

# A Model of Legal Acts:

## Part 1: The World of Law

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### Abstract

This paper aims at providing an account of legal acts that forms a suitable starting point for the creation of computational systems that deal with legal acts. The paper is divided into two parts. Because legal acts will be analyzed as intentional changes in the world of law, the ‘furniture’ of this world, that consists broadly speaking of entities, facts and rules, plays a central role in the analysis. This first part of the paper deals with this furniture and its philosophical underpinnings, and at the same time introduces most of the logical apparatus that will be used to deal with it. The focus in the first part is on static and dynamic legal rules and their interplay in constituting the world of law

### *Keywords*

legal acts; dynamic legal rules; static legal rules; counts as rules; doctrinal concepts; internal legal concepts

## PART 1: THE WORLD OF LAW

### 1. Introduction

In the law, legal acts (juridical acts, legal transactions, acts-in-the-law, Rechtsgeschäfte, actes juridiques) play a central role.<sup>2</sup> The concept of a legal act applies to phenomena in different legal systems, even in systems where the expression ‘legal act’ is not part and parcel of the conceptual tool kit of every lawyer. Legal acts, such as entering into, or terminating a contract, making a last will, transferring a property right, making a statute, granting a license, and passing a verdict, are familiar phenomena in the law of both the common law and

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the civilian tradition. In the civilian tradition it is customary to treat all these different events under the common denominator of legal acts. Expressions used to denote them are ‘juridical acts’ (Von Bar 2009, 183), ‘Rechtsgeschäfte’ (Larenz and Wolf 2004, 393) and ‘actes juridiques’ (Terré 2006, 170). In the common law tradition, the notion of a legal act does not play the central role which it has in the civilian tradition, but a similar role is taken by the notion of a power. Where the civilian tradition speaks of a legal act, the common law tradition speaks of the exercise of a power. (Halpin 1996)

As a first approximation, legal acts may be characterized as intentional changes in ‘the world of law’, where the world of law is the set of all facts and things brought about by the law. (This will be made more precise in section 4.) Although quite a bit work in AI and Law more or less touches upon legal acts (e.g. Hage and Verheij 1999; Hage 2005b; Andrade 2007; Dahiyat 2007; Sartor 2005, chapters. 21-25, 2006, 2009 a and b), a systematic treatment of this central legal notion from a computational perspective is still lacking. In this paper I hope to start remedying this deficiency. My intention is to give an account of legal acts that is both realistic from a legal perspective and sufficiently precise to form the basis for a computer implementation. The paper does *not* describe such an implementation.

As will be elaborated in the second part of this paper, the enterprise of providing a systematic treatment of legal acts in general is hazardous for at least two reasons. The one reason is that the idea of a legal act is an abstraction from legal acts as they figure in different legal systems. A general account of legal acts must on the one hand avoid to be so abstract as to be useless, and on the other hand remain an account of legal acts that abstracts from concrete legal systems, and not a characterization of one system’s positive law.

The second reason is that, to the author’s knowledge, no legal system has a set of rules that regulates all legal acts in full. Some systems do not have any rules for legal acts in general, but only rules for, for instance, legislation, administrative dispositions, judicial decisions, and contracts. Other systems – the Netherlands are a case in point – have general rules for some aspects of some kinds of legal acts in general. Despite these complications it is possible to say a

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<sup>2</sup> In using the term ‘legal act’, I follow the usage in Von Bar *et al.* 2009.

number of things about legal acts in general. How this is possible is discussed extensively in the second part of this paper.

This paper aims at providing an account of legal acts that forms a suitable starting point for the creation of computational systems that deal with these transactions. They might include systems that automate the relation between administrative organs and citizens, and sophisticated systems for automated trade. Systems that simulate the operation of (part of) a legal system probably cannot even reach some level of adequacy if they cannot deal with the dynamics of law that is connected with legal acts. The account given in this paper is on the one hand analytical, in order to be sufficiently precise for purposes of automation, and on the other hand ‘logical’ in the sense that it is described by means of a logical language. The advantage of such a ‘logical’ description is that it shows how representation of the world of law in a computational system is possible. That is helpful even if in the end the choice for another formalism of representation is adopted.

The paper is divided into two parts. Because legal acts will be analyzed as intentional changes in the world of law, the ‘furniture’ of this world, that consists broadly speaking of entities, facts and rules, plays a central role in the analysis. The first part of the paper deals with this furniture, including its philosophical underpinnings, and at the same time introduces most of the logical apparatus that will be used to deal with it.

Only in the second part, legal acts will be the central object of attention. There, a number of crucial notions in connection with legal acts will be discussed, such as validity, avoidance, representation, capacity, competence, and power. Also the consequences of legal acts will be dealt with. The paper is concluded with a comparison with other work and a summary overview of the topics that were dealt with.

#### PRELIMINARIES

Most of the examples have been borrowed from Dutch law, because the author is most familiar with that particular legal system. Care has been taken, however, to find examples the relevancy of which is recognizable for readers who have their legal roots in different legal systems, whether they belong to the civilian or to the common law tradition.

In the formalization of examples, it was often necessary to choose whether a conditional should be formalized as a rule or as a material conditional. I have strived to formalize those conditionals as rules of which it could with some plausibility be assumed that they might represent rules of a particular legal system. Material conditionals were used for the expression of conditional connections which are on the meta-level, or did otherwise not represent a legal rule. Sometimes it was not easy to make this choice, and therefore arguably sometimes rule formulations might be replaced by material conditionals or the other way round. Not much of the argument hinges upon this, however.

To enhance the readability of this paper for readers who are not interested in formalization, the parts which contain substantial formalisms have been placed in separate sections (sections 5 and 6 of this part, and section 15 of the second part). As a consequence, some subjects are dealt with twice, one time informally and a second time formally, but real repetition has been avoided as much as possible.

## **2. Two perspectives**

There are at least two ways to look at the law and to the operation of legal rules. One way is to see the law as a discursive (argumentative) practice. The other way it to see the law as a set of special facts, as a ‘world of law’. In legal practice, both views are used. The very idea of a legal act presupposes the latter way of looking at the law, a way that assigns a central place to the ‘world of law’.

### LAW AS A DISCURSIVE PRACTICE

Looking from the perspective of law as a discursive practice, the facts of the law, such as the facts that Barack Obama is the president of the USA, that Jones sold Smith his real estate, or that the legislature yesterday passed a general prohibition on smoking, are not out there to be discovered, as one can discover a mountain, or the phone number of a person. Legal facts are *constructed* by means of arguments, and they are there because they are the outcomes of good legal arguments, actual or merely hypothetical. Proponents of different legal standpoints may offer arguments with incompatible outcomes. The best of these arguments determine the contents of the law, and not the other way round.

According to this view of the law, which one might call ‘legal constructivism’<sup>3</sup>, rules are tools for the construction of legal arguments. A legal reasoner can use a rule to make the step from the facts that satisfy the rule conditions to the facts of the rule conclusion. Acceptance of the conclusion is then justified because the rule is taken to be valid and its conditions to be satisfied. In this connection, defeasibility plays an important role, because many rules allow for exceptions which are not mentioned in the rule conditions. As a consequence, conclusions that were justified on basis of the rule and the facts that satisfy its conditions may turn out not to be justified anymore in the light of additional information. (Hage 2003) If the role of rules as reasoning tools is to be modeled by logical means, the best way to do so is in a dialogical or at least a dialectical setting. (Ashley 1992; Gordon 1994; Loui and Norman 1995; Prakken 1995 and 1997; Verheij 1996; Lodder 1999; Hage 2000a). In this paper, the role of rules as argument tools and with it the defeasibility of rule-based conclusions will seldom be touched upon.

