

The Concept of Functional Interdependence between Economics and Law

HANS-PETER SCHWINTOWSKI*

1. Statement of the Problem

The word "economics" derives from the Greek *oikos* (house) and the polysemantic root *nem-* (here in the sense of to regulate, manage, organise). Aristotle, born in 384 BC in Stageira in Thrace (the northern part of modern Greece) and dying in solitary exile 62 years later,¹ made it his aim to elaborate systematic accounts of all branches of knowledge; notably, however, he did not devise a system of either economics² or "legal science" in the modern sense, although the notion of law already existed,³ finding early expression in a form that to this day remains unsurpassed: his own *Nicomachean Ethics*. Much evidence suggests that Aristotle's era formed a watershed in the intellectual development of mankind, since for the first time unconscious ("bicameral") decision-making processes were then giving way to conscious ones, as a result of man's systematic investigation of the world around him, his discovery of the patterns and laws of nature, and his attempts to work out rules for a purposeful form of coexistence.⁴

The emergence of these conscious processes, or of what we now term the decision-making systems of the "macro-society" (Adam Smith⁵), was accompanied by a painful growth of awareness of phenomena such as guilt and atonement, justice and its abuse, good and evil, and war and peace — in short, of what evolutionary biologists refer to as the dualistic structures characterising the development of living systems.⁶ It is symptomatic that this process of growing awareness is still often sensed today as giving rise to a "loss of centre";⁷ many people, consciously or otherwise, still desire to follow the teachings of the "hundred schools" of Lao-Tse from the second half of the first millenium BC, which strove to collect the fragments of the old disinte-

* Univ Professor Dr, Humboldt-Universität zu Berlin, Germany.

1 Störig, H J, *Kleine Weltgeschichte der Philosophie* (1978 Vol 1), at 175.

2 For further details see Finley, M I, *The Ancient Economy* (1973) at 21.

3 Wesel, U, *Juristische Weltkunde* (1984) at 21, 49; Haft, F, *Aus der Waagschale der Justitia* (1987) at 1.

4 See the fundamental study by Jaynes, J, *The Origin of Consciousness in the Breakdown of the Bicameral Mind* (1976); the title is misleading: the book deals not so much with the origins of consciousness — on which subject see Popper, K R and Eccles, J C, *The Self and Its Brain* (1977) — but with the origins of conscious decision-making systems.

5 Smith, A, *An Enquiry into the Nature and Courses of the Wealth of Nations* (1789).

6 Binning, G, *Aus dem Nichts. Über die Kreativität von Natur und Mensch* (1989) at 79.

7 See Sedlmayr, H, *Art in Crisis: the Lost Centre* (1957), written from the point of view of an art historian.

grating Chinese social order, sifting through them and attempting to refashion them into a new unitary system.⁸ What bound those schools together was the notion that a once smoothly functioning order (Dau = way) had degenerated into confusion due to human inadequacy — an idea also to be found in the mythologies of ancient Egypt and Greece, and in the Old Testament tradition of paradise lost; it still lives on in most natural religions even today.⁹

This is not difficult to comprehend if one bears in mind that early man lived in small groups which functioned satisfactorily without the need for anything more than unconscious decision-making systems. Such systems ceased to be adequate, however, as populations grew and as trade, especially between the Mediterranean nations, gradually increased. They began to be superseded, according to modern estimates, from around 3000 BC onwards by systems of conscious decision-making (systems which to us today seem self-evident), consisting of rules, laws and principles of ordering. The question of the accuracy of this timescale, first posited by Julian Jaynes in 1976,¹⁰ is not as important to our present discussion as the fact that at some stage in history conscious decision-making systems such as economics and law emerged — strictly speaking, as part of the extended process by which the socially ordering structures of civilisation developed, a process to all appearances still under way.

This, in my view, sheds light on why, say, theocratic doctrines of salvation are even today able to hold their own against highly sophisticated analytical theories of knowledge. A key factor here may be the wish to revert to earlier, unconscious decision-making structures. This is a desire one often hears voiced nowadays, one reason for it being that conscious decision-making systems are felt to be technocratic and authoritarian, in other words, inhumane. We have, of course, long known that the reverse is true, namely that the “macro-society” in which we live leaves us no practical alternative but to evolve complex systems of rules and decision-making mechanisms: these are what enable mankind to continue to survive (for the present at least) despite rapid global population growth. The following reflections are based on the conviction that we need decision-making systems such as economics and law, that these two systems have a common object of investigation, and that their functions are thus closely interdependent. One of my main arguments is that law and economics are synaesthetically linked, that is, conceptually they form two sides of the same coin; their joint effect is to allow the development of behavioural structures and rules that are vital to “macrosocieties” through securing their very economic survival. Hence, the functional interdependence of law and economics deserves to be examined in some detail.

Certainly, law and economics are related in turn to other disciplines concerned with the formation of rules and laws. Their links with sociology,¹¹ socio-psychology and historical studies are obvious; and they also arguably share common ground with the analytical philosophy of mind and with linguistics. Still, if the present paper adopts a more modest, dualistic approach to the theme, this is because the specific relations discernible between law and

8 Laudse (LaoTse), *Daudedsching* (2nd edn 1985) at 28.

9 *Id* at 32; above n4 at 311, 357.

10 Above n4.

11 Cf the earlier work by Raiser, L, Sauermann, H and Schneider, E, *Das Verhältnis der Wirtschaftswissenschaft zur Rechtswissenschaft, Soziologie und Statistik* (1964).

economics have an exemplary aspect: a deliberate narrowing of the subject-area considered will thus allow an easier identification of the most important structures operative in systems of rules and of decision-making generally. Moreover, this approach will demonstrate that there is a marked similarity between the methodological premises of law and economics — a point which, though crucial, has not yet found broad acceptance in the legal academic field. This functional approach arguably yields four basic rules, which together might be said to form the fundamental “magic square” on which all decision-making systems are based. Finally, the synaesthetic linking of law and economics will bring to light certain basic weaknesses in the way these disciplines are currently taught: it can be shown on a practical level that teaching methods in both subjects are not as effective as they could be, and that, in favouring a discrete rather than an interdisciplinary approach, they tend to have intellectually narrowing results; undoubtedly there is room for improvement here.

