On the Ontological Status and Representation of Legal Concepts

Laurens Mommers

Department of Law and Information Technology,
Leiden University, The Netherlands
mommers@law.leidenuniv.nl

Abstract

In this paper I will discuss the nature of legal concepts. The law contains legal concepts, legal relations as well as other concepts and other relations. For an adequate understanding of legal concepts we investigate them from a philosophical viewpoint and a knowledge-representation viewpoint. The philosophical viewpoint leads to a philosophically grounded ontology of law. This provides an answer to the question what legal concepts *are*. As an immediate consequence I treat the representation question: how can legal concepts be represented properly in a formal manner? The representation language used is situation semantics. In the framework developed concepts are formed by constitutive relationships, relating application conditions to concept names. When all conditions apply, this constitutive relation establishes a new institutional fact.

1 Introduction

In this paper I focus on legal concepts, and the place they take in a legal ontology. I claim that an answer to the question what legal concepts *are* enables us to *represent* them. The structure of the representation of legal concepts should resemble as much as possible the actual structure of legal concepts. I call this the criterion of isomorphism. In legal ontologies we use legal concepts and relations among them, as well as other concepts and relations. For an adequate treatment of concepts and relations in knowledge-based systems we face the problem of knowledge representation. For an appropriate knowledge representation we must know what exactly we would like to represent. Therefore, the questions asked in this paper are: what are legal concepts?, and: how can they be represented properly in a formal manner?

In section 2, I discuss legal concepts. In section 3, I present a survey of the most important characteristics of situation semantics. Section 4 uses this formalism as a language for the representation of legal concepts. Section 5 provides two examples of represented concepts. In section 6, I apply these concept representations in a representation of laws. Section 7 contains a summary and conclusions.

2 Ontological characteristics of legal concepts

There are two ontological issues in the law. The first issue is what the existence status of the law itself is, the second issue is what the existence status

is of the parts of reality that the law refers to. The former issue is discussed in section 6, the latter is dealt with in the current section. In legal philosophy, especially institutional legal theory addresses a part of these elements. The elements the law refers to are relevant in the domain of legal knowledge representation.

In addition to the work on the ontology of law as performed in legal philosophy, in the AI-and-law community has developed many so-called 'legal ontologies' (see Visser and Winkels 1997). These are conceptualisations of the legal domain for the purpose of building legal knowledge-based systems. They contain descriptions of legal concepts and relations among them. As far as these legal ontologies make claims about the elements of reality, ontology as a philosophical discipline becomes relevant. I use work from both areas to give an answer to the question what legal concepts are. I will do it carefully by clearly separating the two viewpoints involved. First I establish a realist ontological doctrine for the legal domain. Second I discuss the work of Searle and of MacCormick and Weinberger on institutional facts. Third, I discuss the legal ontology developed by Van Kralingen (1995). I combine these three elements into a view on legal concepts.

2.1 Legal realism

To suit the criterion of isomorphism mentioned above, a formal specification of a concept has to correspond with the structure of legal reality. The philosophical discipline called ontology examines this area. The existence of certain elements of the legal part of reality is claimed in an ontological doctrine. The notion of a legal concept is embedded in an ontological doctrine called legal type-token realism. It is based on a definition of realism given by Devitt (1991, p. 23) and on the ontological ideas of Searle (1969, 1995) and Anscombe (1958) that inspired the establishment of institutional legal theories (MacCormick and Weinberger 1986). Legal type-token realism contains a stronger ontological claim than those proposed by Devitt (1991) and Searle (1995), but it will not be defended in this paper (see Mommers et al. 1997 and Mommers, submitted). I use the legal type-token-realism doctrine to provide proper ontological backing for legal concepts. It is defined as follows:

> *Legal type-token realism*
> *Most current common-sense and scientific physical, legal, social, and psychological types, and tokens of those types, exist objectively.*

A type is a category of things or phenomena, and a token is a concrete specimen of such a category; if we use some concept such as 'judge' in a way not referring to a specific judge, we refer to a type. If we refer to a specific judge, we refer to a token of the type. The doctrine defined above says that both types and tokens of these types exist in an objective way. In Mommers (submitted) I claim that legal types are supervenient on other legal, physical, social, or psychological common-sense and scientific types, i.e., they constitute an extra layer of existence above (but dependent on) those types. The same goes for tokens of these types. As an example of these two supervenience relations, the type 'qualified manslaughter' supervenes the type 'manslaughter', and a token of the type 'qualified manslaughter' supervenes a token of the type 'manslaughter'. Types such as 'manslaughter' are *institutional* types: they refer to a category of human (legal) institutions. A token

of such a type is called an institutional fact. When someone kills someone else on purpose, and this is qualified as manslaughter, there is a new institutional fact. The way these institutional facts are brought into being is elaborated on below.