#### LAW AS INSTITUTIONAL FACT

The second view of the law reifies the facts of the law. These facts are assumed to exist, not in the same way as ‘natural’ facts, but at least in a similar way, as institutional facts. We are all familiar with the physical world. The facts in the physical world obtain to a large extent independent of human beings. The social world, or social reality, does not only depend on what is physically the case, but also - and to a large extent - on what people believe the social world is. A fact in the social world can obtain because (sufficiently many) members of a social group believe it obtains, that it obtains because people believe that it obtains, and that (sufficiently many) other members of the group have the same belief, both about this fact, about its mode of existence, and about what the others believe. (Tuomela 2002, chapter 5; MacCormick 2007, chapter 1; Searle 2010, chapter 3) Jane may, for example, be the leader of an informal group, because most members of the group take her to be the leader, because they believe that the

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<sup>3</sup> This legal constructivism can be seen in the jurisprudential work of Ronald Dworkin (1986, 52 and 90), but also in work on ethics (Rawls 1980) and on the foundations of mathematics. (Constructivism 2010; Constructive Mathematics 2010)

others take her to be the leader too and because they believe that the other members have the same beliefs.<sup>4</sup>

Some rules exist as legal rules because sufficiently many people that participate in a legal system accept these rules as legal rules and believe that others do the same. In modern societies, however, most legal rules derive their existence and status as *legal* rules from being made in accordance with rules that specify how to make legal rules. They exemplify a second way in which things and facts in social reality can obtain, namely through the operation of rules, including legal rules. Rules deal with how people should behave towards each other, but also with the proper use of language, with the definitions of games, and with the membership of socially defined sets, such as the set of legal rules. If the conditions of these rules are satisfied, their consequences hold in social reality.

The part of social reality that is the result of the application of rules is called the *institutionalized part of social reality*. Typical phenomena within the institutionalized part of social reality (or the social world) are the existence of money, of promises, of the law and of everything created through the law, such as officials, legally defined organizations and most legal rules. Let us call the mode of existence in the institutionalized part of the social world *existence as institutional entity or fact*. (Searle 1995, 27-29)

#### THE WORLD OF LAW

On the view of law as institutional fact, the world of law is part of the social world. In fact, most of the world of law belongs to the institutionalized part of the social world. (Hart 1997, 77-96; MacCormick and Weinberger 1986) This part of the world of law is based on the operation of legal rules.<sup>5</sup>

Given the view of law as institutional fact, legal arguments do not determine the contents of the law; they are meant to discover what the facts of law are, just as arguments can be used to find out things about the natural world. For instance, a person already has a right to compensation for damages, because this is a fact in the world of law and legal reasoning is meant to find this out.

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<sup>4</sup> As Torben Spaak kindly pointed out, there are more related analyses of this mode of existence, such as the one offered in Lagerspetz 1995.

<sup>5</sup> However, not all of the world of law belongs to the institutionalized part of social reality. Rules of customary law, for instance, belong to the world of law because they are broadly accepted as rules of law. In this paper, the non-institutionalized part of the world of law will mainly be ignored, because it is only marginally relevant for legal acts.

### 3 The doctrinal notion of a legal act

Any discussion of legal acts runs the risk of being burdened by an ambiguity. Sometimes the notion of a legal act is *an internal legal concept*, used in the rules of a particular legal system. This is for instance the case in the Netherlands, where there are rules that specify under which circumstances a legal act comes about. (art. 3:32-37 BW) It is also possible, however, to abstract from the way in which a particular legal system deals with legal acts and to develop a general notion of a legal act which can be used to characterize legal systems and which makes it, for instance, possible to ask whether a particular system recognizes legal acts and which phenomena are in this system dealt with as legal acts. This more abstract notion will be called the *doctrinal notion of a legal act*, because this notion was developed in legal doctrine.<sup>6</sup> It will be discussed later in this section, but let us first have a closer look at the role of the internal legal concept of a legal act.

#### INTERMEDIATE LEGAL CONCEPTS

Many facts in the world of law do not have any physical counterpart. An example would be the fact that Smith owns the farm Blackacre. For some, in particular the so-called ‘Scandinavian realists’ (Ross 1957 ; Olivecrona 1971, 135-185) this lack of physical reference has meant that words like ‘own’, or ‘ownership’ or ‘right’ are meaningless, because, since they lack physical reference, they would lack any reference. A more adequate interpretation of these words is that they represent a particular legal status, such as that of ‘owner’, of ‘president’, or of ‘suspect’. The role of such a status is to function as intermediary in legal arguments (Ross 1957; Lindahl and Odelstad 1999), and – on a reifying interpretation – as a kind of intermediary facts in the world of law. (Brouwer and Hage 2006)

Let us take ownership as an example. The law knows several ways to obtain ownership, such as creation of a good, inheritance, or transfer of the right. Moreover, the law attaches many legal consequences to being an owner, such as

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<sup>6</sup> Although the internal legal notion and the doctrinal notion of a legal act are different things, they have influenced each other. The doctrinal notion was developed through abstracting from different forms of legal acts as used in the legal rules, while the rules have been adapted to the notion as it was developed in legal doctrine.

the duty for everybody except the owner not to destroy the owned good, and the competence of the owner to transfer the ownership, or to create a limited right (e.g. mortgage) with respect to the owned object.

In theory, the legal consequences of ownership might be attached directly to all the different ways in which ownership can be acquired. For instance, one might have the rule that if one has inherited a good, all other persons have the duty not to destroy this good. In this way it is possible to do without ownership altogether, because all the legal consequences that are traditionally attached to the existence of this right are then attached to all different ways of what would traditionally be ways of acquiring ownership. If there are three ways to become owner of a good and if there are four legal consequences attached to ownership, twelve (three *times* four) rules are required to bring about the necessary connections. See Figure 1 **Fout! Verwijzingsbron niet gevonden..**

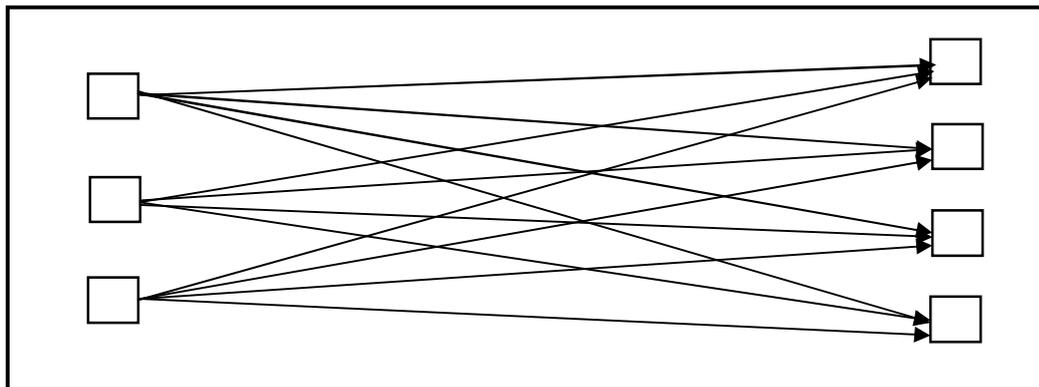


Figure 1

It is more economical, however, to work with an intermediate category – the category of ownership – that forms the intermediary between the rules that specify under which circumstances particular legal consequences obtain, and the rules that specify which legal consequences obtain if the conditions of the former rules are satisfied. (Ross 1957) If there are three ways to acquire ownership and four legal consequences are attached to ownership, a legal system that uses the category of ownership, needs seven (three *plus* four) rules to regulate this subject (see Figure 2).

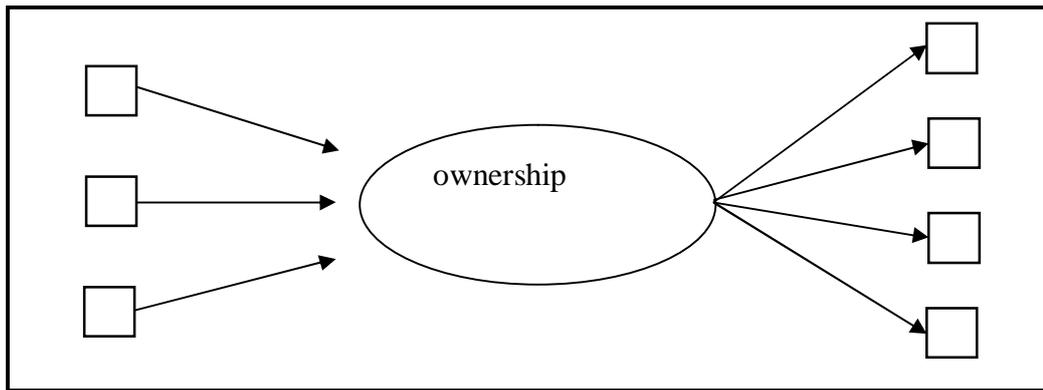


Figure 2

Many states of affairs in the world of law, such as the fact that somebody owns a thing, that somebody has a particular function (e.g. public prosecutor), or that a person counts as a criminal suspect, concern the presence of a legal status that functions as intermediary between other states of affairs.

