

## Chapter 1

### The Concept of Risk

#### I.

Risk is addressed nowadays by a wide variety of special research areas and even by different scientific disciplines. The traditional statistical treatment of risk calculation has been joined by economic research. Instrumental in this development has been the brilliant approach taken by Frank Knight.<sup>1</sup> His original aim was to explain entrepreneurial profit in terms of the function of uncertainty absorption. This was no new idea: Fichte had already introduced it in relation to the ownership of land and class differentiation. In the modern context of economics, however, it has permitted the astute linking up of macro and micro-economic theory. Knight's distinction between risk and uncertainty has, however, meanwhile petrified into a sort of dogma – so that conceptual innovation earns the reproach of not having applied the concept correctly. But other disciplines do not face the problem of explaining company profits, nor are they concerned with the differences and connections between theories of the market and the business enterprise. Why should they then draw the concept from this source?

Statistical theories have been joined by applications in the fields of decision and games theory interested in their own controversies – such as the degree of meaningful subjectivization of expectations and preferences. As a sort of countermove, psychologists and social psychologists have established that in reality people do not calculate in the way they should if they put store by earning the attribution 'rational' from the statistician. They commit 'errors', some would say. Others would claim that they act in a manner adapted to the requirements of everyday life. In any case it is striking that such deviance displays both structure and direction. The gap is growing ever wider and

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<sup>1</sup> See Frank Knight, *Risk, Uncertainty and Profit* (Boston, 1921).

deeper. As in continental drift, the disciplines are moving farther and farther apart. We now know that housewives in the supermarket and street children in Brazil can calculate highly successfully – but not the way they learned to do so, or did not learn to do so, at school.<sup>2</sup> We know that values can be quantified – with the result that what was really meant can no longer be recognized.<sup>3</sup> And not only private persons cannot do so or do not make the effort. In positions where rationality is among the duties attributed to the role, where particular care and responsibility in dealing with risks are expected, even in the management of organization – risks are not calculated quantitatively; or at least not in the way conventional decision theory proposes.<sup>4</sup> But if this is the case, what use are theories of risk that determine their conceptual approach in terms of quantitative calculation? Is the aim, as in certain moral theories, only to set up an ideal to permit everyone to establish that he cannot live up to it – luckily no more than others can? Handling quantity and its practical relevance are at stake – at any rate for specialized areas of research and the academic disciplines.

Still within these models of quantitative risk calculation, which are generally guided by the subjective expectation of advantage, we now realize that an important correction must be made. We shall refer to it as the *disaster threshold*. One accepts the results of such a calculation, if at all, only when it does not touch the threshold beyond which a (however unlikely) misfortune would be experienced as a disaster. For this reason subsistence farmers are highly averse to risk because

- 2 See Terezinha Nunes Carraher, David William Carraher, and Analúcia Schliemann, 'Mathematics in the Streets and in Schools'. *British Journal of Developmental Psychology* (1985), pp. 21-29; Terezinha N. Carraher, Analúcia D. Schliemann and David W. Carraher, 'Mathematical Concepts in Everyday Life,' in G. B. Saxe and, M. Gearhart, eds., *Children's Mathematics* (San Francisco, 1988), pp. 71-87; Jean Lave, 'The Values of Quantification,' in John Law, eds., *Power, Action and Belief: A New Sociology of Knowledge?* (London, 1986), pp. 88-111.
- 3 As one example of numerous treatments of this topic, see Eric Ashby, *Reconciling Man with the Environment* (London, 1978).
- 4 See James G. March and Zur Shapira, 'Managerial Perspectives on Risk and Risk Taking,' *Management Science*, 33 (1987), pp. 1404-1413, and the empirical studies evaluated there.

they are under the constant threat of hunger, of losing their seed, of being unable to continue production.<sup>5</sup> Under money economy circumstances we find corresponding results: entrepreneurs facing liquidity problems are less willing to take risks than those who are not plagued by this problem when the risk is of a given magnitude.<sup>6</sup> It will probably be necessary to take into account that the disaster threshold will have to be located at very different positions, depending on whether one is involved in risk as a decision maker or as someone affected by risky decisions.<sup>7</sup> This makes it difficult to hope for consensus on such calculation even when dealing with specific situations.

But that is not all. In the meantime the social sciences have discovered the problem of risk as well; but not so to speak in their own front yard, but because it has not been nurtured and watered with enough care in neighbouring plots. Cultural anthropologists, social anthropologists, and political scientists point out – and rightly – that the evaluation of risk and the willingness to accept risk are not only psychological problems, but above all social problems. In this regard one behaves as the pertinent reference group expects one to, or – either in conformity with or in breach of prevailing opinion – in terms of one's socialization.<sup>8</sup> The background to this position, although initially only

- 5 See, for a broader survey, Elisabeth Cashdan, ed., *Risk and Uncertainty in Tribal Societies* (Boulder, 1990). See also, for example, Allen Johnson, 'Security and Risk-Taking among Poor Peasants: A Brazilian Case.' In George Dalton, ed., *Studies in Economic Anthropology* (Washington, 1971), pp. 1443-150; James Roumasset, *Rice and Risk: Decision making among Low-Income Farmers* (Amsterdam, 1976); James Roumasset et al., eds., *Risk, Uncertainty, and Agricultural Development* (New York, 1979); John L. Dillon and Pasquale L. Scandizzo, 'Risk Attitudes of Subsistence Farmers in Northeast Brazil: A Sampling Approach.' *American Journal of Agricultural Economics*, 60 (1978), pp. 425-435.
- 6 See Peter Lorange and Victor D. Norman, 'Risk Preference in Scandinavian Shipping.' *Applied Economics*, 5 (1973), pp. 49-59.
- 7 See greater detail in Chapter 6.
- 8 Provocative in this regard: Mary Douglas and Aaron Wildavsky, *Risk and Culture: An Essay on Selection of Technological and Environmental Dangers* (Berkeley, 1982); Mary Douglas, *Risk Acceptability According to the Social Sciences* (London, 1985). See also Branden B. Johnson and Vincent T. Covello, eds., *The Social and Cultural Construction of Risk:*

postulated as a countertheory, is a better understanding of the extent of the problem, inspired above all by the technological and ecological problems confronting modern society. This brings to the foreground the question of who or what decides whether (and within which material and temporal contexts) a risk is to be taken into account *or not*. The already familiar discussions on risk calculation, risk perception, risk assessment and risk acceptance are now joined by the issue of selecting the risks to be considered or ignored. And once again, discipline-specific research can reveal that this is not a matter of chance but that demonstrable social factors control the selection process.

However, these efforts still presuppose an individualistic point of departure. They modify the results of psychological research. If, for example, such research demonstrates that individuals in everyday contexts typically underestimate risks – perhaps because everything has gone well to date and because one overestimates one's capacity for controlling events and underestimates the extent of loss or damage that can be suffered in situations one has yet to experience, – then we can pose the question of how communication that seeks to raise the level of risk awareness must be constituted.<sup>9</sup> There is no doubt that by

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*Essays on Risk Selection and Perception* (Dordrecht, 1987); Lee Clarke, 'Explaining Choices among Technological Risks.' *Social Problems*, 35 (1988), pp. 22-35 (stressing intervening organizational interests); Christoph Lau, 'Risikodiskurse: Gesellschaftliche Auseinandersetzungen um die Definition des Risikos.' *Soziale Welt*, 40 (1989), pp. 418-436 (with emphasis on the difference in perspective between interested parties and those affected; Aaron Wildavsky and Karl Drake, 'Theories of Risk Perception: Who Fears What and Why', *Daedalus* 119(4) (1990), pp. 41-60.

