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The molecular concept of law

Hendrik Gommer*

The rare scholars who are nomads-by-choice are essential to the intellectual welfare of the settled disciplines.

Benoit Mandelbrot¹

Introduction

In his famous work *The Concept of Law* Hart asked himself the question ‘what is law?’ Ever since the publication of this book in 1961, Hart’s answers have retained their appeal and persuasive force. His concept of law has survived 50 years of scholarly critique and even attack. But will it survive another 50 years of encroachment? I believe that without a thorough update it will not. Hart based his theory on sociological observations. Sociologists for a long time – especially in the 1960s – believed that society itself can prescribe norms and rules. Individuals make society. Society is more than the sum of its parts, so society is of a more ultimate order, an order that has to be maintained by rules coming forth from that society.² This circular reasoning is also found in Hart’s theory of legal positivism. The elevation of society above individuals seems to create a dualism: for law to be law we need secondary rules of recognition that will help us to decide what is law and what is not. Society generates these secondary rules.

In what he calls the minimum content of natural law, Hart describes why members of a society cooperate. Without cooperation people cannot survive. People are vulnerable and approximately equal, they have a limited capacity for altruism, their resources are limited and they have limited understanding and strength of will. Obedience to group rules makes cooperation possible and this cooperation helps group members to survive, despite their frailty and limitations.³ All this Hart derives from his sociological observations, but his perception does not

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1 In A.L. Mackay, *A Dictionary of Scientific Quotations*, 1991, p. 163

2 E. Durkheim, *Les Jugements de Valeur et les Jugements de Réalité*, 1911, par. IV, <http://classiques.uqac.ca/classiques/Durkheim_emile/Socio_et_philo/ch_4_jugements/jugements.pdf>.

3 H.L.A. Hart, *The Concept of Law*, 1997 (1961), pp. 191-198.

hold with new biological insights; from a biological perspective, Hart's sociological truisms have proven to be untrue, because modern evolutionary biology is not about the survival of the individual (or even of a species) but about the spreading of genes. This knowledge changes the fundamentals of Hart's theory and therefore his theory as a whole.

Hart acknowledges man's desire to survive 'because it is already his natural end'. On first thoughts this looks like a rejection of dualism: if people follow rules, they have a better chance of surviving; therefore they will *strive* for survival as a goal. Yet Hart appears to adhere to dualism by making a 'birth' distinction between rules and morals: morals are rooted in biology, rules source back to society. Biology, however, is monistic in character. Organisms, traits of organisms, thoughts and constructs of organisms – and these include human-made rules – inevitably have their origins in genes, in molecules that act (and react) in accordance with chemical laws of nature.

Dworkin has introduced political principles. However, he is trying to find these principles by searching in common law, which is, in turn, based on these principles. I do not find this convincing. Where Dworkin rejects the idea of objective morals, modern biology could probably deliver a more fundamental theory on morals and principle. Posner's pragmatic theory does not convince me either. If pragmatic judges interpret a statute by what they think a legislator would have done, they are still weighing consequences, and this simply cannot be done in a rational way. Biology and psychology teach us that we unconsciously apply evolutionary principles of which many judges and legislators are not aware. To put it bluntly, biological facts, to a degree, determine our norms and rules.

In this paper, I will try to reform Hart's concept of law into a molecular concept of law that fits a modern, monistic biological perspective. I will start by analyzing factors that play an important role at the level of genes.

A molecular theory of law

In essence, my biological theory of law is based on fractal patterns. A fractal is 'a rough or fragmented geometric shape that can be split into parts, each of which is (at least approximately) a reduced-size copy of the whole'.⁴ Macroscale patterns mirror microscale patterns. This way of thinking is related to evolutionary theories. It recognizes evolutionary mechanisms. However, the actual type of natural selection does not affect the idea that properties of molecules can be recognized in human behaviour. By focusing on the fractal pattern, we can evade detailed biological discussions on exactly how natural selection takes place. That discussion would either bog us down or divert us from the main issue, which is the link between the properties of genes and basic notions in law. By recognizing fractal structures in our empiric reality, we can link very different levels and disciplines and subsequently jump from genes to emotions to law in a systematic manner.

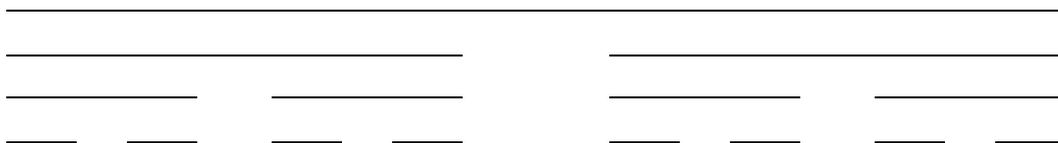
At the lower level, stable molecules can cluster together and form genes. Genes are stable molecules that can replicate. Replication is difficult when a gene floats through its environment on its own, because it will seldom come across useful molecules (nutrients or food) and it can fall apart easily through radiation, heat or other disturbing events. If genes can work together in a sequence of genes (DNA), it will be easier for them to find shelter and food. DNA, on a second level, can also replicate itself. Some genes will enable the construction of cell walls, others will

4 B. Mandelbrot, *The Fractal Geometry of Nature*, 1982.

facilitate the storage of food in these walls, and yet others will support cell motion, etc. Genes that work together in this way will replicate and spread more easily. If a new gene (mutation) benefits the spreading of all genes, that new gene will spread over the population. Successful spreading thus depends on important characteristics of genes: they are stable, they replicate, they need nutrients (food) to replicate and they can cooperate. Genes (alleles actually) that benefit reproduction will spread over the population more effectively than genes (alleles) of the same type that are less beneficial. Growth is therefore also a characteristic of replicating molecules. At the third, cellular level the same principle occurs. Cells can cooperate with other cells. They can then specialize to the benefit of the organism. Cells can multiply by dividing themselves and they need food (molecules) to grow (in number). At the level of organisms, the same pattern can be discerned. Organisms that cooperate can specialize, can find more food and can defend themselves better. Organisms that can survive and reproduce, can spread (grow in number). With those organisms their genes will spread too. The fifth level is that of groups. Stable groups can cooperate with other groups to find more food and to defend themselves better. They do not reproduce, but they can try to overcome other groups, spread their influence and form states. States constitute the sixth level: they offer stability, food and protection to their inhabitants. Even states can cooperate to improve their security and food production. The seventh level is globalization in which states work together to fight mutual threats such as diseases, climate change and terrorism. Even at this level the characteristics of the gene can be recognized. Globalization is a condition for states, groups, individuals, cells, DNA and genes to prosper. More food can be produced and global threats can be addressed. Thanks to globalization, genes can still spread in an environment that is hostile to their stability. Because of this molecular, chemical, biological, sociological, anthropological, political mechanism, all seven levels will be stable as long the constituent parts can be stable, find food and prosper. It may appear as if genes, cells, individuals, groups and states *strive* to find food, to spread and defend themselves, but organisms at each of these levels are in fact genetically driven to act in this way, and even if humans act consciously, they do so because of the underlying properties of the genes. Molecular properties are the cause without purpose.