#### INSTITUTIONAL LEGAL FACTS

MacCormick (1973) connected this idea of intermediate concepts to the theory that the law exists (mainly) in the form of institutional facts. There he sketched the following picture:

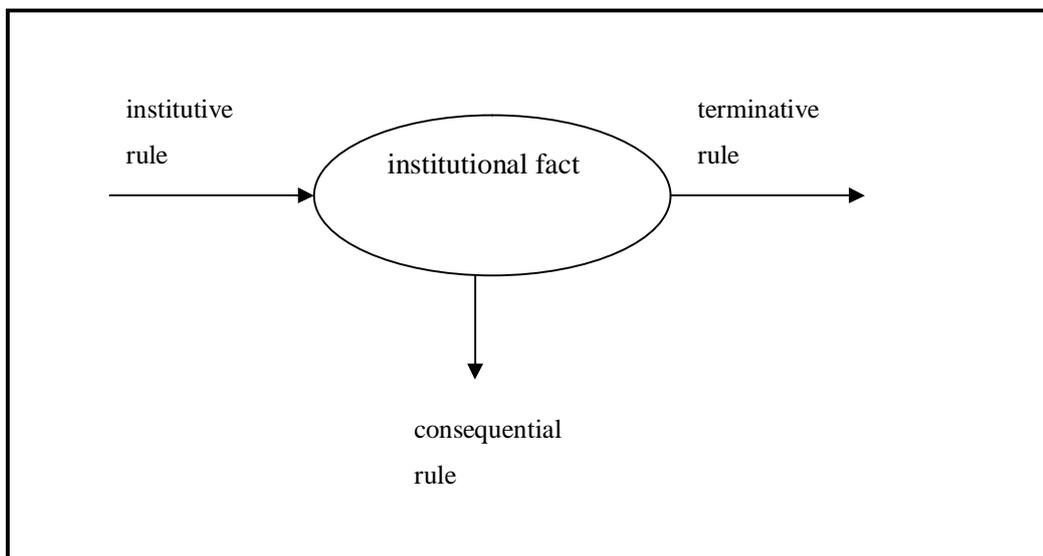


Figure 3

A legal system recognizes a particular institution, for instance ownership, if it has three kinds of rules:

1. *institutive rules*, which indicate under which circumstances a particular instantiation of the institution (e.g. a particular case of ownership) comes about;
2. *terminative rules*, which indicate under which circumstances a particular instantiation of the institution is terminated (e.g. somebody loses his ownership);
3. *consequential rules*, which indicate the legal consequences that the law attaches to the presence of the institutional fact (e.g. that the owner is permitted to destroy his property).

The institution in general exists in (is recognized by) a particular legal system if the system has these three kinds of rules.<sup>7</sup> A particular instance of the institution exists if it resulted from the application of an institutive rule.

It is important to note that this picture of MacCormick turns into the earlier picture of intermediate facts if the terminative rules are ignored and the consequential rules are moved to the position of the terminative rules. In fact, MacCormick's picture may be seen as the more general one, and for this reason it will be used as a starting point for the more detailed analyses, later in this paper.

#### 'LEGAL ACT' AS INTERMEDIATE CONCEPT

The notion of a legal act can also be used as such an intermediate concepts which signals the presence of a particular legal status. The status of (valid) legal act is brought about by the application of institutive rules. Moreover, there will be consequential rules which specify the consequences if this status is present in a particular case. And there will be other rules indicating how this status can disappear again (e.g. through avoidance).

The scope of application of the consequential rules will then depend on the number and contents of the institutive rules. For instance, if the law attaches by means of a set of rules particular consequences to the presence of a contract, the scope of application of these rules will be determined by the rules which specify when a contract comes about. If these institutive rules are modified, the regulation of contracts is modified too. If different legal systems want different rules for contracts, this may, amongst others, be brought about by different

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<sup>7</sup> It may be argued that the terminative rules are not crucial and that an institution can also exist by means of only institutive and consequential rules. We will ignore this possibility here, however.

institutive rules for contracts. As a consequence, the internal legal concept of a contract differs from the one system to another.

This may be very useful as a legal tool to regulate a specific part of social interaction. It is less useful, however, as a means of specifying what contracts are in general.<sup>8</sup> More in general, a theory about the nature of legal acts which is applicable to legal acts in more than one legal system should better not refer to the contents of the institutive rules for legal acts in particular legal systems. To state it in a different way: a general theory of legal acts should use the doctrinal notion of a legal act, rather than the internal notion of a particular legal system. The question that immediately rises then is what this doctrinal notion is, if it cannot be based on the rules of a particular legal system. To answer this question, we will turn to the theory of speech acts.

#### LEGAL ACTS AS SPEECH ACTS

In an early paper, Searle (1979) classified speech acts by means of the notion of *direction of fit*. He distinguished between the *world-to-word* direction of fit between speech acts and the world, and the *word-to-world* direction of fit. To illustrate the difference between the two, he used the following example: Suppose I make a shopping list that I use in the supermarket to put items in my trolley. A detective follows me and makes a list of everything that I put in my trolley. After I am finished, the list of the detective will be identical to my shopping list. However, the lists had different functions. If I use the list correctly, I place exactly those items in my trolley that are indicated on the list. My behavior is adapted to what is on my list. In the case of the detective it is just the other way round; the detective's list reflects my shopping behavior. If we consider my behavior as (part of) the world, we can say that my shopping list has the world-to-word direction of fit, because my behavior (the world) must fit the words on the list (the words). The detective's list, on the contrary, has the word-to-world direction of fit, because his list must fit my behavior.

According to Searle, every speech act has a propositional content, which indicates what the speech act is about, and an illocutionary force, which indicates

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<sup>8</sup> For this reason, inferential theories of meaning, such as the theory of Brandom (1994), are less attractive for the understanding of legal status words, such as contract. See also Hage 2009. For a different view, see Sartor 2009a and c.

the kind of speech which is performed about this propositional content. For instance, the sentence 'There is a big dog over there' has the propositional content that there is a big dog over there. Depending on the circumstances of utterance, it may be a pure factual description of the situation (illocutionary force 1) or a warning (illocutionary force 2) that there is danger ahead.

The direction of fit as exposed by Searle holds between the propositional content of a speech act and the world. The illocutionary force of a speech act determines which direction of fit is involved. Searle distinguished five main kinds of speech acts: assertives, directives, commissives, declarations and expressives. For the present purposes, only the distinction between assertives and declarations is relevant. *Assertives* commit the speaker to something's being the case. For instance, the sentence 'It's raining' can be used for an assertive speech act. Assertives have the word-to-world direction of fit; they are successful if they are true.

*Declarations* bring about a correspondence between the speech act's propositional content and the world. They have, what Searle calls, a double direction of fit, because the world is made to fit the propositional content of the speech act, while that content comes to fit the world. For instance, the sentence 'I hereby give you my car' can be used for a declaration. Such declarations are only possible given a *background of rules* which specify how these declarations can be performed and what the consequences are if such a declaration is performed.

Searle's analysis of different kinds of speech acts by means of the difference in directions of fit provides a suitable starting point for the analysis of legal acts. For that purpose it needs to be amended, however. The first amendment is merely terminological. Declarations in Searle's sense are speech acts by means of which facts are created. Since these acts are constitutive, these speech acts by means of which the world is changed will be called *constitutive acts*, or *constitutives*.

The second amendment concerns the direction of fit of constitutives. According to Searle constitutives have a double direction of fit, because the world is altered to fit the propositional content of the speech act by representing the world as being so altered (Searle and Vanderveken 1985, 53). The expression 'double direction of fit' is somewhat misleading, however, because it suggests that both directions are equally important. If somebody copies the file which contains

the text of this paper, his file comes to be identical to mine, and mine comes to be identical to his. However, his copy of the file comes to be identical to my copy in a more basic sense than the other way round, because his copy of the file is adapted to my copy and not the other way round. Approximately the same holds for the double direction of fit: the words come to fit the world only because the world has been adapted to the words. Therefore constitutives will be taken as having the world-to-word direction of fit.