2. *The Functions of Economics and Law*

The word “function” (deriving from the Latin for “performance”) refers, generally speaking, to a task, or, again, to the role played by the component parts of a systematic whole; it can also mean “achievement”, “activity”, or a “mode of activity by which a thing fulfils its purpose”. The mathematical meaning is that which underlies the use of the term in both economics and legal studies: functions are “tasks performed to a specific end”.¹² The issue here is, in brief, to consider the respective functions of the two disciplines. There is no real consensus in either field as to what its function or task actually is. One widely held view, according to the recent comprehensive study by Peter Behrens, is that the relation between economics and law consists in an exchange of information about matters which fall outside the immediate ambit of each: “Legal practice supplies economic science with data; conversely, academic legal study learns from economics what there is to know about ‘the nature of its object’”.¹³ A contrasting view is that of Walter Eucken, structurally similar, incidentally, to the Marxist conception, which holds that all human action is based on plans, and that where there is a multiplicity of such plans some form of coordination is required. This results in a social order in which law is not an immutable *donnée*, but an alterable value serving to structure socio-economic relations.¹⁴ A third view, which is gaining increasing ground, is the “economic analysis of law”, an approach based on the work of Coase and Posner, which, as Behrens rightly emphasises, looks into possible alternative forms of action.¹⁵ For economics, the central issue, as Samuelson puts it, is:

12 Krawietz, W, *Recht als Regelsystem* (1984) at 9; Mestmäcker, E J, *Regelbildung und Rechtsschutz in marktwirtschaftlichen Ordnungen* (1985) at 5; Chmielewicz, K, *Forschungskonzeptionen der Wirtschaftswissenschaft*, (2nd edn 1979) at 19; Schanz, G, *Erkennen und Gestalten* (1988) at 27.

13 Behrens, P, *Die ökonomischen Grundlagen des Rechts* (1986) at 6; see also (referring to Veit) above n11 at 9; also of interest: Mestmäcker, E J, “Competition Policy and Antitrust: Some Comparative Observations”, *Zeitschrift für die gesamten Staatswissenschaften* 136 (1980) at 387-407.

14 Behrens, above n13 at 8.

15 Behrens, above n13 at 21.

the study of how people and society choose to employ scarce productive resources, which could have alternative uses, to produce various commodities, and of the distribution of these commodities among individuals and groups.¹⁶

This line of enquiry, reflecting the ideas of Adam Smith, attempts to re-establish economics as a social science, thus enabling it to perform the task of analysing various alternative control mechanisms.¹⁷ With regard to law, leaving aside potentially confusing ramifications,¹⁸ the object of such economic analysis is "to isolate those criteria which are identifiable as specifically legal, and which cannot be said to belong to other disciplines".¹⁹ This method lays particular emphasis on constant questioning as to how and why certain criteria emerge and what their significance is for the possibility of alternative legal norms; it is thus intended to "lead to a greater degree of rationality in legal reasoning".²⁰

Nevertheless, such approaches are too narrow for adequate treatment of the matter in hand: for on closer scrutiny they turn out to be mere sub-functions of the systems of law and economics, and of their interrelation. Indeed, it may well be that traditional ideas of that interrelation developed as they did because the proper function of each system was never really investigated as such: preconceptions (perhaps subconscious) were doubtless already operative here. In order to clarify the actual problem at stake, I should like to return to the fundamental question posed above: what tasks, or functions, are fulfilled by systems such as economics and law? An answer of kinds begins to emerge if, disregarding their substantive aims, one looks for the structural role of the two disciplines — that is, for the supporting structures they provide, without which the social system as a whole would collapse. Considered in this purely functional sense, uninfluenced by the question of specific ends, both economics and law can be shown to perform a strikingly simple, almost trivial sounding, basic function: their essential task, irrespective of practical differences, is to set up restrictions, which are given the name of laws or rules.

Moreover, as Karl Popper demonstrated long ago, economics and law share this function with every other empirical science.²¹ The structures of what Adam Smith called the "macro-society"²² and Popper the "open society",²³ and which form the basis of what Hayek terms his "theory of spontaneous orders",²⁴ arise from action which is simultaneously regulated and, for that reason alone, free. Restrictions, in Manfred Eigen's words, are thus "an important precondition for the making of unambiguous decisions of choice", that is, they form an indispensable part of any intellectual system such as economics or law.²⁵

16 Samuelson, P A, Nordhaus, W D, Richardson, S, Scott, G and Wallace, R, *Economics* (2nd Aust Ed 1992) at 7.

17 *Id* at 6.

18 Behrens above n13 at 22.

19 *Id* at 22.

20 *Id* at 27. Both helpful and stimulating, besides Behrens, is Kirchgässner, G, "Führt der homo oeconomicus das Recht in die Irre?" *Juristen-Zeitung* (hereafter *JZ*) (1991) at 104.

21 Popper, K R, *The Logic of Scientific Discovery* (1992) at 31.

22 Above n5.

23 Popper, K R, *The Open Society and its Enemies* (1980).

24 Hayek, F A, *Law, Legislation and Liberty* (1973) vol I at 38.

25 Eigen, M and Winkler, R, *Laws of the Game: How the Principles of Nature Govern*

Yet the question remains as to why it is specifically the creation of restrictions and rules that forms the task of economics and law. Would it not make equal sense to emphasise the ordering role played by law, or its public policy dimension; or in the case of economics, the minimisation of operating costs, or the search for rules underlying the apparent chaos of mid- and long-term trends in industry and the national economy? Such questions are undoubtedly justified; however, they serve as a reminder that any attempt to describe a function already reflects the influence of a prior explanatory model. I am drawing attention to these perhaps seemingly banal points because the model put forward here has not yet been applied, as far as I can see, in either economics or law. It derives from the natural sciences, where it plays a role in molecular physics, evolutionary biology and the closely-related research techniques of modern genetics. In the present context, too, the basic idea is very simple. Decision-making systems such as economics and law are the product of prior determinative systems, such as space and matter. The basic functions of all such systems must therefore have essential elements in common: since the basic function of a living cell, for example, can be construed in terms of the interplay of movement and restriction, it seems reasonable to suppose that comparable mechanisms operate in the intellectual sphere, finding expression in systems such as economics and law. Seen thus, both economics and law appear as complex analogues of the laws of nature. Hence, knowledge pertaining to one field can bring productive results for the other, and vice versa. What conclusions then, may be drawn for systems of rules such as economics and law? Let me return to my basic argument once again.

The development of what we nowadays understand as reality has been described by 1986 Nobel Prize winner Gerd Binnig as a four stage process according to which, first, space evolved, followed by matter, then by life and finally by intelligence.²⁶ A similar approach is adopted by Karl Popper with his "three world model";²⁷ resemblances can also be seen to the "layer model of the real world" propounded by the philosopher Nicolai Hartmann in the late 1930s.²⁸ It is irrelevant here whether one views the evolution of life and intelligence in terms of a layer model in which space and matter have chronological priority; much more significant is the fact that there seems to be unanimity on one central point: namely, that space, matter, life and intelligence evidently all consist of ever-recurrent, self-reproducing fundamental natural elements. The smallest sub-atomic particles known at present are leptons and quarks; they combine to form neutrons, protons and other elementary particles; these make up the atoms comprising the chemical table, which in turn are capable of forming a huge range of molecules. On the organic level especially, complex molecules which are capable of reproducing themselves are of major importance: for they form the basis of living organisms, including man

Chance (1981) at 76.

²⁶ Above n6 at 96.

²⁷ Popper, K R and Eccles, J C, above n4 at 61; also of interest: Bunge, M, *Das Leib-Seele-Problem* (1984).

