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BEHAVIOUR IN UNCERTAINTY

and its Social Implications

Most of the choices we make or the decisions we take involve imponderables. What induces us to choose this menu or that, this hat or that, this spouse or that? How does a doctor arrive at a diagnosis or a judge at a verdict? And what mysterious urge drives the gambler to his fate?

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BEHAVIOUR IN UNCERTAINTY

BY JOHN COHEN

Humanistic Psychology

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AND ITS SOCIAL IMPLICATIONS

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Chance is powerful everywhere: let your hook be always hanging ready. In waters where you least think it, there will be a fish.

OVID

If you expect to render these uncertain things certain by dint of reason you will no more effect it than if you were to endeavour to be mad with reason.

TERENCE

I've reached the harbour,
Hope and Chance, adieu!
You've play'd with me, now
Play with others too.

LE SAGE

CHAPTER 1

PATTERNS OF UNCERTAINTY

Whichever way we look at man, in every epoch and in every form of society, we see that, from birth to death, he constantly finds himself in predicaments fraught with uncertainty. Some uncertainties, such as those deriving from economic circumstances or from the hazards of disease, stem from sources outside himself. Others spring from his inner experience: uncertainty about success or failure in love or other social enterprise, uncertainty about the future, in this life or beyond the grave.

We shall consider in this book the way man faces and attempts to triumph over these pervasive and inescapable uncertainties. We begin with a problem which we all repeatedly face, in private or occupational life, the problem of assessing evidence. The more delicately balanced evidence seems to be for and against an issue, the more uncertain we must necessarily be about the decision we have to make. In the following chapter we shall examine in detail how people assess the sheer *weight* of evidence for innocence or guilt, when the *balance* of evidence remains the same. For example, are we more likely to think a man is guilty when there are 10 witnesses against him and 10 for him *or* when there are 5 against him and 5 for him? A more general question in the assessment of evidence is this: is a rule completely shattered, like Humpty Dumpty, when a single exception is found? Or, putting the question another way, are we more convinced by a larger amount of evidence with some counter indications *or* by a smaller amount with no counter indications? Thus we shall enquire into the manner in which people cope with uncertainty (*a*) when faced with different *amounts* of evidence which are *equally balanced* and (*b*) when confronted with a larger mass of conflicting evidence, on the one hand, and a smaller mass of uncontradicted evidence, on the other.

In all these foregoing situations, the individual who assesses the

evidence has to judge or decide. We turn from here to *similar* types of paired situations of a gambling character in which the alternatives are equally likely and the individual has to *commit* himself to one or the other. He has to *choose*, and something is at stake: there are prizes to be won. We shall study the effects of varying the different factors that enter into an experimental lottery, and we shall be particularly interested in the choices people make when confronted with two lotteries, in only one of which they can gamble, that is, in both lotteries the chance of winning is exactly the same, but the total number of chances is greater in one than in the other. As in the previous chapter we shall enquire systematically into all the variations that can occur in situations of this sort in order to arrive at conclusions with some claim to generality.

From experimental lotteries we shall move to a study of a National Lottery with the aim of determining the features which influence the gambling behaviour of the participants. This analysis will be made in the context of the history of lotteries since antiquity to our own day, and the historical review will bring us to a consideration of other forms of gambling in contemporary society.

We may suppose that the way in which we deal with uncertainties when we gamble with money is not unrelated to the way we govern the uncertainties that arise in us as motorists when driving a vehicle on the road. Risks and hazards are inevitably incurred on the road because, as will be shown, our vehicles and the traffic systems in which they move lack built-in automatic safety devices. We may suppose, too, that the highest levels of uncertainty at which people are prepared to act, what we call their 'maximum risk-taking level', is perhaps a feature which characterizes a culture as a whole in every aspect of its activities: at least, this hypothesis is worthy of investigation. A special problem of great importance today is the effect of the intake of alcohol on the risks and hazards of the road: the evidence which bears on this will be considered from a practical as well as a theoretical viewpoint.