2.2 The structure of institutional reality

The logical structure of institutional reality, as proposed by Searle (1995, p. 79 f.), is summarised in the following. The formula 'X counts as Y in C' represents a general status-assigning function. It says that under the circumstances referred to by C, a fact X is regarded as a fact Y, transcending the mere fact X by the status assigned to it. This structure can be iterated and combined into complex systems of interrelated institutions (ibid., p. 80). There are different types of functions assigning status: symbolic powers create meaning, deontic powers create rights and obligations, honourific powers create status for its own sake, and procedural powers create conditions on the way to power and honour (ibid., pp. 99-103).

A theory adjusted to the legal domain was forwarded by MacCormick and Weinberger (1986). They distinguish institutive, consequential, and terminative rules. Institutive rules bring into existence some kind of legal entity (e.g., a contract). Consequential rules define consequences attached to there being in existence some legal entity (e.g., one has to comply with the conditions in a contract, if there is a contract). Terminative rules put an end to the existence of some legal entity (e.g., a divorce puts an end to a marriage) (ibid., pp. 52-53). An instance of a legal institution (e.g., the concept of divorce) exists in time, as consequence of it being created by an institutive rule, maintained by a consequential rule, and ended by a terminative rule. The actual concepts or institutions *as types* do not have that kind of existence (ibid., p. 53).

Both theories have in common that instances of legal concepts are claimed to exist, and that these instances are constituted by some kind of constitutive rules. Rules establish relations among concepts, and instantiated legal concepts are institutional facts. In case of Searle, there is no explicit solution for the problem of bringing into existence institutional facts, while MacCormick and Weinberger use their institutive rules for that purpose.

Although this overview of theories is by no means complete, it shows the possibilities of relating institutional facts to each other.

2.3 Conceptualisation of the legal domain

In recent years several attempts have been made to conceptualise the legal domain. The so-called legal ontologies that result from these research projects are diverse. Valente (1995) distinguishes between different types of knowledge, while Verheij and Hage (1997) and Van Kralingen (1995) differentiate between what can be regarded as actual ontological categories. The ontology by Van Kralingen (1995) is taken as a starting-point for my formalisation. He has designed a conceptual framework of the law for the purpose of representing statute law. This framework consists of a specification of norms, acts, and concepts in the form of frames. These can be regarded as three ontological categories. I limit myself to the discussion of concept frames. They contain the elements needed for conceptual definitions from the viewpoint of legal knowledge representation.

In Van Kralingen's view, legal concepts are specified by seven items, namely the *name* of the concept, its *type*, its *priority*, its *promulgation*, the *scope* of application, its *conditions*, and some *instances* of the concept. Four concept types are distinguished: definitions, deeming provisions, factors, and meta-concepts (ibid., p. 68). Definitions contain the conditions for a legal concept to apply (possibly deviating from the normal meaning of that concept) (ibid., pp. 66-67), deeming provisions introduce legal fictions (e.g., a bike is deemed a motor-vehicle) (ibid., p. 98), a factor determines the applicability of a concept statistically, and thus it is in fact one of the application conditions of a concept, not a concept itself (ibid., p. 68), and meta-concepts determine the applicability of other concepts (ibid., p. 68). A priority value is only given when the concept is of type factor. Promulgation is the source of the concept description, scope is its range of application. The conditions slot determines the intension of the concept, while the instances slot gives (part of) the concept's extension. To use these concept frames for automatic inferencing, they have to be translated into formal specifications. This matter is discussed in sections 3 and 4.

2.4 A notion of legal concepts

After the discussion of ontological approaches of legal concepts from legal philosophy and from AI, I now explain what legal concepts will be in my framework. Legal concepts are considered to be legal types, as they are precisely the entities that exist objectively, but not independently of the mental, i.e., they exist by collective intentional assignment of status. In brief they are referred to by the Y term (as a type) of the 'X counts as Y in C' formula. This status-assignment function is regarded as the link between different concepts, or between brute facts (i.e., physical facts, such as 'the car drove 60 miles per hour') and legal concepts. For instance, in some cases an act is considered as a legal act, namely, if it is a human act with an intended legal consequence. The notion of a legal act is a legal concept. The notion of an act is a social concept. The connection between the two is established by conditions that make regular acts 'count as' legal acts. In a specific case, a token of a regular act type counts as a token of the legal act type. The notion of a legal concept adopted in this paper is rather empty on its own. It is a legal type that gains its meaning through the application conditions that are related to it. The legal type is the consequent of the 'counts as'-relation, which connects it with the antecedent of the relation, consisting of the application conditions. The antecedent thus contains the application conditions that are part of Van Kralingen's norm frames.