This analysis of constitutives very much and not coincidentally (Searle 2010, 28/9) resembles the picture sketched by MacCormick of institutional legal facts. Constitutives are the means by which institutional legal facts are created, and the institutive, (terminative) and consequential rules mentioned by MacCormick are precisely the background which form the abstract institution and which makes the performance of constitutive acts possible.

The next step is to apply this unified picture of institutional theory of law and speech act theory to legal acts. A legal act is then a kind of speech act by means of which a change is brought about in the world of law. The propositional content of the speech act determines which changes will be brought about if the speech act is valid. By the way: the speech act needs not be a real *speech* act. All that is necessary is that there is an act with a propositional content and that the law attaches to the performance of this act the consequences which are specified in the propositional content of the act.

There is another aspect of legal acts which has received ample attention in doctrinal legal writings<sup>9</sup> and is not so much emphasized by Searle's theory of speech acts and that is that the change brought about by a legal act must be intentional. This leads us to the following doctrinal characterization of a legal act:

*A legal act is an act with a propositional content, performed with the intention to bring about the change in the world of law that is indicated by means of the propositional content.*

*A legal system recognizes legal acts if it has rules that specify how a legal act is to be performed and that attach by and large the intended consequences to the valid performance of the legal act for the reason that they were intended.*

Legal acts on this definition will be the subject of more detailed analysis in the sections 7 to 14. This analysis will be based on a conceptual framework about entities, facts and rules, and it is to this framework that we will turn now.

## 4 Rules

The world of law in a broad sense consists of everything the existence of which is based on the application of legal rules. This includes real estate, mayors, cars, but also certain kinds of events, acts, states of affairs and rules.

### ENTITIES

In predicate logic it is customary to distinguish between full sentences, which have truth values, and terms and function expressions, which denote so-called ‘individuals’. For instance, ‘John’ would be a term, which presumably denotes a man, while ‘John whistles’ is a sentence which has a truth value, but does not, as a whole, denote anything (pace Frege). Because ‘individuals’ suggests that persons are involved, while the logical use of this term is much broader, we will use the term ‘entity’ instead of it. So, entities are what is denoted by terms and by function expressions. Both the numeral ‘2’ and the function expression ‘2<sup>2</sup>’ denote entities, namely respectively the numbers two and four.

### FACTS AND STATES OF AFFAIRS

States of affairs are by definition everything which is expressed by a declarative sentence, such as the state of affairs that Paris is the capital of China and the state of affairs that Beijing is the capital of China.<sup>10</sup> The former of these states of affairs does not obtain and is therefore a non-fact. The latter does obtain, and is for that reason also a fact.

States of affairs are considered a kind of entities, which may be somewhat weird in the eyes of many logicians because they are expressed by full sentences. However, the introduction of states of affairs as entities both conform to standard linguistic usage (people talk *about* states of affairs) and has many advantages for

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<sup>9</sup> This is very obvious in those writings which expose the so-called ‘will theory’ of legal acts. See for instance Flume 1979, 7 and Fried 1981.

<sup>10</sup> The sentence *expresses* a state of affairs, but does *not denote* it, because full sentences do not denote.

the representation of knowledge domains, especially those which involve rules and their operation.<sup>11</sup>

States of affairs are either abstract or concrete. An abstract state of affairs can be realized (instantiated) in different ways. For instance, the abstract state of affairs that it is raining can be realized at different times and places. Whereas states of affairs can be either abstract or concrete, *facts*, states of affairs which actually obtain, are always concrete.

Facts obtain at a particular moment, and this moment is assumed to be part of the fact description. So the fact would not be that it rains, but that it rains a time *t*.

#### RULES

Rules are a kind of entities, like tables, chairs and prime numbers. They are immaterial, like prime numbers, but exist in time, like tables and chairs. They consist of a condition part and a conclusion part, which are both abstract states of affairs. The point of rules is that if their conditions are satisfied, that is, if an instantiation of the abstract state of affairs which forms its conclusion, obtains, their conclusions obtain.<sup>12</sup>

The world of law is subject to change. Part of this change consists of events that take place in the 'ordinary' world and which count as changes in the world of law. For instance, if a person *P* becomes 18, this event counts as becoming of age in the world of law. Another part of the changes is brought about by rules which attach new facts to existing ones. If a person is of age, he has the capacity to perform legal acts. As a consequence, if *P* becomes 18, he does not only become of age, but also receives the capacity to perform legal acts.

As these examples illustrate, the operation of rules is crucially important for understanding the dynamics of the world of law. We will therefore go into some detail about the kinds of rules and their modes of operation. The rules that constrain the world of the law can be divided into dynamic rules and static

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<sup>11</sup> More details on the treatment of states of affairs as entities can be found in Hage 1997: 131f and Hage 2005a: 72f.

<sup>12</sup> Although adequate logical models of the legal domain are not well possible without non-monotonic logics (Hage 2003; but see also Hage 2005a: 70), I will ignore that as much as possible in this paper, in order to focus on what is important in the present context.

rules.<sup>13</sup> Dynamic rules determine the development of the world of the law in time; static rules determine the combinations of states of affairs that can obtain simultaneously.<sup>14</sup>

#### DYNAMIC RULES

A simplified example of a dynamic rule would be the rule that somebody who commits a crime is punishable. This rule makes that a particular state of affairs ( a person is punishable) obtains, after some event took place (this person committed a crime).<sup>15</sup> Dynamic rules bring about changes in the world of the law.

Dynamic rules may be conditional, in which case the legal consequence is only attached to the event under certain conditions. An example is the rule that if it is dark, the occurrence of a car accident obligates the drivers to place a warning triangle on the road next to the cars.

The operation of dynamic rules is depicted in Figure 4:

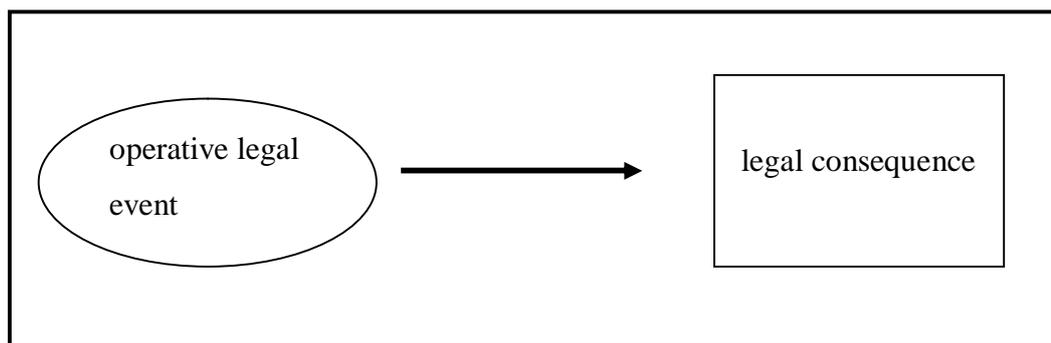


Figure 4

The horizontal arrow indicates a connection in time: the legal consequence (or: legal effect) occurs *after* the event took place. Obviously, an event may have more than one legal consequence.

Events are indicated by means of an oval. Events that have legal consequences are called *operative legal events*.

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<sup>13</sup> A similar distinction was also made in Sartor 2005 chapter 21. See also the brief discussion in part 2 of this paper, section 16.

<sup>14</sup> The distinction between dynamic and static rules was inspired by Kelsen's distinction between statics and dynamics of law. (Kelsen 1960, chapters IV and V)

<sup>15</sup> That the legal effects brought about by a dynamic rule only obtain *after* some event took place, should not be interpreted as that there is some lapse of time after the event and before its legal effects take place. It only means that the legal effects only begin *when* the event takes place.

The rectangle indicates a state of affairs. A state of affairs may also be ‘negative’: if somebody transferred (the ownership of) his car to somebody else, the first-mentioned person is not the owner anymore.

#### FACT TO FACT RULES

Not all legal rules attach legal consequences to an event, with the effect that the consequences come to obtain *after* the event took place. There are also rules which attach the presence of a fact to the presence of another fact. An example is the rule which attaches the fact that a person is competent to alienate an object to the fact that this person owns that object. Because the operation of these rules does not involve changes over time, such rules will be called *static rules*.