9 There has been research, for example, in the field of warnings against risks in product advertising (see W. Kip Viscusi and Wesley A. Magat, *Learning About Risk: Consumer and Worker Responses to Hazard Information* (Cambridge, Mass., 1987). The multifarious efforts to influence sexual behaviour in the face of the AIDS risk fall under this heading. Generally speaking we may assume that a policy of information is more likely to bear success than a recognizably educative intention. See Douglas, *op.cit.* (1985), p. 31 ff. for further indications. Mere information confirms to a certain extent the individual's image of himself, leaving the

including social contexts and operations, a necessary complementation of psychological insights is provided as well as a convincing explanation of why individuals react differently in differing social situations. As we learn more and more in this respect, however, we finally reach a point where we have to ask ourselves whether attribution to individual decision making (whether rational, intuitive, habitual etc.) can still be regarded as tenable at all. Or whether, leaving this aside, we should not attempt a strictly sociological approach, tackling the phenomenon of risk only in the sense of communication – naturally including communication of decisions made by individuals.

Without taking such a radical stance, sociology has finally also turned its attention to the problem of risk; or it has at least laid claim to the term risk. Following the ebbing of anticapitalist prejudice, it now finds a new opportunity to fill its old role with new content, namely to warn society.<sup>10</sup> At present this function is, however, being performed completely without reflection; and by this we mean that sociology is not reflecting on its own role. For even if the sociologist knows that risks are selected: *why and how does he do this himself?* Sufficient theoretical reflection would have to recognize at least the 'autological' component that always intervenes when observers observe observers. The social determination of all experience and action recognized by sociology also applies *mutatis mutandis* with regard to the discipline itself. It cannot observe society from without, it operates from within society; and of all observers, *it should be the first to realize the fact*. It may all very well adopt the topics of the moment, may support protest movements, may describe the dangerous nature of modern technology or warn against irreparable environmental damage. But others do the same. What ought to go beyond this is a theory of the selectivity of all societal operations, including the observation of these operations; indeed, even including the structures determining these operations. For sociology, the topic of risk ought thus to be subsumed under a theory of modern society, and should be shaped by

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decision up to him, while anything going beyond this and still addressing the individual appears 'paternalistic' and demands of the individual that he bow to exhortations contrary to his inclinations.

10 See Ulrich Beck, *Die Risikogesellschaft: Auf dem Weg in eine andere Moderne* (Frankfurt, 1986).

the conceptual apparatus thereof. But there is no such theory, and the classical traditions that continue to guide the majority of theoreticians in the field of sociology provide few openings for topics such as ecology, technology, and risk, not to speak of the problems of self-reference.

We cannot at this point discuss the general difficulties of interdisciplinary research. There is cooperation at project level, and there are areas of research that could be referred to as 'transdisciplinary' fields, for example, cybernetics and systems theory. Risk research could represent a further possibility. For the moment, however, the negative consequences of participation by numerous disciplines and special research areas are most apparent. There is no definition of risk that could meet the requirements of science. It appears that each area of research concerned is satisfied with the guidance provided by its own particular theoretical context. We must therefore question whether, in individual research areas, and even more so more in interdisciplinary cooperation, science knows what it is talking about. If only for epistemological reasons we may not assume that such a thing as risk exists, and that it is only a matter of discovering and investigating it. The conceptual approach constitutes what is being dealt with.<sup>11</sup> The outside world itself knows no risks, for it knows neither distinctions, nor expectations, nor evaluations, nor probabilities – *unless self-produced by observer systems in the environment of other systems.*

When we seek definitions of the concept of risk, we immediately find ourselves befogged, with an impression of being unable to see beyond our own front bumper. Even contributions addressing the

11 This should not be read as a commitment to an 'idealistic' or 'subjectivist' version of the theory of knowledge. It is intended only to mean that science (and correspondingly society as well) has to orientate its own operations on the distinction between self-reference and external reference if it is not continuously to confuse its subject matter with itself. Respecting this distinction (however internally conditioned and sustainable in its evolution) results in the 'existence' for the scientific observer of perfectly objective entities to which the concept of risk can be applied. There is, however, no guarantee that a majority of observers will agree in their identification and understanding of an object, and all the less so, the more system-differentiation in society and its subsystems advances. This alone is the problem discussed in our text.

topic directly fail adequately to apprehend the problem.<sup>12</sup> The concept of risk is frequently defined as a 'measure'<sup>13</sup>; but if it is only a problem of measurement, it is not quite clear what all the fuss is about. Problems of measurement are problems of convention, and in any case the risks of measurement (thus of measurement errors) are not the same as what is being measured as a risk. Such examples could be multiplied *ad infinitum*, paradoxically in the exact sciences in particular; for they seem to assume that exactitude has to be expressed in the form of a calculus and that the use of everyday language accordingly requires no precision.

It is, however, generally agreed that not too much attention needs to be paid to questions of definition, for definitions serve only to delimit, not adequately to describe (let alone explain) the object under investigation. After all, if it is not at all clear what one is supposed to be dealing with, it is quite impossible to start investigating. And, rightly or wrongly, the sociologist will be permitted to assume that this imprecision offers the opportunity to switch topics in accordance with fash-

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- 12 Baruch Fischhoff, Stephan R. Watson and Chris Hope, 'Defining Risk.' *Policy Sciences* 17 (1984), pp. 123-139, oscillate for example, between two levels: that of defining the concept of risk and that of measuring concrete risks. Lawrence B. Gratt, 'Risk Analysis or Risk Assessment: A Proposal for Consistent Definitions.' In Vincent T. Covelto et al., eds., *Uncertainty in Risk Assessment, Risk Management, and Decision Making* (New York, 1987), pp. 241-249, after discussing a number of attempts at definition, provides one of his own: 'The potential for realization of unwanted, adverse consequences to human life, property, or the environment' (244, 248). But consequences of what? Can one not risk other things as well, e.g., reputation?
- 13 For example, Robert W. Kates and Jeanne X. Kasperson, 'Comparative Risk Analysis of Technological Hazards.' *Proceedings of the National Academy of Science* 80 (1983), pp. 7027-7038 (7029), provide the definition: 'A hazard, in our parlance, is a threat to people and to what they value (property, environment, future generations, etc.) and risk is a measure of hazard.' These measurement theory version can be developed in a variety of directions and can make a valuable contribution to the field. For a survey see Helmut Jungermann and Paul Slovic, 'Die Psychologie der Kognition und die Evaluation von Risiko.' In G. Bechmann, eds., *Risiko und Gesellschaft*, Opladen (in press).

ion and opinion, with changing sponsors, and shifts in public attention. We thus have good reason to concern ourselves initially with delimiting the object of risk research.

## II.

Older civilizations had developed quite different techniques for dealing with analogous problems, and thus had no need for a word covering what we now understand by the term risk. Mankind had naturally always been preoccupied by uncertainty about the future. For the most part, however, one trusted in divinatory practices, which – although unable to provide reliable security – nevertheless ensured that a personal decision did not arouse the ire of the gods or of other awesome powers, but was safeguarded by contact with the mysterious forces of fate.<sup>14</sup> In many respects the semantic complex of sin (conduct contravening religious instruction) also represents a functional equivalent, inasmuch as it can serve to explain how misfortune comes about.<sup>15</sup> In ancient oriental maritime trade there was already what could be described objectively as risk awareness accompanied by the corresponding legal institutions,<sup>16</sup> which to begin with were scarcely to be distin-

14 Rather rashly, Vincent T. Covello and Jeryl Mumpower, 'Risk Analysis and Risk Management: An Historical Perspective.' *Risk Analysis* 5 (1985), pp. 193-120, assume that certainty is provided by religious advice and authority. However, the evolution of highly complex divinatory methods (wisdom) in the early literate civilizations of Mesopotamia and China suggests that uncertainty was by no means removed, but was transformed in evolutionary processes into ever more complex knowledge, written records, ambiguities, or contradictions requiring interpretation, and not least of all into the figures of self-fulfilling prophecy (Oedipus type), warning against including prophecies of misfortune into one's own efforts towards avoiding it, because precisely by doing so one would trigger the conditions for its occurrence. A great deal of material is in Jean-Pierre Vernant et al., *Divination et rationalité* (Paris 1974).