3 Situation semantics as a representation language

The choice for situation semantics as a language for legal knowledge representation has been inspired by four of its characteristics: it contains sorted variables (indicating classes of objects), it may be used to express higher-order properties (i.e., properties of properties), it enables us to underspecify situations (expressing the fact that a representation seldomly contains all information about a situation), and it constitutes context-dependency (expressions are linked to a specific place and time). In predicate logic, these features are not present by default. However, one should be able to express these features in an extended version of predicate logic, though possibly at the expense of notational efficiency. In using the language of situation se-

mantics, I attempt to preserve the isomorphism between the object represented and its representation. It should be noted that there is an analogy between on the one hand types and tokens as used in the realist doctrine defined in section 2, and on the other hand situation types and situations as introduced below. A type is the analogon of a situation type, and a token is the analogon of a situation.

3.1 The basic elements of situation semantics

Situation semantics was developed as a representation language for natural language in the general framework of situation theory, developed by Barwise and Perry (1983). Situation theory is a theory of information and meaning based on *ecological realism*. The idea is that meaning is in the world, and in the interaction between individuals and their ecological niche (Gibson 1979). Situation semantics recognises states of affairs, courses of events, individuals, relations, and space-time locations as elements of its ontology. States of affairs are situations as they are in the world. Courses of events are combinations of such situations, linked to different locations in space and time. Any attempt to describe such states of affairs and courses of events leads to *abstract* versions of them: abstract states of affairs and abstract courses of events. These are incomplete descriptions of real situations. An abstract state of affairs or course of events consists of one or more so-called *infons* or *constituent sequences*, each expressing a certain relation between different individuals or constants, and linked to a certain place and time.

3.2 Means of classification

In addition to abstract states of affairs and courses of events, situation and event *types* are distinguished. Whenever a certain entity in an infon (relation, individual, or space-time location) is not instantiated (an uninstantiated entity is called an *indeterminate*), a state of affairs becomes a situation type, and a course of events becomes an event type. Situation and event types *classify* situations: they are a means of grouping situations. For sake of simplicity, from now on all states of affairs and courses of events are called situations. Hence, situation types and event types are all called situation types. A constraint is a relation between situation types. Barwise and Perry (ibid., p. 97) introduce three types of constraints: *necessary* constraints, *nomic* constraints, and *conventional* constraints. Necessary constraints hold between relations. For instance, they express the necessary relationship between the situation type that *Jane* is guilty of theft and a situation type that *someone* is guilty of theft. Nomic constraints generalise over patterns caused by the laws of physics, e.g., the relation between a type expressing that an object has a mass and the type expressing that this object exerts gravitational force. Conventional constraints indicate what relations exist between phenomena as a result of conventions in a society, e.g., the relation between a type expressing that a person has intentionally killed another one, and the type expressing that he has committed manslaughter. Conventional constraints are especially important in the legal domain, where conventions are the crucial factor in determining legal facts and legal consequences. Each constraint type is either conditional or unconditional. A conditional constraint is linked to a certain space-time location. An uncondi-

tional constraint is valid in all space-time locations. Constraints express meaningful relations of an extensional or intensional nature.

3.3 Syntax of the situations and situation types

The expression below shows the syntax of the language used: *S* is a situation type if and only if it constitutes *I*, where *I* is a non-empty set of infons. The symbol _ denotes the support relation, which means that the properties and relations in the infons are part of the situation or situation type denoted by the letter on the left. The _ symbol does not exclude the presence or later addition of more infons in the situation or situation type. It thus expresses the fact that most actual situations cannot be completely specified by application conditions. An infon consists of a space-time location *l*, a relation *r*, the objects of that relation $o_1,...,o_n$, and a polarity index *i*. The polarity index indicates whether the situation (or situation type) applies ($i = 1$) or not ($i = 0$). These are all indeterminates (printed bold) in the expression below.

$$S \_ \langle \boldsymbol{l}_1,\langle \boldsymbol{r}_1,\boldsymbol{o}_{1,1},...,\boldsymbol{o}_{1,n}\rangle,\boldsymbol{i}_1\rangle$$
$$...$$
$$\langle \boldsymbol{l}_m,\langle \boldsymbol{r}_m,\boldsymbol{o}_{m,1},...,\boldsymbol{o}_{m,p}\rangle,\boldsymbol{i}_m\rangle$$

If all indeterminates (i.e., ***l***, ***r***, ***o***, and ***i***) are instantiated, *S* becomes a situation (denoted *s*) instead of a situation type. A situation type is anchored by applying an anchor to it. An anchor in situation semantics is what is called an assignment in model-theoretic semantics. It contains a partial or complete description of the relation between indeterminates and objects. An anchor *f* for a situation type *S*, denoted by *S*[*f*], provides the referents for at least some, or all, of the indeterminates in *S*. Any state of affairs or course of events is turned into a situation type or event type, respectively, if it includes at least one indeterminate. Barwise and Perry (1983, p. 72) distinguish among individual, relation, and location indeterminates.