Fractals

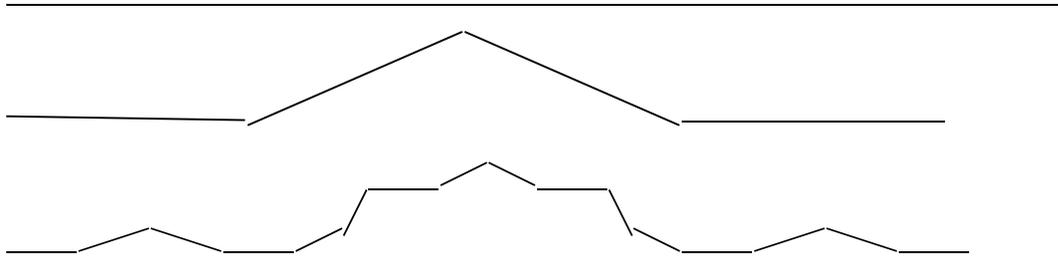
The principle described here shares many features with fractal theory. Fractals are objects whose smallest particles have the same structure as the composite whole of these particles.⁵ The Cantor set is probably the simplest fractal. A line can be divided into two lines and each of these lines can in turn be split into two new lines, and so on. The result is many short lines with gaps between them. The macrostructure resembles the microstructure.⁶



5 C. Brown & L. Liebovitch, *Fractal Analysis*, 2010, p. 3.

6 N. Lesmoir-Gordon et al., *Introducing Fractal Geometry*, 2000, pp. 20-21.

The Swedish mathematician Helge von Koch developed the Koch curve, filling the gaps in a straight line with new, equally angled lines in a repetitive process. With every step more ‘bulges’ are added. The initial, straight line is called the *initiator*, the repeating action the *generator*.⁷



Fractals can also be recognized in the coast of Great Britain, which superficially shows only big coves. More detailed charts show smaller coves. The number of coves increases with the degree of detail. This is an example of a *scaling relationship*.⁸ Note that nowhere are the coves identical, but the structure – the principle, the plan – is the same. The coast evolved in a situation where the environment was not as homogenous as the piece of paper on which computer drawings are made. A fractal’s environment will influence its eventual form.

Fractals manifest themselves in apparent chaos by random processes. Because of the generator, ordered structures will appear in chaos. The pattern of many natural structures – a snowflake, leaves, cell growth, lungs, our brain – approximates a fractal. Chaos combined with a generator will yield very complex, yet ordered structures that repeat themselves.⁹ Henri Poincaré showed that even complex behaviour ultimately consists of simple patterns that can be described with simple mathematic models.¹⁰ In behaviour, a few patterns are repetitive. These repeating patterns are called *iterations*. Iterations can go on forever but are restrained by their environment. The iteration of the lines in the example given above is stopped because the surface of the paper is a restraining factor. A gene can replicate itself, but replication will stop when no useful molecules are left. A cell can multiply, but will stop doing so when it lacks space or food. In the same way, patterns are restrained by their environment.¹¹



Barnsley’s fern fractal as created by Daniel Edwins¹²

7 P.M. Iannaccone & M. Khokha, *Fractal Geometry in Biological Systems. An Analytical Approach*, 1996, p. 5.

8 L.S. Liebovitch, *Fractals and Chaos*, 1998, p. 108.

9 Lesmoir-Gorden et al., *supra* note 6, pp. 43-44.

10 *Ibid.*, p. 50.

11 *Ibid.*, p. 59.

12 This is not a real fern. It is a fractal created by Daniel Edwins, <www.danieledwins.com>. A fractal with 100,000 points was generated in 0.2 seconds. Random Iteration Algorithm, outlined by Michael Barnsley, to create Barnsley’s fern. Note that from an evolutionary perspective the fern has a very old shape, which implies that its generator is probably relatively simple.

Many natural processes are random events that are structured by a generator. The result is a fractal.¹³ These fractals are not as exact as mathematical models, but they do have a statistic self-similarity.¹⁴ For instance, our lungs have one fractal dimension for the first seven generations and other dimensions in the bronchi.¹⁵ It is likely that these structures are shaped by a genetically coded *generator*. According to Barnsley, ‘when a *V*-variable geometrical fractal model is found that has a good match to the geometry of a given plant, it is likely there is a specific relationship between these [mathematical, HG] codes and the information stored in the genes of the plant’. The fern fractal is a one-variable fractal, as is the lettuce fractal. When these two variables are combined, leaf-shaped structures materialize and it is speculated that the leaf shape therefore needs two genes.¹⁶ The gene prescribes the generator. In this way, a relatively low number of genes may suffice to account for a very complex body.¹⁷ This idea is confirmed by the growth of different types of bacterial colonies. Bacteria only have about 1,000 genes, but their colonies have very complex fractal structures. The shape of the colony of different types of bacteria is also different. Genes determine the pattern of the colony, but the shape also depends on external factors. If other bacteria are encountered, the structure of the colony will change at the point of contact and some genes will be switched off.¹⁸ In this way, a limited number of genes can cause very complex behavioural patterns to evolve.¹⁹ Even at the gene level, cooperation is important. By working together, genes can produce more sophisticated and mutually beneficial structures.

What fractal theory can teach us is that properties of a generator – and genes can operate as such – can be recognized on various levels in biology, psychology, sociology, anthropology, politics and law. By studying these properties, we can find the basic notions of law. In addition, fractal theory shows us that a simple formula can generate very complex structures in behaviour. The same formula can probably generate these structures in law too.

The dependent gene

Thanks to fractal theory, we know that two genes could suffice to explain the form of leaves in plants. And knowing that, it is not so difficult to imagine how 1,000 genes can create different fractal patterns that make cells grow. Genes that are stable can spread. A gene on its own, however, will face serious difficulties in trying to replicate and spread. It has to encounter the right molecules that are necessary for replication. The combination of a gene that generates a flagella and a gene that generates a device to capture the right molecules helps both genes spread faster. Selection will therefore be to the benefit of the gene combination. Nonetheless, the capture-device gene has to share the captured molecules with the flagella gene. Only if they find twice the number of molecules the separated ancestors needed, will the combination be successful.²⁰ Is the capture-device gene altruistic, because it shares its food with the flagella gene? Well, not exactly. Sharing is a necessity to find additional food. Without sharing, the flagella gene will not replicate and the capture-device gene will soon be isolated. It will probably be ‘eaten’ by a stable gene combination in which the capture-device gene does share. Is the not-sharing gene

13 Lesmoir-Gorden et al., *supra* note 6, p. 63.

14 Liebovitch, *supra* note 8, p. 12.

15 Lesmoir-Gorden et al., *supra* note 6, p. 108.

16 M.F. Barnsley et al., *Variable Fractals and Superfractals*, Australian National University 2004.

17 Liebovitch, *supra* note 8, p. 24.

18 T. Matsuyama & M. Matsushita, ‘Morphogenesis by Bacterial Cells’, in Iannaccone & Khokha, *supra* note 7, pp. 127-129.

19 *Ibid.*, pp. 151-155; M. Khokha & P.M. Iannaccone, ‘Mosaic Pattern in Tissues from Chimeras’, in Iannaccone & Khokha, *supra* note 7, pp. 195-198, 201.

20 See also W.D. Hamilton, ‘The Evolution of Altruistic Behavior’, 1963 *American Naturalist*, pp. 354-356.

selfish? Well, no. It will not succeed and will be food for the cooperating gene combination. Genes are not altruistic, nor are they selfish: they depend on each other. Sometimes the cooperation of two genes is successful. In the same way, the cooperation of 1,000 genes can be successful. Such notions as egoism or altruism are not relevant on the level of genes. Genes generate fractals and sometimes the combination of two fractal patterns makes the underlying cooperating gene generators replicate faster. It is a matter of reciprocity.

