ARE THE COGNITIVE SCIENCES RELEVANT FOR LAW?

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ABSTRACT

This chapter addresses the question whether the cognitive sciences are relevant for law. The answer to this question will turn out to be a threefold 'yes'. First, if law is traditionally conceived as a set of rules that prescribe what ought to be done, there is a role for the cognitive sciences in determining the facts of the cases to which the law is to be applied (evidential reasoning). Legal decision making often involves the application of open-textured concepts, and the cognitive sciences can study the psychological processes and perhaps also the biases involved in such application. Moreover, the results of the cognitive sciences may also be important for the evaluation of law, and for determining what would be good law.

A perhaps more ambitious role for cognitive sciences in law has to do with the determination of the content of the law. If law is a social phenomenon and if social phenomena depend on what goes on in human minds, cognitive sciences can, at least in theory, study the content of the law. Some would argue that the cognitive sciences could never fulfil this more ambitious role, because law has to do with what OUGHT to be done, or ought to be the case, while sciences, including cognitive sciences, can only study what IS the case. It will be argued that this fundamental objection against this role for the cognitive sciences is misguided: there is no hard difference between IS and OUGHT and even if law belongs to the realm of OUGHT, cognitive sciences may still be relevant for determining the content of the law.

Finally, the cognitive sciences may disrupt the image of humankind that underlies law. It turns out that people are less rational than may seem at first sight, that they often do not know what motivates them, that it is not obvious what actions and agents are, and that it is unclear what the best level of explanation is for human actions or bodily movements. A change in the image of humankind that underlies law, to reflect the recent insights of the cognitive sciences, but also of ancient philosophical debates, may have important consequences for the contents of law.

Keywords: cognitive sciences, constructivism, image of humankind, legal science, naturalism

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1. Introduction

'Are the cognitive sciences relevant for law?' At first sight this question seems superfluous. Of course the cognitive sciences are relevant for law, just like many other sciences! On second thought, the question turns out to make some sense. Sciences aim to provide us with information about the world, about its facts and about the laws that govern these facts. Law aims to guide human behaviour; it does not aim to provide information at all. To state it by means of slogans: sciences deal with what IS the case, while law deals with what OUGHT to be done. From this perspective, law and sciences seem to be worlds apart, and the question after the use of the cognitive sciences for law does make sense.

Before starting our discussion, it is useful to delineate the topic. By law I will mean a set of rules, rights and principles, compliance with which is by and large enforced by collective means such as the power of the State.[2] By the cognitive sciences, in a broad sense that transcends pure cognition, we will mean all those sciences that study the functioning of mind and its physical substrate. They include relevant parts of psychology, biology, cognitive neurosciences, sociology, economy, philosophy, and artificial intelligence.

The first part of the discussion will deal with the question why there may be an issue at all regarding the relevance of the cognitive sciences for law. Sections 2 and 3 address this question and provide some historical and jurisprudential information which explains the doubts that some may have. These doubts are in last instance based on a strict distinction, if not division, between IS and OUGHT.

Section 4 argues that, even if this distinction is taken as strictly as some do, there is still room for the cognitive sciences in law.

There are good reasons not to make the distinction between IS and OUGHT too strictly. Section 5 presents these reasons. This section differs from the rest of the chapter because the argument presented there, which introduces different categories of facts, including the category of 'constructivist facts' is philosophical, and addresses the cognitive sciences only superficially. Section 5 closes with a discussion of what the implications are for the role of the cognitive sciences in law, if the distinction between IS and OUGHT is downplayed.

The argument up to this point will be focused on the relevance of the cognitive sciences for law as it is presently conceived. In section 6, the angle will be reversed, and the question becomes how law should be conceived from the perspective of the cognitive sciences. This section focuses on the im-

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2   This definition limits law to positive law and defines positive law as law that is enforced by State organs. Moreover, it ignores the institutional side of law, the organizations which make law, adjudicate or enforce, and only focuses on the 'rule-aspect' of law. Other definitions are certainly possible, but for a sharp opposition between law and the sciences, the given definition, which focuses on the content of law, is attractive.

age of humankind that underlies law as it presently is, and addresses the question whether this image is disrupted by recent insight from the cognitive sciences. It also raises the question whether the foundations of law can remain the same in the light of the findings of the cognitive sciences. For example, does it still make sense to guide human behaviour by imposing duties or by threatening with sanctions, and should we still treat people as responsible beings?

2. Legal Science as a Normative Science

The tendency to see the relation between empirical sciences and legal science as problematic was promoted in the early 20th century by the writings of Hans Kelsen (1934). Kelsen propagated a 'pure theory of law', by which he meant a non-empirical, non-moral science of law. In his early work, Kelsen was strongly influenced by the philosophy of Immanuel Kant. Kant was, in turn, influenced by David Hume, if only by opposing Hume's views (Brožek, 2013, pp. 115-128). To get a proper understanding of Kelsen's view of law and legal science proper, we will first pay some attention to these two major influences.

2.1 Hume on Reason and Passion in the Motivation of Human Behaviour

Hume's work on moral philosophy is famous for, amongst others, his view on the relation between reason and passion in the motivation of human behaviour and his suggestion that it is impossible to derive ought-conclusions from is-premises only.[3] According to Hume, there are two components in the motivation (the will) that a person has to do something. One component is passion, the other reason. Traditionally these two were, according to Hume, seen as competing sources of motivation, but wrongly so, as the one needs the other as complement:

> 'Nothing is more usual in philosophy, and even in common life, than to talk of the combat of passion and reason, to give the preference to reason, ... In order to shew the fallacy of all this philosophy, I shall endeavour to prove *first*, that reason alone can never be a motive to any action of the will; and *secondly*, that it can never oppose passion in the direction of the will.' (Hume, 1978, Book II, Section III. Italics in the original)

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[3] As any important work, Hume's *Treatise on Human Nature* is the object of interpretational discussions. This is not the place to enter into these discussions. The views that are described to Hume here have certainly been inspired by Hume, but there is no claim that they represent the, or even a, correct Hume-interpretation. Cf. the introduction of (Railton, 2006).

Hume continues to claim that reason by itself - conceived as empirical knowledge, mathematical knowledge, and knowledge about causal relations - cannot motivate. In last instance, the passions drive people, and reason can only steer this driving force of the passions. For example, if a person P is thirsty, he desires to drink. This desire would in the Humean classification belong to the area of passion. In itself the desire does not motivate P to take a glass of water. However, P also believes that there is water in the tap, that this water can be collected in a glass and that having a glass with water allows him to drink. These believes in themselves do not motivate any action either, but in combination with the desire to drink, they motivate P to fill a glass with water from the tap and to drink it. Here we have in a nutshell Hume's belief/desire theory of motivation. Passions, expressed in desires, are the force that drive people to act, and reason, in the form of means/end-beliefs, transform these abstract desires into the motivation to perform particular actions.

A crucial aspect of this belief/desire model is that beliefs and desires - reason and passion – are, *in last instance*, distinct entities. Some desires may be derived, such as the desire to take a glass of water, which is derived from the desire to drink and the belief that taking a glass of water is a means to drink. The ultimate desires, however, are not the outcome of any reasoning process, but just happen to a person. Being thirsty and the closely related desire to drink are states of a person that happen to exist and they are not the result of belief-based reasoning. Analogously, beliefs depend on sensory information and on reasoning, but not on passions or desires. Because beliefs and desires are distinct entities, the ones cannot be reduced to the others. They exist in last instance independent of each other, and they are both necessary for a proper understanding of motivation.

There seems to be a natural transition from this belief/desire model of motivation to the (onto)logical distinction, or even the gap, between IS and OUGHT:

> 'Beliefs concern what *is* the case according to the agent; their satisfaction conditions are met when the agent gets the facts right. ... Desires and values, by contrast, concern what *is to be* or *ought to be* the case according to the agent; they "aim the agent toward and end", namely, the desired object of valued state. They have action-guiding force on behalf of what they represent, not simply credence in it. They therefore lack straightforward truth conditions, and one cannot straightforwardly apply the same notions of objectivity, or norms of logic and evidence, to desire and to reasoning that concludes in action, *practical reason*.' (cf. Railton, 2006).

There is much in this brief argument that can questioned, but the main message seems convincing: on the one hand we have beliefs that describe an independently existing reality, and on the other hand desires which express how an agent wants reality to be. These are – according to the message –

different things (the ontological distinction). Moreover, because they are different things, it is logically impossible to derive the ones from the others. The logical gap between IS and OUGHT reflects the ontological gap between beliefs and desires.

If these gaps between reason and passion and between IS and OUGHT really exist, and if law belongs to the realm of OUGHT, the gaps explain why the role of the cognitive sciences in law, which deal with what IS the case, can at best be limited.

2.2 Kant's Distinction between Theoretical and Practical Reason

Where Hume's major distinction was between, on the one hand, passion and desires and, on the other hand, reason and beliefs, Kant's major distinction was between theoretical and practical reason. Theoretical reason deals with matters of fact and our explanation or prediction of them. Practical reason, by contrast, deals with the question what one ought to do, or what would be the best to do. (Wallace, 2018)

Both theoretical and practical reason are manifestations of reason. This means that Kant does not have a role for the Humean passions in the determination of what ought to be done. There is not necessarily a conflict with Hume here, as Hume's theory is a theory of motivation, of what actually moves human behaviour, while Kant's theory is a theory of what an agent ought to do. A theory of motivation would, in Kantian terminology, belong to the domain of theoretical, not of practical reason. It is important to notice, however, that the consistency between the views of Hume and Kant is then rescued by emphasizing the distinction between IS (motivation) and OUGHT (justification). By assuming that Hume and Kant tried to answer different questions, one presupposes the distinction between what the facts are and what ought to be done.

According to Kant, the OUGHT-question should be answered by means of practical reason and there is no role for Humean passions in this connection. Passions are the passions of concrete persons, while reason is connected to humanity as such and not to individual persons. The ultimate moral command is, according to Kant, the categorical imperative. In one of its formulations, this categorical imperative reads that one should only act according to that maxim whereby one can at the same time will that it should become a universal law. This imperative 'is categorical because it commands and constrains us … without regard to our personal preferences or any empirically contingent ends' (Wilson and Denis 2018).

Although Kant's views differ considerably from those of Hume, they have the same implications for the role of the cognitive sciences in relation to law considered as a normative enterprise. Kant might have stated it as follows: as law deals with the question what ought to be done, it belongs to the sphere of practical reason. The cognitive sciences, which aim at explanation and prediction, belong to

the sphere of theoretical reason. Because the cognitive sciences and law belong to these two different spheres, the former cannot be relevant for the latter (Mackor, 2013).