Static rules may be conditional too. An example is the rule that in case of emergencies, the mayor of a city is competent to evoke the state of emergency. This rule conditionally attaches the fact that some person has a competence to the fact that this person is the mayor.

Actually there are two types of static rules. In the next subsection we will consider the so-called ‘counts-as rules’. First we will have a closer look at those static rules which attach new facts to existing ones, and which we will call *fact tot fact rules*. The example about the mayor who is competent to evoke the state of emergency is an example of such a fact tot fact rule. The operation of fact tot fact rules is depicted as follows:

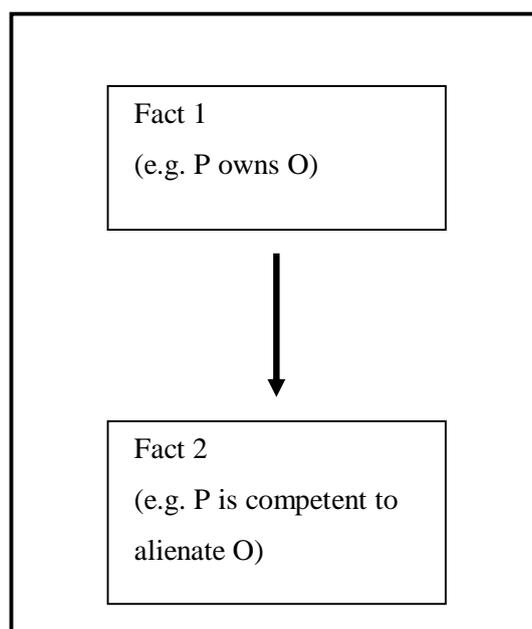


Figure 5

That the arrows points downwards indicates that the relation between the two facts is timeless.

#### COUNTS-AS RULES

The second kind of static rule consists of the so-called *counts-as rules*.<sup>16</sup> Counts-as rules make that entities of one type also count as entities of another type. For instance the president of the USA also counts as the commander in chief of the USA army. Often, the entities that count as another kind of things are events. For instance, under particular circumstances, causing a car accident counts as committing a tort, or offering money to another person counts as an attempt to bribe an official. Counts-as rules also make that facts of one type counts as facts of another type. For instance, the fact that a prospective husband before the altar said 'I do' counts as the fact that he married his wife

Usually counts-as rules are conditional, meaning that entities of type 1 only count as entities of type 2 if certain conditions are satisfied. (Searle 1995, 28) An example from Dutch law (art. 3:84 of the Civil Code) would be the rule that the delivery of a good counts as the transfer of that good if the person who made the delivery was competent to transfer and if there was a valid title for the transfer. Another example would be that a legal act performed by a representative counts as a similar act performed by the represented person.

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<sup>16</sup> Counts-as rules have become quite popular in the recent literature, due to the influence of Searle (1995). In the jurisprudential literature, counts-as rules have for a long time been known under the name of rules of recognition (Hart 1994). As Spaak points out (Spaak 1994: 167-169), these rules were also familiar in the Scandinavian literature as 'norms of qualification'.

The operation of counts-as rules can be depicted as in Figure 6:

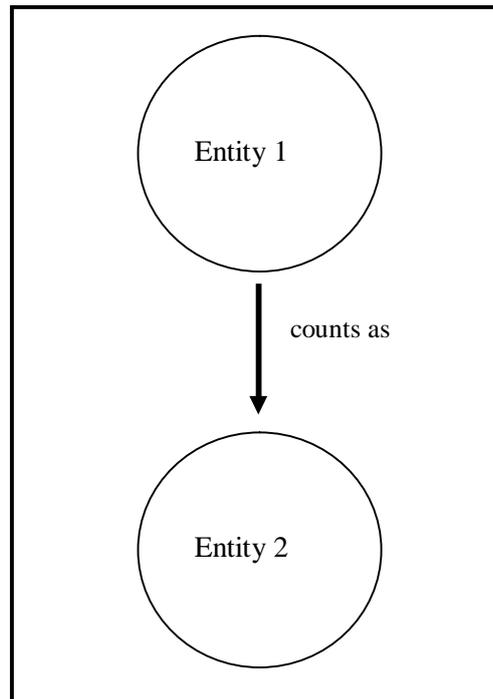


Figure 6

The vertical arrow indicates again that the relation between entity 1 and entity 2 is timeless. The entities are indicated by means of circles, but ovals (for events), or rectangles (for states of affairs) would also have been possible.

#### DYNAMIC AND FACT TO FACT RULES

To gain a proper understanding of the roles which the different kinds of rules play in the constitution of the world of law, it is important to study how these rules interact with each other. We will therefore consider an extended example.

The first part of the example illustrates how the effects of a dynamic rule are extended through the operation of a fact to fact rule. If A transfers the ownership of a good G to B, the immediate consequences are that A is not the owner of G anymore and that B has become the new owner. Because the owner of a good is competent to alienate this good, B has also become competent to alienate G. This is an indirect consequence of the transfer. Graphically, this interaction looks as follows:

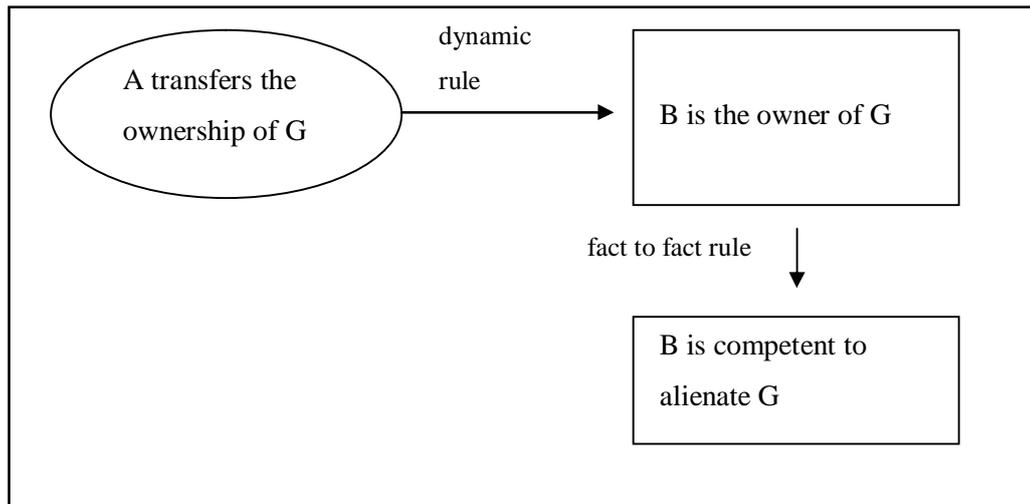


Figure 7

#### COUNTS AS AND DYNAMIC RULES

To bring about legal consequences, an event needs to have a particular status. For instance, the delivery of a good G in itself does not make the person who received the good owner of it. This becomes different if the delivery amounts to a transfer of ownership. In the law this is handled through the interaction of a counts-as rule that specifies under which circumstances a delivery counts as a transfer of ownership, and a dynamic rule that attaches the change of ownership to the transfer.

For instance, if A delivers the good G to B, and if A was competent to transfer the ownership and if there was a valid title for the transfer<sup>17</sup>, then the delivery counts as a transfer of the ownership of G. The consequences of this transfer are that A loses his ownership, and that B becomes the new owner. Graphically this looks as follows:

<sup>17</sup> These conditions are the ones mentioned in article 3:84 of the Dutch Civil Code.