²⁸ Hartmann, N, *Der Aufbau der realen Welt*, (3rd edn, 1964); also useful from a scientific angle: Hawking, S W, *A Brief History of Time: From the Big Bang to Black Holes* (1988); see also Cramer, F, *Chaos und Ordnung, Die komplexe Struktur des Lebendigen* (1988); and Gierer, A, *Die Physik, das Leben und die Seele* (3rd edn, 1986).

himself, the most complex living being known. To take an image used by Gerd Binning,

Nature is structured like a language. Its smallest elements are letters, which, when put together, form words. Words make up sentences; several sentences can form a whole story, several stories a book, numerous books a library, et cetera.²⁹

In short, complexity derives from simplicity. This process can also be represented as a pyramid, as Binning suggests at various points, relying on research done by Reeves.³⁰ The fact that the world is structured according to its constituent elements³¹ also underlies my argument that the task of economics and law is to create restrictions which we call rules: for the two disciplines, being themselves part of nature, must function according to the same laws or principles as nature itself (cf the correspondence between atoms and macromolecules): for the so-called laws of nature underlying the natural sciences, also to an extent, form the fundamental principles of all other cultural disciplines.

What would seem to make these reflections plausible is the fact that, on the one hand, law and economics form an essential part of the process of our intellectual development (the evolution of our system of thinking), and that, on the other, such processes can only function according to identical underlying laws precisely because they both build on and respond to the same constituent elements as have determined space, matter and life, namely (sub-) atomic particles and molecules. Thought can thus only have the same basic structure as such an element and its compounds, for otherwise — and this is the essential point — it could not be comprehended by the chains of amino acids in our DNA. In simple terms, all intellectual systems, and hence too economics and law, can only be comprehended by DNA because the basic structure of thought analogically resembles that of DNA itself. Thus, the same basic laws which govern (sub-) atomic particles and molecules must recur in the realm of thought; conversely the structures typifying that realm must have their counterparts in the (sub-) atomic and molecular constitution of space and matter. This, I believe, is a novel and (I hope) interesting theory, in that it allows the natural sciences to derive benefit from the cultural disciplines, and vice versa. As we are not yet in a position to account for such basic laws and principles in neurophysiological terms, the present enquiry should rather be regarded as a series of hypothetical speculations as to their nature and operations. In other words, in asserting that the basic function of law and economics is to create restrictions, or to develop rules and guiding principles, I am, in the absence of inter-disciplinary research hitherto into genetics and law, merely theorising, though I hope in a reasonably convincing way, one capable of being put to some positive heuristic use in non-scientific pursuits. For instance, the function of rules is analogous to that of mutation blockers in macromolecules: they act as constataions which enable meaningful orders to emerge, but also to be superseded and discarded if need be. Rules are thus constituent elements in particular developmental processes, or to use Heisenberg's terminology,

29 Above n6 at 25.

30 Id at 24.

31 For further reading, see Minsky, M, *The Society of Mind* (1987) at 21; Braitenberg, V, *Künstliche Wesen* (1986); Flechtner, H-J, *Grundbegriffe der Kybernetik* (5th edn, 1970); Ashby, W R, *Introduction to Cybernetics* (1964).

constants in contexts governed by the uncertainty principle. In situations of conflict, and this is further characteristic of them, rules cause matters either to stabilise at a new level or else to be resolved. Hence, they are essential elements in decision-making systems — that is, in systems such as economics and law whose purpose is to resolve conflicts in some way or other. That such a system might be able to solve conflict by synthesising competing alternatives is a well known fact, which doubtless has its natural analogue in the form of the emergence of new physical or chemical units.

Thus, it may be said that economics and law have the task of creating rules and laws to govern human behaviour, rules which have the potential of allowing decisions to be made, and which therefore tend to give rise to a "state of symmetry"³² at a new level, or else become superseded. In this sense, economics and law are decision-making systems which share the same objective, that is, they are functionally interdependent in that they both regulate matters which have, at the very least, an economic dimension in common. This self-evident fact should not be lost sight of even though research into both disciplines has resulted in the development of highly specialised subject areas and sub-topics.

One question remains open, however. If it is correct to say that the function of both economics and law is to set up rules for human conduct, this still does not tell us whether there are particular areas of life (and if so, which) that naturally belong to either the legal or the economic sphere. To put it differently: which issues are strictly legal, and which involve an economic dimension as well? As far as I can see, this question has been posed neither in legal nor in economic studies, though this is probably in part because it is not usual to reflect on what the basic functions of these disciplines are.³³ I have to admit that I myself do not currently have any definitive answer to offer — though I do consider the question worth asking.³⁴ Instead, I would like now to turn to a matter which has long preoccupied legal scholarship, but which is no less important for economics too — namely, the question of the structure of a "right" rule.

32 Above n6 at 96, 151: deciding something, in terms of scientific categories, means forming a pattern of symmetry — a convincing image for law too, the point being that a decision produces a new state of equilibrium between the parties, such that the resolution of legal disputes represents the removal of "states of disequilibrium".

33 This also applies to the sociology of law, which as yet has not been able to develop a "theory of legal unity" of its own; cf Luhmann, N, *A Sociological Theory of Law* (1985) at 275-6; for a general overview, see Willke, H, *Systemtheorie entwickelter Gesellschaften* (1989) at 111, which suggests that Maturana's idea of "self-reference" (ie the self-development and self-determination of living systems) could be taken as the basic model of social theory: see Maturana, H R, *Erkennen: Die Organisation und Verkörperung von Wirklichkeit* (2nd edn, 1989) at 137; cf also Teubner, G, *Law as an Autopoietic System* (1993).

34 One possible theory of what could constitute legal questions is as follows: all problems relating to the survival of the species, not just concerned with the individual, can be conceived of as legal questions, for the fact that they are capable of being decided about optimises the survival of the species. This theory could be applied *mutatis mutandis* to economics.

3. *The Structure of a "Right" Rule*

If it is true to say that in a valuefree, purely functional sense, economics and law share the task of creating restrictions qua rules, the next question is to identify the structure of those rules that can claim to be "right" ones. For only when convincing criteria have been worked out for these will it be possible to talk about "rule-governed orders" in Popper's sense. This search for the structures of right rules, whether in economics or law, is best approached in two stages: rules can be viewed either as the expression of man's genetic code, or as the consequence of a freely made choice. In the first case, the structures are fixed;³⁵ the rule, if indeed it deserves to be so called, is of necessity right. In the second, the structures are variable: through constant repetition, they can eventually become so entrenched that they finally appear innate. Processes of this kind are known as "conditioning". In economics and law, too, the significance of such conditioning processes, which we shall return to below, is certainly considerable, even if their precise nature is not yet really understood.

A. *Predetermined structures*

It may be said that a great many of the systems of rules commonly used in law and economics are based on innate structures: the use of words calls up a genetic behavioural program. While it is not yet known exactly how this functions in neurophysiological terms, the fact that it does so function is, I believe, clear enough.

For example, when two people are involved in a dispute, we take it for granted that there is, at least potentially, a way of resolving the dispute. We are also able to come up at once with quite precise ideas as to how a conflict may be resolved — for instance, by one side giving in, or by a compromise, or by the payment of compensation (for example, damages), or even, to take the worst scenario, by the use of military force. Clearly, various other solutions might be possible.