2.3 Kelsen's *Reine Rechtslehre*

Kelsen's *Reine Rechtslehre*, the Pure Theory of Law (Kelsen, 1960, 1992), was perhaps the most influential reflection of the Kantian style of thinking in legal theory. In the very first section of the first edition of the *Reine Rechtslehre*, Kelsen sets out his program. The Pure Theory of Law strives for cognition of its object, the law.[4] It aims to answer the questions what the law is and how law is made, and not what the law ought to be, or how law ought to be made. The purity of the Pure Theory of Law consists in the fact that this theory aims to free legal science from all foreign elements. These foreign elements would include - on the factual side - psychology and biology, and - on the normative side – ethics and theology.

Kelsen strongly emphasises that law is not a branch of morality. He distinguishes between the moral and the legal ought and assumes that law deals with what legally ought to be done or ought to be the case. In this respect, he differed from Kant, who saw both morality and law as aspects of one single practical reason.

According to Kelsen, legal norms exist because they have been created, for example by a legislator or a judge. Kelsen denotes the mode of existence of norms as the 'validity' of norms. This validity is the result of the meaning that is attached to some norm-creating event by another valid norm. For instance, the decision taken by the municipality council to prohibit cars that pollute in the city centre creates a valid legal norm, because there is a 'higher' norm which empowers the municipality council to create norms like this. This higher norm gives the decision of the council the meaning of valid law. The result is a chain of valid norms, alternating with norm-creating events. Lower norms are created by legislation, where the competence to legislate was conferred by higher norms.

A plurality of norms forms a system or order, if all the validity chains can be traced to a single norm as the basis of their validity. All other norms in the system can then be said to derive their validity from this basic norm, which Kelsen calls the *Grundnorm* of the system. Since the validity of a norm can only be based on the validity of another norm, the validity of all norms in a legal system is traced back to the validity of this *Grundnorm*. There is one exception, and that is the *Grundnorm* itself. By definition, its validity cannot be traced back to some other norm.

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[4]   The text of this section and the following two sections on Ross and Hart uses fragments of (Hage, 2018, chapter 1).

This creates the theoretical problem where the validity of the *Grundnorm* derives from. It seems that there is an infinite regress of norms that can only be valid on the basis of another valid norm.[5] Kelsen solves this problem by positing the *Grundnorm* as a presupposition of a factually existing legal system:

> 'The Pure Theory of Law works with the basic norm as a hypothetical foundation. Given the presupposition that the basic norm is valid, the legal system resting on it is also valid. (…) Rooted in the basic norm, ultimately, is the normative import of all the material facts constituting the legal system. The empirical data given to legal interpretation can be interpreted as law, that is, as a system of legal norms, only if the basic norm is presupposed. (…) The basic norm is simply the expression of the necessary presupposition of every positivistic understanding of legal data. It is valid not as a positive legal norm – since it is not created in a legal process, not issued or set – but as a presupposed condition of all law-making, indeed, of every process of positive law.' (Kelsen, 1992, p. 58)

A presupposed basic norm must explain the validity of all ordinary norms that constitute a legal system. When should such a presupposition be assumed? It only makes sense to speak of a legal system, and therefore also to interpret a set of norms as valid, if the norms are actually used, if the system is by and large efficacious. Therefore, the validity of a legal system depends *in a certain way* on the efficacy of the system. The clause 'in a certain way' is meant to emphasise the gap between IS and OUGHT; the efficacy of the legal system cannot make its own basic norm valid. And yet, in a certain way, the validity of the basic norm seems to depend on the efficacy of the system.

Kelsen is caught in a dilemma: the existence of law is a matter of fact, and at the same time it cannot be a matter of fact as law belongs to the realm of OUGHT. What does this mean for the role of the cognitive sciences in law? To answer this question, it is necessary to delve into the theory of legal reasoning.

3. Legal Reasoning

Legal reasoning, and in particular legal decision making, depends on theories about what counts as law. These theories are often implicit and are therefore seldom discussed in legal practice. Still, they are present in the background and influence legal thinking, including our thinking on the relevance of the cognitive sciences for law.

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[5] This problem will return, and will be solved in a non-Kelsenian way, in section 5.4.

There are many forms of legal reasoning, including reasoning about what the law should be, what the law was in the past, how the law should be explained, and how the law will develop. However, most legal reasoning is devoted to the question what legal consequences the law attaches to a particular (kind of) case. This is the kind of reasoning that must be performed by legal decision makers such as courts and arbiters, but also by practising lawyers and legal scientists. It aims at the justification of judgements about the correct outcome of legal cases. Here we will focus on this kind of reasoning, which aims at legal justification.[6]

For analytical purposes, legal justification is sometimes divided into two 'stages'. These 'stages' are logical constructs and do not necessarily succeed each other in time. One stage consists in applying a legal 'rule' to the facts of a case; the other stage is the establishment of the rule that is to be applied. The distinction was labelled as the distinction between first and second order justification (MacCormick, 1978, p. 100/101; Wróblewski, 1992, pp. 198-203), or as the distinction between internal and external justification (Alexy, 1978, Chapter C II). It is closely related to the distinction between questions of fact and questions of law. The outcome of a legal case depends both on the facts of the case and on the content of the law. The facts are assumed to exist objectively, although there may be disagreement on what they are. For instance, did the suspect really kill the victim? If there is uncertainty about the facts, evidential reasoning plays an important role, but this is not reasoning about the law proper.[7] Sometimes there is disagreement about the content of the law, and then it is necessary to use arguments to justify the rule that is applied to the facts. This justification would be the second order or external justification, while the application of the rule to the facts would be the first order or internal justification.

The distinction between evidential reasoning and external justification (to use Alexy's terminology) is complex. The worn-out example of vehicles in the park (Hart, 2012, pp. 128/9) can illustrate why this is so. Suppose that there is a by-law prohibiting to bring vehicles into the park. War veterans bring an old tank that is out of use into the park as a war monument. Is this forbidden under the law? We will not attempt to answer that question here, but raise the question whether the legal rule that must be used reads that it is forbidden to bring vehicles into the park, or that it is forbidden to bring out-of-use tanks into the park as war memorials?

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[6] The relevance of the cognitive sciences for the process of legal reasoning itself is shown in (Brožek, present volume).

[7] Actually, things are a bit more complicated. Evidential reasoning is governed by legal rules (e.g. what kinds of evidence are allowed; what is the probative force of a statement of the suspect) and there may be disagreement about these rules. If that is the case, reasoning about the content of the law plays a role in evidential reasoning. Here, we will ignore this complication.

In the former case, the formulation of the legal rule can remain close to the formulation of the by-law by means of which the rule was created. However, if the rule is to be applicable, the facts of the case must then be classified as bringing a vehicle into the park.

In the latter case the description of the facts can be much more concrete: the war veterans brought an out-of-use tank into the park to be used as a war memorial. However, the formulation of the rule is much less obvious now, as there is no direct connection anymore between the formulation of the by-law and the rule. Clearly, somewhere in the decision making process, it is necessary to answer the question whether the introduction of the tank into the park falls under the prohibition of the by-law, but it less obvious whether this decision is a decision about the facts of the case or about the content of the rule. Because the final decision cannot be based on the by-law alone, additional justification is unavoidable, and it is important to determine what kinds of arguments are allowed in this justification. For those who assume that the argument is an argument about the law, theories about the nature of law become practically relevant, as they inform us what are good arguments in the external justification of a concrete legal judgement.

Let us consider a different example to illustrate the relevance of this discussion for law and the cognitive sciences. In the case *Roper v. Simmons* (543 U.S. 551, 2005), the Supreme Court of the United States held that it is unconstitutional to impose capital punishment for crimes committed while under the age of 18. According to Morse (2013), the rational capacities of the defendant are at stake. Those with diminished or undeveloped rationality are, according to Morse, less responsible than people with normal or fully developed rational capacities. Let us assume that it is unconstitutional in the US to impose capital punishment on persons who were insufficiently responsible at the time they committed their crime.

Morse correctly emphasises that neuroscience can provide us with information about the less developed brains of juveniles, but that it cannot tell us whether a defendant was sufficiently responsible when he committed a crime. There is a logical step from the stage of brain development to the legal classification of (in)sufficient responsibility.[8] The issue at stake is whether this logical step is based on law. If it is a matter of establishing the applicable legal rule, as Morse implicitly assumes, the logical step is a legal matter. In that case, the relevant expertise is legal and the decision should arguably not be decided by neuroscientists or psychiatrists, but by lawyers. However, if it is a matter of classifying the case facts – was the crime committed by an insufficiently responsible person – lawyers would not have any privileged knowledge and neuroscientist or psychiatrists would be at least equally competent to answer the question. The relevance of neuroscience and more in general the cognitive sciences would be bigger then.

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[8]   See also the discussion of the insanity defence and the role of experts in (Meynen, present volume).

The division of questions between law and non-law is a legal matter. As Kelsen pointed out (Kelsen, 1960, p. 282), law resembles the legendary King Midas. Everything that King Midas touched turned into gold. Similarly, everything that law deals with becomes a legal matter. Therefore, the law determines who counts as responsible. Moreover, if the law wants to, it can also determine who counts as - legally speaking - rational. If legal reasoning is divided into legal and non-legal questions, the law draws the borderline. This means that if the role of the cognitive sciences is limited to the non-legal issues, this role is determined by the law.

4. The Role of the Cognitive Sciences in a Traditional View of Law

Traditionally, law draws its own borders broadly. Many questions that are legally relevant are considered to be legal questions. Moreover, if law and the sciences are opposed for the reason that law deals with what OUGHT to be done while the sciences deal with what IS the case, a broad interpretation of law entails a narrow interpretation of the role of the sciences in the context of answering legal questions, including the cognitive sciences. In this section we will, for the sake of argument, adopt this traditional view of law and its relation to the sciences, and try to delineate the room that is left to the cognitive sciences in relation to law. Even in this traditional view, according to which cognitive sciences cannot be relevant for the content of the law, there is still a role for the cognitive sciences in at least the following three areas:

1. proof of case facts (evidential reasoning);
2. classification of case facts; and
3. reasoning about good law.