4 Representing legal concepts

In my framework, the solution to representing legal concepts is based on Van Kralingen's concept frames, and on ontological principles, drawn from institutional legal theory. The representation should adequately provide the meaning of the concept. The concept's meaning, considered as its intension and extension, is determined by the conditions slot and the instances slot of Van Kralingen's concept frames. The type slot tells us in what way to define the concept. The contents of the priority slot, promulgation slot, and scope slot are part of the intension of the concept. From the theory of institutional facts we take the notion of a 'counts as'-relation. Within the framework of situation semantics, an intensional relation 'counts as' is defined. This relation, based on Searle's (1995, p. 18) work about constitutive relations, is used to link the application conditions to the concept name.

4.1 The intensionality of the constitutive relation

The nature of the constitutive relation is intensional, which means that the terms that are filled in for X and Y in 'X counts as Y' cannot be changed for extensionally identical expressions without changing the meaning of the expression. A different way to state the same is that it is not allowed to substi-

tute co-referring terms in case they are under the reach of an intensional predicate (in this case 'counts as'). Intensionality plays an important part in natural-language semantics. A classic example is Frege's 'evening star – morning star' example (*cf.* Gamut 1991): a sentence like 'the morning star is the evening star' is true, as both expressions refer to the same entity. But a sentence like 'John thinks the morning star is the evening star' need not be true, as 'to think' is an intensional verb. The extension of 'morning star' (the actual entity) is something different from the intension of 'morning star' (its meaning). Frege's distinction between extension and intension is a basis for conceptual definitions.

The intensionality of the 'counts as'-relation is important for two reasons. First, there may be changes in definitions of legal concepts. Second, there may be cases where the concept is declared applicable, while not all conditions apply. This may or may not be a reason to adjust the conditions in the antecedent type. If it is not, the extension of the concept is expanded, but the intension remains the same. In that case the intension no longer determines the extension of the concept on its own. From the occurrence of a token of a certain concept (the extension of the concept is expanded) we may thus no longer infer the occurrence of its application conditions.

The intensionality of the 'counts as'-relation is expressed in situation semantics as follows (where ***r*** is replaced by 'counts as'):

$MC_1 = \langle l_u, \langle \text{intensional}, \boldsymbol{r} \rangle, 1 \rangle$
$S_1 = \langle l_u, \langle \boldsymbol{r}, C_1, C_1' \rangle, 1 \rangle$
$S_1' = \langle l_u, \langle =, C_1, C_1'' \rangle, 1 \rangle$
$S_1'' = \langle l_u, \langle =, C_1', C_1''' \rangle, 1 \rangle$
$S_1''' = \langle l_u, \langle \boldsymbol{r}, C_1'', C_1''' \rangle, \boldsymbol{i} \rangle$

These situations together say the principle of substitutivity *salva veritate* does not hold: the meta-constraint MC_1 states that the relation ***r*** is intensional, the situations S_1 to S_1''' express that if that relation holds between two situation types C_1 and C_1', and C_1 is equal to C_1'' and C_1' is equal to C_1''', then it need not necessarily be the case that the relation ***r*** also holds between C_1'' and C_1''' (hence the uninstantiated polarity index ***i***). We are thus able to express the 'counts as'-relation holding between situations, or between situation types.

4.2 Other characteristics of the 'counts as'-relation

Apart from its intensionality, the constitutive relation is non-transitive, asymmetrical, and irreflexive. The non-transitivity constraint means that, whenever there is such a constraint between a situation type *S* and a situation type *S'*, and there is such a constraint between a situation type *S'* and a situation type *S''*, being a token of type *S* does not automatically yield a token of type *S*, though it *does* yield a token of type *S'*. The asymmetry constraint means that whenever there is a relation between a situation type *S* and a situation type *S'*, the same relation does not hold between *S'* and *S*. The irreflexivity constraint means that whenever there is a relation between a situation type *S* and a situation type *S'*, the relation does not automatically hold between type *S* and type *S*.

We can express these characteristics of the 'counts as'-relation formally in the following way, where the *MC* (meta-constraint) types are situation types classifying all those relations (denoted by ***r***) that are transitive, symmetri-

cal, or reflexive, and the polarity index 0 means that the meta-constraints do not apply. In the formal expressions below, again, ***r*** should be replaced by 'counts as'.