Fractals are found on all biological levels: in molecules, in cells, in tissues, in organs and in organisms.²¹ In addition, these structures also create fractal *movements*, such as the beating of the heart,²² respiration²³ and even the behaviour of crowds. Crowds behave in the same way as a complex organism.²⁴ Variation in biological processes is not random, but evolves in accordance with fractal theory. In a way, nature is deterministic, because a few simple mechanisms determine how processes will develop. Nevertheless, in the long term biological processes are unpredictable, because small disturbances in the environment can cause major alterations.²⁵ One could say nature is a deterministic chaos.²⁶ No two ferns will be alike, *yet* they both have the same structure. Similarly, no two law systems will be alike, yet they share the same basic principles.

Let us assume that not only genes contain codes that work as a generator, but that some properties of genes – like stability, reproduction, the need for nutrients, reciprocity and growth – act as generators for fractal patterns as well. In both cases, the environment acts as *initiator*. The fractal pattern can then be recognized in cells, organisms, groups and even states. If this is true, some simple but strong characteristics can be recognized on all levels (scaling relationship). For the fractal structure to exist, it is essential that all levels are stable, that food is available and that replication takes place. Where there is no food, growth and replication will stop. Superficially, genes, cells, organisms and groups may appear to *strive* for spreading, but the behaviour they display is in fact a fractal pattern with genes acting as a generator that brings structure to chaos. Just as law brings order to society. But is this parallel appropriate? According to Mill it is not. Law in nature is descriptive; laws that require people to behave in a certain way are prescriptive.²⁷ Hart minimizes the gap between descriptive law and prescriptive law by approaching nature from a teleological point of view. Man desires to survive because it is already his natural end. Similarly, societies are natural ends too. Hart observes that man's desire to survive is perceived as a human goal that is reflected in our thought structures. To raise any 'question concerning how men should live together, we must assume that their aim, generally speaking, is to live'.

Let us look at this idea of Hart's. If it is true that man desires to survive (to achieve stability), then it is also true (if not more so) that man desires to reproduce. This desire is caused by the generator that is programmed by genes. It is not the reproduction of the individual that is important, but that of its genes. In this perspective, then, paradoxically suicide can sometimes be an apt survival strategy. If an individual cannot go on, becomes a burden to the group and harms the reproduction of other individuals with a shared gene pool, they could 'feel' suicide is the least bad option. Again, survival is not man's ultimate desire, but the spreading of his genes is. That desire is not the starting point; it is an emotion caused by a biological mechanism. In

21 Iannaccone & Khokha, *supra* note 7, p. 10.

22 Lesmoir-Gorden et al., *supra* note 6, p. 120.

23 Liebovitch, *supra* note 8, p. 23.

24 Lesmoir-Gorden et al., *supra* note 6, p. 130; Brown & Liebovitch, *supra* note 5, pp. 51-63.

25 Liebovitch, *supra* note 8, p. 162.

26 *Ibid.*, p. 164.

27 J.S. Mill cited by Hart, *supra* note 3, p. 187.

evolutionary terms, the property of genes to survive by replication makes us feel good when circumstances for proliferation are favourable. Emotion is the evolutionary calculator that makes an estimation of our reproductive chances. This is why Hart's truisms should be recalibrated. According to fractal theory, the desire to spread our genes is reflected in our thought structures. The human species has been evolutionarily successful thanks to its disposition to live in groups. By living in groups, people could find more food and defend themselves against other groups. For that reason, people will desire to live in groups *and* to spread their individual genes. Indeed, justice will evolve when these two factors are to be combined. *People's desires reflect the needs of their genes.*

Genes of individuals that take advantage of other individuals within a society tend to be even more successful than genes of individuals that cooperate. Even as we work together we need to be smarter than our fellow group members. We can cheat them, steal from them, murder them or even better: use them as slaves. Genes that programme people to cheat will tend to be very successful and spread quickly within the population. *Unless other people expose the cheaters.* In a stable society, cheaters – free riders – will be caught and punished. Their cheating will ultimately thwart their efforts to reproduce, and so the genes of cooperative humans that only cheat in a limited and/or very smart way will spread within the population. I therefore agree with Hart that sanctions are required 'as a guarantee that those who would voluntarily obey shall not be sacrificed to those who would not'.²⁸ A society is viable if it offers some of its members a system of mutual forbearances; it need not offer them to all.²⁹ In other words, societies are also the outcome of biological processes that are rooted in the characteristics of genes. It may be to the benefit of group stability if a dictator tells citizens how to behave. A dictatorial society can thrive and outstrip other societies. It is the oppressed, and societies threatened by the dictatorial regime, that will denounce such a society as bad. The dictator prescribes rules that will keep society stable. A dictatorial decree that all traitors shall be hanged is an appropriate law because it will stabilize society. However, such a decree can also be formulated as a descriptive rule. In a dictatorial society, traitors are hanged, because treason, if tolerated, will destabilize that type of society. There is thus no principal difference between descriptive and prescriptive rules. Within a certain group rules will be prescribed that are necessary to keep the group stable. Surely, it is a biological mechanism that groups will not survive if they do not punish renegades. What is treason and what is not depends on the specific environment, situation and society concerned. Indeed, to make 'hasty judgements that laws were invalid and ought not to be obeyed' would endanger society.³⁰ From a modern biological perspective, it is appropriate to use the wider definition of law – all rules that are necessary to a stable society. All law that is meant to keep a society stable can be called law, even if it results in the suffering of members of society. Yet the oppressed will reject this kind of law as *unjust*. What do they mean by unjust?

The fractal-like structure of reproductive success

Let us look again at the bacterial colony with its 1,000 genes. What do these genes need to spread over a Petri dish? They need food, a temperature of about 30 degrees Celsius and space. Potential threats to their spreading are a shortage of food, a temperature that is too high or too low, too little space, hazards that kill bacteria in the colony or another bacterial colony with other genes

28 Hart, *supra* note 3, p. 198. See also E. Fehr & S. Gächter, 'Altruistic Punishment in Humans', 2002 *Nature*, pp. 137-140.

29 *Ibid.*, p. 201.

30 *Ibid.*, p. 211.

that invades their colony. If circumstances are propitious, the colony will flourish. According to fractal theory, the mechanisms that work in single-cell colonies will probably be found in colonies of higher organisms too. So, people similarly need food, good climate conditions, space and the absence of threats from other groups. As an additional factor that bacteria do not need to reproduce, people need mates. When these needs are met, people can be said to feel happy. Happiness is 'thus a proximate mechanism that leads us to perform and repeat acts that in the environments of history, at least, would have led to greater reproductive success'.³¹