Even more dramatic than gambling with life and limb on the road, sober or drunk, is the gamble with life in suicide, and particularly in so-called 'attempted' suicide, which may carry with it any degree of uncertainty of unsurvival, from attempts which are as likely to fail as to succeed, at one extreme, to those which are almost sure to succeed or almost sure to fail, on the other. And let us bear in mind that the subjective uncertainty of the motorist when he makes a dangerous

manœuvre, or of the suicidal person when swallowing a handful of barbiturate pills, is not necessarily a measure of the 'objective' chance of an accident or death. Furthermore, in studying the uncertainties associated with suicide we cannot limit ourselves to the 'attempts', which are generally gambles with life in the proper sense. We must also investigate the *actual* suicides. They cannot be said to be gambling with life in the same sense as the attempted suicides for they are subjectively and objectively sure to die, but they may be said to be gambling with their ultimate fate or destiny after death. They stake their lives in the hope of achieving some greater reward, either the cessation of all existence or of attaining some far more blissful state in the hereafter.

In Chapter 7 we turn to states of uncertainty and risk-taking in the world of sport and play. Very similar methods are described for the measurement of judgement in relation to skill in football as are described for assessment of the motorist's judgement and skill in Chapter 5. The situations of the motorist and footballer are comparable. Just as the former has to ask himself (explicitly or implicitly, without actually 'thinking') how likely he feels he will be to drive safely through a narrow gap in the traffic, so the footballer has to consider, before kicking the ball, whether he is likely to make it reach its destination. Many other situations on the highway and football ground share much in common from the point of view of behaviour in uncertainty. And what holds for the footballer is true also of most other forms of sport and athletics where chance and skill each play a part.

The variety of situations discussed in Chapters 2 to 7 might all be said to involve the making of a decision. The expression 'decision-making' is, indeed, frequently employed to include the making of a choice, the expressing of a preference, the arriving at a judgement and many other 'operations' which bring a process, so to speak, to a close. In these six chapters, which may be said to be concerned with diverse types of situation in which decision-making occurs, the decision-maker is assumed to be normal and healthy. However, this is not invariably the case. Nor is a normal person always in a state of mind in which he can make a 'healthy' decision, that is, the decision he would make if he were free from certain constraints. In Chapter 8, therefore, we devote ourselves to a brief analysis of decision-making under stress, not necessarily an acute or immediate stress, but possibly one due to a chronic disorder of the personality. Pathological decision-

making is exemplified best of all in obsessive disorders, and since the pressures of civilized life, especially the pressures which force us to regulate our lives by the clock, make obsessives of us all, very few of us at some time or other do not suffer from a disturbance in our decision-making equipment. Apart from transient or enduring disorders, there also appear to be significant differences in the degree of uncertainty tolerated by members of diverse occupational groups.

In Chapter 9 we take up the task of defining the common concepts, rather than the procedures, underlying the situations which form the subject-matter of the preceding chapters. Throughout the book we are haunted by the notions of chance and possibility in the background and therefore we try to come to grips with them, bearing in mind the different contexts—gambling, traffic, suicide, play—in which they arise; and we distinguish between the notion of chance as such, as a factor in human life, and the *belief* in chance. Reflection on the idea of 'chance' prompts a discussion of the relationship of the notion of possibility to that of probability, a consideration of rare events, and an analysis of the fundamental conception of psychological probability in the context of the various themes of the book.

All these species of behaviour in uncertainty have a long and exciting past. Their place in history and contemporary life alike can be better appreciated by a study of the predominant part played by divinatory practices in societies of all kinds. These practices may seem irrational by our standards today. Nevertheless they retain their vitality to a certain extent, as indicated in the Survey of Divination (Appendix) which gives a sketch of divinatory practices in different times and places. Some understanding of these practices and of their social significance is necessary in order to understand that the problems of decision-making in uncertainty are not new. They have plagued man since the beginning and the 'rational' methods which we can employ today, if we wish, may be compared with their irrational antecedents, which have been at the disposal of our ancestors through the ages.

The book presupposes no specialized knowledge and is more or less self-contained. Nevertheless the reader who wishes to probe the subject-matter further and learn something of its background and of the way it is related to other studies of psychological probability is advised to consult two earlier volumes: *Risk and Gambling** (with

* Longmans Green, 1956.