My main concern here, however, is with what we actually mean by saying that something which we call a "dispute" or "conflict" has been resolved. A libellous statement in the press, after all, is still there even once the injured party has been awarded damages. And what does it mean when partners or nations assure one another that they are reconciled? These are cases of what is called "dispute resolution"; this can only come about, I suggest, if our DNA contains structures which respond to certain words, sentences or forms of behaviour by forming new states of symmetry or equilibrium. The ability to resolve disputes must be based on a genetically fixed behavioural program, though it doubtless manifests itself differently from person to person. This

35 This is probably not quite accurate; rather, heredity and environment form a mutually interacting framework of conditioning factors, which represents a prerequisite for the development of life. See Radigk, W, *Kognitive Entwicklung und zerebrale Dysfunktion* (1986) at 12; for a general overview, see Prigogine, S, and Stengers, I, *Dialog mit der Natur* (5th edn, 1986); a highly speculative view is expressed in Sheldrake, R, *The Presence of the Past: Morphic Resonance and the Memory of Nature* (1988). A more pragmatic approach, however, is needed for the present reflections, which, for the purposes of comprehensibility, are based on traditional structures, but which are still open to possible far-reaching correction in the light of future developments.

thesis may well provide a useful starting point for future research on criminal behaviour: there is evidence to suggest that criminal offenders might have a different genetic structure from their law-abiding fellow-citizens. However that may be: systems of rules which are conducive to decision-making must to some extent embody innate decision-making structures, since otherwise decisions per se would be impossible.³⁶ The crucial question is: which rules may be taken as innate or fixed? My belief is that the laws or structures underlying formal logic,³⁷ methods of reasoning, the possibility of different decisions, the influence of our relation to others on our decision-making (for example, greater tolerance towards persons close to us), as well as rational discourse³⁸ and non-rational responses (for example, a sense of honour, a desire for vengeance or a spirit of altruism) alike, might well all be predetermined.³⁹ If so, this would mean that a considerable proportion of the legal consequences to which our actions give rise could also be regarded in a sense as predetermined. In the field of economics, concepts which show evidence of being based on innate structures include efficiency, costs, competition and status.

For those readers who find it difficult to accept the idea that the structures underlying decision-making processes could be innate, perhaps the following example will help. You are sitting inside a train which is stationary; alongside it, on the next track, stands another train, also stationary. If one of the trains moves off, then you will decide either that you are moving or else that the other train is, though an actual decision in this case may, strictly speaking, be impossible. We react in exactly the same way to the famous optical illusions in the pictures of the artist M C Escher, where, for example, flights of stairs can be interpreted as either converging or diverging.⁴⁰ The crucial point here is not how we decide in this situation, but that we decide at all, even though the situation actually cannot be decided about. The examples could of course be multiplied; they would serve to illustrate that our minds work according to predetermined structures of rules which render what we call decision-making possible. Both economics and law would, I believe, benefit if this point were given wider recognition. One thing, however, is sure: in so far as regulatory structures are based on innate determinants, they are in a sense automatically right precisely because they are immutable.⁴¹

B. Variable structures

Again, there are regulatory structures which are variable that is, not genetically predetermined. These are what give rise to diversity in human behaviour.⁴² En-

36 For further details, see Radigk, W, above n34 at 16.

37 See Menne, A, *Einführung in die Logik* (1983).

38 Alexy, R, *Theory of Legal Argumentation: The Theory of Rational Discourse as Theory of Legal Justification* (1989).

39 The linguistics aspect of this is dealt with in Chomsky's theory of generative grammar: cf Lyons, J, *Noam Chomsky*, (4th edn, 1976); also highly informative is Haarmann, H, *Universalsgeschichte der Schrift* (1990).

40 Cf the illustrations in Hofstadter, D R, *Gödel, Escher, Bach: An Eternal Golden Braid* (1979).

41 That innate structures can be altered by genetic engineering shows that matters are not quite as simple as they seem in this respect either. Nonetheless, the present theory appears for the moment both sound and practicable.

42 Examples from the field of biological anthropology are given in Eibl-Eibesfeld, "Stammesgeschichtliche Anpassungen im Verhalten des Menschen" *Biologische Anthropologie*

tering into a contract of sale or hire, putting one's business into liquidation, introducing a new production method, altering one's advertising strategies, planning and carrying out a bank robbery — these are all undertakings which, apart from a few exceptions, are structurally variable. This is of course the sphere in which we encounter problems deriving from the relation of law and morality — in short, the question of what is the right law, the "right rule".⁴³ Here too, I submit, consideration of the functional laws of nature may offer us some assistance.

Besides the principle of dualism, the natural sciences also work with the uncertainty principle, as formulated in terms of physics by Heisenberg.⁴⁴ Simply put, this means that in the natural world variable structures cannot be discerned with absolute precision; uncertainties will always remain, that is, there will always be some room for movement or variation, thus allowing for the possibility of alterations or corrections to the system — in short, for development. If the principle is applied to the system of human intelligence, the following (negative) definition of the concept of a "right rule" may be derived: rules properly operative in variable fields yet which enforce rigid unalterable modes of behaviour are implicitly wrong; that is, the less room for manoeuvring such a rule allows, the more compelling its substantive justification needs to be (flexibility principle).⁴⁵ Every motorist realises that there have to be rules determining roadlane conventions, but it would be quite unacceptable if a driver was not allowed (say, in emergencies) to cross over onto the other side of the road. Whoever kills another human being is as a rule severely punished, but not if the act was done in self-defence or during military conflict. Maximising profits is a legitimate objective in business, but only to the extent that it does not entail grave environmental risks for society at large. Equally, clever marketing is quite permissible, as long as the consumer is not misled or subjected to an irresistible psychological pressure to buy.

State restrictions on individual freedom may be both necessary and sensible. But in order to be legitimate, they must be underpinned by a system of checks and safeguards allowing exceptions and ensuring that, if need be, a rule can be relaxed or even superseded. In Germany this mechanism is generally known as the principle of proportionality; it has come to form an integral part of the thinking underlying our constitutional law. By contrast, it is difficult to regard systems based on the arbitrary exercise of power as legitimate in terms of the flexibility principle just outlined, since they necessarily give rise to rigid, and hence arbitrary, rules, which often have only a formal relation to specific cases and seldom allow for the possibility of correction or review. In view of this, a consideration of basic scientific laws, Heisenberg's uncertainty

(1972, Part 2) at 3, 48; cf also Vogel, C, "Gibt es eine natürliche Moral?" Meier, H (ed), *Die Herausforderung der Evolutionsbiologie* (1988) at 193.

43 For further details see Dreier, R, "Recht und Moral" *Recht, Moral, Ideologie* (1981) at 180.

44 This term, derived by Heisenberg from quantum mechanics in 1927, means that both the position and velocity of an object cannot be gauged exactly at the same time; this unavoidable indeterminacy of a particle's state at any given moment also makes it impossible to predict its future position and velocity precisely. See the *dtv-Atlas zur Atomphysik* (1976) at 19.