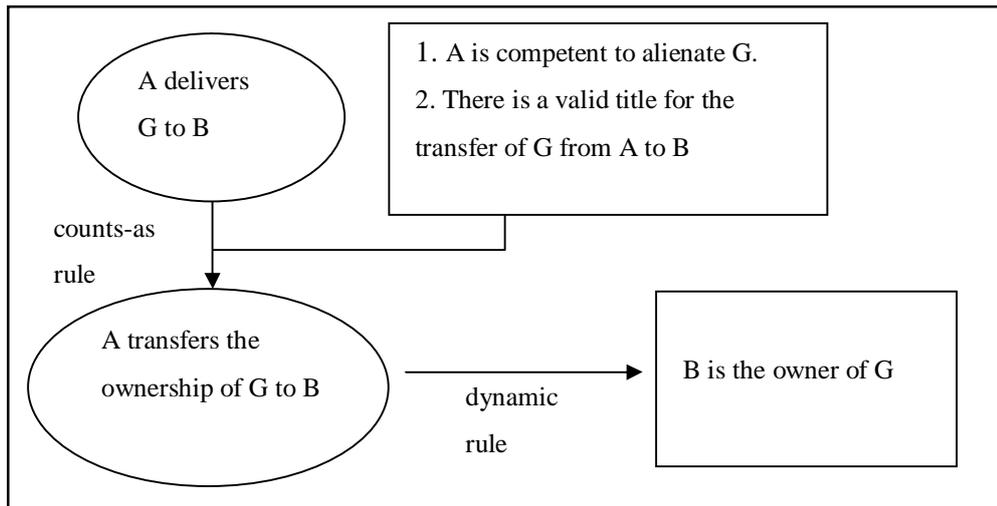


Figure 8

### RULE CREATION

One of the legal consequences that can be brought about through the application of a dynamic rule is that a new rule becomes valid. This rule can then attach new legal consequences to already existing facts. Suppose, for instance, that the Dutch legislature makes a statute which contains the rule that the mayor of a city is competent to evoke the state of emergency. Through this rule, the mayor of Maastricht would become competent to evoke the state of emergency in Maastricht. Graphically this can be represented as follows<sup>18</sup>:

<sup>18</sup> The horizontal line from the box that represents the fact that the rule is valid to the downward arrow that represents the a-temporal relation between the fact that X is the mayor to the fact that X is competent means that the a-temporal relation is based on the static rule whose validity is represented by the box.

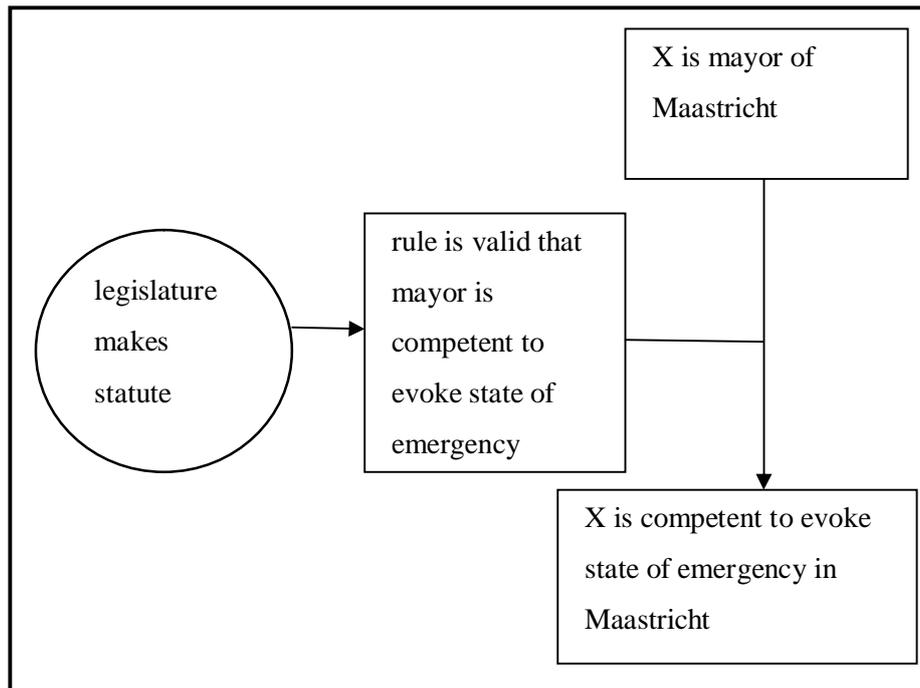


Figure 9

The creation of a rule is comparable to bringing about a new fact, including that the new fact may bring additional new facts along. (Searle 2010, 96-100) There is a major difference however, because a new rule does not lead to a single new fact, but possibly to a large amount of new facts. In the above example, not only the mayor of Maastricht would become competent to evoke the state of emergency, but the mayors of all Dutch municipalities.

## 5 Logic

In the previous sections we have seen an informal analytical account of the ‘world of law’ and in particular of the role that rules play in this world. To make this account more precise and to facilitate the use of it in legal knowledge representation, this section provides the necessary logical tools.

### 5.1 The language L

The tools consist mainly in an extension of the language of first order predicate logic, called L. The extension consists in a number of dedicated predicates, relations, and function expressions and some conventions.<sup>19</sup>

<sup>19</sup> The language is essentially that exposed in chapter 4 of Hage 2005a, with some simplifications and some additions. That chapter also gives background information that could not be presented here. Notice that

## BASICS

The first convention concern a specification of the language for predicate logic that will be used:

- All constants for relations, predicates, and sentences without a subject-predicate structure start with an uppercase letter.
- All function expressions, individual constants and variables start with a lowercase letter, except individual constants and variables denoting states of affairs, which start with an asterisk (\*), followed by a lowercase letter.
- The constants  $\forall$ ,  $\exists$ ,  $\sim$ ,  $\&$ ,  $\vee$ ,  $\rightarrow$  and  $\equiv$  stand for the universal and the existential quantifier, negation, conjunction, inclusive disjunction, the material conditional and equivalence, respectively.
- To prevent long sequences of universal quantifiers, we will sometimes use the convention that all free variables in a sentence are assumed to be bound by a universal quantifier.
- Variables are *italicized*.
- All formula's will be written in a special typescript.

## STATES OF AFFAIRS

The second convention concerns *states of affairs*, which are treated as entities. If  $S$  is a sentence, and if  $s$  is the string that results if all the uppercase letters at the beginnings of the atomic sentences that are part of  $S$  are replaced by lowercase sentences, then  $*s$  typically denotes the state of affairs expressed by  $S$ .<sup>20</sup>

Variables for states of affairs start with an asterisk too. For instance, the following sentence expresses that Jane believes everything that John believes<sup>21</sup>:

$\text{Believes}(\text{john}, *s) \rightarrow \text{Believes}(\text{jane}, *s)$

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the presupposed logical background is that of deductive logic. The reasons for not choosing a non-monotonic logic are first that the theory of legal acts presupposes a reified view of the world of law, instead of legal constructivism, while defeasible reasoning fits best with legal constructivism. And second, the use of a non-monotonic logic would add logical complications which might detract from the main messages of this paper. All of this does not subtract from it that a future extension of the present work might have to use a non-monotonic logic as background logic.

<sup>20</sup> Because states of affairs are from a logical point of view individuals (or entities), they may be denoted by other expressions too, including proper names and function expressions. To distinguish between these other terms and the conventional term  $*s$ , the latter is said to denote the state of affairs expressed by  $S$  *typically*.

<sup>21</sup> To limit the complexity of sentences, we will use the convention that all open sentences are assumed to be closed under universal quantification over all free variables. Notice that this does not apply to rule formulations, because these do not contain full sentences.

If a sentence is true, the state of affairs expressed by it obtains. L has in this connection a dedicated predicate constant `Obtains/1`, that operates on terms that denote states of affairs. The relation between the truth of a sentence and the state of affairs typically expressed by this sentence is defined as follows:

`Obtains(*s)` is true iff `s` is true.

Abstract states of affairs are denoted by a term for a state of affairs that contains at least one free variable. For instance `*rescued(tarzan,y)` denotes the abstract state of affairs that Tarzan rescued somebody. Notice that this expression is a term that denotes a state of affairs. In particular it should be distinguished from the sentence  $(\exists y)\text{Rescued}(tarzan,y)$ , which expresses the concrete state of affairs that there is a person whom Tarzan rescued.

Concrete states of affairs can instantiate abstract ones. A concrete state of affairs `*s` instantiates an abstract state of affairs `*s'`, if and only if there is some substitution  $\sigma$  such that the term that typically denotes `*s` is the result of uniformly substituting all variables in the term that typically denotes `*s'` by constants according to  $\sigma$ .

## RULES

In L rules are treated as entities, denoted by a function expression which has the rule conditions and the rule conclusion as its parameters. (Something like: the rule with conditions a and conclusion b.)

L employs to this purpose a dedicated function constant that has rules as its values: `⇒/2`. Both the first parameter and the second parameters are terms denoting abstract states of affairs. The first parameter stands for the rule conditions, the second for the rule conclusion. For instance, the following term denotes the rule that thieves are punishable:

`*thief(x) ⇒ *punishable(x)`

If the same free variable occurs both in the condition part and in the conclusion part of the rule, they should in case of instantiation be instantiated by the same value.