15 In regard to this comparison see also Mary Douglas, 'Risk as a Forensic Resource.' *Daedalus* 119(4) (1990), pp. 1-16 (4 ff.).

16 See A. L. Oppenheim, 'The Seafaring Merchants of Ur.' *Journal of the American Oriental Society* 74 (1954), pp. 6-17.

guished from divinatory programmes, appeals to tutelary gods, etc., but which from a legal point of view – particularly as far as the distribution of roles between the suppliers of capital and the seafarers was concerned – clearly performed insurance functions, and which with relative continuity right up to the Middle Ages was thus to influence the law of maritime trade and maritime insurance. Even in non-Christian antiquity there was, however, still no fully developed decision awareness. Thus the term 'risk' first appears in the transitional period between the late Middle Ages and the early modern era.

The etymology of the word is unknown. Some suspect it to be Arabic in origin. In Europe the word is to be found already in medieval documents, but it spread only with the advent of the printing press, in the initial phase apparently in Italy and in Spain.<sup>17</sup> There are no comprehensive studies on the etymology and conceptual history of the term,<sup>18</sup> and this is understandable, since the word at first occurs relatively rarely and is used in a great variety of contexts. It finds significant application in the fields of navigation and trade. Maritime insurance is an early instance of planned risk control,<sup>19</sup> but elsewhere we

17 For English the *Oxford English Dictionary*, 2nd ed. (1989), vol. XIII, p. 987 provides references only from as late as the second half of the seventeenth century. For German the *Deutsches Fremdwörterbuch*, Hans Schulz, ed., later Otto Basler (Berlin, 1977) Vol. 3, p. 452 ff. gives references from the mid-sixteenth century. It should, however, be noted that the renaissance Latin term *risicum* had been in use long before, in Germany as well, so that such evidence is rather a question of whether and what was printed in German.

18 An alternative could be in historical studies of image and symbol. See Hartmut Kugler, 'Phaetons Sturz in die Neuzeit: Ein Versuch über das Risikobewußtsein.' In Thomas Cramer, ed., *Wege in die Neuzeit* (Munich, 1988), pp. 122-141.

19 The juridical typology of these contracts is worth noting. Since legal actions in the civil law tradition required both *nomen et causa*, new types of contract could not simply be created. Thus even in Roman times recourse was had to the misused form of the wager. The arbitrariness of an uncertain event, on the occurrence or nonoccurrence of which one could conclude wagers could also be transferred to an instance of real foreboding. See Karin Nehlsen-von Stryk, 'Kalkül und Hazard in der spätmittelalter-

also find formulations such as 'ad risicum et fortunam' or 'pro securitate et risico,' or 'ad omnem risicum, periculum et fortunam Dei' in contracts regulating who is to bear a loss in the event of its occurrence.<sup>20</sup> The term risk does not, however, remain limited to this field, but spreads from about 1500 on, probably with the expansion of printing. Scipio Ammirato writes, for example, that whoever propagates rumour runs a risk (*rischio*) of being asked where he obtained his information.<sup>21</sup> Giovanni Botero writes: 'Chi non risica non guadagna,' and following an old tradition, distinguishes this maxim from vain, foolhardy projects.<sup>22</sup> Annibale Romei reproaches whoever 'non voler arrischiare la sua vita per la sua religione'.<sup>23</sup> In a letter addressed to Claudio Tolomei by Luca Contile on 15th September 1545,<sup>24</sup> we find the formulation: 'vivere in risico di mettersi in mano di gente forestiere e forse barbare.' Since the existing language has words for danger, venture, chance, luck, courage, fear, adventure (*aventuyre*) etc. at its disposal,<sup>25</sup> we may assume that a new term comes into use to indicate a problem situation that cannot be expressed precisely enough with the vocabulary available. On the other hand, the word

lichen Seeversicherungspraxis.' *Rechtshistorisches Journal* 8 (1989), pp. 195-208.

20 See Erich Maschke, 'Das Berufsbewußtsein des mittelalterlichen Fernkaufmanns.' in Carl Haase, ed., *Die Stadt des Mittelalters*, Vol. 3 (Darmstadt, 1973), pp. 177-216 (192 ff.); Adolf Schaube, 'Die wahre Beschaffenheit der Versicherung in der Entstehungszeit des Versicherungswesens.' *Jahrbücher für Nationalökonomie und Statistik* 60 (1893), pp. 40-58, 473-509 (42, 476).

21 *Della Segretezza* (Venice, 1598), p. 19.

22 *Della Ragion di Stato* (1589), quoted from the edition from Bologna 1930, p. 73. On the waning of moral criticism of foolhardiness, hubris, *superbia*, etc. see also Kugler op. cit. (1988).

23 *Discorsi* (Ferrara, 1586), p. 61.

24 Quoted by Claudio Donati, *L'Idea di Nobiltà in Secoli XIV-XVIII* (Rome, 1988), p. 53.

25 On the two last terms mentioned, practically synonymous with the present-day usage of the word 'risk', see Bruno Kuske, 'Die Begriffe Angst und Abenteuer in der deutschen Wirtschaft des Mittelalters.' *Zeitschrift für handelswissenschaftliche Forschung*, N.F. 1 (1949), pp. 547-550.

goes beyond the original context (for instance in the quotation 'non voler arrischiare la sua vita per la sua religione'), so that it is not easy to reconstruct the reasons for the new concept coming into existence on the basis of these random occurrences of the term.

With this proviso we presume that the problem lies in the realization that certain advantages are to be gained only if something is at stake. It is not a matter of the costs, which can be calculated beforehand and traded off against the advantages. It is rather a matter of a decision that, as can be foreseen, will be subsequently regretted if a loss that one had hoped to avert occurs. Since the institutionalisation of confession, religion has sought by every means to move the sinner to repentance, the religious variant of regret. Risk calculation is clearly the secular counterpart to a repentance-minimization programme; in any case an attitude inconsistent in the temporal sequence of events: first this, then that. Thus it is at all events a calculation in terms of time. And in the difference between the religious and secular perspectives lies the tension of the well-known wager proposed by Pascal<sup>26</sup>. The risk of unbelief is in any case too high, for it is salvation that is at stake. The risk of belief, that we genuflect quite unnecessarily, appears by contrast insignificant.