C. E. M. Hansel) and *Chance, Skill and Luck*.* The present book is an effort to extend in new directions the enquiries described in the two earlier publications, which prepare the reader for the great diversity of processes and activities in which psychological probability plays its role.

* Pelican Books, 1960.

CHAPTER 2

WEIGHING THE EVIDENCE

1

From time to time everyone has to weigh up a situation before deciding what to do: to vote for this political party or that, to drink this wine or that, to marry this girl or that. We may have to balance the good sense of one party in its Home Policy against its stupidity in Foreign Affairs; in another party, it may be the other way round. This wine may have an exquisite bouquet but its price is exorbitant, the other wine is cheaper but less appealing to the palate. This girl's charm is unchallenged but she is something of a shrew, the other girl is the soul of good nature but not terribly prepossessing. What are we to do? Before we decide, we try to assess the merits and demerits of the alternatives we are faced with; that is, we make a comparative assessment, and the relevant considerations which we weigh up naturally vary with circumstances and with the individual decision-maker.

The subjective element that enters the choice may be illustrated by the fact that a judge can seldom if ever evaluate with complete objectivity the pleas made by prosecution and defence; and a doctor is in much the same position when he makes his diagnosis. Just as the judge comes to a point where the evidence, say, for guilt seems to him to outweigh the evidence for innocence, so the doctor reaches a stage where he feels he must pronounce, say, in favour of the kidneys and against the liver. In the realm of law a verdict may be changed on appeal to a higher court, and the subjective imprecision in medical assessments explains the variability in diagnosis from one doctor to another.

Rarely will two doctors agree precisely on the interpretation of symptoms, on the sounds heard through a stethoscope, or on the

colour of the patient's skin, though the experienced clinician observes more than the novice, and his judgement is more precise. This variation also occurs in pathology: 'Determinations by different laboratories of the same patient's blood urea, blood glucose, cell counts, serum proteins and other features of significance in health and disease often show a very wide range of estimate'.[1] This is the conclusion reached in a study of clinical reports made by experienced doctors investigating respiratory diseases such as pneumoconiosis, tuberculosis, and bronchitis. In one group, estimates of the number of patients who coughed up sputum varied from 12 to 42 per cent. Cyanosis, measured photometrically by an oxymeter, was overlooked by 47 per cent of the investigators. Differences of opinion also emerged among 6 radiologists interpreting 6,000 X-ray films. Four per cent of the films obtained from perfectly healthy people were considered to be tuberculous, and a rather larger percentage of the films of patients with known tuberculosis were passed as normal.

In these medical, judicial and other situations, the evidence may vary both in amount and in pattern, and irrespective of the sheer quantity of evidence, there may be many weak points *in favour* which are counter-balanced by fewer strong points *against*. Thus the likelihood of the truth of any conclusion drawn from the evidence may be high or low; the subjective likelihood may also vary in similar fashion.

II

Items of everyday evidence are usually imponderable and unequal. Neither the amount nor the pattern can be precisely specified. So if we are to determine *experimentally* whether people agree about the inferences to be drawn from evidence, the items of which it consists must be made equivalent. They would then carry approximately the same weight for all those who have to evaluate it. Experimentally, we have to substitute comparatively uniform items of evidence for the qualitatively diverse considerations which arise in everyday life; by 'uniform' I mean from the experimenter's point of view.

A century ago the British psychologist, Alexander Bain wrote:

> The vital circumstance in belief, is never to be contradicted—never to lose *prestige*. The number of repetitions counts for little in the process: we are as much convinced after 10 as after 50: we are more convinced by 10 unbroken than by 50 for and one against.[2]

Bain assumed his principle to be universally true, that in *all* situations *all* people would decide the way he describes regardless of the content of the evidence. Far from favouring the popular fallacy 'an exception proves the rule' (L'exception confirme la règle), he is almost inventing a new one, viz. 'an exception destroys the rule'! At any rate he goes so far as to imply that forty *additional* items of evidence are cancelled by one single conflicting item.

Bain's example may be taken to illustrate a principle of wide application which may be expressed as follows: a relatively short series of items of evidence, so long as it remains uncontradicted, is more convincing than a relatively long series contradicted even by a single item. This bears a family resemblance to situations we have elsewhere examined as problems of 'extrapolation'—inferences drawn from samples varying in size and composition.[3] Bain's statement is, however, no more than a hypothesis. On putting it to the test we find that only two-thirds of our subjects obey Bain's 'law'. The other third choose to violate it.