45 The flexibility principle corresponds to the principles of regulation and self-organisation in biology and technology; cf the fascinating reflections on the theory of play by Nobel Prize winner Manfred Eigen, in above n25 at 45.

principle especially, may have much to bring to the debate on the relation of law and morality.

C. *Conditioning*

Finally, let us turn briefly to the phenomenon of rules that become fixed, or what behavioural science calls "conditioning". A person is not born with a specific religion. He has to grow up in it; one day its dogma may become so important for him that he would rather face conflict or even death than renounce his faith. In such cases, variable regulatory structures are converted into quasigenetic ones. This might be what happens in the case of some criminal offenders, who often already "learn" as children that it is more useful, according to the values of the group in which they grow up, to run the risk of being convicted. Nor is it inconceivable that this is how hierarchical structures form in business undertakings or families: certain habitual male-female role divisions might well be the result of processes of structural conditioning—and, by extension, so might a range of economic and legal rules. This becomes particularly clear when we ask whether some traditional mode of conduct ought to be superseded. Can we really permit ourselves to sacrifice the venerable *German Civil Code*, or the even more widely renowned *French Napoleonic Code* of 1804, on the altar of the projected codification of civil law at European level? Should the English really be expected to give up the common law for the sake of a European ideal? Will any model of car be allowed to drive around London as a taxi cab? Would it not mean the total demise of English justice if judges and barristers were made to shed their wigs forever? Clearly, numerous questions are involved here, and even those which are not wholly serious point to a social phenomenon that has remained relatively un-researched so far — that of how rules which start out as variable later ossify, becoming almost insuperably quasi-genetic. To date, answers as to why rules tend to harden in this way in the human mind have not gone beyond conjecture. It is suggested that there is a connection between the body's supplying itself with its own opiate proteins, or endorphins, and structures of behaviour. Important research is now being conducted into the "chemistry of the brain", which before long could significantly alter our knowledge about ourselves.⁴⁶ The latest research suggests that the human brain strives for states of chemo-physical equilibrium, or symmetrical patterns,⁴⁷ through the medium of decision-making systems; this could well imply a connection between chemistry, physics and the cultural sciences. Were this connection to prove tenable, then the function of ordering systems would arguably be to develop rules that help to establish states of mental equilibrium (principle of symmetry).

Of course, these remarks are highly speculative. This is partly because genetic engineering is still in its infancy; but it is also due to the fact that aca-

46 For further information, see Snyder, S H, *Drugs and the Brain: A Scientific American Book* (1987); Strickberger, M W, *Genetik* (1988) at 523; cf also the constructive approach of Hoebel, B G, "Neurogene und chemische Grundlagen des Glücksgefühls", MacLean, P D, "Die drei Dimensionen der Entwicklung des Gehirns und des Rechts" at 114, and Masters, R D, "Evolutionsbiologie, Politische Theorie und die Entstehung des Staates" at 15 in Gruter, M and Reh binder, M (eds), *Der Beitrag der Biologie zu Fragen von Recht und Ethik* (1983) at 87.

47 Prigogine, I, in Meier, H, above n42 at 21.

demic lawyers, economists, and even scientists seldom adopt a synaesthetic approach to investigating their subject-areas. Coordinated interdisciplinary research is the exception — a situation which strikes me as increasingly questionable. I believe that the reflections outlined above adequately suggest that research combining economics, law and the natural sciences could very usefully be undertaken — at, say, an institute for legal genetics.

4. *The Basic Functions of an Optimum Decision-making System*

In my view, four basic requirements must be fulfilled if regulatory decision-making systems such as law and economics are to perform their functions with maximum efficiency. These requirements correspond to the fundamental conditions which form the basis of living systems, and which as such comprise the subject-matter of the natural sciences:

- i. functionality;
- ii. optimisation;
- iii. uncertainty;
- iv. correction.

These four rules could be said to form the “magic square” of the functional requirements underlying not only law and economics, but all other decision-making systems. More specifically, they may be seen as a concrete manifestation of the program already discussed in general terms under the heading of the right rule.

i. Functionality requires that only those rules which serve to realise certain objectives have a place in the system concerned — for example, the stress coefficients used in construction work, or the principal rules of the highway code. Applied to social welfare law, the requirement of functionality means that whoever has nothing of his own should be financially supported. This is not a contradiction of the rationale behind the free market economy but rather a logical consequence of it, for it is in the interests of such an economy that those living in it should also be able to participate in it; thus, each individual is enabled to do so, at least to the extent of satisfying his basic needs. In the field of environmental issues, functionality takes the form of regulations on clean air and water, clear and comprehensible provisions governing the disposal of toxic waste and operating procedures for hazardous installations. With regard to public health and pharmaceuticals, functionality gives rise to laws requiring the provision of clear and comprehensible information about the constituent ingredients of drugs and the prohibition of administering fatal doses. Again, in commercial law it can mean the adoption of the optimum cost-effective solution (for example, according to the “property rights” theory).

It is of course possible to argue about exactly where the boundary lies in particular cases between rules which are functionally necessary to achieve a specific objective, and those which may only be desirable to that end. The former East German “Trabant” could be said to meet the functional definition of a car — but this is not to say that its technical standards should be universally conformed to. In other words, for the purposes of attaining a certain goal, it is not enough simply to lay down requirements that do no more than provide a necessary minimum standard; rather, every effort should be made to ensure that the measures adopted function as well as possible.

ii. This objective is served by the second of the above requirements, optimisation. Its importance has been highlighted recently by the "economic analysis of law" approach, as developed by Coase and Posner in the United States.⁴⁸ The essence of this requirement can be described as follows: rules are to be preferred where their benefit outweighs their cost (hence the term, "optimisation rule") — an idea in my view strikingly self-evident. Essentially, the criticisms levelled against the economic analysis of law, in Germany principally by Fezer,⁴⁹ are not aimed at this requirement in particular, but at the notion that the search for and setting of legal goals should be reduced to economic terms.⁵⁰ The concept of optimisation may sound simple; in practice, however, it can prove very difficult. This is primarily because use/cost analysis has to include factors which are hard to quantify. In economic theory various possible solutions have been put forward; for example, Pareto's theory of efficiency, or the models of Kaldor and Hicks.⁵¹ Thus, as Behrens says:

without doubt, the economic analysis approach shows that economics and law have a common field of application. Both disciplines are concerned with human conduct (as far as it involves the process of deciding between alternatives). It follows logically from this that economic theory, which concentrates on human decisions of choice, cannot disregard the fact that legal rules serve to restrict the number of possible alternatives, just as, conversely, legal scholarship must learn to recognise legal rules as themselves resulting from decisions made between alternatives, and to analyse them in the light of the economic criteria on which they are based.⁵²

iii. A further, especially problematic category consists of those cases where it is uncertain what precisely should be done. Such uncertainties may occur at the levels of both functionality and optimisation. Should the function of public health policy be called into question simply because we do not prohibit smoking or alcohol consumption? Are we to do away with nuclear power or hazardous chemical plants because the requirement of functionality demands it — or should we do so on grounds of optimisation, that is, for reasons of cost? Does the catalytic converter really optimise the price exacted from the environment by the motor car? Should we stop using FCC's and PCV? Should the various social welfare systems within the EC all be brought into line with one another? And do workers need to have the same rights throughout the Community or not?