These brief references provide an initial impression that there is a complex problem in the background motivating the formation of a concept that fails, however, to supply an adequate indication of this problem. It is not a matter of mere cost calculation on the basis of reliable prognoses. Nor is it only a matter of the classical ethical super-norm of measure (*modestas, mediocritas*) and justice (*iustitia*) to be respected in all striving after worthwhile goods. It is not a matter of those similarly timeless forms of rationality in which a stationary society makes allowances for the fact that life must be borne as an admixture of advantages and disadvantages, of perfection and corruption, and where too much of a good thing can be bad for you. It is not only a matter of attempting to express rationality as a metarule, whether as an optimization rule or a rule of the golden medium attempting to establish the distinction good and bad as a unity while formulating

26 *Pensées* No. 451 in the classification of the edition of the Bibliothèque de la Pléiade (Paris, 1950), p. 953 ff. Pascal uses the terms *hazard, hazarder*.

this unity in its turn as good (as advisable). Here we are not resolving a paradox by applying the schematism of good and bad to itself. Nor has it only to do with the peripheral rhetorical caprices of discovering that bad is good and good is bad.<sup>27</sup> And as a result the old *prudentialia* fails, which had taught that and how one can cope in those situations of life where the *varietas temporum* and the mixture of good and bad qualities in one's fellow men play a role. While the terminology of risk had already become current, all these old instruments were nevertheless made use of with still greater force – as, for instance, in the doctrines of the virtues of the prince and his advisers or in the concept of *raison d'état*. But at the same time we recognize in the dramatisation of these semantic forms that the situation is gradually slipping out of the protagonists' grasp. Whither does Richelieu cull the maxim: 'Un mal qui ne peut arriver que rarement doit être présumé n'arriver point. Principalement, si, pour l'éviter, on s'expose à beaucoup d'autres qui sont inévitables et de plus grande conséquence'<sup>28</sup> The reason is probably that there are so many causes for things going wrong in improbable ways that they cannot all be allowed for by rational calculation. These maxims take us to the heart of current political controversies on the consequences of modern technologies and the ecological problems confronting modern society. This gives the concept of risk, which Richelieu did not have to employ at all, a quite different status. But which one?

Etymology alone provides no reliable lead. It gives us certain clues, above all that relations between claims to rationality and the time dimension become more and more precarious. Both indicate that it is a question of decisions that serve to bind time, although *we cannot gain sufficient knowledge of the future; indeed, not even of the future*

27 For examples see Ortensio Lando, *Paradossi, cioe sententie fuori del comun parere* (Venice, 1545); Ortensio Lando, *Confutatione del libro de paradossi nuovamente composta, in tre orationi distinta* (s.l., s.a.).

28 'A misfortune that cannot occur but rarely ought to be presumed never to occur. Principally if, in order to avoid it, one exposes oneself to many others that are inevitable and of greater import.' Original quoted from the edition *Maximes de Cardinal de Richelieu* (Paris, 1944), p. 42. On the current position see Howard Kunreuther, 'Limited Knowledge and Insurance Protection.' *Public Policy* 24 (1976), pp. 227-261.

*we generate by means of our own decisions.* Since Bacon, Locke, and Vico, confidence in the feasibility of generating circumstances has grown; and to a large extent it has been assumed that knowledge and feasibility correlate. This pretension corrects itself to a certain degree with the concept of risk, as it does in other ways with the newly invented probabilistic calculation. Both concepts appear to be able to guarantee that even if things do go wrong, one can have acted correctly. They immunize decision making against failure, provided one learns to avoid error. The meaning of *securitas* correspondingly changes. Whereas in the Latin tradition the term had denoted a subjective frame of mind of freedom from care or as a negative value of heedlessness, especially with respect to salvation (*acedia*), in French the concept (*sûreté* – later on the objective concept of *sécurité* is added) takes on an objective meaning.<sup>29</sup> It is as if, in the face of an increasingly uncertain future, a secure basis for the making of decisions now had to be found. All this meant a vast expansion in the scope and pretensions of capability, and the old cosmological limitations, the constants of being and the secrets of Nature were replaced by distinctions falling within the domain of rational calculation. And this has determined the understanding of risk to this day.

If we enquire how this rationalist tradition sees the problem, we receive a simple and convincing answer: losses are to be avoided as far as possible. Since this maxim alone would restrict the radius of action too greatly, one does have to permit, and that means 'risk', actions that can in principle cause avoidable loss, provided that the estimate of the possible degree of loss appears acceptable. Still today, risks are evaluated by multiplying the degree of loss by the probability of loss.<sup>30</sup> In other words, it is a matter of a controlled extension of

29 See with many references Emil Winkler, *Sécurité* (Berlin, 1939). See also the study by Franz-Xaver Kaufmann, *Sicherheit als soziologisches und soziopolitisches Problem: Untersuchungen zu einer Wertidee hochdifferenzierter Gesellschaften* (Stuttgart, 1970), that also provides evidence for a shift in meaning in the modern period.

30 See e.g., ..... We can also find critical statements, not least of all from applied mathematicians. See Sir Hermann Bondi, 'Risk in Perspective.' In M. G. Cooper, ed., *Risk: Man-Made Hazards to Man* (Oxford, 1985), pp. 8-17.

rational action, just as, in the economic field, anyone who operates only with equity and not with loans does not exhaust the resources of rational action. For these purposes, it suffices to assume differing utility functions and probabilistic distributions with respect to the consequences of different decisions, and to describe the decision itself as risky in view of the differences in results. A *concept* of risk going beyond this is superfluous and would find no place in the structure of this theory.

The rationalist tradition can thus produce good reasons, and it would be inappropriate to contradict it on this level. To abstain from risk, especially under today's conditions, would mean to forswear rationality. But a sense of unease nevertheless remains. The rationalist tradition has broadly been accused of not seeing what it does not see, 'failing to take account of the blindness inherent in the way problems are formulated.'<sup>31</sup> If, however, we wish to observe how the rationalist tradition observes, we must free ourselves from its way of understanding of the problem. We have to leave it with its problem, but seek to understand that it cannot see what it cannot see. We have to shift the theory to the level of second-order observation. But this makes demands on concept formation inadequately served by both interdisciplinary discussion and the etymology and conceptual history of the term.

### III.

Particular care in concept formation is required at the second-order level in observing observation. We assume that every observer has to make use of a distinction, since he is otherwise unable to indicate what it is that he wishes to observe. Indication is possible only on the basis of distinguishing the state indicated, and the drawing of distinctions makes it possible to indicate one or other of the sides of a distinction. These rules follow the form calculus of George Spencer

31 Thus Terry Winograd and Fernando Flores, *Understanding Computers and Cognition: A New Foundation for Design* (Reading, Mass., 1987), p. 77. See also p. 97 ff.

Brown,<sup>32</sup> and for this reason we occasionally speak of 'form' when we refer to a distinction separating two sides and requiring operations (and also time) – either for the purpose of recalling the name of one of the sides in order to condense identity, or to cross the boundary in order to take the other side as the point of departure for the next operation. We have chosen this rather than the usual bases, whether the theory of causation or statistical methodology, because we wish to investigate observations – and observations are nothing more or less than distinguishing indications.

A further preliminary remark should be made on the distinction between first-order and second-order observation. Every observer uses a distinction for the purpose of indicating one or other of the sides. To cross from one side to the other he requires time. He is therefore unable to observe both sides simultaneously, although each side is *at the same time* the other side of the other. Nor is he able to observe the unity of the distinction while he is making use of it, for to do so he would have to draw a distinction relative to the first distinction, thus using a further distinction for which the same would apply. In brief, observation cannot observe itself, although an observer as a system has time to switch distinctions and, at the level of observation of the second order, is thus able to observe himself as well.

Moreover, we must note two modes of drawing distinctions. The first indicates something as distinct from everything else, without specifying the other side of the distinction. What is specified by this manner of distinction we shall for the purpose of our investigations refer to as *objects*.<sup>33</sup> In observing objects, indicating and distinguishing the object coincide; these two operations can only performed *uno*

32 See: *Laws of Form*, quoted from the reprint (New York, 1979).

33 There are, of course, many other usages of the concept of object. What is important is that we do not proceed on the basis of the distinction object/subject; for in choosing this form (let us call the subject form) we would leave ourselves no room for what we wish to refer to in the text as 'concepts'; the form would consequently have to accommodate concepts as instruments for the observation of 'subjects', thus leading us into the trap of the insoluble problem of 'intersubjectivity'. It would no longer be possible adequately to describe the observation of observers and we would probably lose our way in the labyrinth of suspected ideology, relativism, pragmatism, pluralism discourse theory, etc.