4.1 Evidential Reasoning

Evidential reasoning deals with the question what the facts of a case are. The same holds for classificatory reasoning, and it is not always easy to keep the two apart. Although the next subsection, which deals with classification, will illustrate the distinction by means of some examples, it is useful to define it already now. Classification deals with the question which facts also *count as* other facts. For instance, does pain count as damage, or does the absence of a particular brain function count as a lack of rationality? Evidence addresses the question whether the presence (or absence) of some facts makes it *rational to believe or accept the presence (or absence) of some other facts*. For instance, should we believe or accept in law that defendant committed the crime, if a polygraph suggested that he was lying when he denied his involvement?

It is quite obvious that the cognitive sciences are relevant for evidential reasoning. In her introduction to a chapter on Brain Imaging Techniques, Roskies (2013) mentions a role for these techniques in

determinations of competency (to comply with the law) and lie detection. She might as well have mentioned a role of the same techniques in the establishment of damage or other legally relevant facts with an important neurological element, such as the presence of pain (Goodenough and Tucker 2010), or the lack of working capacity.[9] Neuroimaging evidence is well-known to play a role in judicial decision making (Moriarty, present volume).

A very different branch of the cognitive sciences, the logic and computational theory of evidential reasoning, is also highly relevant for law. In this connection, logic should be taken in a broad sense, to include not only formal logic, but also logically precise forms of epistemology. It includes, for example, the theory of defeasible reasoning applied to legal evidence (Prakken, 2001; Bex, 2009; Di Bello and Verheij, 2018), the legal application of Bayesian statistics (Fenton and Berger, 2016), the theory of scenarios (Wagenaar, Van Koppen & Crombag, 1993; Bex, 2009; Mackor, Jellema & Van Koppen, present volume), and coherentist theories of evidence (Hage, 2005; Amaya, 2015, 2018).

4.2 Classification

Classification occurs when some facts are considered to be also facts of some other kind. We then say that the former facts count as the latter facts (Grossi, Meyer & Dignum, 2008). Because such a step from one kind of facts to another kind is always rule-based, we can say that the relation between the one kind of facts and the other kind is based on counts-as rules.[10] For instance, the step from the fact that somebody negligently damaged goods that belong to somebody else to the fact that the former person committed a tort is based on the counts-as rule that negligently damaging somebody else's goods counts as a tort. Other examples would be that the President of the United States counts as the Commander in Chief of the US army, or that skateboards count as vehicles for the purpose of the Traffic Act (Hage, 2018, pp 102-15).

The cognitive sciences can provide support for the counts-as rules that underlie legal classification. For example, if somebody has a particular kind of brain damage, she may not be able anymore to follow rules and therefore lack the responsibility that is required for criminal liability. The classificatory step from suffering from a particular kind of brain damage to the inability to comply with rules can be supported by neurological findings to the effect that persons with that kind of brain damage tend not to follow rules.

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[9] The reason that Roskies did not mention these may well have been that she was writing for a primer on *criminal* law and neuroscience.

[10] Classification is a traditional topic in the theory of legal argumentation. See, for example, (MacCormick, 2005, p. 41).
Counts-as rules were made popular by Searle in his work on social ontology (Searle, 1995, pp, 43-48).
The issue at stake in both fields is essentially the same, however.

This example also illustrates that the role of the cognitive sciences in legal classification lies in the support for classificatory or counts-as rules. These sciences cannot directly support a classification for two reasons. One reason is that classificatory judgments are universalizable: if facts of one kind in a particular case also count as facts of some other kind, facts of the former kind will in similar circumstances generally count as facts of the latter kind. This is the same point as that classification is always rule-based. If the cognitive sciences support a particular concrete classification, they do so by supporting the counts-as rule that underlies this classification.

The second reason is that classification of facts comes on top of establishing the facts that are classified. Classification of brain damage as the inability to comply with rules comes on top of establishing brain damage. Sciences, including the cognitive sciences, can only establish the facts at the bottom of a chain of classification, not the classificatory additions to these 'bottom facts'. However, cognitive sciences can support the classificatory rule that leads from the presence of brain damage to the inability to follow rules.

This argument implies that the role of the cognitive sciences in legal classification always consists in support for classificatory, or counts-as rules. This is not an independent role, but falls under the third role of the cognitive sciences in the ordinary view of law: reasoning about good law.

4.3 Reasoning about Good Law

Legal rules have a purpose, and their quality – are they good or bad rules? – depends on the quality of the purpose and on the efficacy of the rules in achieving their purpose without having undesirable side-effects. For example, rules that promote health in people are *pro tanto* good rules, while rules that discriminate against some part of the population are *pro tanto* bad ones. A rule that is efficacious in promoting public health is *pro tanto* better than a rule that is less successful in promoting this goal. A rule with many undesirable side-effects is *pro tanto* worse than a rule with fewer of these side-effects.

The quality of a rule may also depend on whether it implements another rule and on the quality of this latter rule. Consider for example a rule that defines insanity for the purpose of a law on the insanity defence in criminal law. If the rule defines insanity in such a way that it promotes the purposes of the insanity defence, it is *pro tanto* better than a rule that defines insanity in a manner that conflicts with the point of this defence. Of course, this presupposes that the insanity defence has a good point.

These examples all illustrate that the causal effects of rules are crucial for the quality of these rules. Other examples can easily be given. It is important to know whether a projected rule will succeed in motivating people to comply (Epstein, 2006), as it is important to know how rules will affect the

mental states - happiness or unhappiness – of the persons who will have to apply them or against whom they will be applied. The cognitive sciences, in particular the relevant parts of game theory (Bowles & Gintis, 2011; Zaluski, 2013), (moral) psychology and cognitive neuroscience (Doris et al., 2010; Sinnott-Armstrong 2008a and b), and other biology (Zaluski, 2009; Sapolsky, 2017), are highly relevant for producing this causal information. This means that there is an important role for the cognitive sciences in the legislative process and in judicial decision making that leads to precedents. Court procedures should, for instance be designed in such a way that they give as little leeway to judicial biases as possible, and cognitive sciences can inform us under which circumstances biases occur (Kahneman & Tversky, 1982; Kahneman,2012; Rachlinski, Guthrie & Wistrich, 2007; Rachlinski *et al*, 2009; Hoffman, present volume; Leibovitch, present volume; Aharoni, present volume) and what procedures may mitigate their effects (Gigerenzer 2006; Haidt & Bjorklund, 2008).

Also when courts and administrations exercise discretionary powers, cognitive sciences can play an important role in determining how these powers are best exercised. An example would be the choice for a particular form or amount of punishment, where cognitive sciences can inform the decision maker what kind of punishment would be most efficacious in achieving the intended purpose of the punishment (Roskies, 2013).

4.4 Summary on the Traditional View

If law is approached from the traditional perspective, it is seen as normative – belonging to the realm of OUGHT. If it is also assumed that descriptive sciences belong to the realm of IS, and that there is a logical gap between IS and OUGHT, then the cognitive sciences cannot inform us about the content of the law. However, even from this perspective it turns out that there is an important role for the cognitive sciences in law, in particular in evidential reasoning and in reasoning about what would be good law. The sceptical question with which we started this chapter can therefore be given a reassuring answer: for sure, there is an important role for the cognitive sciences in law, even if law is approached from a traditional perspective.

As we will see in the next section, this role for the cognitive sciences becomes even more important if we are prepared to question the traditional perspective and do not separate the OUGHT-law from the IS-sciences.

5. Challenging the IS-OUGHT Distinction

Hardly anybody will question the existence of *some* role for the cognitive sciences in law, and in the previous section we have seen why. The principled scepticism about the role for the cognitive sciences does not concern the 'ordinary' use of insights of cognitive sciences in the application of law or in

thinking about what good law would be, but the pretension that law can be 'naturalized' and that, amongst others, cognitive sciences would be able to answer the question what the law is. This is a recurring theme, that already played a role in Kelsen's pure theory of law and the reactions on that theory by, amongst others, Alf Ross (1946, chapter III) and Herbert Hart (2012, chapter IV). In the present volume, this theme is revived in the contributions of Pavlakos, Stelmach and Heidemann.

5.1 Ross: Validity as Projection

Kelsen distinguished two elements in law, a factual and a normative one, neither of which can be reduced to the other. According to the Danish legal philosopher (and pupil of Kelsen) Alf Ross, there lies a problem in the dual nature of law, according to which the normative aspect depends on the factual aspect, and the other way around. Both aspects depend on the other and this seems to lead to an infinite chain with alternating elements of normativity and factuality without an element that can exist independently. The way in which the factuality and normativity of law depend on each other is destructive for the legal phenomena.

> 'The sting of the problem lies in the very fact that the two points of view cannot be distinguished and isolated; the thesis is bound to lead to the antithesis and vice versa. The interpretation by means of reality cannot be carried through without recourse to the category of validity, and the reverse. The two points of view reflect each other like mirrors with an endless perspective. This is the really awkward dilemma of the concept of law.' (Ross, 1946, pp. 76/7)

In Ross' view, neither the factual nor the normative aspect of law can exist independently from the other and this seems to make the existence of law impossible because of a lack of foundation. And yet, law exists, so there must be something wrong; the mutual dependence must be shown not to exist.

Ross aims to prove this by showing that the normative aspect of law can be reduced to hard facts. In doing so, he takes an approach which later became known as projectivism. Projectivism was mainly developed in ethical theory as the view that moral value judgments express valuations which are not part of reality proper, but are in a sense 'projected' upon the world (Blackburn, 1984, pp. 181/2; Joyce, 2016). Analogously, Ross held the view that the validity of legal rules is not a characteristic of rules which actually exists 'out there', but rather something that legal subjects project upon legal phenomena. More in particular he held the view

'(…) that every extant theory of law is in its foundation characterized more or less by three elements, viz. 1) the element of reality, more precisely defined as an actual element of compulsion; 2) the element of validity; and 3) a logical interdependency of these elements.' (Ross, 1946, p. 78)

The basic idea is that the validity of legal norms is nothing more than a projection upon legal reality of the fear of compulsion that legal subjects experience. Analogously, the experience of validity would be a causal factor contributing to the exercise of compulsory measures. Basically, what Ross does is replace normative notions like 'validity' and 'competence' by psychological ones and explain the existence of these notions as projection of mental experiences on the legal phenomena. It will be clear that Ross' approach to the validity of law would make the cognitive sciences directly relevant for the determination of what the law is. However, against this approach it may be objected that Ross completely disposes of normativity, in order to avoid what he thought to be a mistaken view of what normativity is.