In another Bain-like predicament the results seem at first sight to depart even more from what he would have expected. Suppose in one situation 10 witnesses say a motorist is to blame for an accident and not the pedestrian, and 5 witnesses say that the pedestrian is to blame and not the motorist. In a second situation, there is only one witness against the motorist and none for him. We find that most people (nearly two-thirds) are more convinced of the motorist's guilt by 10 against 5 than by one against none; the rest being convinced the other way round. But this need not necessarily be taken as conflicting with Bain's supposition. He could protest that a mere one in favour, although there is none against, is not enough; some repetition is needed to cope with the opposition in any circumstances. Let us represent these two situations as 10 : 5 and 1 : 0. It is worthy of note that those to whom 1 : 0 outweighs 10 : 5 feel very strongly about this. So much is clear from replies many of them give when asked to say how many additional witnesses would be needed to counter-balance the 5 so as to make their testimony as credible as the single witness with no opposition. They say that at least several hundred witnesses would be required to counter-balance the 5 opponents. The idea probably never occurred to Bain that his problem could be studied experimentally. Had it done so, he would have found that the issue is not as simple as it appears to be at first sight.

III

I now propose to examine a contemporary range of situations which exemplify the basic principle of which Bain gives a single illustration.

Imagine that a car is involved in an accident to a pedestrian. Some witnesses to the accident say the motorist is to blame, and the pedestrian not to blame: others say that the pedestrian is to blame and the motorist not to blame.

Now imagine a second similar situation in which another car is involved in the same kind of accident.

The sole distinction between the two accidents is that different numbers of witnesses are involved, for and against the motorist and pedestrian. Assume that all the witnesses are equally honest and have had the same amount of driving experience.

Now consider the four numbers in the last row of the tabulation that follows and decide which of the two motorists you think is more to blame, the one in Accident A or the one in Accident B. This particular case is only one example of many that might be cited. Let us enumerate the chief varieties.

Accident A No. of witnesses who say:		Accident B No. of witnesses who say:	
Motorist to blame; pedestrian not to blame	Pedestrian to blame; motorist not to blame	Motorist to blame; pedestrian not to blame	Pedestrian to blame; motorist not to blame
4	3	8	6

CASE I. Same proportions of witnesses for and against the motorist in both situations, e.g. 5 : 5 in one and 2 : 2 in the other.

CASE II. Proportion of witnesses against the motorist is greater than the proportion for him in both situations, but there are *more* witnesses altogether in one of the situations, e.g. 4 : 3 in one and 8 : 6 in the other.

CASE III. Slight differences in the proportions of witnesses against the motorist in the two situations, e.g. 2 : 2 in one and 6 : 5 in the other.

Each of these three categories has many variants.

CASE 1. Same proportion of witnesses for and against the motorist in both situations, e.g. 5 : 5 in one and 2 : 2 in the other.

In general, if the number of witnesses who blame the motorist is the same as the number who do not blame him, people tend to be more convinced of the motorist's guilt in the situation where the total number of witnesses is greater. The chief reason they give is that where there are more witnesses there is likely to be more accuracy and less error; another reason given is the *absolutely* large number of accusing witnesses.

The minority, however, adduce similar arguments for reaching the opposite conclusion. Some of them reason, for example, that the fewer the witnesses, the more reliable they are because there is less confusion. Others say that members of a smaller group will think more carefully. Some add that fewer witnesses allow less scope for personal error. The point is also made that if one motorist has fewer exonerators than another he is at a greater disadvantage.

The influence of a larger total number of witnesses is most marked when 5 : 5 is compared with 2 : 2. And while 5 : 5 seems clearly less convincing of the motorist's guilt than 10 : 10, it is only slightly less convincing of guilt than 50 : 50. Thus there seems to be a clear limit to the credibility induced by the sheer *number* of witnesses. The explanation may be that when the total number of witnesses exceeds a certain value, our subjects find it difficult to make up their minds whether guilt or innocence is indicated and they possibly feel that the accusers and exonerators cancel each other out.