*actu*. The other mode of making a distinction restricts what can constitute the content of the other side of the distinction, for instance women/men; justice/injustice; hot/cold; virtue/vice; praise/blame. The condensate of such a process of drawing distinctions shall be referred to as concepts. Both objects and concepts are distinction-dependent constructs of the observer. Concepts, however, keep the observer at a greater distance than do objects, because they separate to a greater degree the drawing of distinctions and the making of indications as observation operations, and require that distinctions be distinguished.

The late appearance in history of circumstances indicated by means of the new term 'risk' is probably due to the fact that it accommodates a plurality of distinctions within one concept, thus constituting the unity of this plurality. It is not simply a matter of a description of a universe by an observer of the first order who sees something positive or something negative, who establishes the existence or absence of something. It is rather a matter of reconstructing a phenomenon of multiple contingency, which consequently offers different observers differing perspectives.

Future loss may occur – or not, as the case may be. Seen from the vantage point of the present, the future appears uncertain, although it is already apparent now that future 'presents' will be either the way we want them to be or quite different. At the present moment we cannot know how they will turn out. But we can know that we ourselves or other observers will in a future present know what the situation is, and will then judge differently from the way we do now – although differences of judgement among us might arise.

On the other hand – and in addition to what has just been said – what can occur in the future also depends on decisions to be made at present. For we can speak of risk only if we can identify a decision without which the loss could not have occurred. It is not imperative for the concept (although this is a question of definition) whether the decision maker perceives the risk as a consequence of his decision or whether it is others who attribute it to him; and it is also irrelevant at what point in time this occurs – whether at the time when the decision is made or only later, only when the loss has actually occurred. For the concept as we intend to define it, the only requirement is that the contingent loss be itself caused as a contingency, that is to say that it be avoidable. Here, too, differences in observer perspective are con-

ceivable, offering a variety of opinions on whether a decision should be made despite the risk thereby incurred or not.

In other words, the concept indicates a highly hierarchical contingency arrangement. Following the Kantian concept with its time reference, we could also speak of a contingency *schema*. Or with Novalis we could speak of the 'Alleseinheit des Schemas'.<sup>34</sup> Thus the fact that two temporal contingencies, event and loss, are firmly coupled as contingencies (not as facts!), although this is not imperative, makes it possible for observers to differ in the way they see things. Temporal contingencies provoke social contingencies, and this plurality, too, cannot be cancelled out by an ontological formula. One can, of course, reach agreement on whether to make a decision or not; but this is then a matter of communication not of knowledge. Once dissolved into temporal and social differentiations there is no return to the innocence of primary observation. The gate to paradise remains sealed – by the term risk. What we have just referred to as a contingency schema strains the medium of meaning in which all experience and communication must find forms. Meaning can be defined as a medium that is generated by a surplus of indications of other options.<sup>35</sup> In the final instance all meaning thus resides in the distinction of actuality versus potentiality.<sup>36</sup> The actual is always the way it is; and in the world it is always simultaneously present with other actualities.<sup>37</sup> Since all systems carry out (or do not carry out) their

34 'The all-oneness of the schema.' See 'Philosophische Studien 1795/96' in the compilation of the edition by Hans-Joachim Mähl and Richard Samuel, *Werke, Tagebücher und Briefe*, Vol. 2 (Darmstadt, 1978), p. 14. Loc. cit. also: 'Das Schema steht mit sich selbst in Wechselwirkung. Jedes ist nur auf seinem Platze, was es durch die andern ist.' 'The schema interacts with itself. Each thing in its place is what it is only by virtue of every other thing.'

35 For more detail see Niklas Luhmann, *Soziale Systeme: Grundriß einer allgemeinen Theorie* (Frankfurt, 1984), p. 92 ff.

36 Which is in its turn a distinction that can enter into itself. For, in the mode of the possible, what is actual is in its turn possible (and not impossible), while within the possible other possible actualities are indicated.

37 See Niklas Luhmann, 'Gleichzeitigkeit und Synchronization.' In Niklas Luhmann, *Soziologische Aufklärung*, Vol. 5, *Konstruktivistische Perspektiven* (Opladen, 1990), pp. 95-130.

operations in actuality, arbitrariness can never be given free rein.<sup>38</sup> But in the meaning-constitutive field of the possible, the plurality of perspective may increase and it might become correspondingly more difficult to give it form. We can already recognize this in the growing possibilities for negating risk – whether in the direction of security, when one asserts the impossibility of a future instance of loss, or in the direction of danger, when one denies the attributability of loss to a decision, or with the aid of secondary distinctions such as known/unknown risks or communicated/non-communicated risks. As in modal logic problems, the use of negations must thus be specified.<sup>39</sup> But all this happens – and it shows the practical effect of this switch to a second or third level of observation – on condition that the negation of a risk – of any sort whatsoever – in its turn also constitutes a risk.

All this, however, does not yet sufficiently explain the operative use of the concept of risk. What does this word indicate? Which side of which distinction? What negation option (which other side of which distinction) does the concept imply if we wish to define it for scientific use? If we want to know what an observer (of the second order) means when he refers to an observed prospect as risky, we must be able to state within the framework of which distinction the concept of risk indicates the one (and not the other) side. In other words, we ask for the form that guides an observer when he refers to an observation as a risk; and by 'form' we always understand a boundary, a severance separating two sides requiring us to state which side we are selecting as the point of departure for the following operation.

It is clear that the rationalist tradition sketched above, although offering us a form, does not provide a concept of risk. It translates into calculation injunctions the problem of how loss can be averted to the highest possible degree despite exploitation of the options of rationality. We then have the form optimal/nonoptimal, and thus a whole cascade of secondary distinctions to be calculated in different ways. In brief, the significance of the problem and its specific modernity

38 Risky decisions are also decisions, are observable as actual occurrences, take place under the condition of simultaneity with other events. And all this happens the way it happens.

39 On corresponding problems and the necessity of a multivalued logic to handle them see Elena Esposito, 'Rischio e Osservazione,' MS (1990).

should not be underestimated, but on the contrary should be emphasized. But it does not supply the form that will provide us with a concept of risk.

It is widely held that the concept of risk is to be determined as a counter-concept to security.<sup>40</sup> In political rhetoric this has the advantage that if we speak out against all ventures deemed to be too risky, we also appear to lay great store by the generally appreciated value of safety/security. This rapidly (much too rapidly) gives rise to the idea that one really desires security, but that, given the state the world is in (formerly one would have said: beneath the moon), one has to accept risks. The risk form thus becomes a variation on the distinction of desirable/undesirable. A somewhat more refined version is to be found among safety experts. Their professional experience teaches them that absolute safety cannot be achieved. Something can always happen.<sup>41</sup> For this reason they use the concept of risk mathematically to specify efforts to ensure safety and the measure of what can reasonably be achieved.<sup>42</sup> This corresponds to the transition from deterministic to probabilistic risk analysis. Much the same is also true with respect to the literature on consumer protection.<sup>43</sup> This confirms the widespread tendency to define risk as a measure for mathematical processes. One can then, with an eye on the sociologists, concede that the concept of security indicates a social fiction and that one can invest

40 See Lola L. Lopez, 'Between Hope and Fear: The Psychology of Risk,' *Advances in Experimental Social Psychology* 20 (1987), pp. 255-259 (275 ff.). It should be noted that the German term 'Sicherheit' used by the author is a very broad term that can be translated as 'safety', 'security' or 'certainty' as the case may be (RB).