5.2 Hart and the Internal Aspect of Rules

In his book *The Concept of Law,* the English legal philosopher Hart tried to give an account of law's normativity that holds the middle ground between Kelsen's view that normativity is a realm of its own, and Ross reduction of normativity to a feeling of compulsion. Hart's view is based on the distinction between being obliged and having an obligation (Hart, 2012, pp. 5/6 and 82/3). The story attached to this distinction is familiar amongst legal philosophers. A gunman orders somebody to hand over their money and threatens to shoot his victim if he does not obey. The victim is obliged to hand the money to the gunman, but – and this is the crucial point – there is no obligation to do so. Being obliged and having an obligation are quite different things. The victim was obliged to hand over the money because he believed that otherwise he would be shot, and because he did not want to be shot. In a sense, handing over the money was the only option available.

The threat of a sanction may also be attached to an obligation, but it does not constitute the obligation. An obligation is imposed by a rule, and it can also exist if there is no sanction attached. As a matter of fact, an obligation could even exist if the person having it were not aware of it, and (therefore) feels no desire to comply with it. In other words, obligations presuppose some form of normativity, while being obliged does not have any such presupposition. This is where Hart differs from Ross.

Hart tried to explain his notion of normativity through a discussion of social rules and how they differ from habits. The members of a group have a habit if their behaviour converges. For example, mem-

bers of the group tend to attend dance parties when there is one in their city. Convergence of behaviour suffices for the existence of a mere habit, but not for the existence of a rule:

'(…) where there is such a rule, deviations are generally regarded as lapses or faults open to criticism, and threatened deviations meet with pressure for conformity (…).
Secondly, where there are such rules, not only is such criticism in fact made but deviation from the standard is generally accepted as a *good reason* for making it. Criticism for deviation is regarded as legitimate or justified in this sense, as are demands for compliance with the standard when deviation is threatened.' (Hart, 2012, pp. 55/6; italics in the original)

The criticism when a social rule is violated, the demands for conformity, and the facts that these criticisms and demands are considered to be justified by the rule are all manifestations of the internal aspect of rules. What, then, does this internal aspect of rules involve? Not merely a feeling of being bound, as was claimed by Ross:

'The internal aspect of rules is often misrepresented as a mere matter of 'feelings' in contrast to externally observable physical behavior. (…) But such feelings are neither necessary nor sufficient for the existence of 'binding' rules. (…) What is necessary is that there should be a critical reflective attitude to certain patterns of behavior as a common standard, and that this should display itself in criticism (including self-criticism), demands for conformity, all of which find their characteristic expression in the normative terminology of 'ought', 'must', and 'should', 'right' and 'wrong'.' (Hart, 2012, p. 57)

Social rules share with mere habits a convergence in behaviour patterns, but are distinguished by the fact that people following a social rule have a critical reflective attitude towards the behaviour of themselves and of others to whom the rules apply. This critical reflective attitude is called the 'internal aspect' of rules. It is not a mere feeling, but neither is it a separate sphere of normativity, as Kelsen would have it.

Hart locates the internal aspect of rules, the counterpart of Kelsen's normativity, in an actually existing social practice. With this theory of normativity as the 'internal aspect' of rules, Hart seems to have found middle ground between the extremes of Kelsen and Ross. However, this 'middle ground' seems to be closer to the psychological approach of Ross than to the Kantian approach of Kelsen, as it locates the internal aspect of rules in social reality and the sphere of IS. This means that it leaves

more room for a role of the cognitive sciences than Kelsen would have allowed when it comes to establishing the validity of legal rules.

5.3 Brute Social Facts

Elsewhere (Hage, 2018, pp. 192-194), I have argued that compliance with rules is better construed as compliance with duties or obligations that are often, but not always, imposed by rules. The internal aspect of rules that Hart tried to characterize is on this view nothing other than the internal aspect of duties or obligations. A person who recognizes that (s)he has a duty to do something will normally *ipso facto* be motivated to act accordingly (Rosati, 2016). On Ross' view, this internal aspect would be the essence of the duty: the ought of the duty is a feeling of obligatoriness, comparable to being obliged in Hart's sense. Duties are in this view psychological entities. Hart amended Ross' view by elevating duties to the social level: the existence of a duty is a complex phenomenon in social reality with accompanying psychological aspects. Arguably, both accounts miss something in their analysis of normativity, something that might be referred to as that aspect of normativity that Kelsen had in mind when he claimed that the OUGHT cannot be reduced to an IS (Kelsen, 1960, p. 5). The challenge is to identify this aspect without claiming, as Kelsen did, that there is a separate and rather mystical realm of OUGHT.

Constructivism, might be a solution to the puzzle how law can be a matter of fact, while at the same time transcending mere psychological and sociological phenomena.[11] Constructivism in the sense used here is a refinement of the acceptance theory of social reality.

Before continuing the argument, it may be useful to give a brief overview of kinds of facts. First, there are objective facts, which are assumed to exist independent of (human) minds. If such facts exist, typical examples would be that there is water in the oceans on Earth, or that John is taller than Jean. Then there are purely subjective 'facts', such as the 'fact' that chocolate tastes better than cauliflower. Because these are purely subjective, depending on taste or subjective judgment, some would prefer not to call them 'facts' at all. And then there is an intermediate category of facts, which are mind-dependent, but which do not depend entirely on personal taste or subjective judgment, but in last instance on social acceptance. These facts are called 'social facts'. Some of them are rule-based, such as the fact that Anton has the obligation to pay his landlord Violet €700 on the fist of every month. The gist of the present argument is that some social facts are so-called 'constructivist

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[11] The following argument is rather technical and dense. Some readers may want to skip it. The argument pleads for the conclusion that an ought is a kind of fact, and that the cognitive sciences can be relevant for establishing the existence of ought-facts. Therefore, if law deals with what ought to be done, the cognitive sciences may also in this way be relevant for law.

facts', which depend not only on acceptance, but also on arguments, and that ought-facts belong to this category.

According to the acceptance theory of social reality, a fact exists in social reality if sufficiently many[12] members of a social group:

a. accept that this fact exists,

b. believe that sufficiently many members of the group accept that this fact exists, and

c. believe that the fact belongs to a kind of fact that exists in social reality (as opposed to objective reality).

Let us study the following example: Jean is the leader of a cycling club. The members of the club are for our present purposes the relevant social group. Most likely these members do not believe that leadership is a fact of nature, which exists independent of social practices. Leadership depends, in their opinion, on acceptance. This means that condition c is satisfied.

Almost all members of the club consider Jean to be the leader. They do not only believe that Jean is the leader, but they also act accordingly, by complying with Jean's decisions, and giving (self-)criticism if a member of the group does not comply. (That would be Hart's internal aspect.) This means that condition a is satisfied.

Finally, almost all members of the club believe that almost all members consider Jean to be the leader. This means that the group members know of each other that they recognize Jean's leadership. This means that condition b is also satisfied.

The acceptance theory of social reality holds that facts exist in social reality by being accepted in the way described above. Let us call the facts that exist in this way *brute social facts.* Because in the case of the cycling club and its leader, all three conditions are satisfied, Jean is the leader of this cycling club as a matter of brute social fact.

5.4 Constructivism

Many social facts are brute: they exist because and to the extent that they are accepted as existing. However, some social facts are different. It does not merely suffice that they are accepted; there is

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[12] Because of a division of cognitive labour, the purely numerical definition of what exists in social reality may have to be replaced by a definition that assigns an important role to 'experts'. This complication will be ignored here.

also a normative aspect involved.[13] I will call such facts *constructivist facts*.[14] A constructivist fact exists if and only if:

- it exists as a brute social fact, and it is not the case that it ought not to exist; or

- it ought to exist.

In this connection it is crucial that ought-facts, including the fact that some other fact ought not to exist, are a kind of constructivist facts themselves, and that this definition invokes the presence or absence of constructivist facts as conditions for the existence of a constructivist fact. Technically speaking, this means that the definition of constructivist facts is recursive: it invokes itself.[15] Recursive definitions run the risk of leading to an infinite regress. A good example is Kelsen's definition of legal validity of norms, which invokes the validity of other norms. This definition threatens to lead to an infinite regress, and Kelsen only avoided the regress by positing the validity of the basic norm *ex hypothesi*. The present definition of constructivist facts avoids this regress by including acceptance – the mode of existence of brute social facts – as a foundation on which the recursive definition can 'bottom out'.

As a first approximation, constructivist facts may be seen as facts that exist if they ought to exist. For these facts, the alleged gap between OUGHT and IS does not exist: they are by definition what they ought to be. However, this approach leads to an infinite regress, as we saw in the discussion of Kelsen's *Reine Rechtslehre*, which – without using the present terminology – defined the legal ought and legal validity as constructivist facts.

A simple example can further elucidate this. Take the fact F and assume that it is a constructivist fact. We adopt for the sake of argument that a constructivist fact exists, if and only if it ought to exist. Let us, finally, formalize that F ought to exist as $O(F)$. The theory then boils down to the following formula that holds by definition for all constructivist facts: $F \equiv O(F)$. Since $O(F)$ is a constructivist fact itself, it then also holds that $O(F) \equiv O(O(F))$. $O(O(F))$ is, in turn, equivalent to $O(O(O(F)))$, and so on … As this example illustrates, the adoption of a too simple recursive definition of constructivist fact makes that a constructivist fact can only exist if an unending series of ought-facts exists.

It is necessary to find a way to escape from this regress which is better than Kelsen's 'solution' to assume a foundational ought as presupposition of legal systems. This solution is to use a three-

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[13] In order not to complicate the discussion even further, it is ignored here that many social facts are rule-based.

[14] The name 'constructivist facts' derives from the connection between these facts and the term 'constructivism' as used in ethical theory (Bagnoli, 2017). The details of the connection are beyond the scope of this contribution.

[15] The notion of recursion is most often used in computer science, and a readable introduction can be found in the Wikipedia encyclopaedia as the lemma <Recursion (computer science)>. A useful discussion of recursion in a legal setting can be found in (Ruiter, 1993, pp. 20-26).

valued logic: for every constructivist fact holds that it ought to exist, or that it ought not to exist, or neither one of them (the third possibility). A constructivist fact exists if it ought to exist, and does not exist if it ought not to exist. In the third case - if neither it ought to exist nor ought not to exist - and only then, it exists if it exists as a brute social fact.

If a query for the existence of a constructivist fact ends in an infinite regress of oughts, as illustrated by the example above, the fact does not exist. So, in our example, the constructivist fact F would not have existed, as the condition for its existence leads to an infinite regress.