$MC_2 = \langle l_u, \langle \text{transitive}, \boldsymbol{r} \rangle, 0 \rangle$
$S_2 = \langle l_u, \langle \boldsymbol{r}, C_2, C_2'' \rangle, 1 \rangle$
$S_2' = \langle l_u, \langle \boldsymbol{r}, C_2'', C_2' \rangle, 1 \rangle$
$S_2'' = \langle l_u, \langle \boldsymbol{r}, C_2, C_2' \rangle, 1 \rangle$

$MC_3 = \langle l_u, \langle \text{symmetrical}, \boldsymbol{r} \rangle, 0 \rangle$
$S_3 = \langle l_u, \langle \boldsymbol{r}, C_3, C_3' \rangle, 1 \rangle$
$S_3' = \langle l_u, \langle \boldsymbol{r}, C_3', C_3 \rangle, 1 \rangle$

$MC_4 = \langle l_u, \langle \text{reflexive}, \boldsymbol{r} \rangle, 0 \rangle$
$S_4 = \langle l_u, \langle \boldsymbol{r}, C_4, C_4 \rangle, 1 \rangle$

An example illustrates the consequences of these characteristics. When we say that killing a person on purpose counts as manslaughter, we establish an intensional relation between conditions (someone kills someone else, and he does this on purpose), and the occurrence of 'manslaughter', which is supervenient on the fulfilment of the conditions. The conditions and 'manslaughter' are expressed as situation types, which are combined in a conditional conventional constraint, expressing a meaningful relationship between conditions and consequences arising from them, linked to a specific space-time location. The antecedent type of the constraint expresses the conditions, while the consequence type expresses the 'concept name' (a legal type) itself. The non-transitivity of this constraint is illustrated when we assume there is an additional constraint linking the occurrence of manslaughter to the occurrence of criminally negligent manslaughter. In that case we have a constraint linking *O* (the conditions for manslaughter) to *O'* (manslaughter), and a constraint linking *O'* to *O''* (criminally negligent manslaughter). The non-transitivity constraint says that even if these constraints are present, *O* does not count as *O''*. The asymmetry constraint says that if manslaughter counts as criminally negligent manslaughter, criminally negligent manslaughter need not count as manslaughter. The irreflexivity constrains says that manslaughter does not count as manslaughter.

The axiomatisation of the 'counts as'-relation differs from the one given in Jones and Sergot (1996), who claim that both the antecedent and the consequent of this relation (denoted as a connective $\Rightarrow_s$) are interchangeable with other propositions if logical equivalence is retained (ibid., p. 436). This is possible as this relation is defined within an intensional logic, so that the principle of substitutivity *salva veritate* still holds. However, the further axiomatisation is different: the relation is held to be both reflexive, symmetric and transitive, while above I claimed that this is not suitable for the 'counts as'-relation.

5 Two examples of represented concepts

So far I have discussed the formal characteristics of the 'counts as'-relation, which is used to represent legal concepts. Below I give two examples of represented legal concepts: qualified manslaughter and accomplice. The first example stems from the article on qualified manslaughter (art. 288 of the

Dutch Penal Code). The concept of qualified manslaughter in this article is translated into the following formal expressions. Situation type V expresses a constitutive constraint relation between types O and O', of which O stands for the accumulation of all conditions in the article (the intersection and union symbols determining their extension), O' stands for the actual concept (qualified manslaughter), and $\Rightarrow_c$ stands for the 'counts as'-relation. Bold italic printed characters stand for indeterminates (variables), of which $\boldsymbol{l}$ is a space-time location, and capital italic characters stand for situation types. The following set of situation types is a representation of the text of art. 288 of the Dutch Penal Code. Qualified manslaughter occurs when manslaughter (killing on purpose) is followed, accompanied or preceded by a punishable fact, and manslaughter is committed with the intention to prepare or facilitate that fact. Or it should be committed to ensure the person himself or his accomplices to remain unpunished or to ensure the possession of what has been illegally taken when he was caught in the act.