Primates live in small groups. These provide more food, fewer threats from other groups, and mates. Individuals in a group have less space, but the benefits of the group are clearly more substantial. Larger groups involve even greater costs to individuals,³² such as the loss of space to reproduce. Therefore, there have to be more benefits. Individuals will therefore unconsciously strive to gain more space for their spouse within the group. They can do this by murder, theft (of food and space), rape, incest and abuse. These actions, however, are major threats to the reproduction of group members and primates will punish group members that display such behaviour. They unconsciously feel these acts are wrong and should not be tolerated. The actors, however, stand to gain from these acts in terms of reproduction benefits; they will only feel bad if other group members punish them. To the cooperating primates, these acts are 'unjust' because they are *solely* in the interest of the actors and not in the interest of group stability. As Alexander puts it, group members have to act in a reciprocal way. They contribute to the group in order to reap the benefits of group life. Alexander speaks of systems of indirect reciprocity. They involve social investment, which represents a short-term cost that may yield a long-term benefit.³³ These systems evolve 'automatically' within group moral systems.³⁴ Reciprocity itself can be considered a generator that causes stable patterns in a cooperating environment, where food is essential. If this system of reciprocity is disturbed, group members will (have to) take action to restore balance. Killing group members amounts to murder, but killing out-group organisms can be profitable and will not be felt as *bad*. Groups of primates are normally quite small. Prosimians, such as lemurs and bushbabies, live in groups of 5-10 members. Monkeys and apes live in groups of 5-50 members. Dunbar found the maximum group size in primates to be related to the Neocortex Ratio, which is defined as the neocortex volume divided by the volume of the rest of the brain. In prosimians this ratio is 0.8-1.4, in monkeys and apes it is 1.5-3. The higher the ratio, the bigger the maximum group size.³⁵ Clearly, living in a group requires a great deal of unconscious calculation. The individual has to calculate how it should behave to maximize reproduction, but also how other group members should behave to maximize group performance. These complex calculations need a great deal of brain capacity. As Dunbar suggested, it is possible for humans to know approximately 150 people quite well.³⁶ The human brain size is big enough to make moral calculations for relationships within a group of 150 people. The group members know one another by name and by reputation. They gossip and put pressure on deviants.³⁷ They

31 R.D. Alexander, *The Biology of Moral Systems*, 1987, p. 26.

32 *Ibid.*, p. 79.

33 *Ibid.*, p. 111.

34 *Ibid.*, p. 95.

35 R.I.M. Dunbar, 'Brains on Two Legs', in F.B.M. de Waal, *Tree of Origin*, 2001, p. 180.

36 *Ibid.*

37 J.B. Haviland, *Gossip, Reputation and Knowledge in Zinacantan*, 1977; H.F. Todd Jr., 'Litigious Marginals: Character and Disputing in a Bavarian Village', in L. Nader & H. F. Todd (eds.), *The Disputing Process*, 1978, pp. 86-121; R.B. Edgerton, *Deviance: A Cross-Cultural Perspective*, 1975.

engage in social censure by treating them coolly, by criticizing or ridiculing them, or even by ejecting them from the group.³⁸

As group size increases, group morals will no longer suffice and we need other measures to ensure the balance between the individual's interests and the group's interests. As long as these two factors are balanced, we experience *justice*. However, in larger (and growing) groups, it is impossible to know every member, and so free riders have more chances. When individual group members act in their own interest more than they do in the interest of the group, the other group members will experience these actions as *unjust*.³⁹ Participants not only wish to contribute to the group interest, they also expect a contribution from other group members. When some members keep too much to themselves, the other group members are likely to experience this behaviour as selfish and unjust. This awareness can elicit feelings of anger, guilt, disgust and sadness. People feel impelled to act on those emotions and rectify the *injustice*, i.e., restore the reciprocal balance within the group.⁴⁰ This can be qualified as the first stage in the development of moral systems.

As Hart puts it, this social pressure is the primary factor determining whether certain rules are thought of as giving rise to obligations. They are believed to be necessary to the maintenance of social life.⁴¹ When someone is under an obligation, this implies the existence of a rule, even if that is sometimes unconscious. Nevertheless, an obligation is only felt when there is a slight chance that breaking group moral will backfire on the transgressor.⁴² To be sure, the word *rule* is confusing, as it implies more or less conscious thinking. Yet all primates employ unconscious rules. This unconscious notion of rules we could call *moral*: basic principles of right and wrong. *One should not kill group members* is an example of a strong moral shared by all primates. Relatively small primate groups can use morals to keep the group stable. This is the second stage of evolving moral systems.

In growing groups, it will be more difficult to let other group members know how to behave. Language can serve to communicate group moral, to tell other members what is expected of them. Thanks to language, morals can be put into words. Morals can be communicated in stories that reflect common truths about human nature that each society expresses in its own way. According to James Ridgway, these stories can show a way to improve cooperation, cooperation that will improve growth. From this perspective, law is a 'specialized tool for resolving these narratives into rules for handling complex problems of cooperation.'⁴³

Eventually morals become rules. If a group member kills a fellow group member on purpose, he (or she) commits murder and, if caught, will be punished. Like stories, rules are the cultural projection of emotions and morals. It is in this way that Hart's primitive society has evolved. In such a society, 'rules must contain in some form restrictions on the free use of violence, theft, and deception'.⁴⁴ These rules will keep the balance between individual reproduction interests and group stability (the common interest of all group members). Indeed, 'such rules are in fact always found in the primitive societies of which we have knowledge, together with a variety of others imposing on individuals various positive duties to perform services or make

38 C. Boehm, 'Egalitarian Society and Reverse Dominance Hierarchy', 1993 *Current Anthropology*, pp. 227-254.

39 M.D. Hauser, *Moral Minds*, 2009, pp. 357-358.

40 M.L. Lerner, 'The Justice Motive', 2003 *Personality and Social Psychology Review*, pp. 388-399.

41 Hart, *supra* note 3, p. 87.

42 *Ibid.*, p. 84.

43 J.D. Ridgway, 'The Three Patterns of Human Interaction: Evolutionary Biology and the Convergence of Narrative and Economic Legal Theory', 2010 *SSRN*, <www.ssrn.com>, abstract_id=1652513.

44 *Ibid.*, p. 91.

contributions of the common life.’⁴⁵ These primary rules form the third stage in the evolution of moral systems. The next stage needs secondary rules. Note that primary rules evolved from unconscious morals.

According to Hart, ‘it is plain that only a small community closely knit by ties of kinship, common sentiment, and belief, and placed in a stable environment, could live successfully by such a regime of unofficial rules’.⁴⁶ As communities are growing, rules have to be made official, so that all community members feel an obligation to act in accordance with these rules. The biblical story of the Mosaic Covenant is a marvellous illustration of this process.⁴⁷ The twelve sons of Jacob and their families went to Egypt to escape famine. There they found food and the families thrived. The Israelites increased in numbers, so much so that the Egyptians felt threatened by them and treated them harshly. The Israelites eventually managed to flee into the wilderness of Sinai. It was there, on Mount Sinai, that the Israelites’ leader, Moses, received the Ten Commandments, inscribed on two stone tablets and binding the people of Israel and their god to each other. God said: ‘If only you will now listen to me and keep my covenant, then out of all peoples you shall become my special possession; for the whole earth is mine.’⁴⁸ In order to flourish, the people of Israel committed themselves to serving the god of Abraham, Isaac and Jacob as their only god. In other words, if they wanted to spread their genes all over the world, they had to stick to some rules that would keep the group stable. In this way, a set of basic rules governing group life were authorized and legitimized. In setting up courts of law to administer justice based on religiously inspired rules, the Israelites implemented secondary rules.

The system of primary and secondary rules, the fourth stage, will function within states, but will not have any jurisdiction outside states. As the populations of states grow, living space will once again be threatened. The search for more space and food can lead to war, and large, specialized and strong groups will generally be at an advantage in war. But when states become stronger, it becomes increasingly difficult (if not impossible) to win wars. Counterproductively, wars will be detrimental to the reproduction of individuals and the spreading of their genes. Pacts and treaties will then become inevitable. They create the conditions under which people of all states can thrive. This is the fifth evolutionary stage of moral systems.

The final stage will be reached when all people live according to common rules, so that they can reproduce – or at least *feel* they can – without being threatened by other people, other states, calamities, climate change, etc. In this way, globalization could in theory lead to world-wide peace. But that peace will always be fragile, because taking advantage of cooperators is also a characteristic of genes. There will always be cells, organisms, groups and states trying to catch a free ride by pursuing their own interests without contributing to the whole.