The same holds if there is an infinite regress in establishing that a fact ought not to exist. Suppose again that F is a constructivist fact. If it were a mere brute social fact, it would have existed, because we will assume for the sake of argument that the conditions a-c, mentioned in the previous section, are all satisfied. However, as F is constructivist, a fourth condition must be met: it should not be the case that F ought not to exist. This means that if an attempt to prove that F ought not to exist ends in an infinite regress, we can take it that it is not the case that F ought not to exist. Because F would have existed if it had been a brute social fact, F exists as a constructivist fact.

The upshot of the given definition of constructivist facts is that these facts can also exist if they are merely accepted and in this respect, they are like brute social facts. However, there is a crucial difference. A real brute social fact exists if it is accepted, even if it ought not to exist. For example, if everybody accepts Jean as the leader of the cycling club, she is the leader, even if she ought not be the leader. Being the leader of a social group is a brute social fact, and acceptance is all that is needed for the existence of such a fact. It does not make sense to say that Jean is not the leader, because she is - for instance - unsuitable as a leader.

This is different for the constructivist fact that Jean ought to buy all members of the club a drink. Even if everybody accepts this, it is still not a fact if it should not be a fact. If there are good reasons why Jean should not buy everybody a drink – e.g. unknown to the club members, the drinks have been poisoned – Jean ought not to buy the drinks. Moreover, Jean ought to buy all members of the club a drink if this ought to be a fact, even if it is not broadly accepted as a social fact.

Constructivist facts differ from brute social facts because there is always the possibility to raise the question whether they really should exist, a possibility that does not exist for brute social facts. However, the conclusion that a fact ought or ought not to exist must *in the end* be based on acceptance. This means that in the end all ought-facts exist in the form of acceptance, either of the ought-fact itself, or of some other ought-fact on which it is based. This acceptance is itself a matter of non-social fact.

5.5   Application to Law

This discussion about constructivist facts is very abstract. Let us therefore see what this means for law. Suppose that Anton rented his home from Violet against €700 a month, to be paid on the first day of the month. It is the first of March, and the question that needs to be answered is whether Anton ought to pay Violet €700.

As a matter of brute social fact, the legal rule exists that contracts lead to the legal consequences they were intended to establish.[16] Anton and Violet have a contract that creates an obligation for Anton towards Violet to pay her a monthly rent of €700. Given this obligation, which exists as a matter of rule-based fact, Anton ought to pay Violet the money. This obligation is the result of acceptance of its underlying social rule in the legal community in which Anton and Violet partake. This social rule is at the same time also a legal rule, because the consequence of this rule is that Anton has a legal obligation towards Violet, an obligation that the State apparatus will normally enforce.

Normally, if somebody has a legal obligation to do something, this person legally ought to do it (step from obligation to ought). If there is no reason why Anton ought not to pay the money to Violet, Anton ought to pay her the money. However, if there is such a reason, it has to be balanced against the obligation as a reason why Anton ought to pay. Suppose, for example, that Anton needs the money to feed his hungry children. As a matter of social fact, parents have the duty to feed their children. So, at least *pro tanto*, Anton ought to feed his children, and since the only we to do so (we assume) is to spend his money on food, instead of paying the rent, Anton ought not to pay the rent.

If these facts are all that is relevant, there are two reasons: one why Anton ought to pay Violet €700 and one why he ought not to do that. The first reason is rule-based, where the existence of the rule is a matter of social fact. The second reason is duty which exists directly as a matter of social fact. Both social facts can be established by sciences, including social sciences.

If there are both reasons for and against an ought-conclusion, the proper outcome depends on the relative weight of these reasons. Which reason 'outweighs' the other reason is a matter of social fact again, at least if there are no reasons dealing with this issue. (Such a reason might be based on an earlier judicial decision.)

The argument as described until here is *in the end* completely based on social facts, which depend *in the end*, completely on what people believe and accept. However, this is not the full story. There may be other reasons why Anton ought, or ought not, to pay his monthly rent to Violet. Whether these reasons exist depends, again *in the end*, on social facts, and can in principle be established by means of sciences that describe what IS the case. Every step in the relevant chains of argument is open to

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[16]   Interestingly, the rule that contracts lead to their intended consequences is not everywhere in the civil law world codified. Apparently, this rule is assumed to exist even without a statutory foundation.

discussion, but *in the end* all arguments in this discussion must be based on premises that are true because of objective or social facts.

5.6 A New Perspective on Law and the Cognitive Sciences

Let us assume that ought-facts are constructivist facts, which differ from brute social facts, but nevertheless depend for their existence on a social practice of acceptance. Then there is no fundamental difference between the OUGHT and the IS. As the expression 'ought-facts' suggests, an ought is a fact. This means that sciences, including the cognitive sciences, which give us information about the facts, can also give us information about what ought to be done. The Kelsenian argument is that IS and OUGHT are different realms, that the sciences can give us information about the realm of IS, but that law belongs to the realm of OUGHT for which the sciences are not relevant. This argument turns out to be based on an incorrect view of what the OUGHT is. Speaking of 'realms' is not very illuminating, but if we do so nevertheless, we should conclude that the realm of OUGHT belongs to the realm of IS. The next conclusion is then that sciences that deal with what is the case can also deal with what ought to be done. And the conclusion that then follows is that the cognitive sciences may be relevant for law by answering the question what ought to be done. They would be relevant, for instance, by specifying the circumstances under which people accept legal ought-facts. This a topic that has not received much attention yet, but which may be highly relevant for a proper understanding of law.

6. Disruptive Cognitive Sciences

In the previous section is was argued that the question what ought to be done is, in the end, when the recursion bottoms out, a matter of social fact. If the law deals with the question what ought to be done, as many believe it does, it can still be the object of science and in particular also the cognitive sciences. The objection against the use of the cognitive sciences to establish the content of the law is based on a false ontological presupposition. As soon as this presupposition is given up, the relevance of the cognitive sciences for establishing the content of law becomes apparent.

6.1 Law's Image of Humankind

The cognitive sciences are also relevant in a different way. Underlying law there is an image of humankind. A long philosophical tradition has cast doubts on this image and these doubts are confirmed by the modern cognitive sciences. If it turns out that law is based upon a fundamentally wrong image of humankind, there is reason to redesign law completely, assuming that there will still be a role left for law at all. The role of the cognitive sciences in this connection may be labelled as a contribution to reasoning about good law (see section 4.3). However, the impact of a substantially

changing image of humankind on law is so big that the role of the cognitive sciences in this connection deserves a separate discussion.[17]

The image of humankind that underlies Western[18] law is that human legal subjects are mostly rational creatures, who are – to use a word that has become fashionable – reasons-responsive. This reasons-responsiveness is closely connected to the notions of free will and rationality. The following fragment provides a good illustration:

> '… consider again the case of Allison and her decision to walk her dog. A reasons-responsive view of the will says that Allison's volition to walk her dog is free if, had she had certain reasons for not walking her dog, she would not have decided to walk her dog. Imagine what would have happened had Allison turned on the television after waking from her nap and learned of the blizzard before deciding to walk her dog. Had she known of the blizzard, she would have had a good reason for deciding not to walk her dog. Even if such reasons never occur to her (that is, if she doesn't learn of the blizzard before her decision), her disposition to have such reasons influence her volitions shows that she is responsive to reasons. Thus, reasons-responsive views of the will are essentially dispositional in nature.
>
> Coercion and manipulation undermine free will, on this view, in virtue of making agents not reasons-responsive. If Allison has been brainwashed to walk the dog at a certain time, then even if she were to turn on the news and sees that it is snowing, she would attempt to walk the dog despite having good reasons not to. Thus, manipulated agents are not reasons-responsive, and in virtue of this lack free will.' (Timpe, 2019)

The notion of reasons-responsiveness is used in this fragment to illustrate a particular view of free will. However, the disposition to act rationally – on the basis of reasons – also defines reasons-responsiveness.

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[17] One illustration of how cognitive sciences may change the image of humankind that underlies law is the discrepancy between the concepts used in modern psychological theorizing, and the concepts used by law to categorize human behaviour. See (Kurek, present volume).

[18] It is hazardous to assume that all law is based on the same image of humankind. However, it seems more likely that the main Western legal traditions, the Roman law tradition and the Common Law tradition, by and large share the same image, which is described here.

The next step, which is taken in Western legal systems, is to use reasons-responsiveness as a precondition for responsibility. Only persons who are reasons-responsible, are responsible for their own actions and can be fault-liable in tort law,[19] or liable to be punished in criminal law.

Law assumes that adult people who do not suffer from exceptional mental conditions are reasons-responsive and in this sense rational. This assumption justifies that legal subjects can undertake contractual obligations (freedom of contract) and can – more in general – perform juridical acts by means of which they modify the legal positions of themselves and sometimes also of other persons.[20] It also justifies that persons who committed crimes can be punished by way of retribution (Golding, 1975; Claessen, 2019). And, finally, it justifies that political decisions are, directly or indirectly, made by taking votes (democratic elections).

A noteworthy side-effect of this assumption of rationality is that (justificatory) theories of rational action can be used for explaining and predicting human behaviour. This happens in the discipline of Law and Economics where economic theories of rational action are used to explain and justify legal rules.[21]

6.2 Knowing Why[22]

It is not at all obvious that people are rational or reasons-responsive in the way that law presupposes. One ground for doubting this rationality lies in the limited capabilities that people have to recognize the determinants of their own actions. If people are to be held responsible for their actions, they should at least know why they did what they did. One of the findings of cognitive science is that this is often not the case. Several studies suggest that people confabulate to explain their own behaviour.

One study dealt with posthypnotic suggestions. Under hypnosis, people are prompted to do weird things after their hypnosis has ended, such as dressing in a lamp shade and the victims might really do what they were suggested to do. Because the behaviour is weird, it is highly unlikely that it had another cause than the suggestion done under hypnosis, a suggestion which they did not remember. When asked why they behaved in such a strange way, the victims came up with explanations which sounded somewhat plausible, but which were patently false (Estabrooks, 1943).