41 From this point of view one then often likes to say, due to human shortcomings.

42 Thus, e.g., E. N. Bjordal, 'Risk from a Safety Executive Viewpoint.' In W. T. Singleton and Jan Hoven, eds., *Risk and Decisions* (Chichester, 1987), pp. 41-45. See also Sylvius Hartwig (ed.), *Große technische Gefahrenpotentiale: Risikoanalysen und Sicherheitsfragen* (Berlin, 1983).

43 See Peter Asch, *Consumer Safety Regulation: Putting a Price on Life and Limb* (Oxford, 1988), e.g., p. 43: 'The prevention of all consumer accidents and injuries – 'zero risk' – is neither a realistic nor a useful goal.' Quite right! But what then?

tigate what in social communication is treated uncontroversially as certain and how stable these fictions are in the face of contrary experience (for example, announced connection times at airports).<sup>44</sup> Security as a counterconcept to risk remains an empty concept in this constellation, similar to the concept of health in the distinction ill/healthy. It thus functions only as a reflexive concept. Or also as a safety-valve concept for social demands that, in proportion to the variable level of demand, affect risk calculation. In effect the risk/security pair provides us with an observation schema that in principle makes it possible to calculate *all* decisions from the point of view of the risk involved. As a result, this form has the incontestable virtue of universalizing risk awareness. Thus it is not by chance that since the seventeenth century the topics of security and risk have matured in a process of mutual interaction.

These considerations induce us to pose the question of whether there can be situations where we can choose between risk and security, between risky and safe alternatives, or even whether we must choose between them. This question requires bringing the conceptual approach more accurately into focus. Such an option is frequently put forward.<sup>45</sup> The apparently 'safe' alternative then implies the double certainty that no loss will occur and that the opportunity will be lost that one would possibly have been able to take via the risky variant. But this argument is deceptive, for the lost opportunity was in itself no certainty. It thus remains uncertain whether by forgoing the opportunity one has lost out on something or not; and what remains is an open question of whether one ought to regret preferring the 'safe' variant or not. However, this is a question that will frequently be im-

44 Adaptation to the sensibilities of public opinion is meanwhile also playing a role. See, e.g., Chris Whipple, 'Opportunities for the Social Sciences in Risk Analysis: An Engineer's Viewpoint.' In Vincent T. Covello et al., eds., *Environmental Impact Assessment, Technology Assessment, and Risk Analysis: Contributions from the Psychological and Decision Sciences* (Berlin, 1985), pp. 91-103.

45 For example, on managerial decisions see Kenneth R. MacCrimmon and Donald A. Wehrung, *Taking Risks: The Management of Uncertainty* (New York, 1986), p. 11 and throughout. And this despite the fact that the authors are familiar with the concept of opportunity loss (see 10 *et alibi*).

possible to answer if the opportunity is not taken up at all, and the risky causal proceeding is not even set in motion. The risk of the one variant nevertheless colours the entire decision making situation. It is not possible to forgo an uncertain advantage with absolute certainty because the sacrifice might possibly not be one (but one cannot know this at the time). One can refuse to be guided at all by risk-related distinctions – for instance in the context of primarily religious or otherwise 'fanatical' ventures. But when one does take risks into consideration, every variant in a decision making repertoire – that is to say the entire alternative – is risky, if only with the risk of not grasping certain opportunities that could possibly prove advantageous.

Safety experts, but also all those who accuse them of not doing enough for safety, are first-order observers. They believe in facts; and when they cross swords or negotiate, it is typically on the basis of differing interpretations or differing claims in relation to the same facts (the same 'niche', as Maturana would say).<sup>46</sup> One demands more information, better information, complains about the information being withheld by those who wish to prevent others from projecting other interpretations or making greater demands on an objectively given universe of facts<sup>47</sup> – as though there *were* 'information' available that one could *have* or *not have* as the case may be. And, as we have said, the first-order observer takes this to be the real world. But the observer of the second order faces the problem that what different observers consider to be the same thing generates quite different information for each of them.

This is not true for the second-order observer who is observing another observer to see what the latter can and cannot see.

To do justice to both levels of observation, we will give the concept of risk another form with the help of the distinction of risk and danger. The distinction presupposes (thus differing from other distinctions) that uncertainty exists in relation to future loss. There are then two possibilities. The potential loss is either regarded as a conse-

46 Impressive material on this field in Dorothy Nelkin, ed., *The Language of Risk: Conflicting Perspectives on Occupational Health* (Beverly Hills, Cal., 1985).

47 See, e.g., Michael S. Brown, 'Disputed Knowledge: Worker Access to Hazard Information.' In Nelkin op. cit., pp. 67-95.

quence of the decision, that is to say, it is attributed to the decision. We then speak of risk – to be more exact of the risk of decision. Or the possible loss is considered to have been caused externally, that is to say, it is attributed to the environment. In this case we speak of danger.

This distinction between risk and danger plays no significant role in the voluminous literature on risk research.<sup>48</sup> There may be a variety of reasons for this. We have already mentioned carelessness in concept formation. Linguistic reasons may also play a role. In the largely English-language literature the words risk, hazard, and danger are available and are usually employed almost synonymously.<sup>49</sup> There is indeed an awareness that it plays an important role in perceiving and accepting risk whether we venture voluntarily or involuntarily into dangerous situations<sup>50</sup>; or also whether we believe that we have the consequences of our own behaviour under control or not. But this describes only variables that one assumes, and can possibly demonstrate, to influence risk perception and the willingness to take risks. In

48 Frequently the terms risk and danger are used synonymously or overlapping in meaning. Lopez, op. cit. (1987), p. 265, writes for example: 'Risky choices are choices that have an element of danger.' Nicholas Rescher, in *Risk: A Philosophical Introduction to the Theory of Risk Evaluation and Management* (Washington, 1983), although distinguishing between running a risk and taking a risk (p. 6), himself makes hardly any further use of the distinction. Explicitly rejected by Anthony Giddens, *The Consequences of Modernity* (Stanford, Cal., 1990), esp. p. 34 f., on the grounds that risk is precisely the danger that future loss could occur; it does not depend on the consciousness of the decision maker. And indeed, it should not depend on consciousness as a purely psychic phenomenon. Nevertheless, we must differentiate between whether a loss would occur even without a decision being taken or not – whoever it is that makes this causal attribution.

49 In Ortwin Renn, 'Risk Analysis: Scope and Limitations.' In Harry Otway and Malcolm Peltu, eds., *Regulating Industrial Risks: Science, Hazards and Public Protection* (London, 1985), pp. 111-127 (113), we find in a context where we would expect conceptual clarification: 'Risk analysis is the identification of potential hazards to individuals and society'.

50 A subject of debate since the publication of Chauncey Starr, 'Social Benefits versus Technological Risk.' *Science* 165 (1969), pp. 1232-1238.

this respect it is not a matter of determining the form of the risk concept. This has to be tackled following the methodology proposed here by determining the counterconcept, and thus by distinguishing distinctions.