$V = [O \Rightarrow_c O']$
$O \quad O_1 \cap O_2 \cap O_3 \cap O_4 \cap O_5 \cap [[O_6 \cup O_7] \cap [O_8 \cup O_9] \cap [O_{10} \cup O_{11} \cup O_{12}]] \cap O_{13}$
$O' \_ \langle \boldsymbol{l}, \langle \text{qualified\_manslaughter}, \boldsymbol{z} \rangle, 1 \rangle$
$O_1 \_ \langle \boldsymbol{l}_1, \langle \text{punishable\_fact}, \boldsymbol{a} \rangle, 1 \rangle$
$O_2 \_ \langle \boldsymbol{l}_2, \langle \text{manslaughter}, \boldsymbol{b} \rangle, 1 \rangle$
$O_3 \_ \langle \boldsymbol{l}_3, \langle \text{subject}, \boldsymbol{c} \rangle, 1 \rangle$
$O_4 \_ \langle \boldsymbol{l}_4, \langle \text{accomplice}, \boldsymbol{d} \rangle, 1 \rangle$
$O_5 \_ \langle \boldsymbol{l}_5, \langle \text{object}, \boldsymbol{e} \rangle, 1 \rangle$
$O_6 \_ \langle \boldsymbol{l}_6, \langle \text{commit}, \boldsymbol{c}, \boldsymbol{b} \rangle, 1 \rangle \wedge \langle \boldsymbol{l}_6, \langle \text{intent\_to}, \boldsymbol{x}, O_7 \rangle, 1 \rangle$
$O_7 \_ \langle \boldsymbol{l}_7, \langle \text{prepare}, \boldsymbol{c}, \boldsymbol{a} \rangle, 1 \rangle \vee \langle \boldsymbol{l}_8, \langle \text{facilitate}, \boldsymbol{c}, \boldsymbol{a} \rangle, 1 \rangle$
$O_8 \_ \langle \boldsymbol{l}_9, \langle \text{caught\_in\_the\_act}, \boldsymbol{c} \rangle, 1 \rangle \wedge \langle \boldsymbol{l}_{10}, \langle \text{ensure}, \boldsymbol{c}, O_9 \rangle, 1 \rangle$
$O_9 \_ \langle \boldsymbol{l}_{11}, \langle \text{remain}, \boldsymbol{c}, \text{unpunished} \rangle, 1 \rangle \vee \langle \boldsymbol{l}_{12}, \langle \text{remain}, \boldsymbol{d}, \text{unpunished} \rangle, 1 \rangle$
$O_{10} \_ \langle \boldsymbol{l}_{13}, \langle \text{ensure}, \boldsymbol{c}, O_{11} \rangle, 1 \rangle$
$O_{11} \_ \langle \boldsymbol{l}_{14}, \langle \text{possess}, \boldsymbol{c}, \boldsymbol{e} \rangle, 1 \rangle$
$O_{12} \_ \langle \boldsymbol{l}_{15}, \langle \text{illegally\_taken\_away}, \boldsymbol{e} \rangle, 1 \rangle$
$O_{13} \_ \langle \boldsymbol{l}_u, \langle \text{precedes}, \boldsymbol{l}_2, \boldsymbol{l}_1 \rangle, 1 \rangle \vee \langle \boldsymbol{l}_u, \langle \text{precedes}, \boldsymbol{l}_1, \boldsymbol{l}_2 \rangle, 1 \rangle \vee \langle \boldsymbol{l}_u, \langle \text{equal}, \boldsymbol{l}_1, \boldsymbol{l}_2 \rangle, 1 \rangle$

$o \_ \langle l_1, \langle \text{qualified\_manslaughter}, \boldsymbol{t}_1 \rangle, 1 \rangle$
$o' \_ \langle l_2, \langle \text{qualified\_manslaughter}, \boldsymbol{t}_2 \rangle, 1 \rangle$

The two situations o and o' denote instantiations of the concept of qualified manslaughter. Note that these situations do not give information on who committed the crime. Also, the representation above leaves the relations among the space-time location indeterminates $\boldsymbol{l}_1$ through $\boldsymbol{l}_{15}$ unspecified.

To be able to restructure the representation of a concept, the representation should be flexible. If there is a reason to alter the conditions under which the concept applies, one has to add those conditions, and anchor them to different space-time locations. Filling in those locations is a laborious task, and it involves all the problems attached to vagueness. However, a different strategy may be chosen. Instead of giving coordinates of a place and time, we can also use an expression like 'In Amsterdam in the evening of Friday the 13th of May 1998'. In that case we should add an expression saying that, e.g., Amsterdam is in The Netherlands, and that the evening is later than the afternoon.

Note that the constraint V only establishes the application of the concept of qualified manslaughter. It has to be asserted separately who commits the fact. This is achieved by adding a condition $O_{14} \_ \langle \boldsymbol{l}_{16}, \langle \text{commit}, \boldsymbol{c}, \boldsymbol{z} \rangle, 1 \rangle$, where

c should be anchored to the person who commits qualified manslaughter, and ***z*** should be anchored to the instance of the concept qualified manslaughter.

For the second example I use one of the concepts in the definition of qualified manslaughter, *viz.* 'accomplice'. Art. 48 of the Dutch Penal Code says that an accomplice is someone who has been cooperative intentionally in committing a crime, or who has intentionally given the opportunity, means or information to commit the crime.

Again, we give a constitutive rule *V* for the concept 'accomplice':