Another study dealt with split brain patients. To 'cure' them from very heavy epileptic attacks, these patients had their *corpus callosum*, the bundle of nerve fibres that connects the left and the right

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[19] Obviously, tort law recognizes a broad spectrum of situations in which a person is liable for the damage of somebody else. Different versions of fault liability exist, as well a different versions of strict liability. For a summary overview, see (Hage, 2017).
[20] See (Hage, 2018, chapter X).
[21] See, for instance, Friedman (2000, p. 8).
[22] The title of this subsection and the examples discussed in it were inspired by the similar titled chapter from Wilson (2002).

hemispheres of the brain, cut through. As a result, information stored in one hemisphere could not be used to steer the hand controlled by the other hemisphere. Moreover, this information could not be used to explain the movement of this hand, and the patient would confabulate an explanation when asked for one (Gazzaniga & LeDoux, 1978).

Both the posthypnotic and the split brain cases concern extraordinary situations. However, confabulation of reasons for action also takes place in more ordinary situations, as was shown in a study about panty hoses. Customers in a shop were asked to evaluate panty hoses that were stored in a row from left to right. It was known from earlier studies that people had a relative preference for objects on the right hand side of such a row. This case study confirmed this preference. However, when the customers were asked to justify their preferences, they did not mention the position of the preferred panty hose in the row, but other characteristics such as superior knit, sheerness, or elasticity. The panty hoses were identical, though, and the explanations of the preferences were confabulated (Nisbett & Wilson, 1977)

A number of case studies does not suffice to show that people always confabulate the reasons that moved them, but the cases strongly suggest that people quite frequently do not know what moved them. Moreover, all mentioned cases deal with causes, unknown to the agents, which were not very rational. Apparently, people are often moved by irrational causes of which they are not aware.[23] Publicity agents are no doubt aware of this, and in developing commercials they use this knowledge to the advantage of their clients.[24] Law should use this knowledge too.

6.3 Dual System Decision Making

In a series of path-breaking articles, Daniel Kahneman and Amos Tversky (1982) developed a theory of human decision making that explains cognitive biases. This theory was developed into a model of human decision making in which two systems play a role (Kahneman 2012, Part I). The systems, called System 1 and System 2, were defined functionally - in terms of what they do - but were also cautiously associated with different parts of the brain, the limbic system and the cortex respectively (Taleb, 2008, pp. 82/3). System 1 performs unconscious decision making, based on intuition and heuristics. It works fast and smoothly, but may lead to mistaken, biased, judgements. System 2 is the system that 'thinks'. Its operation is often conscious, and takes effort. It makes fewer mistakes than System 1, and mistakes are made consciously and are therefore more easily corrected.

The precise relation between Systems 1 and 2 is still object of discussion. Some see System 2 as a correction mechanism on System 1, when the decision maker has time to think about the decision.

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[23] This is the central theme of Ariely 2009. See also the contribution of Leibovitch to the present volume.
[24] See the contribution of Palka to this volume.

Others, including Haidt (Haidt and Bjorklund 2008 and Haidt 2012), see it primarily as a tool to rationalize the spontaneous decisions of System 1. In the latter function it might perform the role of confabulator that we encountered in the previous subsection.

Whatever the details, if decisions need to be taken swiftly, only System 1 can be involved and the decision making procedure is based on heuristics and is not always rational.[25] Because of this important role of System 1, the presupposition that human beings are reasons-responsive and act on the basis of balanced reasons is not always correct.

6.4 Who is Acting?

Actions are by definition performed by agents and the stereotypical agent is an adult human being. So if a particular decision to act was taken by System 1 or by System 2 in the brain of a particular person, we ascribe this decision to the person, not to the relevant part of the brain. The temptation to ascribe actions to parts of the brain, no matter whether they are defined functionally or physically, was therefore called the 'mereological fallacy' (Bennett & Hacker, 2003; Pardo & Patterson, 2013).

Notice that the mereological fallacy is a fallacy only if we follow common parlance, in which actions are ascribed to agents and in particular to human beings, and not to their brains. The 'temptation' to ascribe decisions and the actions based upon them to parts of the brain might well be interpreted as a proposal to change terminology. Such a change may be justified by the growing insight in what happens when decisions are being made. If this proposal is adopted, the ascription of actions to parts of the body, more specifically to the brain, would be alright.

The distinction between Systems 1 and 2 indicates that it is not obvious to map one person to one brain. There may be more 'systems' in the brain, and it is not immediately clear whether a person should be correlated to one full set of brains, or to a particular subsystem of the brain, whether physically or functionally defined, or to still something else. The possibility that one body 'embodies' multiple personalities or selves also suggests that there is no simple match between on the one hand a body or a brain and on the other hand a self, person, or agent (Radden, 2011). Even if we ignore psychopathology, there are reasons to assume that a person's mind has no single top level decision maker (Dennett, 1991, chapter 5). Also the unity of a person in time has been disputed, for instance in the work of philosophers such as Thomas Nagel (1970), Derek Parfit (1984), or Galen Strawson (2011).

The opposite also occurs: some agents apparently consist of two or more entities which, from a different perspective, are seen as separate agents themselves. A well-known example from the world of

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[25] Because heuristics may have been developed during evolution and have then been selected on survival value, their products need not be irrational. Heuristics may be 'fast and frugal' (Gigerenzer, 2008).

non-human animals, popularized in (Hofstadter, 1980, pp. 310-336), is the ant colony. The individual ants can be seen as separate agents, but the combined behaviour of these agents constitutes an agent at a higher aggregation level: the ant colony. In law, an analogous phenomenon exists in the form of organizations with a recognized legal personality. These organization, include businesses, but also State agencies and full States (Hage *et al,* 2017, pp. 37/8).

In short, recent results from the cognitive sciences cast doubt on the very concepts that underlie the legal approach to actions, responsibility and liability. Human agents often do not act rationally, do not always know what drove them, and are only loosely associated with bodies or parts thereof. If we take a closer look at the perennial discussion about free will and determinism, these doubts are confirmed.

6.5 Free Will and Determinism

Law typically presupposes that humans are reasons-responsive and have (in that sense) a free will. However, there is a long-standing philosophical tradition, starting from the doctrine of determinism, that questions the existence of a free will. Determinism is the view that all events are uniquely determined by what went before, and that given a particular state of the universe at some point in time, only one particular development of the universe after that point in time is possible.[26] If determinism is true and applicable to human actions, there is at every moment in time only one possible action for every agent. In other words, the agent has no alternative possibilities next to the action that (s)he will actually perform. Therefore, the argument continues, the agent has nothing to choose and cannot respond to the reasons for action that exist. The agent is not reasons-responsive and has no free will.[27]

It is disputable whether determinism is generally true, and whether it holds for the domain of human action.[28] One thing is certain: determinism is not a scientific theory that can be falsified or verified. It is better characterized as a paradigm in the Kuhnian sense (Kuhn, 2012), or as the hard core of a Lakatosian research program (Lakatos, 1970). Causal determinism would be a presupposition of a particular way of doing scientific research: assume that every event has a cause and that cause and effect are connected by laws that have no lawless exceptions.[29]

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[26]   A more specific circumscription, which emphasizes the role of causal laws in determinism, can be found in (Hoefer, 2019).

[27]   It is not necessary to include reasons-responsiveness in this argument; an alternative would be to make the existence of alternative possibilities a direct condition for free will. The result remains the same: determinism means no alternative possibilities, which in turn means no free will.

[28]   See the contributions of O'Connor and Kane in (Kane, 2002).

[29]   The word 'lawless' was included here to account for the possibility that there are exceptions to physical laws, but that these exceptions are themselves governed by laws. If that is the case, physical laws may be

As a paradigm or as the core of a research program, determinism has proven fruitful in many scientific domains. In the humanities, the fruitfulness of determinism was not obvious. However, one important consequence of the recent developments in the cognitive sciences is that it has become clear that the determinist paradigm is more fruitful for the explanation and prediction of human behaviour than it was to be expected on the basis of earlier experiences.

Determinism may or may not be true and applicable to human behaviour, but the question whether it is may be less important for the existence of free will than some believe. If determinism is true and applicable to human behaviour, there is seemingly no free will because of a lack of alternative possibilities. If determinism is false, or not applicable, human behaviour seems to be arbitrary, to such an extent that perhaps we should not even speak of behaviour anymore. Suppose, for instance, that my arm rises, without this being the result of a decision of mine. Can we then say that I raised my arm?[30] The issue at stake here is the authorship of actions. The falsity or non-applicability of determinism suggests that 'actions' lack a proper author. Seemingly, there is nobody who performed them, and it becomes questionable whether they can still count as actions at all. To turn it into a slogan: No action without agent, and no agent without authorship.

The attractiveness of determinism is based on the success of the physical sciences which have proven to be able to predict future events with a large degree of detail and reliability. If it turns out to be possible to explain mental phenomena in terms of 'underlying' physical regularities, there is hope that the success of the physical sciences can be translated to psychology and perhaps also sociology.

6.6 Compatibilism, a True but Irrelevant Side Track

The discussion of determinism and its relation to free will is important, not because the determinism issue is itself important, but because it draws our attention to the question how bodily events are related to mental events. To what extent should we pay attention to bodily states when we answer questions about responsibility and liability? This question directly relates to the relevance of the cognitive sciences for law, as the sciences tend to focus on bodily states, while law deals with mental states or events.

Compatibilism is, in one of its meanings, a theory about the relation between determinism and free will. It holds that the existence of free will is compatible with the truth of determinism and its applicability to mental phenomena. There are several variants of compatibilism, but they have in com-

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subject to exceptions, but these exceptions do not subtract from the determinism brought about by the physical laws collectively.

[30] See (Schlosser, 2015) on the role of intention in defining actions and agency.

mon that determinism plays no role in establishing the free will that is required for the attribution of responsibility and liability. Free will is tightly connected to responsibility and liability in the sense that a person's will is taken to be free in the relevant sense if we hold this person responsible or liable. If the truth and applicability of determinism play no role is establishing responsibility or liability, determinism is not relevant for free will either (Haji, 2002). A follow-up question would then be what the precise grounds are for holding a person responsible or liable and consequently for holding this person's will to be free. For the relation between free will and determinism this is not relevant, however. The issues of free will and determinism have been detached from each other and therefore free will and determinism have become compatible.

A similar argument can be used to argue why the findings of the cognitive sciences are not relevant for the attribution of free will, responsibility or liability. As a matter of fact, our practice of attributing responsibility, liability and free will assigns only a small role to the findings of the cognitive sciences and therefore these findings are not very relevant for our practice.

The argument for compatibilism as applied to the relevance of the cognitive sciences for legal practice was in the previous paragraph on purpose presented very succinctly. In this way the serious defect in the argument becomes obvious: it is claimed that the cognitive sciences are only minimally relevant, because we have a social (legal) practice that attaches little relevance to these sciences. This argument is either circular, or it is based on an illegitimate move from IS to OUGHT. It is circular if interpreted as: the cognitive sciences are not relevant because they are not relevant. It makes an illegitimate move from IS to OUGHT if it is interpreted as: our practice does not assign much importance to the cognitive sciences and therefore our practice)should not assign much importance to them.