If primary rules, secondary rules and treaties have evolved from unconscious morals, are rules then but a manifestation of morals?

Moral versus rules

Rules create general standards. Individuals can use these standards to know how they ought to behave within a group, within society. However, as Hart points out, ‘fact-situations do not await

45 Ibid., p. 91.

46 Ibid., p. 92.

47 Exodus 1-24.

48 Exodus 19:5.

us labelled as instances of the general rule'.⁴⁹ Although there are plain cases, in most cases it will not be clear whether a rule applies or not. This, according to Hart, can be referred to as an open texture. Facts have to be valued and rules have to be interpreted to make a fit between the law and daily conflict situations. Formalists will perceive this process to be completely rational and within the bounds of the law. Once the law has been elucidated and the facts have been ascertained and properly classified, the right solution will present itself. What formalists in fact do amounts to disguising the need for making a subjective choice between rules and classifications.⁵⁰

The other extreme of juridical decisions is rule-scepticism. In this perspective, rules are a myth. Law consists simply of judicial decisions. Because general laws never apply to individual cases, for each case a rule has to be formulated that neatly fits the specific situation.⁵¹ Hart does not agree with this point of view. Judges 'might always first reach their decisions intuitively or "by hunches"', but rules are at least 'taken as standards of decision'.⁵² In this way, Hart observes, 'formalism and rule-scepticism are the Scylla and Charybdis of juristic theory'.⁵³

To steer clear of both Scylla and Charybdis, Dworkin has introduced political principles that are based on the political rights of individuals. According to his rights thesis, citizens have moral rights and duties that can be invoked and which a judge has to take into consideration. Laws are also based on these principles; the lawgiver will use them as a guideline.⁵⁴ Principles are therefore not merely important in situations where rules are unclear; they are the fundamentals of rules. Rules cannot be interpreted without principles and by using these principles as a means of interpretation, the right application of the rule can be detected. A judge has no discretion; he has to look for the appropriate principles.⁵⁵ It is the judge's duty to discover what the rights of the parties are.⁵⁶ These rights are based on principles that underlie or are embedded in common law. The judge can find these principles by analysing common law precedents.⁵⁷ Although Dworkin states that a right decision can be found in all hard cases, it could be argued that he adjourns the moment of discretion. How will the judge decide what principles are valid and ought to be used? How can she deduct from common law what the main principles are? How can she decide what principles found in common law are really fundamental? Dworkin's model tries to find principles by fitting particular judgements in a coherent programme, driven by responsibility.⁵⁸ But this is circular reasoning. Common law is based on principles and these principles can therefore be found in common law.

Biological mechanisms and the expanding group

I agree with Hart that a judge has to navigate between Scylla and Charybdis. And with Dworkin I believe that laws are founded in underlying principles and that discretion is narrowed by principles. Dworkin's constructive model, however, in which principles are to be recognized by studying law itself, I do not find convincing. Where Dworkin rejects the idea of objective morals,

49 Hart, *supra* note 3, p. 128.

50 *Ibid.*, p. 129.

51 *Ibid.*, p. 136.

52 *Ibid.*, p. 140-141.

53 *Ibid.*, p. 147.

54 R. Dworkin, 'Political Judges and the Rule of Law', in R. Dworkin, *A Matter of Principle*, 1985.

55 R. Dworkin, *Taking Rights Seriously*, 1978, pp. 39-44.

56 *Ibid.*, p. 81.

57 *Ibid.*, pp. 115-116.

58 *Ibid.*, pp. 161-162.

modern biology could probably deliver a more fundamental theory on morals and principles.⁵⁹ Dworkin illustrates his idea of political principles with the famous case of *Riggs v. Palmer*.⁶⁰ The court noted that ‘No one shall be permitted to profit by his own fraud, or to take advantage of his own wrong.’ This common law principle is also a biological or economic principle. If we let free riders prosper, if we do not punish them, it is the cooperators that will suffer. It is the fundamental principle of reciprocity, which is necessary to keep organisms working together. As we have seen, there is some kind of proto-moral in other animals. A dog will not tolerate another dog taking away its food. The notions of ‘property’ and ‘theft’ refer to situations where individuals have to defend conditions to survive and reproduce. In animals, these notions are not clearly formulated norms (let alone rules) – they are merely vague feelings, based on emotions. The dog will probably not classify the thief of its food as ‘bad’, but it will certainly *sense* it is not to its benefit when its food is taken away. It has to react immediately, because if it does not, it may die. Certain conditions are crucial to the spreading of genes. Natural selection favoured genes that defend these conditions, because organisms that happen to react in the right way will spread. Emotion, caused by chemical processes in the limbic system, is an adequate means to help the organism react quickly. Even fish use it. With the evolvement of the brain these emotions can be refined into feelings, but like all successful biological mechanisms, emotions that have endured have done so because they help the organism to spread its genes.

In addition, where Dworkin thinks that underlying principles can be uncovered through conscious analysis and hard work, modern biology shows that most judges will unconsciously apply biological principles in hard cases. They have little knowledge of biological mechanisms, so they will unconsciously search for principles in common law that they find ‘fundamental’. Judges probably consider these principles fundamental because they are rationalizations of basic biological mechanisms. As Dworkin does not take these psychological processes into account, he himself is duped by rationalizing unconscious convictions. For example, he qualifies the decision of the Supreme Court in *Boumediene v. Bush* as a great victory.⁶¹ The court held that aliens detained as enemy combatants in Guantánamo have a constitutional right to challenge their detention in the American courts. John Mackie justly claims that Dworkin’s constructive model effectively makes it impossible to decide whether certain rights uniquely apply to American citizens or to Americans and aliens alike. ‘People’s prejudices, training, and social position strongly influence their consciences and their speculations.’⁶² According to Dworkin, ‘America owes its duty to respect fundamental human rights (...) to all people who come under its authority.’⁶³ But why is that? Jefferson himself owned slaves. The individual freedom that the Constitution presupposes was never intended to apply to aliens.⁶⁴ Dworkin probably values this new direction of American law as a victory because today we value all people as ‘world citizens’. Our group moral has expanded from tribes to the global society, from nations to the United Nations. From this point of view, Dworkin’s choice is dictated by biological mechanisms whose impact is the result of sociological changes. We have to defend our fellow group members, but since our group has grown to include a worldwide group of people, we have to defend all people in the world in equal measure. We have to feel sympathy, compassion and empathy for them, in the

59 See also: H. Gommer, ‘From the “Is” to the “Ought”: A Biological Theory of Law’, 2010 *Archiv für Rechts- und Sozialphilosophie*, pp. 449-468.

60 115 N.Y. 506, 22 N.E. 188 (1889); Dworkin, *supra* note 55, p. 23.

61 R. Dworkin, ‘Why It Was a Great Victory’, 2008 *New York Review of Books* 55, no. 13.

62 J. Mackie, ‘The Third Theory of Law’, 1977 *Philosophy and Public Affairs* 7, no. 1, pp. 3-16.

63 Dworkin 2008, *supra* note 61.

64 Mackie, *supra* note 62.

same way that we do for our own family.⁶⁵ This cannot be a common law principle, because in earlier times the sociological situation was different. Biology and sociology dictate a change in law, and Dworkin *feels* it.