$$
\begin{array}{lcl}
V & = & [O \Rightarrow_c O'] \\
O & \_ & [O_1 \cap O_2 \cap O_3 \cap O_4] \cup [O_5 \cap [O_6 \cup O_7 \cup O_8]] \\
O' & \_ & \langle \boldsymbol{l}, \langle \text{accomplice}, \boldsymbol{a} \rangle, 1 \rangle \\
O_1 & \_ & \langle \boldsymbol{l}_1, \langle \text{cooperate\_in}, \boldsymbol{a}, O_3 \rangle, 1 \rangle \\
O_2 & \_ & \langle \boldsymbol{l}_2, \langle \text{intentionally}, \boldsymbol{a}, O_1 \rangle, 1 \rangle \\
O_3 & \_ & \langle \boldsymbol{l}_3, \langle \text{commit}, \boldsymbol{a}, \boldsymbol{b} \rangle, 1 \rangle \\
O_4 & \_ & \langle \boldsymbol{l}_4, \langle \text{crime}, \boldsymbol{b} \rangle, 1 \rangle \\
O_5 & \_ & \langle \boldsymbol{l}_5, \langle \text{intentionally}, \boldsymbol{a}, O_6 \rangle, 1 \rangle \\
O_6 & \_ & \langle \boldsymbol{l}_6, \langle \text{give\_to}, \boldsymbol{a}, \text{opportunity}, O_3 \rangle, 1 \rangle \\
O_7 & \_ & \langle \boldsymbol{l}_7, \langle \text{give\_to}, \boldsymbol{a}, \text{means}, O_3 \rangle, 1 \rangle \\
O_8 & \_ & \langle \boldsymbol{l}_8, \langle \text{give\_to}, \boldsymbol{a}, \text{information}, O_3 \rangle, 1 \rangle
\end{array}
$$

In two examples of concepts I have shown that it is possible to use the language of situation semantics to represent the conditions attached to legal concepts, while retaining their original structure. Below I apply this method of defining concepts to a representation of laws.

6 Concept representations in normative expressions

Concepts play a central role in normative expressions. A norm expresses a link among certain concepts, and sometimes it attaches to these concepts some normative consequence for a norm subject. Institutional legal theories consider laws as rules creating institutional facts. These institutional facts are considered as instantiations of concepts. For example, given the fulfilment of a number of conditions (given before), the concept 'qualified manslaughter' applies. We then have established an institutional fact: an occurrence of qualified manslaughter in a given situation. Qualified manslaughter in general is referred to as a legal type, while a specific occurrence of qualified manslaughter is a legal token. We may claim that a valid norm is an institutional fact on itself. Hage (1987, p. 118; 1997, p. 65) refers to these facts as deontic facts. The application of that norm establishes a new institutional fact. There is no direct causal connection between the deontic fact and the institutional fact arising from the application of a law, i.e., there is nothing in the deontic fact that directly causes instantiations of consequent types.

What is the ontological status of a law, regarded as a relation among legal concepts? My conclusion is that a law expressing we ought not commit qualified manslaughter rests on the meaning of the legal types it contains. Laws, just like concepts, become rather empty entities, that in practice should derive their meaning from the meanings of the concepts they contain. These concepts, in their turn, are constituted by the meanings of other concepts. Thus a kind of hierarchy comes into existence between institutional facts and 'brute' facts. In the case of qualified manslaughter, for instance,

one of the conditions that may apply is that manslaughter is committed to prepare or facilitate a punishable fact. For this condition to apply, there must be a fact that can be characterised as a punishable fact. Then it must be established that manslaughter was committed to prepare or facilitate the committing of that punishable fact. So, in addition to the question whether the committing of manslaughter can be established, it must be established whether this was done in order to prepare or facilitate the committing of the other punishable fact. The occurrence of preparation or facilitation is considered as an institutional legal fact on itself.

As in the case of concepts, bringing 'meaning' (or rather, intension) outside the scope of the deontic fact, that fact leaves open the possibility of interpretation changes occurring in some (legal) concepts, while retaining the meaning of other concepts. Meaning (defined as intension and extension) is determined bottom-up. Starting with brute facts, we derive institutional facts in general and institutional legal facts in specific. Deontic facts express relations between those brute facts and institutional facts. According to Verheij and Hage (1997) there are two types of relations between states of affairs (states of affairs being institutional or brute facts): causal and constitutive relations. I consider deontic facts to express purely constitutive relations between legal types. Whenever a law is applied, instantiations of these legal types become legal tokens or institutional legal facts. In a schema, I express the relations as follows:

deontic fact:			
O_1	_	$\langle \boldsymbol{l}_1, \langle \text{ought\_not}, \boldsymbol{s}, O_2 \rangle, 1 \rangle$	modality and subject
O_2	_	$\langle \boldsymbol{l}_1, \langle \text{commit}, \boldsymbol{s}, O_3 \rangle, 1 \rangle$	act and subject
concept:			
O_3	_	$\langle \boldsymbol{l}_2, \langle \text{qualified\_manslaughter}, \boldsymbol{a} \rangle, 1 \rangle$	institutional legal type
V	=	$[O \Rightarrow_c O_3]$	constitutive legal relation
O		defined in section 5	institutional legal type
institutional legal fact:			
s	_	$\langle l, \langle \text{qualified\_manslaughter}, \boldsymbol{a} \rangle, 1 \rangle$	$\boldsymbol{l}$ and $\boldsymbol{a}$ are both anchored

The formal specifications of legal concepts and laws can be used in three ways. First, it may serve knowledge representation as such. Second, it may be used to make visible the relations among different facts and fact types: it is in principle possible to construct graphs of the relations defined. Third, it may be used for searching purposes: related items can be found through the constituting relations among types; this is vaguely analogous to the use of semantic networks. However, in this case the relations are motivated by ontological ideas. The combination of a semantic theory and ontological ideas for the purpose of knowledge representation should thus give us the opportunity to build intelligent applications.