The proper line of argument with regard to free will and determinism - or rather: responsibility and the cognitive sciences – must turn the tables. First, we must establish whether the cognitive sciences have something to say that is relevant for the attribution of responsibility and liability, and if that turns out to be the case, we should determine what consequences to attach to the findings of the cognitive sciences. In this connection, relevance cannot be determined at the hand of the existing social practice, because that would repeat the mistake that was pointed out above. Compatibilism, as the theory that our actual practice does not pay much attention to determinism and related issues, and that determinism is therefore compatible with free will and responsibility as they function in our actual practice, may very well be true. However, for our theoretical investigations it is irrelevant, as we are not interested in what our actual social practice is, but in what it should be. For this latter question, determinism and – for similar reasons – the cognitive sciences, are highly relevant.

6.7 Back on Track: Integrating the Physical Approach to Human Action

Determinism poses a dilemma. Either human action is determined, and then human agents lack alternative possibilities for their behaviour, cannot respond to available reasons, have no free will, and should not be held responsible for 'their' actions. Or human action is not determined, and then:

- it is arbitrary what happens with human bodies,

- the events in question cannot properly be called actions anymore,

- human agents lack alternative possibilities for their behaviour,

- these agents cannot respond to available reasons,

and so on …

The dilemma turns out to be constructive: there are two possibilities which complement each other in the sense that either one of them must be realized. Both possibilities lead to the same conclusions, and therefore these conclusions hold irrespective of whether determinism is true and applies to human action.

How is it possible that merely raising the issue of determinism makes that human agents should not be held responsible for their actions, even without taking a stance on the truth or applicability of determinism? This is possible because raising the issue of determinism frames the discussion about free will and responsibility in physical terminology. Events are either determined or random, and in both cases there is no room for free will and responsibility. Law does not frame its questions in this terminology, and therefore typical legal discussions about the circumstances under which agents can be held responsible for their actions seem to make sense.

This discrepancy between the physical and the legal approach to bodily events, respectively human actions, is not identical to the discrepancy between the psychological approach to decision making, with theories about dual systems and disappearing selves, and the legal conceptualisation of the 'same' issues in terms of agents, intentions and actions. However, it is related to this discrepancy. The cognitive sciences, with their associated conceptualisation of 'agency' in terms of neural processes and decision making systems, disrupt the legal approach. There seems to be a conflict between the different conceptualisations of what goes on, and it is not obvious how this conflict is to be solved.

The easy way out is to assume that there are two 'languages' that describe the same phenomenon, that neither one of these languages is better than the other, and that we can happily continue to use the two conceptualizations in parallel. This is the way adopted by compatibilists, and it has the advantage of an intellectual holiday: there is nothing to worry about and therefore we should not worry. However, if we consider our actual practice of attributing responsibility and liability, we find that

sometimes the findings of the cognitive sciences are already considered relevant (see also section 4). For example, if somebody was involuntarily drugged and committed a crime under the influence of these drugs, we excuse this behaviour and do not punish the agent. The influence of drugs on human behaviour falls under the scope of the cognitive sciences broadly conceived. Apparently these sciences are sometimes treated as relevant. Consistency demands that if the findings of the cognitive sciences are sometimes treated as legally relevant, these findings should be considered relevant in general, unless an explanation if offered for the differences in relevance. At present, such an explanation is lacking, unless it is the circular explanation that this is our social and legal practice (see section 6.6).

If the results of the cognitive sciences are legally relevant, it is necessary to reconcile the vocabularies of the two approaches to bodily events, respectively human actions. That would mean that the cognitive sciences are relevant for law, if only by demanding a reconsideration of the way in which law conceptualizes its domain.

6.8 Consequences

If the image of humankind that underlies law should be changed under the influence of the cognitive sciences, to reflect that humans are often not rational, not reasons-responsive, and do not know what motivates them, what would be the consequences for law? Clearly this is a question that goes beyond the scope of this chapter, but it is possible to provide the beginnings of an answer nevertheless.

The influence of a change in the image of humankind from rational to (often) irrational should be biggest in those area of law that are strongly based on the assumption of rationality. Private law is the obvious candidate here, as it assigns an important role to the autonomy of legal subjects. This assignment can only be beneficial if the autonomy is used wisely or rationally. If, and to the extent that, it is to be expected that legal subjects will not exercise their autonomy in a rational fashion, measures should be taken to protect their interests, and these measures will include a limitation on the possibility for legal subject to arrange their own affairs. For examples of what this may entail, we can look at the protective measures that are in place for juveniles and for mentally impaired persons. It is not likely that similar measures will be desirable for persons that we consider mentally healthy adults, but the protective measures for juveniles and for mentally impaired persons provide at least a glimpse of what direction the new law may go.

In the sphere of constitutional law, a rationality assumption is in place as one of the grounds to allow people to vote about the course of their governments and about future legislation. If we cannot rely on it that people will vote for what is in the proper interests of themselves or of society at large, at

least one ground for democratic decision making seems to be lost. Perhaps a counterweight can be – and has already been - found in the safeguards of human rights, the rule of law, and lengthy bureaucratic decision making procedures. Measures like these provide another glimpse of the direction new law might go.

Perhaps criminal law is the field where the impact of a modified image of humankind will be strongest felt. It has already often been pointed out that a lack of reasons-responsiveness takes away criminal responsibility and that this makes retributive criminal law impossible (Pereboom, 2001, Chapter 6). If a role for criminal law is to remain, it must be confined to measures that promote a better future. In other words, criminal law must become completely consequentialist. This is, by the way, not the same as that criminal law should aim at prevention of crimes. Prevention of crimes may be a way to create a better society, but it is not the only way.[31]

7. Conclusion

This chapter addresses the question whether the cognitive sciences are relevant for law. The answer to this question turned out to be a threefold 'yes'. First, if law is traditionally conceived as a set of rules that prescribe what ought to be done, there is a role for the cognitive sciences in determining the facts of the cases to which the law is to be applied (evidential reasoning). Moreover, the results of the cognitive sciences may also be important for the evaluation of law and for determining what would be good law. This includes the evaluation of potential counts-as rules that can be used for legal classification. (Section 4)

Second, there is reason to assume that there is no hard difference between IS and OUGHT and that even if law belongs to the realm of OUGHT, cognitive sciences may still be relevant for determining the content of the law. In this connection it turned out to be important that that ought-facts are constructivist facts that depend in last instance (when the ought-recursion bottoms out) on acceptance by the members of some group. (Section 5)

Finally, the cognitive sciences may disrupt the image of humankind that underlies law. It turns out that people are less rational than may seem at first sight, that they often do not know what motivates them, that it is not obvious what actions and agents are, and that it is unclear what the best level of explanation is for human actions or bodily movements. A change in the image of humankind that underlies law to reflect the recent insights of the cognitive sciences, but also of ancient philosophical debates, may have important consequences for the contents of law. (Section 6)

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[31] Bentham 1970 is an example of how utilitarianism can wrongly be narrowed down to a theory of crime prevention.

Summarizing, we can confidently claim that the cognitive sciences are highly relevant for law.

References

Alexy, R. (1978). *Theorie der juristischen Argumentation*. Frankfurt a/M: Suhrkamp.

Amaya, Amalia. (2015). *The Tapestry of Reason*. Oxford: Hart.

Amaya, Amalia. (2018). Coherence and Systematization in Law. In *Bongiovanni et al, 2018*, pp. 637-672.

Ariely, Dan. (2009). *Predictably Irrational. The Hidden Forces That Shape Our Decisions*. New York: Harper.

Bagnoli, Carla. (2017). Constructivism in Metaethics. In Edward N. Zalta (Ed.), *The Stanford Encyclopedia of Philosophy* (Winter 2017 Edition).
Retrieved from <https://plato.stanford.edu/archives/win2017/entries/constructivism-metaethics/>

Bennett, M.R. & Hacker, P.M.S. (2003). *Philosophical Foundations of Neuroscience*. Oxford: Blackwell.

Bentham, Jeremy. (1970). *An Introduction to the Principles of Morals and Legislation*. (Ed. J.H. Burns & H.L.A. Hart). London: Methuen (1st ed. 1789).

Bex, Floris. (2009). *Evidence for a Good Story.* PhD-thesis Groningen.

Blackburn, Simon. (1984). *Spreading the Word. Groundings in the Philosophy of Language*. Oxford: Clarendon Press.

Bongiovanni, G., Postema, G., Rotolo, A., Sartor, G., Valentini, C. & Walton, D. (Eds.) (2018), *Handbook of Legal Reasoning and Argumentation*. Dordrecht: Springer.

Bowles, Samuel & Gintis, Herbert. (2011). *A Cooperative Species. Human reciprocity and its evolution*. Princeton and Oxford: Princeton University press.

Brožek, Bartosz. (2013). *Rule-Following*. Kraków: Copernicus Press.

Brožek, Bartosz. (present volume). The Architecture of the Legal Mind.

Claessen, Jacques. (2019). Theories of Punishment. In *Keiler & Roef 2019*, pp. 11-34.

Dennett, Daniel C. (1991). *Consciousness Explained*. London: Penguin Books.

Di Bello, M. & Verheij, B. (2018). Evidential Reasoning. In *Bongiovanni et al*, 2018, pp. 447-493. https://doi.org/10.1007/978-90-481-9452-0_16

Doris, John M. & the Moral Psychology Research Group. (2010). *The Moral Psychology Handbook*. Oxford: Oxford University press.

Epstein, Richard A. (2006). The Optimal Complexity of Legal Rules. In *Gigerenzer and Engel 2006*, pp. 141-157.

Estabrooks, G.H. (143). *Hypnotism*. New York: E.P. Dutton.

Fenton, Norman. Neil, Martin & Daniel Berger. (2016). Bayes and the Law. In the *Annual Review of Statistics and its Application 3,* pp. 51-77.
Retrieved from <https://www.annualreviews.org/doi/pdf/10.1146/annurev-statistics-041715-033428> (last visited on 25 January 2019).

Friedman, David D. (2000). *Law's Order*. Princeton: Princeton University Press.

Gallagher, Shaun (Ed.) (2011). *The Oxford Handbook of The Self*. Oxford: Oxford University Press.