For none of these examples is there at present a rule which could conceivably be held to be the right one, since not enough is known about the details

48 Cf the résumé in Assmann, H-D, Kirchner, C and Schanze, E, *Ökonomische Analyse des Rechts* (1978) at 93; also Behrens, above n13 at 21; Schäfer, H-B and Ott, C, *Lehrbuch der ökonomischen Analyse der Gefährdungs- und Verschuldenshaftung* (1985).

49 Fezer, K-H, "Aspekte einer Rechtskritik an der 'economic analysis of law' und am 'property rights approach'" *JZ* (1986) at 817, and "Nochmals: Kritik an der ökonomischen Analyse des Rechts" *JZ* (1988) at 223.

50 See, eg, Kirchgässner, G, above n19 at 104, and "Das Verursacherprinzip: Leerformel oder regulative Idee?" *JZ* (1990) at 1042; Schünemann, W B, "Der Homo Oeconomicus im Rechtsleben" *Archiv für Rechts und Sozialphilosophie* (1986) at 502; Ott, C and Schäfer, H-B, "Die ökonomische Analyse des Rechts — Irrweg oder Chance wissenschaftlicher Rechtserkenntnis?" *JZ* (1988) at 213.

51 Kirchgässner, G, id at 104 and 109; cf also Rawls, J, "fairness rule" in *A Theory of Justice* (1977) at 11-17.

52 Behrens, above n13 at 30, 335.

of each individual case.⁵³ In other words, where decisions have to be made under conditions of uncertainty, none can be said to be either right or wrong. Nevertheless, there are two practical considerations which show that rules can be of some value in such uncertain situations:

It is expedient to admit several rules in a situation where the making of a decision is subject to uncertainty, as this will enable different systems to compete with one another on a trial and error basis, with the result that the uncertainty can eventually be overcome.

In that process, it may be sensible to establish a uniform basic standard which would serve as a disincentive for economically weak parties to fall below that level for no justifiable reason.

iv. Finally, an optimum decision-making system requires a correction mechanism. This is the concrete expression of the principle of flexibility described above, that is, it follows on logically from the functionality and optimisation rules, given that operating failures and rising costs are signs of a less than optimum legal framework. The correction rule lays down that system errors which gradually creep in also have to be rectified. For those trained in the civil law the correction rule is a familiar instrument: it represents the teleological or purposive method of interpreting legal norms. At the limits of teleological interpretation lies, for instance, the issue of whether judges should fill in the gaps in the law where legislation is left open — a form of corrective rule encompassed by the doctrine of the separation of powers. In Germany, at the legislative level itself, corrections can be made through the Federal Constitutional Court; besides this, scholarship too plays a certain remedial role through dealing with practical problems and providing commentaries on the established law. It remains a problem, however, that below the level of constitutional law it is very difficult to make corrections to the system.

Still, anyone concluding that some of the provisions of the *German Civil Code* are over-complex, opaque and unintelligible to the average citizen would have great difficulty in changing the system in any fundamental way. This has partly to do with the natural inertia of a long-established legal system and its inbuilt resistance to change — a phenomenon which also characterises not only our thought processes but also space and matter themselves. Thus, while we must guard against being hypercritical, economists and lawyers alike are called upon to offer truly constructive criticism: for this is what the corrective rule, if taken seriously, demands. It is concerned not with the time and energy consuming, potentially unprofitable business of simply reflecting on how matters are in some way contradictory or defective, but with actively looking for future remedies and improvements — clearly a far more difficult task than mere passive criticism. In conclusion, I should like to give a few examples of the practical results deriving from the concept of the functional interdependence of economics and law. These examples will, I hope, show that the adoption of a functional approach leads to the consideration of issues markedly different from traditional ones.

53 For further information, see Sinn, H W, *Economic Decisions Under Certainty* (1983).

5. *The Functional-synaesthetic Method: Practical Consequences of the Concept of Functional Interdependence*

A. *Functional-synaesthetic research*

i. *The right system of law*

A major question, one surprisingly neglected so far, is whether the usefulness to society of a legal system is greater than its cost. The question is no doubt difficult; the attempt to define cost in this sense would also give rise to much controversy. However, as it is an issue of fundamental social significance it deserves some consideration, if only because the fact that a society chooses to use one system rather than another may well in itself entail a certain rigidity — possible evidence of a less than optimum state of affairs in terms of the “right rule” discussed above. Not being totally utopian in my outlook, I am aware that one possible reason why this question has not yet been tackled in depth is a general lack of conviction that rigorous academic enquiry into an entire decision-making system — for example, a legal system — would result in any changes to it, thus involving a waste of resources. Nevertheless, this question, at least in the European context, is becoming increasingly topical. In 1989 the European Parliament adopted a resolution⁵⁴ calling on the Community’s Member States to devise a unified European civil and commercial code. This gives us a unique opportunity to take a serious look at the fundamental issues involved in a legal decision-making system from both the legal and the economic points of view. The European Parliament’s proposal would mean adopting the analytical-deductive system of the GermanoRomanic legal family. A common code would be created on the basis of the various civil law jurisdictions. Opposing this tradition is the Anglo-American system of common law, with its inductive method of reasoning which develops from case to case. Clearly, in practice the methods of the two systems are not mutually exclusive. If the European Community really were to go ahead with the creation of a unified civil and commercial code, it would be vital for lawyers and economists to undertake a prior interdisciplinary examination of both the benefits and drawbacks of such a step. My own current proposal would be to adopt a new hybrid system which would deal with questions of fundamental principle by adopting a conceptual approach, and with questions of detail using the case-law method. This would of course call for more than just the creation of a code of law; its proper administration would also require the establishment of an effective European court system.

ii. *The task of devising central concepts for a legal code*

A civil code must provide information on, say, when someone can sue for breach of contract and claim damages. In the *German Civil Code* this matter is dealt with by means of a “systematic list of events causing impairment of contractual performance”. This is an extremely complex and intricate system of rules, and covers cases of impossibility, delayed or defective performance; it

54 Official Gazette EEC No C158/400, 26 June 1989, Doc AZ157/89.

may be material whether something is impossible from the outset or becomes so only after the contract has been entered into. In addition, there is a series of specific types of contract which attract special rules governing performance and delay, the effectiveness of these rules being in turn restricted in some cases by arbitrarily short limitation periods. If this system were used as a highway code, then there would soon be total chaos on our roads, because the rules contained in it would not even make clear what side of the road we should be driving on, or whether red traffic lights meant being able to proceed or having to stop. Such road regulations would very swiftly be repealed, and a new, clear and unambiguous set put in their place. However, in the case of the rules in the *German Civil Code* relating to contractual performance, the matter is different: the average person does not know this area of the law, and lawyers and economists are content to leave him in ignorance. The corresponding set of provisions contained in the *French Civil Code* is similar, if slightly less complicated. It contains both the notion of initial impossibility and also the key principle of supervening impossibility — “inexecution” — which covers not only supervening impossibility in the strict sense but also non-performance, delayed performance and positive breach of contractual duty. For bilateral contracts there is a special provision (Art 1184 CC). The legal remedies are damages and termination.