Like the distinction risk/security, the distinction risk/danger is constructed asymmetrically. In both cases the risk concept indicates a complex state that, at least in modern society, is a normal aspect of life. The other side acts only as a reflexive concept with the function of elucidating the contingent nature of the states covered by the concept of risk. In the case of risk/security, this can be recognized in the problems posed by measurement; in the case of risk/danger in the fact that only in the case of risk does decision making (that is to say contingency) play a role. One is exposed to dangers. Of course, the behaviour of those concerned also has its part to play, but only in the sense of it placing people in a situation in which loss or damage occurs. (If A had chosen to walk down a different street the tile would not have fallen on his head.) Another borderline case is that of choosing between very similar alternatives, for instance, between two airlines serving the same route – and the aircraft one has decided to fly with crashes. But in this case, too, one will hardly regard the decision as a risk, since no risk has been accepted in exchange for certain advantages, but a choice has simply been made between two more or less equivalent solutions to a problem, because it was possible to take only one of them. Thus if a risk is to be attributed to a decision, certain conditions must be satisfied, among which is the requirement that the alternatives being clearly distinguishable in respect of the possibility of loss occurring.

When risks are attributed to decisions that have been made, this leads to the taking of a number of consequent decisions, to a series (or a 'decision tree') of bifurcations, each in its turn offering risky decision making options. The first distinction is whether the loss remains within the usual cost bounds (that is to say within the 'profits wedge'), only raising the costs that have to be accepted; or whether it brings about a situation in which one retrospectively regrets having made the decision.<sup>51</sup> It is only for the purpose of dealing with this sort

51 Recently one has come to speak of 'postdecision surprise' or 'postdecision regret' and to characterize bureaucratic behaviour as an attempt to

of decision that one might subsequently have to regret that the entire mechanism of risk calculation has been developed; and it is abundantly clear that this form of rationality serves to generate a paradox, namely the demonstration that a wrong decision is nevertheless right.<sup>52</sup>

In the schema of risk and danger the interest in security (or risk aversion, or avoidance of danger) is still presupposed but, being self-evident, is not 'marked'.<sup>53</sup> The distinction of risk and danger permits a marking of both sides, but not simultaneously. Marking risks then allows dangers to be forgotten, whereas marking dangers allows the profits to be forgotten that could be earned if risky decisions are made. In older societies it was thus danger that tended to be marked,

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anticipate and under all circumstances to avoid postdecision surprises (which, as we have noted above) leads to a less than optimal exploitation of opportunities for rationality. For the mathematical procedure see David E. Bell, 'Regret in Decision Making Under Uncertainty,' *Operations Research* 30 (1982), pp. 961-981; David E. Bell, 'Risk premium for Decision Regret,' *Management Science* 29 (1982/83), pp. 1156-1166; J. Richard Harrison and James G. March, 'Decision Making and Postdecision Surprises,' *Administrative Science Quarterly* 29 (1984), pp. 26-42 and the following discussion. We shall be coming back to this.

- 52 We could object that this formulation takes no account of the time difference between the taking of the decision and the occurrence of the loss. This is true, and it is also true that the asymmetry of the flow of time in its turn resolves the paradox. For the more finely tuned decision calculation typical of organizations this is, however, insufficient, since it may be required that the time difference be reflected in its turn. In other words, one would like to be sure *now* that *at the point in time when the loss occurs* one will be able to say that one had made the right decision although from the point of view of the loss, the decision is to be regretted. In other words, we are dealing with a complex of meta-rules guaranteeing the consistency of decision evaluation despite inconsistencies. A functionally equivalent mechanism is, of course, professional tenure.
- 53 For the linguistic meta-distinction of marked/unmarked in relation to the sides of a distinction see John Lyons, *Semantics*, Vol. 1 (Cambridge, England, 1977), pp. 305-311. In this discussion we imagine that the presumably preferred side remains unmarked and does not therefore need to be indicated in particular. Marking is then a means of directing attention to where the problem lies.

whereas modern society has until recently preferred to mark risk, being concerned with optimizing the exploitation of opportunity. The question is whether this will remain the case, or whether the present situation is not characterized by the decision maker and the individual affected by the decision each marking the respective other side of one and the same distinction, thus coming into conflict because each party has his own way of seeing things and his own expectations about the way others see them.

These few points already clearly indicate some of the advantages to be gained from substituting the risk/security schema for that of risk/danger. The most important advantage is, however, in the use of the concept of attribution, for this concept relates to second-order observation. The concept has a long prehistory, especially in jurisprudence and economics. In these fields, however, it has always been concerned with the problem of correct attribution – for example of offence to offender or of growth in value to the production factors land, labour, capital, or organization.<sup>54</sup> It is only the investigation of sociopsychological attribution undertaken since the World War II<sup>55</sup> that has attained the level of second-order observance, without itself having this concept and its epistemological and methodological consequences at its disposal. It is now possible to observe how another observer makes attributions, for example, internally or externally in relation to himself or to others, and either to constant or to variable factors, to structures or to events, to systems or to situations. In this tradition of research, the type of attribution is thus itself seen as contingent, the attempt then being made to discover the factors correlating to types of attribution (personal traits, stratification, situational charac-

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54 For a survey see Hans Mayer, 'Zurechnung', *Handwörterbuch der Staatswissenschaften*, Vol. VIII, 4th edn. (Jena, 1928), pp. 1206-1228.

55 Stimulated above all by Fritz Heider, and via Heider related both to juridical and economic methodological problems (in this connection Max Weber should be mentioned) and with Gestalt psychology research on the perception of causal relations. See especially Fritz Heider, *The Psychology of Interpersonal Relations* (New York, 1958), but also Felix Kaufmann, *Methodenlehre der Sozialwissenschaften* (Vienna, 1936), whose valuable treatment of attribution (p. 181 ff.) was not included in the English edition (1944), thus exerting no influence. (Heider will have been acquainted with it.)

teristics, role constellations such as teacher/pupil). The final step would be the *autological consequence*, i.e., the insight that these correlations, too, are attributions correlating to conditions characteristic of the second-order observer. For he, too, is an observer, and thus himself falls within the scope of what he observes.

The fact that the distinction of risk and danger is made to depend on attribution does not mean that it is left to the whim of the observer to label something as a risk or as a danger. Some borderline cases have already been mentioned – especially the fact that at present no criteria for differential decision making are in evidence, or at any rate none that has to do with the variable probability of advantage and possible loss. Of greater significance is another instance, that of damage to the environment. A given threshold being passed, an irreversible shift in ecological balance or the occurrence of a disaster is often not attributable to any particular individual decisions. Observers may well continue to fight about ‘shares’, for example in the question of whether and to what extent automobile exhaust fumes are responsible for the death of forests; but even then it would not be possible to classify starting up a car engine as a risky decision. We would, so to speak, have to invent decisions to accept the attribution – for example, a decision not to prohibit motoring. In other words, in the accumulation of the effects of decision making, in long-term consequences of decisions no longer identifiable, in over-complex and no longer traceable causal relations, there are conditions that can actuate considerable losses or damage without being attributable to decisions – although it is clear that without decisions having been made such detrimental effects would never have occurred.<sup>56</sup> For an attribution can be made to a decision only if a choice between alternatives is conceivable and appears to be reasonable, regardless of whether the decision maker has, in any individual instance, perceived the risk and the alternative, or whether he has overlooked them.