Gazzaniga, M.S. & LeDoux, J.E. (1978). *The integrated mind*. New York: Plenum.

Gigerenzer, G. (2006). Heuristics. In *Gigerenzer and Engel 2006*, pp. 17-44.

Gigerenzer, G. (2008). Moral Intuition = Fast and Frugal Heuristics?. In *Sinnott-Armstrong 2008a*, pp. 1-26

Gigerenzer, G. & Engel, C. (Eds.) (2006). *Heuristics and the Law*. Cambridge: MIT Press.

Golding, Martin P. (1975). *Philosophy of Law*. Englewood Cliffs: Prentice-Hall.

Goodenough, Oliver R. & Tucker, Micaela. (2010). Law and Cognitive Neuroscience. In *Annual Review of Law and Social Science* 6, pp. 61-92.

Grossi, Davide, Meyer, John-Jules & Dignum, Frank. (2008). The many faces of counts-as: A formal analysis of constitutive rules. In *Journal of Applied Logic 6*, pp. 192-217.
Retrieved from <https://doi.org/10.1016/j.jal.2007.06.008> (last visited on 25 January 2019).

Hage, Jaap. (2005). Law and Coherence. In Jaap Hage, *Studies in Legal Logic*. Dordrecht: Springer, pp 33-68.

Hage, Jaap. (2017). Tort Law. in *Hage et al 2017*, pp. 109-128.

Hage, Jaap. (2018). *Foundations and Building Blocks of Law*. Den Haag: Eleven.

Hage, Jaap, Waltermann, Antonia & Akkermans, Bram (Eds.), *Introduction to Law* (2nd ed.). Cham: Springer.

Haidt, Jonathan & Bjorklund, Fredrik. (2008). Social Intuitionists Answer Six Questions about Moral Psychology. In *Sinnott-Armstrong 2008a*, pp. 181-218.

Haidt, Jonathan. (2012). *The Righteous Mind. Why good people are divided by politics and religion*. London: Penguin.

Haji, Ishtiyaque. (2002). Compatibilist Views of Freedom and Responsibility. In *Kane 2002* pp. 202-228.

Hart, Herbert L.A.. (2012). *The Concept of Law*, 3rd ed. Oxford: Oxford University Press (1st ed. 1961).

Hoefer, Carl. (2019). Causal Determinism. In Edward N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy* (Spring 2016 Edition).
Retrieved from <https://plato.stanford.edu/archives/spr2016/entries/determinism-causal/>.

Hoffman, Morris (present volume). The Psychology of the Trial Judge.

Hofstadter, Douglas R. (1980). *Gödel, Escher, Bach: an Eternal Golden Braid*. New York: Basic Books.

Hume, David. (1978). *A Treatise of Human Nature* (Selby-Bigge/Nidditch edition). Oxford: Oxford University Press. (1st ed. 1738-1740).

Joyce, Richard. (2016). Moral Anti-Realism. In Edward N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy* (Winter 2016 Edition).
Retrieved from <https://plato.stanford.edu/archives/win2016/entries/moral-anti-realism/>.

Kahneman, D., & Tversky, A. (1982). *Judgment under Uncertainty: Heuristics and Biases*. Cambridge: Cambridge University Press.

Kahneman, Daniel. (2012). *Thinking. fast and slow*. London: Penguin.

Kane, Robert (Ed.) (2002). *The Oxford Handbook of Free Will* (1st ed.) Oxford: Oxford University Press.

Keiler, Johannes and Roef, David (Eds.) (2019). *Comparative Concepts of Criminal Law* (3rd ed.)¸ Cambridge: Intersentia (1st ed. 2015).

Kelsen, Hans. (1934). *Reine Rechtslehre* (1st ed.). Leipzig: Deuticke.

Kelsen, Hans. (1960). *Reine Rechtslehre* (2nd ed.). Wien: Franz Deuticke.

Kelsen, Hans. (1992). *Introduction to the Problems of Legal Theory*. Translation of the first (1934) edition of the *Reine Rechtslehre* by Bonnie Litschewsky Paulson and Stanley Paulson. Oxford: Clarendon Press.

Kuhn, Thomas S. (2012). *The Structure of Scientific Revolutions*. 50th anniversary edition. Chicago: The University of Chicago Press (1st ed. 1962).

Kurek, Lukasz. (present volume). Law, Folk Psychology and Cognitive Science.

Lakatos, Imre. (1970). Falsification and the Methodology of Scientific Research Programs. In Lakatos & Musgrave 1970, pp. 91-196.

Lakatos, I. & Musgrave, A. (Eds.) (1970). *Criticism and the Growth of Knowledge*. Cambridge: Cambridge University Press.

MacCormick, Neil. (1978). *Legal Reasoning and Legal Theory*. Oxford: Clarendon Press.

MacCormick, Neil. (2005). *Rhetoric and the Rule of Law*. Oxford: Oxford University Press.

Mackor, Anne Ruth (2013). What Can Neurosciences Say About Responsibility? Taking the Distinction between Theoretical and Practical Reason Seriously. In Nicole A. Vincent (Ed.), *Neuroscience and Legal Responsibility*. Oxford: Oxford University Press, pp. 53-84.

Mackor, Anne Ruth, Jellema, Hylke & Van Koppen, Peter J. (present volume). Explanation-based approaches to reasoning about evidence and proof in criminal trials.

Meynen, Gerben. (present volume). The Insanity Defense.

Moriarty, Jane Campbell (present volume). Neuroimaging Evidence in the US Courts.

Morse, Stephen J. (2013). Introduction. In *Morse & Roskies 2013*. pp. xv-xxiii.

Morse, Stephen J. & Roskies, Adina L. (Eds.) (2013). *A Primer on Criminal Law and Neuroscience*. Oxford: Oxford University Press.

Nagel, Thomas. (1970). *The Possibility of Altruism*. Princeton: Princeton University Press.

Nisbett, R.E. & Wilson, T.D. (1977). Telling more than we can know: Verbal reports on mental processes. *Psychological Review 84*, pp. 231-259.

Pardo, Michael S. & Patterson, Dennis. (2013) *Minds. Brains and Law*. Oxford: Oxford University Press.

Parfit, Derek. (1984). *Reasons and Persons*. Oxford: Clarendon Press.

Pereboom, Derk. (2001). *Living Without Free Will*. Cambridge: Cambridge University Press.

Prakken, H. (2001). Modelling reasoning about evidence in legal procedure. *Proceedings of the Eighth International Conference on Artificial Intelligence and Law*. New York: ACM Press, pp. 119-128.

Rachlinski, J.J., Guthrie, C., Wistrich, A.J. (2007). Heuristics and biases in bankruptcy judges. *Journal of Institutional and Theoretical Economics*, 163, 167-186.

Rachlinski, J.J., Johnson, S., Wistrich, A. & Guthrie, C. (2009). Does unconscious racial bias affect trial judges? *Notre Dame Law Review*, 84, pp. 1195-1246.

Radden, Jennifer. Multiple Selves. In *Gallagher 2011*, pp. 547-570.

Railton, Peter. (2006). Humean Theory of Practical Rationality. In David Copp (Ed.). *The Oxford Handbook of Ethical Theory*. Oxford: Oxford University Press, pp. 265-281.

Rosati, Connie S. (2016). Moral Motivation. In Edward N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy* (Winter 2016 Edition).
Retrieved from <https://plato.stanford.edu/archives/win2016/entries/moral-motivation/>.

Roskies, Adina L. (2013). Brain Imaging Techniques. In *Morse and Roskies 2013*, pp. 37-74.

Ross, Alf. (1946). *Towards a realistic jurisprudence*. Copenhagen: Einar Munksgaard.

Ruiter, Dick W.P. (1993). *Institutional Legal Facts*. Dordrecht: Kluwer Academic Publishers.

Sapolsky, Robert M. (2017). *Behave. The Biology of Humans at Our Best and Worst*. London: Bodley Head.

Schlosser, Markus. (2015). Agency. In Edward N. Zalta (Ed), *The Stanford Encyclopedia of Philosophy* (Fall 2015 Edition).
Retrieved from <https://plato.stanford.edu/archives/fall2015/entries/agency/>.

Searle, John R. (1995). *The construction of social reality*. New York: The Free Press.

Sinnott-Armstrong, Walter (ed.) (2008a). *Moral Psychology. Volume 2: The Cognitive Science of Morality: Intuition and Diversity*. Cambridge: MIT Press.

Sinnott-Armstrong, Walter (ed.) (2008b). *Moral Psychology. Volume 3: The Neuroscience of Morality: Emotion, Brain Disorders, and Development*. Cambridge: MIT Press.

Stelmach, Jerzy. (present volume). The Cognitive Approach in Legal Science and Practice
(a history of four revolutions).

Strawson, Galen (2011). The Minimal Subject. In *Gallagher*, *2011*, pp. 253-278.

Tale, Nazism Nicholas. (2008). *The Black Swan. The Impact of the Highly Improbable*. London: Penguin.

Timpe, Kevin. (n.d.) Free Will. Retrieved from https://www.iep.utm.edu/freewill/#SH2c.

Wagenaar, Willem A., Van Koppen, Peter J. & Crombag, Hans F.M. (1993). *Anchored Narratives: The Psychology of Criminal Evidence*. Englewood Cliffs: Prentice Hall.

Wallace, R. Jay. (2018). Practical Reason. In Edward N. Zalta (Ed.), *The Stanford Encyclopedia of Philosophy* (Spring 2018 Edition).
Retrieved from <https://plato.stanford.edu/archives/spr2018/entries/practical-reason/>.

Wilson, Eric Entrican & Denis, Lara. (2018). Kant and Hume on Morality. In Edward N. Zalta (Ed.), *The Stanford Encyclopedia of Philosophy* (Summer 2018 Edition).
URL = <https://plato.stanford.edu/archives/sum2018/entries/kant-hume-morality/>.

Wilson, Timothy D. (2002). *Strangers to Ourselves*. *Discovering the adaptive unconsciousness*. Cambridge (Mass.): The Belknap Press.

Wróblewski, Jerzy. (1992). *The Judicial Application of Law*. Zenon Bankowski & Neil MacCormick (Eds.). Dordrecht: Kluwer Academic Publishers.

Zaluski, Wojciech. (2009). *Evolutionary Theory and Legal Philosophy*. Cheltenham: Edward Elgar.

Zaluski, Wojciech. (2013). *Game Theory in Jurisprudence*. Kraków: Copernicus Center Press.