In the United States, by contrast, the basic principles involved in this area of the law are, apart from those relating specifically to the sale of goods, very simple. The general rule is that of breach of contract: a party who does not fulfil an existing contractual obligation is in breach of the agreement. Thus all the specific instances dealt with separately under German law, such as impossibility, delay, culpa in contrahendo, positive breach, initial inability to perform the contract, et cetera, are subsumed under one basic rule. If the breach is a material one, then the injured party has a right to damages and/or to consider the contract as discharged, without any legal requirement of culpability on the part of the party in breach; in the case of minor breaches the remedy is damages. Specific performance will only be granted in exceptional cases. American law on the sale of goods (*Uniform Commercial Code*), on the other hand, is very complicated. It contains a highly involved system of remedies for breaches of contractual terms, whether express or implied by statute.⁵⁵ Since 1980 we have had the United Nations Convention on Contracts for the International Sale of Goods, now ratified by the Federal Republic of Germany and in force in that country since 1 January 1991.⁵⁶ It is interesting that this Convention has adopted the simple common law principle rather than the approach of the *Uniform Commercial Code*. The essential element (Art 25) is whether there is a fundamental breach of contract. This is always present when the other party suffers damage. There are no sub-divisions into various impediments to contractual performance. The Convention thus provides us with a simpler, clearer, and, I would submit, more cost-effective body of systematic law.

55 For further details, see Elsing, S-H, *US-amerikanisches Handels- und Wirtschaftsrecht* (1985) at 63; Triebel, V v, *Englisches Handels- und Wirtschaftsrecht* (1978) at 35.

56 On this see Basedow, J, *Die Reform des deutschen Kaufrechts. Rechtsvergleichendes Gutachten des Max-Planck-Instituts für ausländisches und internationales Privatrecht im Auftrag des Bundesministers der Justiz* (1988).

Rather surprisingly, however, there are no economic analyses of the German system of breach of contract (for example, written by economists); indeed, almost all the economic analysis of law has been carried out by lawyers. One exception is the *Lehrbuch zur ökonomischen Analyse des Rechts*,⁵⁷ co-written by H-B Schäfer, an economist, and C Ott, an academic lawyer, which ought to serve as a model for future contributions. This lack of academic literature in the field shows that while the idea of the functional interdependence of economics and law has already been developed on a theoretical level, it is still far from being generally accepted. It is to be hoped that economists will be involved in elaborating a new European Civil Code since, as shown by the considerations discussed above, interdisciplinary thinking is a prerequisite for the creation of optimum decision-making systems.

iii. The "endowment enterprise": an ownerless form of business undertaking

One final example: the activities of commercial undertakings in all industrialised societies are pre-structured and regulated by precisely formulated provisions of company and commercial law. The usual pattern is that there a range of defined business forms, from which enterprises can choose that which best suits their economic aims. An important feature, not just of German forms of business organisation, is that the persons who finance the setting-up of the enterprise must in the end also have a say in running it. This system of combining capital investment and control does not apply to the endowment foundation, a form of organisation which, in principle at least, is not among those which the law makes available for commercial undertakings. Nowadays there is a growing tendency for major public limited companies to diverge from the classic model of capital provision plus control, since ownership here is in fact dispersed among a large number of shareholders. The individual shareholder has scarcely any influence on the running of the business and thus no longer exerts any control over it; this means in effect that increasingly it is the directors who are exerting control over the capital side of the business. In some legal systems, such as Japan, this phenomenon is further reinforced in that employees have special powers of control and determination.⁵⁸ Clearly, therefore, our company and commercial law has its practical limitations. Alternatively, it could be said that since this area of the law is deficient, in the absence of reform measures the way ahead lies partly in circumventing the law as it stands at present. In other words, it is conceivable that the forms of business undertaking currently available under the law could usefully be supplemented by a form of "ownerless" undertaking — by what might be called an "endowment enterprise". Such endowment enterprises could, for instance, be set up by the state with the help of endowment funds — say, to establish an industrial base in economically underdeveloped regions for which private investment is scarce. As a corollary of this, there would be no question of the

⁵⁷ *Textbook on the Economic Analysis of Law* (1986).

⁵⁸ Cf Kawamoto, I, "Neue Entwicklungen im Bereich des Gesellschaftsrechts in Japan" in Coing, H (ed), *Die Japanisierung des westlichen Rechts* (1990); Itami, H, "Jin ponsyngikigyo" (worker co-determination in Japanese companies, in the sense of predominant influence), (1987); fuller details are to appear shortly in Takahashi, E, *Die "doppelte Mauer" Japans gegen feindliche Übernahmen aus dem Ausland*.

interests of capital investors conflicting with the economic development of the enterprise. Alternatively, one could imagine investors being willing to transfer a successful business built up from scratch to an endowment enterprise, since there would no longer be the additional requirement that there is at present for such a foundation — namely that it embodies some charitable or similar purpose. These ideas could easily be developed further. It is clear at least that an endowment enterprise would fulfil all those functions that have to be fulfilled by a business undertaking in a market economy — with the result, I would suggest, that the matter of relinquishing control over the capital side would not present a problem. These endowment enterprises, and almost all Japanese businesses are run de facto on this model, could in the end prove to be even more efficient and viable forms of commercial undertaking in highly competitive markets. The proposal is one which would present a challenge to economists and academic lawyers alike, provided they see their task as being, at least in part, to investigate the functions underlying rules in force at any one time.

Enough of such examples. It is, though, perhaps worth noting that as early as the mid 1950s, one of Germany's most famous legal academics, Franz Wieacker, made a functional analysis of a key provision in the German Civil Code, 242 BGB (the "good faith" clause).⁵⁹ Following on from Boehmer, he pointed out that as early as in Roman times, the judicial figure of the praetor was duty-bound to administer justice according to the following maxim: *iuris civilis iuvandi, supplendi [aut] corrigendi gratia*, that is the praetor must strive to ensure that the underlying purpose of the law is fulfilled (functionality rule), or improved (optimisation rule) or corrected (correction rule).⁶⁰ Thus the synaesthetic approach to law-making, which combines attention to both the external function and the internal meaning of legal structures, and attempts to take into account non-legal (for example, economic) factors, proves to have venerable, perhaps forgotten antecedents. The case for reviving it today is all the more compelling than was possible for the "interest"⁶¹ and "value-based"⁶² jurisprudence of Wieacker's day.