If within the context of these limitations we accept this concept of risk, the concept does not indicate a fact existing independently of

56 Wolfgang Bonß, ‘Unsicherheit und Gesellschaft – Argumente für eine soziologische Risikoforschung,’ MS (Nov. 1990), speaks in this connection of second-order dangers.

whether and by whom it is observed.<sup>57</sup> For the moment it remains open whether something is to be regarded as a risk or as a danger. And if we wish to know which is which, we must observe the observer and if necessary develop theories on the conditioning of his observing. Both sides of the distinction can be applied to every still uncertain loss, albeit with varying degrees of plausibility in given societies; for example, to the possibility that an earthquake will destroy houses and kill people, that we can be involved in a traffic accident, that our marriage will not continue in harmony, or that we study a subject we have no use for in later life. For an economically trained eye, the loss can also consist in the failure to materialize of an advantage or benefit in expectation of which one had carried out an investment: one buys a car with a diesel motor, and shortly afterwards the tax on it is raised. In principle we could avoid every loss by making a decision, thus classifying every loss as a risk – for example, we could decide to move from an earthquake-prone area, to give up driving, or not to marry. And if the failure of advantages to materialize counts as loss, then the entire future as future must be seen to fall under the dichotomy of risk and danger. Therefore we can treat these concepts as being *generalizable at will*. There may be certain borderline cases. The danger of a meteorite striking with catastrophic consequences is one example, the probability of which is underestimated only because there is nothing one can do about it. This example teaches us, moreover, that modern society considers danger from the point of view of risk and takes it seriously only as risk. Any interest may be dichotomized in this way provided it is observed. The problem with which the topic of risk confronts us thus appears not to lie in the material dimension. As we shall seek to demonstrate at greater length, it is rather to be found in the relationship between the time dimension and the social dimension.

Finally, if we once again compare the two forms risk/security and risk/danger, this comparison alone provides us with an important insight, which – if respected – would cool down considerably the un-

57 At this stage we mention only in passing that, in the field of epistemology, this has led not to idealistic positions but to constructivist ones. See Niklas Luhmann, *Erkenntnis als Konstruktion* (Bern, 1988); Niklas Luhmann, *Die Wissenschaft der Gesellschaft* (Frankfurt, 1990).

necessarily heated public discussion on risk-related topics, and allow a more moderate tone to prevail. It is true to say for both distinctions that *there is no risk-free behaviour*. For the first form this means there is no absolute safety or security.<sup>58</sup> For the second this means one cannot avoid risks if one makes any decision at all. Anyone following advice and not overtaking in a blind curve runs the risk of not getting along as fast as he could if there were no oncoming traffic. We may calculate any way we wish to do so, and in many cases we may arrive at unambiguous results. But these are only aids to decision making. They do not mean that if we do make some decision or other risks can be avoided.<sup>59</sup> And in the modern world not deciding is, of course, also a decision.

If there are no guaranteed risk-free decisions, one must abandon the hope that more research and more knowledge will permit a shift from risk to security. Practical experience tends to teach us the opposite: the more we know, the better we know what we do not know, and the more elaborate our risk awareness becomes. The more rationally we calculate and the more complex the calculations become, the more aspects come into view involving uncertainty about the future and thus risk.<sup>60</sup> Seen from this point of view, it is no accident that the risk perspective has developed parallel to the growth in scientific specialization. Modern risk-orientated society is a product not only of the perception of the consequences of technological achievement. Its seed is contained in the expansion of research possibilities and of knowledge itself.

58 Exceptions must be allowed. Death is one such exception. For this reason there is strictly speaking no risk of death, but only the risk of your life being shortened. Whoever considers 'life' the highest value would thus be well advised to say: 'long life'.

59 For detailed treatment see Aaron Wildavsky, *Searching for Safety* (New Brunswick, 1988).

60 On this countermovement of rationality and risk see Klaus P. Japp, 'Soziologische Risikoforschung,' MS (1990).

#### IV.

In concluding this chapter we have still to take a brief look at the problem of *prevention*, which, as we will show in greater detail, mediates between decision and risk.

By prevention in this context we mean quite generally preparing for uncertain future losses by seeking to reduce either the probability of occurrence of losses or their extent. Prevention may thus be practised both in the case of danger and in the case of risk. We may arm ourselves even against dangers not attributable to our own decisions. We train in the use of weapons, make certain financial provisions for emergencies, or cultivate friends we can turn to if we need help. However, such security strategies are a side-show. The general motivation behind them is the realization that life in this world is fraught with uncertainty.

When, by contrast, we are dealing with risk, the situation is in significant respects a different one. For in this case prevention influences the willingness to take risks and thus affects one of the conditions for the occurrence of loss. If there is a more or less earthquake-proof method of construction, one will be more readily inclined to build in an earthquake-prone area. A bank is more willing to grant a loan if one can provide sufficient collateral. For the location of a nuclear power station the possibilities of rapidly evacuating the civil population (this put a stop to a project on Long Island) is a not unimportant aspect. But the cycle of reducing and increasing risk, determined by the 'be prepared' factor, goes far beyond this. Studies on the risk behaviour of managers have shown us that they demonstrate a not uncommon tendency to overestimate their control over the course of possible harmful developments; or even to stiffen their resolve by rejecting available data and procuring different, more favourable estimates.<sup>61</sup> In other words one actively seeks out confirmation of the assumption that the course of events will remain amenable to control.

Such behaviour can also be described as a risk distribution strategy. The primary risk of the decision – which is the first concern – is ab-

61 See the research overview of James G. March and Zur Shapira, 'Managerial Perspectives on Risk and Risk Taking', *Management Science* 33 (1987), pp. 1404-1418 (1410 ff).

sorbed, complemented, and weakened by a secondary risk, which, since it is also a risk, can in certain circumstances increase the primary risk. The additional and relief risk can consist in the preventive measures proving quite unnecessary: we toil day after day round the lake to keep fit only to meet our end in a plane crash. Or prevention proves to be causally ineffective. Or it is merely a useful supportive fiction. The risk-elimination risk remains a risk.

Since both primary risks and prevention risks are risks, both involve the problems of risk evaluation and acceptance. But their mutual dependence make it a complex matter and one that is for all intents and purposes unpredictable. It may well be that we see the prevention risk with different eyes and accepts it more willingly because it serves as security against a primary risk. We seek and find an alibi risk. We know the risks involved in technical installations and are therefore all the more willing to rely on the people employed to control such risks, or on redundancies of another sort.

Finally, the problem under discussion also has a political aspect.<sup>62</sup> For the political evaluation of acceptable, permissible risk, safety technology as well as all other measures taken to lessen the probability of losses occurring or to reduce losses or damage in the case of accidents will play a considerable role; the scope for negotiation will presumably be found in this field rather than in that of diverging opinions on the primary risk. But precisely this development takes politics into tricky territory. It is not only exposed to the usual over and underestimating of risks, which initially triggers the politicization of the topics, but also to distortions arising from the fact that one regards the primary risk as being controllable or uncontrollable depending on the result one is hoping to achieve. Every risk evaluation is and remains context bound. Neither psychologically nor under prevailing social conditions is there an abstract risk preference or lack of preference. But what happens if the context producing the risk evaluation is itself a further risk?

62 See David Okrent, 'Comment on Societal Risk,' *Science*, 208 (1980), pp. 372-375 – a text based on a report by the author to the Subcommittee on Science, Research, and Technology of the US House of Representatives.

In conclusion we must take another look at the distinction of risk and danger in this context, and especially in relation to politics. Even if it is only a question of danger in the sense of natural disaster, the omission of prevention becomes a risk. It is apparently easier to distance oneself politically from dangers than from risks<sup>63</sup> – even where the probability of loss or the extent of loss is greater in the case of danger than in that of risk; and presumably also independently of the question (but this would require meticulous inquiry) of how reliable prevention in each case would be and what it would cost. Even if prevention is available for both types of situation, it may nevertheless be relevant whether the primary problem is treated as danger or risk. In Sweden it was politically opportune to evacuate a large number of Lapps by helicopter for the duration of missile testing in their area, although the probability and extent of loss in the event of a helicopter crash were far greater than the possibility that a single person in a sparsely inhabited area would be struck by falling missile debris. But the one case was apparently assessed as a risk, while the other (more-over quite incorrectly) only as a danger.

63 Okrent op. cit. discusses an example of this problem in industrial risks and flood risks in the American canyons.