The predicate constant `Valid/1` serves to express that a rule exists, or – what boils down to the same thing – is valid. It is defined by the following sentence:

$\text{Valid}(\text{rule}) \equiv \text{def. } \exists x(x = \text{rule})$

The following sentence expresses that the rule that thieves are punishable is valid:

$\text{Valid}(*\text{thief}(x) \Rightarrow *\text{punishable}(x))$

#### APPLICATION OF RULES

In the present paper, the defeasibility of reasoning with rules is ignored. Then the ‘logic’ of rules is simple: if the conditions of a rule are satisfied under some instantiation  $\sigma$ , then the conditions of the rule are true under  $\sigma$ . So rules can be used for both modus ponens like arguments and modus tollens like arguments, but (the validity of) rules cannot be derived from the (logical) truth of the conclusion or the (logical) falsity of the conditions.

#### TIME

To formalize the operation of rules which involves the lapse of time, it is useful to add a time tag to sentences that represent states of affairs. For instance:

$\text{Owns}(\text{smith}, \text{blackacre})_t$  represents the state of affairs that Smith owns Blackacre at time  $t$ .

The lapse of time is, for the sake of easy formalization, assumed to be discrete. If  $t$  represents a moment in time,  $t+1$  represents the next moment. If an event takes place at moment  $t$  and this event has immediate consequences, the consequences will obtain starting from moment  $t+1$ .

### 5.2 Semantics

Searle applied the distinction between directions of fit to gain a better understanding of speech acts. It can also be applied to illuminate the difference between descriptive sentences and rules, however. (Searle 2010, 96-100)

Descriptive sentences have the word to world direction of fit, because they aim to be true in the sense of corresponding to the world. Rules, on the contrary, have the direct world to word direction of fit, because – like constitutives – they bring about that the facts in the world come to match the contents of the rule.

There are two differences:

1. constitutives operate once only, while rules impact on all states of affairs which satisfy their applicability conditions<sup>22</sup>;
2. constitutives are momentary events, which take place at a particular moment in time and operate only then, while rules have an existence that stretches out in time and they have impact as long as they exist.<sup>23</sup>

#### RULES AS CONSTRAINTS

Valid rules impose themselves on the world. They constrain the world in the sense that not all combinations of facts are possible. In this respect they differ from most descriptive sentences, which aim to indicate which facts happen to be the case within the boundaries of what is possible.<sup>24</sup>

The most transparent way in which constraints are modeled in logic is in model-theoretic semantics. The idea behind this logical tool is that logical truth is interpreted in terms of what is the case in all logically possible worlds and that logically possible worlds are defined in terms of an interpretation function which, amongst others, assigns truth values to sentences.<sup>25</sup> By means of a slight modification of the traditional way in which model-theoretic semantics is presented, the role of constraints can be made even clearer. This modification is to treat the interpretation function not as a means to assign truth values to sentences, but as a test whether a world, defined as a comprehensive set of states of affairs, is possible. (Hage 2005c)

The starting point for such an account of constraints is to define consistency of sentences in terms of the compatibility of the states of affairs expressed by these sentences, instead of the other way round. Descriptive sentences are called *consistent* if it is possible that they are all true. For instance, the sentences 'John is a thief' and 'John is a minor' are consistent, because it is possible that John is both a thief and a minor. In other words, because the *states of affairs* that John is a thief and that he is a minor are *compatible*, the *sentences* that express these states of affairs are *consistent*. The sentences 'John is a thief'

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<sup>22</sup> Exceptions to rules and analogous rule application are ignored (again).

<sup>23</sup> I assume here that the time which a rule operates coincides with its time of existence.

<sup>24</sup> One might argue that there are also descriptive sentences which are necessarily true, such as the sentence that circles are round. However, such sentences usually (also) express constraints on what is possible, and very often these sentences are better interpreted as formulating constraints on possible worlds than as descriptions of the facts which obtain in these worlds. See also Hage 2005a, 197-200 on the descriptive counterparts of rules.

<sup>25</sup> For one account of this type of semantics, see Lukaszewicz 1990, 38-43.

and 'John is not a thief' are inconsistent, because it is not possible that John both is and is not a thief. It is the *incompatibility* of the *states of affairs* that John is a thief and that he is not a thief that makes the corresponding *sentences* *inconsistent*.

Compatibility and incompatibility of states of affairs are taken to be ontologically prior to the consistency of the sentences expressing these states of affairs. This means that the compatibility of states of affairs cannot be derived from the consistency of the sentences that express them, but that there must be another ground for the compatibility of states of affairs. This other ground is to be found in a set of *constraints* which disallow some combinations of states of affairs in a single world and allow the other combinations<sup>26</sup> Or, to state it in different words, constraints rule out some worlds as impossible, while allowing other ones as possible worlds. Two states of affairs are then compatible if there is at least one possible world in which these states of affairs both obtain. That there is such a world (if there is one) is because it is not ruled out by the constraints on possible worlds.

The states of affairs that John is a thief and that he is not a thief are incompatible because of the constraint that a state of affairs cannot both obtain and not obtain. The world in which John both is and is not a thief is for that reason impossible. A similar constraint is that the single state of affairs that John is both a thief *and* a minor can only obtain if *both* the states of affairs that John is a thief and that he is a minor obtain. Such constraints are usually called *logical* constraints, and they determine which worlds count as logically possible.

In traditional model-theoretic semantics, these incompatibilities are reflected as characteristics of the interpretation function that assigns truth values to sentences. The relevant characteristics in this case are that the interpretation function assigns the truth value false to the sentence  $\sim P$  if and only if it assigns the truth value true to the sentence  $P$ , and that it assigns the truth value true to the sentence  $P \& Q$  if and only if it assigns true to both  $P$  and  $Q$ .

Besides logical constraints, there are also other constraints. There are *physical* constraints that prevent somebody from being in two non-adjacent countries at the same time. It is, for instance, physically impossible that John is

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<sup>26</sup> This point has, in a different context, also been made by Prakken and Sartor (1996, 184/5).

both in France and in Austria. *Conceptual* constraints make it impossible that anything is both a square and a circle.

The crucial modification in the model-theoretic semantics which is proposed here is to treat the constraints not as constraints on the truth values of sentences, but as constraints on which worlds count as possible. A world is only possible if it satisfies all the relevant constraints. This means that what is possible depends on the constraints that are taken into account. A possible world is a set of states of affairs that is possible relative to some set of constraints *c*, in the sense that the facts of that world satisfy the constraints in *c*. So, what counts as a possible world is by definition relative to some set of constraints.

The minimal set of constraints is the language by means of which the states of affairs of the world are expressed, and not – as some would have it – the constraints of logic. The problem with taking logical constraints as the basic ones is that there are several competitors as to what is ‘the’ logic. The multiplicity of logics can be handled by treating the constraints of these logics as competing sets of constraints, defining different sets of logically possible worlds.

Next to the familiar logical, physical and conceptual constraints, there can also be legal constraints on possible worlds. Suppose, for instance, that in a particular legal system the rule exists that owners can transfer their property rights. In the world of the law determined by this system, which is one legally possible world, it cannot occur that somebody is both an owner and unable to transfer his property right.<sup>27</sup> Legal rules function as constraints on those worlds of law in which they exist (are valid).

As this example shows, the constraints on possible worlds can be the result of human culture. By adopting rules, humans can impose additional constraints on the world in which they live. Rule-based constraints are contingent in the sense that they are absent in a world in which these rules do not exist. But when they exist, they rule out certain combinations of states of affairs as impossible, and necessitate other states of affairs, just as logical and physical constraints do.<sup>28</sup>

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<sup>27</sup> Exceptions to rules are ignored here, to focus on the role of rules as constraints on legally possible worlds. Hage 2005c illustrates that it is possible to give exceptions to rules a place in a semantic theory like the present one.

<sup>28</sup> When a temporal aspect is added to the logic, rule-based constraints also rule out certain ‘lines of worlds’, as I will later call them. (Thanks to the anonymous reviewer who suggested this.)