Rule-scepticism

Hart argues that rule-scepticists err because they have to accept secondary rules by which courts are implemented. However, he is off the mark there. Even gorillas and chimpanzees are familiar with the concept of a third party ending a conflict. They do not have any secondary rules. Nevertheless, it is not the dominant ape or the older female that withholds other apes taking food from group members. It is because they feel uncomfortable when theft happens and they feel an irresistible urge to punish the thief. Humans are no different. Most people do not know the law, but they do have a hunch that some actions cannot be tolerated. This hunch is empowered by what they have learned in their youth.⁶⁶ When a child takes another child's toy, its parents will admonish it: 'Don't do that!' The child will learn to feel bad about taking away toys 'in some situations'. There is no clear rule; there are only vague situations that have to be avoided.

Posner connects to this idea. Judgement is not about – as Dworkin argues – how things ought to be, but about how they really are.⁶⁷ Conscious moral philosophy will not help the judge to find the right answer, never mind the one and only right answer. Posner observes that judges are reticent in discussing what they do when judging. He suggests this is because judges like to keep up the appearance that they are applying rules and law to facts, and nothing more. Nevertheless, like human decisions in other areas, theirs are influenced by political preferences, personal characteristics and personal experiences. 'It is the consequence of legalism's inability in many cases to decide the outcome.' Does this mean that 'anything goes'? Not so, Posner holds: a pragmatic judge is a constrained pragmatist who is aware of the requirement of impartiality.⁶⁸ He will be guided in interpreting a statute by what he thinks a legislator would have done.⁶⁹ A good judge, which is what every judge wants to be, tries to decide in accordance with the norms of his society.⁷⁰ In doing so, he reaches down into a subconscious repository of knowledge acquired through education and experience.⁷¹ In complex cases, a judge will do better by using his intuition than by trying to evaluate consciously.⁷² According to Posner, a judge does not have the time to follow elaborate analytical procedures, as Dworkin proposes. The judge's reasoning is primarily intuitive and it could not be otherwise. His explanation afterwards can best be understood as an attempt to explain how the decision could have been arrived at based on step-by-step reasoning.⁷³ Judges, therefore, are not fully conscious of the factors that determine their judicial votes, but it is not guesswork either.⁷⁴ The judge and the law professor have to search for the purpose behind the relevant legal principle.⁷⁵ Where legalists argue that adjudication should be

65 With thanks to Kerry Woods and Elisabetta Berolino at the Critical Legal Conference 2010.

66 C. Engel, 'Learning the Law, 2008 *Journal of Institutional Economics*, pp. 275-297.

67 B. Leiter, 'In Praise of Realism (and Against "Nonsense" Jurisprudence)', Working Paper SSRN 2010, January 23, <www.ssrn.com>.

68 R.A. Posner, *How Judges Think*, 2008, pp. 6-13.

69 *Ibid.*, p. 49.

70 *Ibid.*, p. 60.

71 S. Farnham-Diggory, 'Paradigms of Knowledge and Instruction', 1994 *Review of Educational Research*, pp. 463-468.

72 T.D. Wilson & J.W. Schooler, 'Thinking Too Much: Introspection Can Reduce the Quality of Preferences and Decisions', 1987 *Journal of Personality and Social Psychology*, p. 523; A. Dijksterhuis & L.F. Nordgren, 'A Theory of Unconscious Thought', 2006 *Perspectives on Psychological Science*, pp. 95-109.

73 Posner, *supra* note 68, p. 110.

74 *Ibid.*, pp. 112-114.

75 *Ibid.*, p. 220.

backward-looking, Posner's pragmatist shares the basic moral values of his society and considers what kinds of consequences are good.⁷⁶ However, as was the case with Dworkin's principles, weighing consequences is the result of a complicated interaction of analysis, intuition, emotion, common sense and judgement. According to Posner, the improvement of judicial quality can best be achieved by inducing a greater awareness that the path lies through pragmatism, not legalism.⁷⁷ Still, the problem of weighing consequences is here to stay. 'In deciding what answer is right, even a pragmatist judge must make a moral judgment, regardless of whether he then decides not to enforce his judgment because he recognizes its subjectivity.'⁷⁸ How can the judge know what is best for society? How can he know what is best? Will he choose tribal moral, national moral or global moral? Why is consensus the best answer?

The quilt that bears the patchwork

Hart acknowledged that there is a significant amount of indeterminacy in the law, but argued that this indeterminacy occupied a peripheral zone in the legal system. Posner takes it one step further. Law is much more undetermined than Hart admits and judges come to their conclusion by unconscious processes. Even so, Posner thinks weighing consequences constrains the judgement. But this weighing of consequences requires the same skill as weighing morals. In other words, Hart, Dworkin and Posner try to find a mechanism that explains why the findings of judges cannot be labelled as arbitrary, but none succeeds. The human brain is a black box and this black box makes judgements look arbitrary. We do not know exactly how people think and we therefore do not know how judges think. Judges themselves do not know how they think. This makes adjudication (and this applies to legislation too) by definition undetermined. Yet the three scholars accept the idea that legal rules and moral principles somehow determine how people think they should behave. However, according to Kennedy, these ethical conceptions reflect a deeper level of contradiction.⁷⁹ Like rules, principles compete. Principles cannot help us make the right choice anymore than expected consequences can, because both require the unconscious process of weighing. Weighing involves personal ideologies, experiences, feelings and emotions. It interacts with other decisions, precedents and rules, which thus somehow direct the decision.⁸⁰ Anyone who thinks they are deciding on a rational, analytical basis are fooling themselves, because the limited capacity of the conscious human brain is not equal to the task of performing this complex weighing process.⁸¹ In this Dworkin is right; only demigods of herculean calibre might pull off this feat.

Still, in quite a number of legal cases there is a considerable degree of concurrence among judges, as well as among laypersons. In a famous Dutch case, which bears some resemblance to *Riggs v. Palmer*,⁸² a poor young man married an old and ailing, but rich widow.⁸³ Five weeks after the wedding, the widow was found poisoned. Her husband was charged with and convicted of murder. When asked, about 90% of judges and laypersons think it is unfair to allow the young man to keep his money. Although the law is clear on this point and prescribes that the convicted

76 Ibid., pp. 240-241.

77 Ibid., pp. 376-377.

78 K. Roosevelt III, 'Judge Not', 2008 *Democracy*, no. 9.

79 D. Kennedy, 'Form and Substance in Private Law Adjudication', 1983 *Harvard Law Review*, pp. 616-646.

80 A. Altman, 'Legal Realism, Critical Legal Studies, and Dworkin', 1986 *Philosophy and Public Affairs*, pp. 205-236.

81 Dijksterhuis & Nordgren, *supra* note 72, pp. 95-109.

82 115 N.Y. 506, 22 N.E. 188 (1889).

83 'Onwaardige deelgenoot' [Forfeiture of ownership], decision of the Supreme Court of the Netherlands of 7 December 1990, 1991 *Nederlandse Jurisprudentie*, p. 593.

husband was entitled to his share of the matrimonial property, all assets he acquired when he married the widow were confiscated. Most judges arrive at this outcome, but their reasons diverge. Some invoke unwritten legal principles, others rely on written rules, and the Dutch Supreme Court simply refers to ‘reasonability and justice’. As for laypersons, why do 90% of them find this decision reasonable and justified?