B. *The challenge facing teachers of law and economics*

In this brief final section, I should like to touch on a few of the practical consequences of function based thinking for the teaching of economics and law. In university economics faculties⁶³ there are growing complaints of a "divorce between law and economics". Laws seem to be well nigh permanent and immutable; legal rules are learnt by rote and then simply applied unreflectively, often in connection with economic decisions. This inevitably detracts from the effective legitimacy of both the legal system and the economic decision in question. As the previous points indicate, the divorce between the two fields is not, at least in theory, inherent in the disciplines themselves. Their object of enquiry is identical, and, as shown above, they are functionally inter-

59 Wieacker, F, *Ausgewählte Schriften*, Vol 2 (newly edited by Simon, D, 1983) at 195, 205. 60 Id at 205.

61 Cf Heck, P, "Interessenjurisprudenz: Vortrag an der Universität Frankfurt am Main vom 15 December 1932" in *Recht und Staat*, Vol 97 (1933).

62 For further information, see Larenz, K, *Methodenlehre der Rechtswissenschaft*, (5th edn) at 117.

63 For further details, see Achtenhagen, F, *Didaktik des Wirtschaftslehreunterrichts* (1984).

dependent. It is however essential that students should be taught about this interdependence. This can be done if teachers abandon the idea that legal structures in economics are, as it were, preordained, and thus simply to be accepted unquestioningly as natural *donnes*. The law component in economics must be both effectively integrated and taught in functional-synaesthetic terms. In practice, this might mean adopting something like the following fourstage model:

Stage 1: Ascertaining what the actual economic problem to be examined is;

Stage 2: Analysing the mutual interests of the parties concerned, and considering what rules are needed to resolve the dispute;

Stage 3: Considering what rules existent law provides for resolving such disputes;

Stage 4: Carrying out an analytical comparison between stages 2 and 3.

Three results may be envisaged:

- a. Either the economic problem (Stage 2) has been formulated too narrowly or too widely, or, conversely,
- b. the relevant legal provisions (Stage 3) are too narrow or too wide, or, again,
- c. both the economic and legal elements require redefinition in the light of each other.

With slight variations, this model could also be used in law teaching — and doubtless is, in German universities today, in lectures, though not in seminars and tutorials. This is because, in accordance with a largely unquestioned tradition, in these smaller practical classes, German law students learn the technique of producing written answers to problem questions, which then form the content of their final examinations. This means in effect that law teaching is restricted to testing students' detailed knowledge of existing legal provisions, and to assessing their capacity to apply that law to a given set of facts. Under the present German system, functionalsynaesthetic methods have no place in either class work or final examinations. Students are not required to analyse the underlying interests at stake in a particular case or to consider critically what rules would be sensible or sufficient. The result is that they never have to gain any real insight into the functions of the legal system which they learn to use; they are never taught how to distinguish between optimum and less than optimum systems of rules; not even the difficulties involved in statutory drafting is made clear to them. Thus our future lawyers are being trained to think statically in formulaic conceptual categories, often without any awareness of the basic functions underlying legal rules. Of course, the bleakness of this picture may in practice be mitigated to some extent by the emphasis placed by individual teachers on class discussion, and also by the compulsory work placements that young lawyers complete during their studies as well as by their trainee experience after graduation. The fact remains, however, that what counts most is the student's achievement in the final written examinations, both at the end of his academic studies and following his traineeship, with the result that it tends to dominate his training and preparation leading up to those exams. In my opinion, the whole concept of basing legal education on written work needs to be reconsidered; I see no reason why what is good for economics students should be bad for their colleagues in the law faculty. The end of term tests would then take on quite a different form, for example, that of the four-stage model outlined above. Stage 1 would require a working out

of the problem or conflict that is to be solved in legal terms (ascertainment of conflict). Stage 2 would entail analysing the interests of the parties involved, together with a brief formulation of the rules that could resolve the issue (analysis of conflict). Not until Stage 3 would the student apply himself to solving a case in the traditional way, that is, by applying the current law to a given set of facts (traditional problem question). Stage 4, finally, would be a matter of comparing Stages 2 and 3, so as to ascertain whether the exalting law is in need of correction, in accordance with the "correction rule" principle (discussion of the function of a law). I am confident that such a functional method of learning would have strikingly innovative effects on legal practice, not just as regards finding the answer to particular cases, but also as a general mode of thinking. People versed in functional thinking, who make it a basic rule to question the sense of what they are doing or to ask themselves whether it might be improved on, automatically open up qualitatively new perspectives in life, thereby bringing both to themselves and to those around them a new measure of freedom — one for which I have tried to outline a theoretical basis in this paper.

6. *Summary*

1. Economics and law have a common object of enquiry; they are synaesthetically linked with one another.
2. Economics and law share the function of setting up restrictions, which we call laws or rules. Analogous to the constituent particles of atoms and molecules, these are "an important precondition of unambiguous decisions of choice" (Manfred Eigen), that is, they form an indispensable part of the development of all intellectual systems such as economics or law.
3. Economics and law, being themselves part of nature, must function according to the same laws as nature (cf the relation between atoms and macro-molecules) does. This means that the laws of nature basic to the natural sciences also in part form the fundamental principles of every cultural discipline, including law and economics. The basic structure of all thought must thus resemble that of molecules, because otherwise it could not be accessible by the chains of amino acids in DNA. Hence, all intellectual systems, including economics and law, can only be "understood" by DNA because its basic structure and that of those systems are analogous.
4. Rules are constituent elements of specific developmental processes; in Heisenberg's terminology, they provide constants where, according to the uncertainty principle, the main values involved are variable. In situations of conflict they tend either to stabilise at a new level, or else to be superseded and abandoned. These characteristics make rules essential constituents of decision-making systems.
5. Systems of rules that support decision-making processes must to some extent contain decision-making structures, since otherwise any decision at all would be impossible. Thus, the structures governing logic, rational argumentation, the capacity to compare and draw conclusions, and both rational and irrational discourse alike, might well be innate.
6. Variable structures in nature cannot be ascertained with absolute precision; uncertainties will always remain (cf Heisenberg); thus, there will always be room for manoeuvring, allowing for changes and corrections,

that is, development, in the system concerned. Applied to intellectual systems, this permits the following definition of the structure of a "right rule": in variable fields, rules entailing rigid, unalterable modes of behaviour tend to be wrong; the less room for manoeuvre a rule allows, the more compelling the legitimation behind it has to be (flexibility principle).

7. The function of ordering systems (if the connections elaborated in this paper are tenable) consists in developing rules that are conducive to establishing states of mental equilibrium (symmetry principle).
8. Systems of rules, and decision-making systems such as law and economics, fulfil the purposes formulated above if they meet four basic requirements: functionality, optimisation, uncertainty, correction. Together, these four criteria could be said to make up the "magic square" underlying the operative requirements of decision-making systems such as law and economics.
9. The methods of traditional legal science, with (above all in Germany) its emphasis on "interests" and "values", should be replaced by the aim of acquiring a functional (synaesthetic) knowledge of the law, an approach long since put into practice in other fields.
10. If functional thinking is to be properly nurtured, the teaching methods applied in legal education need to be revised. The intellectually narrowing process of merely applying the existing law to given factual situations ought to be replaced by strategies of functional learning. These could conceivably take the form of a fourstage model:
 - a. ascertaining the nature of the conflict;
 - b. analysing the conflict (interests at stake);
 - c. solving traditional problem questions;
 - d. discussing the function of the rules involved, that is, a functional comparison of stages 2 and 3.