The effect of the sheer number of witnesses is strikingly brought out in situations of Case III (which we shall soon consider) where, for example, 2 : 1 is compared with 5 : 3. Here, 20 to 37 per cent of our subjects support the greater incrimination of the larger number of witnesses in 5 : 3 in spite of the fact that this small numerical advantage is handicapped by a weaker balance of evidence against the motorist.

A problem of special interest arises when, in one of the two situations, there are *no* witnesses, so that a comparison has to be made between 0 : 0 and, say, 5 : 5. This is the limiting case, and subjects fill in the evidential gap from their fantasy; 60 per cent are more convinced of the motorist's guilt in 5 : 5 than in 0 : 0. On the other hand, a substantial minority of 40 per cent are more convinced of his

guilt in 0 : 0. Some of these say the very fact that there are no witnesses at all suggests that the motorist deliberately vanished from the scene because of his guilt, whilst others argue that 0 : 0 is more incriminating because in 5 : 5 the evidence is conflicting and therefore in doubt. A balance of 10 : 10 is felt to be more incriminating than 5 : 5 against the motorist, when compared with 0 : 0. And, consistent with this, a direct comparison between 10 : 10 and 5 : 5 favours 10 : 10 as more incriminating.

To sum up: Where the proportion of witnesses against the motorist is the same in the two situations which are being compared, the majority of people are swayed by the number of witnesses available, that is, by the sheer weight of evidence, but only up to a certain point. Beyond that point, a greater number of witnesses means little or may even have a reverse effect. There is, however, always a minority of people not so swayed by numbers as such.

CASE II. Proportion of witnesses against the motorist is greater than the proportion for him, in both situations, but there are more witnesses altogether in one of the situations, e.g. 4 : 3 in one and 8 : 6 in the other.

We now turn to a comparison where, as previously, there are more witnesses altogether in one situation than in the other, but now the proportion against the motorist, in both situations, *exceeds* the proportion for him. The result is clear; here, too, between two-thirds and three-quarters of our subjects believe the evidence weighs against the motorist more where, other things being equal, there is a larger total number of witnesses. Thus 16 : 12 is felt to be more incriminating than 4 : 3, 8 : 4 more incriminating than 2 : 1, and 20 : 4 more incriminating than 5 : 1. The same effect appears when 10 : 90 is compared with 1 : 9 and when 90 : 10 is compared with 9 : 1. But here too there is a limit to the credibility induced by the sheer number of witnesses. Thus, for example, 75 per cent are more convinced by 8 : 6 versus 4 : 3, whereas only 64 per cent are more convinced by 10 : 2 versus 5 : 1. This difference may, however, possibly be due to the peculiar role of a single witness. For the minority who find 5 : 1 more incriminating than 10 : 2 emphasize particularly the fallibility of the single witness who exonerates the motorist and accuses the pedestrian. It appears, paradoxically, that a lone witness carries less weight than he would if supported by others. The fact that he stands

in isolation seems to make him suspect and render his testimony feeble. To the minority, therefore, the ratio 5 : 1 seems overwhelming and they are less influenced than others by the larger total in 10 : 2.

CASE III. Slight differences in the proportions of witnesses against the motorist in the two situations, e.g. 2 : 2 in one and 6 : 5 in the other.

Consider the case where the proportion of witnesses against the motorist is *not* the same in the two situations. In such circumstances it would be natural to expect that everyone should feel a stronger conviction of the motorist's guilt where the proportion against him is greater, whether or not this proportion is based on a larger total number of witnesses. A person who did not express such a belief would seem odd. Nevertheless, between 5 and 30 per cent of our subjects take this view, according to varying circumstances. The proportion who think in this fashion increases as the evidence against the motorist becomes stronger, that is to say, as his guilt seems blacker. For instance 5 per cent favour 2 : 2 as against 6 : 5 whereas 30 per cent favour 5 : 1 as against 21 : 4, although here, it is true, we have again the phenomenon of the witness whose testimony seems weak because he is alone.