The ruling of the New York court in *Riggs v. Palmer* gives an interesting clue. The murderer could not keep his money because ‘no one shall be permitted to profit by his own fraud’.⁸⁴ This principle is identical to the one genetic mechanism analyzed above. Genes that programme people to cheat will tend to be very successful and spread quickly within the population. Unless, of course, other people expose the cheaters. Stable groups will not permit individual group members to profit by their own fraud. So what is going on in a judge’s brain? Some reflection on our own thoughts may give us an idea. I once asked students to judge a standard case.⁸⁵ A young woman travels by train without paying the fare and is fined. Should she pay the fine? The immediate and unanimous response was: ‘Yes, she should!’ When asked how they came to this decision, most students replied: ‘She has to keep to the rules!’ Although this explanation has a rational ring to it, that perception changes when some case details are added. The girl had a ticket, and on the ticket it said that it was valid all day. On the internet, however, the terms and conditions applying to the type of ticket the young woman had bought stipulated that it was invalid before 9 am. The students now felt that the fine was unfair and that the young woman should not pay. When asked why, the students replied: ‘It does not *feel just*’. The students’ decision comes from their unconscious and reflects some undefined feeling. Emotions prompt quick judgements. Only afterwards do we search for rational explanations for the choices we make. Just as in the case of judges explaining why the convicted husband should forfeit his title to the matrimonial property. These results are in accordance with Damasio’s findings. People decide on the basis of emotions and feelings.⁸⁶ In most cases, emotion-driven decision-making comes first, with a conscious, rational, rule-based reconstruction following in its wake. So, if we want to find out how judges form their judgements, we have to know what triggers their emotion. Emotions enable quick responses and are thus indispensable to survival. If my partner is leaving me for someone else, I will feel jealous. This jealousy will likely make me furious. Jealousy, fear, happiness, aggression, love – these all are emotions that help people to react quickly in new situations. We share these emotions with many other animals. From an evolutionary point of view, they are very old. The emotional control centres in the hypothalamus and the limbic system flood our thoughts with all the emotions that give us an awareness of good and evil.⁸⁷

A while back, researchers at the Max Planck Institute carried out an interesting experiment with chimpanzees. One chimpanzee was given food. Then a second chimpanzee was placed in a cage facing the first chimpanzee. The second chimpanzee could pull away the food from the first chimpanzee and eat it. When the second chimpanzee did this, the first began to scream. When the first chimpanzee was subsequently given a rope which it could pull to spill all the food, it did so immediately, even though that meant neither ape could consume the food.⁸⁸

84 115 N.J. 511, 22 N.E. 190 (1889).

85 This case is thoroughly described in H. Gommer, ‘Het is maar een standaardzaak’ [Cases like this are two a penny], 2010 *Strafblad*, April.

86 A.R. Damasio, *Descartes’ Error-Emotion, Reason and the Human Brain*, 1994; A. Bechara et al., ‘Deciding Advantageously Before Knowing the Advantageous Strategy’, 1997 *Science*, pp. 1293-1295.

87 E.O. Wilson, *Sociobiology*, 1975, p. 3.

88 K. Jensen et al., ‘Chimpanzees Are Vengeful but Not Spiteful’, 2007 *PNAS*, pp. 13046-13050; See also the film ‘Ape Genius’ of *PBS Nova*.

The evolutionary mechanism is to punish free riders, i.e., group members that take advantage of group rules without investing in the group. This mechanism is in fact a genetic principle. Only genes that make organisms punish free riders will spread. This principle is therefore rooted deep in our brain and in our emotions and feelings. Our conscious can only describe what we feel. Like apes do, we punish those that profit by their own fraud, i.e., group members that spread their genes by free riding at the expense of their hard working fellow group members. Rules, precedents and written principles try to catch this very old mechanism, which is quite straightforward in simple situations. When an ape takes food from another ape, this is 'unfair'. However, in a complex society even the simplest cases can turn out to be very complex. To keep everyone working together, we need some ingenious device to maintain that even complex situations can be resolved by applying the simple principle of stability and reciprocity. We have created such a device; it is called the law.⁸⁹ However, as Critical Legal Studies claim, ultimately no unconscious decision will want for a rule or principle that can serve to explain it.⁹⁰ And unless and until a supercomputer is designed that can calculate all variables that are relevant in deciding if someone is free riding in the evolutionary sense of the term, we will have to make do with quite arbitrary judicial reasoning fleshing out this basic principle. Legislators do the same thing, and as unconsciously, when they formulate new rules. Consequently, law can be quite consistent as long as judges, legislators and citizens apply (unwittingly) the basic genetic principles of stability and reciprocity. Because the law itself is based on these principles, judges can find a rationalization of their feelings – that are also based on these principles – in the law. We consider the killing of fellow citizens to be wrong, because ultimately such behaviour is not to the benefit of our genes. And because of this, every human society in the world prohibits murder. Is such universal proscription inevitable? Yes it is, because without laws against murder our genes will eventually become extinct and that is an alarming prospect to us, the carriers of those genes...

The role of the judge in the molecular concept

As a group expands, rules come into play. They will function as guiding standards, as a beacon, to help identify which actions are not in the interest of group stability and not in the interest of spreading the genes of the group members. Rules will not and cannot determine behaviour in all complex situations, nor are they the only resource that group members will use to make decisions. Individuals will probably make their choices first and foremost based on their feelings, intuition and emotions. Afterwards, they may check if their choices comply with some rule, but in most cases rule-based verification will only occur in cases of conflict, i.e., when the intuition of two quarrelling parties leads to different outcomes. Even when contracts have been signed, most parties do not live by them. Rather, they cooperate on the basis of 'fairness'. They do this because their feelings tell them to do so. Contracts are performed, because such performance benefits the stability of the group. This evolutionary mechanism is critical. To maintain stability group members will punish those that do not comply. Only when conflicts arise will parties scrutinize their contract to determine how they (or the other party) should have behaved. Then the applicable rules must be consulted and interpreted to decide which party is in the wrong, i.e., which party tries to profit from its own fraud. Still, in deciding, judges will use their intuition too. The only difference is that judges do not have a particular interest in the cases before them. Their

⁸⁹ As shown above, this function can also be fulfilled by stories that enhance cooperation by triggering certain emotions.

⁹⁰ Altman, *supra* note 80.

decisions are impartial. Nevertheless, this impartiality is not absolute. Judges have ideologies, political interests and convictions that colour, modify or qualify their impartiality. Essentially, a judge's duty is to end conflicts and to make decisions that contribute towards social stability. In turn, society will accept the indeterminacy of judicial decisions.

People will value judicial decisions as just if judges take into account not only the applicable rules, but also the underlying feelings of what is fair, what is just and what is right. That is to say, if no one can 'profit by his own fraud'. The acceptance of judgements would probably improve by uncovering the unconscious deliberations that are disguised by formalists and exaggerated by some realists. It would be in the interest of the law and of the administration of justice to carry out research on the proto-moral that we share with other animals. If we do, we can learn to grasp more fully what we mean by such notions as fairness and justice, as well as calibrate our rules and moral principles.