6 Conclusion and further research

I have provided an ontological analysis of legal concepts, and a way of representing them with the help of the formal language of situation semantics. This representation method leaves open the possibility of changing the application conditions of those concepts: a concept can be linked to a specific area of space and time, and application conditions can always be added

later. The representation has the form of extensional and intensional relations between sets of application conditions. These sets of application conditions are linked to a concept type by means of a conditional conventional constraint. Whenever a set of application conditions applies, and a relation exists between that set and a concept, a token of that concept is established, which is considered as an institutional fact. The conventional constraint is regarded as a constitutive rule.

It is thus shown that the formal language of situation semantics is a suitable means of representing the constitutive relations among concepts, while leaving intact the ontological foundation of those concepts. Further research should yield an answer to the question whether situation semantics is a better means for expressing legal ontologies than an extended version of predicate logic. The ontological foundation of legal concepts is given by the application of institutional legal theory. Accordingly, the isomorphism between the structure of legal reality and its representation is retained. The representation formalism (situation semantics) can be used to build a philosophically grounded legal ontology for the purpose of representing, visualising, and searching legal knowledge.

Acknowledgements

I would like to thank prof. dr H.J. van den Herik, dr A.H.J. Schmidt, and two anonymous referees for their extensive comments on previous versions of this paper. The research presented is financed by the Netherlands Foundation for Science NWO under number 41503034.

References

Anscombe (1958)
Anscombe, G.E.M., On brute facts, *Analysis* 18, 1958, pp. 69-72.

Barwise and Perry (1983)
Barwise, J. and J. Perry, *Situations and Attitudes*, Cambridge, Mass./ London, England: The MIT Press 1983.

Devitt (1991)
Devitt, M., *Realism and Truth*, Cambridge, Mass./Oxford: Blackwell 1991.

Gamut (1991)
Gamut, L.T.F., *Logic, Language, and Meaning. Volume 2: Intensional Logic and Logical Grammar*, Chicago/London: The University of Chicago Press 1991.

Gibson (1979)
Gibson, J.J., *The ecological approach to visual perception*, Boston: Houghton Mifflin 1979.

Hage (1987)
Hage, J.C., *Feiten en betekenis. Een verhandeling over ontologie en praktische rede*, dissertation, Leiden: Leiden University 1987.

Hage (1997)
Hage, J.C., *Reasoning with Rules. An Essay on Legal Reasoning and Its Underlying Logic*, Dordrecht: Kluwer Academic Publishers 1997.

Jones and Sergot (1996)
Jones, A.J.I. and M.J. Sergot, A Formal Characterisation of Institutionalised Power, *Journal of the IGPL* 4, 1996, pp. 429-445.

Van Kralingen (1995)
Kralingen, R.W. van, *Frame-based Conceptual Models of Statute Law*, dissertation, Leiden: Leiden University 1995.
MacCormick and Weinberger (1986)
MacCormick, D.N. and O. Weinberger, *An Institutional Theory of Law: New Approaches to Legal Positivism*, Dordrecht: D. Reidel 1986.
Mommers et al (1997)
Mommers, L., A.H.J. Schmidt, and E.W. Oskamp, Controversies in the ontology and law debate, in Visser and Winkels, *Proceedings of the First International Workshop on Legal Ontologies*, Melbourne, Australia, July 4 1997.
Mommers (submitted)
Mommers, L. (submitted), *Naar een realistisch fundament voor het recht.*
Searle (1969)
Searle, J.R., *Speech acts: an essay in the philosophy of language*, Cambridge: Cambridge University Press 1969.
Searle (1995)
Searle, J.R., *The Construction of Social Reality*, London, England: Penguin Books 1995.
Valente (1995)
Valente, A., *Legal Knowledge Engineering*, Amsterdam: IOS Press 1995.
Verheij and Hage (1997)
Verheij, B. and J.C. Hage, States of Affairs, Events, and Rules: An Abstract Model of Law, in Oskamp A., R.V. De Mulder, C. van Noortwijk, C.A.F.M. Grütters, K. Ashley, T. Gordon (eds), *Legal Knowledge Based Systems, Jurix: The Tenth Conference, Jurix '97*, Nijmegen: GNI 1997.
Visser (1995)
Visser, P.R.S., *Knowledge Specification for Multiple Legal Tasks. A Case Study of the Interaction Problem in the Legal Domain*, dissertation, Leiden University 1995.
Visser and Winkels (1997)
Visser, P.R.S. and R.G.F. Winkels, *Proceedings of the First International Workshop on Legal Ontologies*, Melbourne, Australia, July 4 1997.