The most striking instance of this sort occurs in a comparison between 2 : 1 and 5 : 3 where no less than 37 per cent are more impressed by the motorist's guilt in 5 : 3 although the proportion against him is only 0·63 whereas in 2 : 1 it is 0·67. One reason given for this curious judgement is that there are 5 witnesses against the motorist in the one situation and only 2 against him in the other; that is, the decision is based on the absolute numbers of accusing witnesses.

Those who are more impressed by the smaller totals of witnesses in Case III adduce much the same reason as their counterparts in Cases I and II, namely, that the fewer the witnesses, the more reliable they are and the fewer differences of opinion. Also, fewer witnesses, it is said, are in a better position to view the scene, less subject to mutual influence, more likely to clarify the issue and less likely to confuse it.

IV

About 1,000 subjects in all took part in the experiments, all of them students in Teachers' Training Colleges, including a Catholic Training

College. It is perhaps not without interest that the decisions made by the Catholic students differ from those given by the students in the other Colleges. The Catholic students tend to hold that more credibility attaches to a smaller number of witnesses. Could this be an unconscious projection of their socio-religious convictions? In support of this possibility is the fact that, generally speaking, those who favour the smaller total appear to be more confident of their decision than those who favour the larger total.

In most instances each of our subjects was asked to decide in relation to one pair of situations only, but on certain occasions a group of subjects made decisions in relation to a *series* of paired situations. It turned out that those who were more convinced by the larger number of witnesses were consistently so, and *vice versa*, those who were more convinced by the smaller number of witnesses, consistently made similar decisions.

A critic might say: it is all very well to present the witnesses as *supposedly* always uniform in every respect, in fact, when people come to assess the evidence given by these witnesses they do so, very often, by injecting subjective considerations which devalue some witnesses and enhance the value of others. Hence each witness is not regarded as a 'standard' or 'unit' item of evidence. I concede this, of course. In one extreme instance one of our subjects placed his confidence in a single witness just because he stood alone! One bright young girl* made the following comment:

> There being granted an equal honesty and an equal competence (etc.), how to explain at all that the witnesses disagree? This can only be explained by admitting that the fact in question could not so easily be watched exactly (at the good distance, by the good angle of view, etc.); but then only a small number *could* notice the scene exactly, and these *may* well be found among the smaller part, the minority (not, indeed, limited to one or two). Furthermore [she added] a large group of witnesses is more likely to gather in snow-ball fashion whereas a small group more probably consists of individuals each of whom makes a *personal* statement which should weigh more than the statements of the members of the larger group.

This state of affairs, however, is by no means peculiar to the present

* The daughter of Professor Jules Prussen of Luxembourg who kindly transmitted her response.

investigation. In virtually all psychological experiments the subject is, so to speak, a transducer[4] with an input-output function which varies with the circumstances.

This subjective transformation of the 'objective' situation prompts us to distinguish two types of situation with respect to the evaluation of evidence. The first type of situation generates independent 'bricks' of information in such a way that the validity of one 'brick' can never be called into question by the non-validity of another. For instance if we find that the first eleven of a dozen eggs are good and the twelfth turns out to be stale, we do not retrospectively condemn the eleven good ones because of the unsavoury twelfth. The eleven eggs may still be perfectly sound although, it is true, their posthumous reputation may now be open to some suspicion, and further purchase from the same source may be less enthusiastic than it was in the past.

The second type of situation generates, not autonomous and self-contained 'bricks', but rather a continuous kind of 'cement-like' evidence, so that if one piece collapses it may drag the rest with it. If a neighbour says 'Good morning' on eleven consecutive days in what seems to be a polite fashion, his unmistakably sharp snub on the twelfth day may lead us to re-assess the previous eleven encounters; we may see them now for what they 'really' were, as only a façade for an underlying rudeness.

The essential difference between the two types of situation is this: in the first case when an item of evidence is established, it is established finally, and can never be annulled or negated; in the second case, an item can never be established once and for all but remains subject to retrospective revaluation.

In presenting the situations for our subjects to judge, we, the experimenters, may hope we are concerned only with the first type of situation, but our subjects make this an impossible task. We give them eggs out of which they fabricate cement! Although they do not engage in retrospective revaluation, they nevertheless feel obliged to remould the eggs in order to be able to arrive at a decision satisfactory to themselves.

