IvS: it does not serve as an intermediary between the perceiver and the object perceived. The criterion of reliability is therefore not relevant.

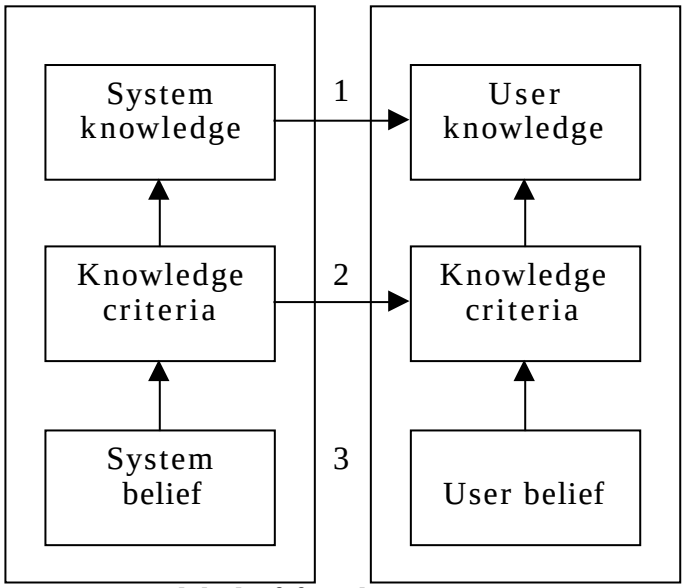
It is not a goal of IvS to maintain consistency in its case file. Logical consistency of beliefs in the system is attained by not allowing characteristics at the same time to hold and not hold for a certain case. Normal use of the system ensures that this will not be the case.

Coherence amounts to mutual interdependence of statements. On the one hand, IvS enhances coherence through its underlying model: the coherence of sentences increases with the convergence of justification statements. As justification statements are structured through IvS, the system tends to support coherence. On the other hand, the system leaves open the possibility of accommodating diverging reasons. In general, the interactions between system and user will increase the coherence of the beliefs stored in the system.

3.2 General assessment

Knowledge criteria apply to four types of belief. The beliefs are contained in legal information systems. Knowledge criteria are conditions to establish whether some belief is knowledge, and hence, they help assessing the task of a legal information system. For instance, IvS increases the justification proper of a belief held by its user, and ESM increases the coherence of a belief present in the system. Other knowledge criteria (truth, reliability, consistency) can be influenced by the employment of a legal information system as well.

In schema 2, we summarise the relations among beliefs and knowledge in information systems and in the heads of their users. The arrows pointing upwards indicate that a belief becomes knowledge whenever the proper knowledge criteria are fulfilled. Arrow number 1 refers to the acquisition of knowledge by the user of an information system. This relation is always indirect. In order to gain knowledge, a user has to acquire a testimonial belief about a belief produced by the system. In order to classify this belief as knowledge, the user can derive at least part of the fulfilment of the applicable knowledge criteria from the contents of the information system. For example, if the system contains a belief *p* that justifies a different belief *q*, the testimonial belief *q'*, held by a user, and based on *q*, may also be justified by a testimonial belief *p'*, held by the user, based on a belief *p* present in the system. Arrow number 2 refers to the relation between the fulfilment of knowledge criteria in the system and the fulfilment of knowledge criteria in the user. In order to gain beliefs, a user acquires them via the information system. A belief produced by the system



thus becomes a testimonial belief for the user. Hence, arrow number 3. A user may also base a belief partly on sources other than the system, or form other types of belief. In that case, arrow number 3 forms only part of the belief-acquisition route.

Schema 2 Relations among system beliefs and user beliefs

4 Conclusions and further research

The main research question of this paper was: how can we use knowledge criteria to evaluate the tasks of legal information systems? To answer this question, we showed which knowledge criteria are needed to turn legal beliefs into knowledge. We applied our findings to the tasks of two information systems, namely ESM and IvS. These are representatives of two categories of legal information systems. In the category of decision-making systems, decisions should often be regarded as interpretative beliefs. In the category of systems that help the user to make decisions, the resulting decision is often also an interpretative belief, but this belief is held by the user of the system. From our evaluations of these systems, we draw two conclusions.

First, the belief evaluation of an information system does not make sense without taking into account the role of its user (cf. subsection 3.2). Only when we know what type(s) of belief the system contains and the type(s) of belief the user holds, we can properly evaluate which knowledge criteria apply.

Second, legal information systems are mainly concerned with interpretative beliefs. But they often also contain testimonial beliefs, or they require provision of those beliefs by their users. These beliefs are subject to other knowledge criteria. Consequently, the system has to use other procedures and techniques to transform these beliefs into knowledge (if required).

Future research should demonstrate in what ways the knowledge criteria that are central to legal knowledge, namely justification proper and coherence, can be more adequately defined with respect to the contents of legal information systems. Also, it should be investigated if, and how, truth can be used as a knowledge criterion for interpretative beliefs. Moreover, the question how the reliability criterion can be applied to testimonial beliefs and inferential beliefs should be answered.

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