## CONSTRAINTS ON LOGICALLY POSSIBLE WORLDS

Assume that  $L = \{s_1, s_2, \dots, s_n\}$ , where  $s_1 \dots s_n$  are all the well-formed closed sentences of  $L$ . All sentences are assumed to have a time tag, and two sentences which only differ in their time tag are nevertheless different sentences.

Let  $s_i$  be a sentence in  $L$ , and let  $*_{sa_i}$  denote the state of affairs that is typically expressed by  $s_i$ .  $*_{sa_i}$  is then a state of affairs that is *possible relative to*  $L$ .<sup>29</sup>

Let the set  $SA_i$  be the set of all states of affairs that are possible relative to  $L$  and which have in common that their time tag is  $i$ . Let  $W_i$  be the power set (the set of all subsets) of  $SA_i$ . Intuitively,  $W_i$  stands for the set of all worlds at time  $i$ , the content of which is expressible in  $L$ .  $i$  is said to be the time tag of all elements of  $W_i$ . Every  $w_i \in W_i$  is a subset of  $SA$ .

*Lines of worlds*  $WL_1 \dots WL_n$  are ordered set of subsets of  $SA$ , such that:

- for all values of  $i$  no two subsets in  $WL_i$  have the same time tag;
- if two subsets in  $WL_i$  have time tags  $m$  and  $n$  respectively, with  $n$  as the bigger number, then there are subsets in  $WL_i$  with time tag  $t$  for every  $t$  such that  $n \geq t \geq m$

A line of worlds may be intuitively interpreted as the development of a world in time.

Over the elements of every world line  $WL_i$  a successor-relation is defined such that a world  $w' \in WL_i$  is the successor of world  $w \in WL_i$  iff the time tag  $\tau'$  of  $w'$  is one bigger than the time tag  $\tau$  of  $w$ .

There are no other constraints on the states of affairs that are elements of the worlds in  $W$ . There are, for instance, worlds in  $W$  in which the state of affairs  $*_p \ \& \ q$  obtains, but in which the state of affairs  $*_q$  does not obtain. Such worlds are possible relative to  $L$ , but they are not logically possible.

Worlds that are logically possible are subject to a number of additional constraints. The set of these logically possible worlds is denoted by  $W_L$ . These worlds, which are logically possible, must satisfy the following constraints<sup>30</sup>:

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<sup>29</sup>  $L$  may be thought of as the conceptual scheme by means of which worlds are 'captured'.

1. if  $*p \in w$  then  $*\sim p \notin w$ , if  $*\sim p \in w$ , then  $*p \notin w$ , if  $*p \notin w$ , then  $*\sim p \in w$ , and if  $*\sim p \notin w$ , then  $*p \in w$ .
2.  $*p \ \& \ q \in w$  if and only if both  $*p \in w$  and  $*q \in w$ .
3.  $*p \ \vee \ q \in w$  if and only if either  $*p \in w$ , or  $*q \in w$ , or both.
4.  $*p \ \rightarrow \ q \in w$  if and only if either  $*p \notin w$ , or  $*q \in w$ , or both.
5.  $*p \ \equiv \ q \in w$  if and only if either both  $*p \in w$  and  $*q \in w$ , or both  $*p \notin w$  and  $*q \notin w$ .

These constraints correspond to the traditional constraints of propositional logic stated in terms of relations between states of affairs.

6.  $*\exists x(r(x)) \in w$  if and only if there is an individual  $a$ , such that  $*r(a) \in w$ .
7.  $*\forall x(r(x)) \in w$  if and only if there is no individual  $a$  in  $w$ , such that  $*r(a) \notin w$ .

These constraints give the traditional meaning of the quantifiers, again stated in terms of states of affairs.<sup>31</sup>

A constraint that is characteristic for rules is that if the conditions of an existing (valid) rule are satisfied, the consequences of this rule obtain. Let  $*conditions/\sigma$  and  $*conclusion/\sigma$  denote the states of affairs expressed by respectively the conditions and the conclusion of a rule with their variables instantiated according to substitution  $\sigma$ . Then the above mentioned constraint becomes<sup>32</sup>:

8. If  $*valid(*conditions \Rightarrow *conclusion) \in w_i$ , and
  - $*conditions/\sigma \in w_i$ , then
  - $*conclusion/\sigma \in w_{i+n}$ .

Finally there are some constraints to guarantee that logical relations also hold between states of affairs:

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<sup>30</sup> All states of affairs are assumed to have the same time tag, which is therefore omitted.

<sup>31</sup> To gain simplicity at the cost of precision, the formulations of the constraints 6 and 7 do not deal with compound formulas, or the use of quantifiers or function expressions within the scope of the quantifiers.

<sup>32</sup> The references to the worlds  $w_i$  and  $w_{i+n}$  are necessary to make the constraint also applicable to dynamic rules. In the case of a dynamic rule,  $n$  will have the value 1 (the world of the legal consequence is the successor to the world of the operative event); in the case of a static rule the value of  $n$  will be 0 (the two worlds coincide). For rules with delayed legal consequences, the value of  $n$  will be bigger than 1.

First, terms which denote states of affairs expressed by logically equivalent sentences are co-referential:

9. If and only if for all worlds  $w \in W_L$  it holds that  $*p \equiv q \in w$ ,  
then  $*p = *q$ .

Second, two states of affairs are logically compatible if there is at least one logically possible world in which they both obtain (at the same time)<sup>33</sup>:

10. If and only if there is at least one world  $w \in W_L$  such that  $*p \ \& \ q \in w$ ,  
then  $*Compatible(*p, *q) \in w$  holds for all worlds  $w \in W_L$ .

A state of affairs is said to entail another state of affairs if the second state of affairs obtains in all worlds in which the former obtains:

11. If and only if for all worlds  $w \in W_L$  it holds that if  $*p \in w$ , then  $*q \in w$   
then  $*entails(*p, *q) \in w$  for all worlds  $w \in W_L$ .

From 10 and 11 follows that:

12. For all worlds  $w \in W_L$  it holds that if  $*entails(*p, *q) \in w$  and  
 $*\sim Compatible(*r, *q) \in w$ , then  $*\sim Compatible(*r, *p) \in w$ .

## 6 An example

To illustrate the interplay of static and dynamic rules without having to cope with the intricacies of legal acts, we will briefly discuss an example which does not involve a legal act.

The example concerns the case in which somebody dies and somebody inherits a good and thereby receives the permission to destroy the inherited good. This example involves two rules, one about inheritance and one about the permission of owners to destroy their goods. To keep the example simple, the rule about inheritance will be simplified strongly, to make it run that if somebody dies, the inheritor becomes the owner of everything the testator owned. The following sentence expresses that this rule is valid:

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<sup>33</sup> By replacing the logical constraints by other constraints (possibly a superset), different versions of compatibility can be expressed.

$$\text{Valid}(*\text{dies}(x)_t \ \& \ \text{inheritor}(x, y)_t \ \& \ \text{owns}(x, g)_t \Rightarrow \\ * \text{owns}(y, g)_{t+1})$$

The validity of the rule that the owner of a good is permitted to destroy this good can be expressed as follows:

$$\text{Valid}(\text{owns}(p, g) \Rightarrow * \text{permitted}(p, \text{destroy}(g)))$$

where the predicate `Permitted/2` stands for permitted to do. The following sentences express the relevant facts of the case:

```
Dies(john) 2011-01-04-12:05:00
Inheritor(john, jane) 2011-01-04-12:05:00
Owns(john, volvo) 2011-01-04-12:05:00
```

From the validity of the first rule and these facts it follows that<sup>34</sup>:

```
Owns(jane, volvo) 2011-01-04-12:05:01
```

And from this and the validity of the second rule it follows that

```
Permitted(jane, destroy(volvo)) 2011-01-04-12:05:01
```

This example ends the first part of this paper which offers an analytical and a logical account of legal acts. In this first part, legal acts are given a place in the ‘world of law’. This world of law is characterized as a part of institutional reality and its mode of operation is sketched at the hand of dynamic rules and two kinds of static rules. The first part is closed by providing some logical tools by means of which the world of law and its operation can be described, and with an illustration of how the interplay of static and dynamic rules can be represented formally by means of these tools. The second part of the paper will focus exclusively on legal acts.

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<sup>34</sup> We assume that the time 2011-01-04-12:05:01 is the immediate successor of 2011-01-04-12:05:00.

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