Relation to existing theories

I am not the first scholar to ponder the relationship between evolutionary biology and law. So what is new and significant? Firstly, the molecular concept of law bridges the gap between the 'is' and the 'ought', so that jurisprudence no longer has to be cut off from discoveries in empiric sciences. Like Hart, many philosophers of law presume there is a gap between biology (or animals) and reason (which humans have and animals have not).⁹¹ Because of this gap, there is also an unbridgeable gap between facts and norms. Facts originate from biology, norms stem from reason. Jan Koster, a philosopher of language, stated that the gap between 'ought' and 'is' makes it impossible to reduce ethics to biology.⁹² Cees Maris concluded that all empiricists agree that norms cannot be derived from facts.⁹³ Alf Ross for example said: '[T]o build a doctrine of morality upon a purely empirical foundation must be an illusion.'⁹⁴ Even well-known moral biologists like Frans de Waal and Morris Hoffman that do not accept a gap between biology and reason do not dare deny the gap between facts and norms. 'All that nature can offer is information, not prescription,' De Waal writes.⁹⁵ 'The biggest philosophical barrier remains the naturalistic fallacy: [...] we should always be aware of Hume's command never to confuse the is with the ought,' writes Hoffman in his paper on law and biology.⁹⁶ However, without bridging the gap between the 'is' and the 'ought' a true natural law theory is not feasible. And that is exactly what the molecular concept does, as I explain more fully in 'The Resurrection of Natural Law Theory'.⁹⁷

Secondly, in my theory I derive prescriptions from descriptions gradually. This derivation meets the objections raised by David Hume as he considered the is/ought problem as well as G.E. Moore's objections to the naturalistic fallacy. These objections were refuted in 'From the "is" to the "ought"'.⁹⁸

91 E.g. Hans Kelsen, *Introduction to the Problems of Legal Theory*, 1967.

92 J. Koster, 'Ceaseless. Unpredictable creativity: language as technology', 2009 *Biolinguistics*, pp. 61-92.

93 C.W. Maris, *Critique of the Empiricist Explanation of Morality*, 1981, p. 243.

94 A. Ross, *On Law and Justice*, 1959, p. 290.

95 F.B.M. de Waal, *The Age of Empathy*, 2009.

96 M.B. Hoffman, 'Law and Biology', 2008 *The Journal of Philosophy, Science & Law* 8, May 2.

97 H. Gommer, 'The Resurrection of Natural Law Theory', 2011 *Rechtstheorie* 1 (forthcoming).

98 Gommer, *supra* note 59.

Thirdly, introducing fractal theory allows us to unify biological, psychological, sociological, economic and political perspectives on law. In addition, such an enriched angle answers the question of how the ‘enormous problem of translation’ can be met.⁹⁹ Law is not an externally imposed system. Rather, it grows within communities because the genes that benefit from a stable society – where free riders will face high costs – will have a stimulating effect on its evolution. Finding all mechanisms that underlie human affairs will require a great deal of research, but because genes are a *conditio sine qua non* for human affairs, a genetic factor will always be needed for the translation.

Fourthly, as I discuss comprehensively in ‘The Biological Essence of Law’, the fascination with ‘law and evolutionary biology’ is not caused by ‘various hobby horses of the right’, as Leiter and Weisberg think.¹⁰⁰ However, these are bold statements that can be refuted with my natural law theory. Law cannot change everything and nature certainly puts limits on utopian aspirations. Law was not introduced by some extraterrestrial powers to civilize selfish humans and to restrain some of their more unruly biological inclinations: it is a product of evolutionary processes. Law cannot change everything, but it certainly has changed much to the benefit of our genes and therefore to the benefit of ourselves. Law is a precipitation of proto-morals. Justice will therefore never be found if our biological needs are not met.

My theory resembles the explanations of Paul Robinson, Robert Kurzban and Owen Jones on intuitions of justice. They also consider natural selection as the ‘origin of all complex, functional human traits’.¹⁰¹ Evolution has in particular contributed to intuitions that condemn physical harm, sexual harassment, the taking of property and cheating in exchanges.¹⁰² Because the most successful strategy is to cooperate selectively with other cooperators, the ability to discern unfairness is crucial. Individuals who cheat, injure group members or take a free ride must be punished. A psychological system that can compute when someone is a free rider will therefore improve fitness. Shared intuitions of justice contribute to this ability, will attune sanctions within the group and will thus reduce the number of transgressions.¹⁰³ However, their theory is confined to biological explanations, whereas my molecular theory of law shows how, to a certain extent, we derive our normative principles from factual, biological mechanisms. Consequently, with the recognition of the monistic perspective on law a major paradigmatic shift will occur in the concept of law as well as in ethics. Scholars can start searching for elementary, basic and universal notions, in order to build a thorough system of principles that underlie ethical principles. The ideas of Scott Fruehwald fit this concept best. Fruehwald states that ‘a universal system of basic rights is hardwired into our brains’.¹⁰⁴ That is why fundamental rights exist in all societies. My theory goes one step beyond that. It is not only basic rights that have a counterpart in biological mechanisms, it is the very concept or system of law itself that does. Knowledge of molecular properties can help legal scholars to ‘create a better legal system’ as well as to find out what is meant by ‘better’.

99 P.C. Westerman, *The Disintegration of Natural Law Theory*, 1998, pp. 287-297.

100 B. Leiter & M. Weisberg, ‘Why Evolutionary Biology Is (So Far) Irrelevant to Legal Regulation’, 2009 *Law and Philosophy*; H. Gommer, ‘The Biological Essence of Law’, 2011 *Ratio Juris* (forthcoming).

101 P.H. Robinson et al., ‘The Origins of Shared Intuitions of Justice’, 2007 *Vanderbilt Law Review*, pp. 1639-1643.

102 *Ibid.*, pp. 1644-1646.

103 *Ibid.*, pp. 1646-1651.

104 E.S. Fruehwald, ‘A Biological Basis of Rights’, 2010 *Legal Studies Research Paper Series Hofstra University*, <www.ssrn.com/abstract=1440247>.

Conclusion

Hart bases his theory on biological perspectives, but he appears to adhere to dualism by making a ‘birth’ distinction between rules and morals: morals are rooted in biology, rules source back to society. Dworkin has introduced political principles, yet he is trying to find these principles by searching in common law, which is, in turn, based on these principles. Posner’s pragmatic judge interprets a statute by what he thinks a legislator would have intended, but he is still weighing consequences, which cannot be done in a rational way. Still, there is a considerable degree of concurrence among judges, as well as among laypersons.

What fractal theory can teach us is that properties of a generator – and genes can operate as such – can be recognized on various levels in biology, psychology, sociology, anthropology, politics and law. By studying these properties, we can find the basic notions of law. In addition, fractal theory shows us that a simple formula can generate very complex structures in behaviour. The same formula can probably generate these structures in law too.

Dworkin’s choice seems to be dictated by biological mechanisms whose impact is the result of sociological changes. We have to defend our fellow group members, but since our group has grown to include a worldwide group of people, we have to defend all people in the world in equal measure. We have to feel sympathy, compassion and empathy for them, in the same way that we do for our own family.

As Critical Legal Studies claim, ultimately no unconscious decision will want for a rule or principle that can serve to explain it. And unless and until a supercomputer is designed that can calculate all variables that are relevant in deciding if someone is free riding in the evolutionary sense of the term, we will have to make do with quite arbitrary judicial reasoning fleshing out this basic principle. Legislators do the same thing, and as unconsciously, when they formulate new rules. Consequently, law can be quite consistent as long as judges, legislators and citizens apply (unwittingly) the basic genetic principles of stability and reciprocity. Because the law itself is based on these principles, judges can find a rationalization of their feelings – that are also based on these principles – in the law.

The molecular concept of law bridges the gap between the ‘is’ and the ‘ought’, so that jurisprudence no longer has to be cut off from discoveries in empiric sciences. In this way, prescriptions derive from descriptions step by step. Law is a product of evolutionary processes. It cannot change everything, but it certainly has changed much to the benefit of our genes and therefore to the benefit of ourselves. Yet law is also a precipitation of proto-morals. Justice will therefore never be found if our biological needs are not met.

Recognition of the monistic perspective on law will prompt a major paradigmatic shift both in the concept of law and in ethics. Scholars can start searching for elementary, basic and universal notions, in order to build a thorough system of universal notions that underlie ethical principles.