Finally, in so far as the experimental situation simulates everyday situations in medical or legal practice or in domestic or social affairs, we must be prepared to expect similar decisions to be made. A practical outcome of our enquiry may be that it may help the decision-maker to be on his guard since he can now perhaps see more clearly the factors which may influence him. For example, a political party may

retain its most fervent and zealous supporters so long as its numbers remain small;[5] when the numbers increase, these enthusiasts turn elsewhere and the party is taken over by the big number fans, for whom the truth is only the truth if it is widely acknowledged. Fashion exemplifies this phenomenon *par excellence*. Fashion is, first of all, something that comes and goes. In this simple sense there are fashions in medicine, in politics, in sport, in crazes, cults and fads, in beliefs and practices of all kinds, as well as in clothes. But fashion in clothes is self-defeating. For the moment a style is in fashion it ceases to be fashionable. The woman that sets the fashion must wear a dress that is unlike all existing dresses, in cut, colour, length, style. It must be unique, with only a few variants. Once a model is imitated on a large scale and worn by large numbers of women, the fashionable woman abandons it. No sooner has the Paris mode become universal than the houses of *haute couture* find novel outlets for their inexhaustible inventiveness.

There is a difference between the assessment of evidence and the making of a choice, although before actually choosing a menu or armchair we may sometimes wish to weigh up the pros and cons. Thus choice may presuppose taking note of the evidence, but assessment of evidence does not necessarily entail making a choice. In the chapter to follow we shall turn from the simple weighing of evidence to actual commitment in a situation involving choice. In such a situation the individual has to do more than say which pattern of evidence he finds more convincing; he has to state his preference and say: 'I choose'.

NOTES AND REFERENCES

1. *New Scientist*, 1961, 12, No. 266, p. 727.

2. Alexander Bain, *The Emotions and the Will* (3rd edition), London: Longmans Green, 1875, p. 512.

3. In *Risk and Gambling*, Chap. III, and in *Chance, Skill and Luck*, p. 37.

4. Because of this transducer effect it is difficult, unfortunately, to treat this enquiry as an exercise in information theory. Otherwise we could regard each witness as representing one 'bit' of information, since what he is presumed to say is tantamount to a 'Yes' or 'No' in answer to the question: 'do you consider the motorist guilty?' If this procedure were justifiable, the differences in the weight of evidence (i.e. number of witnesses) could be expressed as differences in the amount of information, and differences in the proportions for and against the motorist could be represented as a signal/bias ratio. Looked at in this way, those who believe the motorist is more incriminated by a smaller total of witnesses seem to treat information beyond a certain point as redundant, and beyond

redundancy, as 'noise'. Furthermore, the different decisions in Case II would depend on the threshold of evidence, in terms of signal/bias ratio, acceptable to the individual.

Such a method of analysis, although difficult, is not impossible. It presupposes the existence of a subjective scale of the value of a witness. As an illustration of what is required I shall briefly describe an experiment on a related problem, viz. the determination of the subjective value of a 'bit' of information.

Subjects were given a page on which was printed a number of small circles. They were told the number, and that the experimenter was thinking of a particular circle. Their task was to say how many questions they would have to ask in order to identify the circle for sure. Only questions which could be answered by 'Yes' or 'No' were allowed. Ten such pages were presented to each individual, the number of circles on any given page ranging from 2^1, by successive powers of 2, to 2^{10}.

In theory the number of questions that must be asked by the subject in order for him to locate a particular circle with certainty is the logarithm, to the base 2, of the number of circles on the page; that is, the number of 'bits' of information, on the page. Actually, however, the number of questions our subjects, even adults, believe to be necessary is greater than this. Take 9-year-old children as an illustration. When there are 256 (or 2^8) circles on the page (that is, eight 'bits' of information) they require, on the average, as many as 70 questions; when there are 512 circles they require 89 questions; when there are 1,024 circles they require 450 questions. This shows a considerable discrepancy between the 'objective' and 'subjective' information. With increase in age from 9 to 20, this discrepancy grows less but does not disappear.

When the subjects are asked not only to say how many questions they need to ask but also to go ahead and locate the actual circle which the experimenter has in mind, an interesting fact comes to light. The number of questions they do *in fact* ask is very much less than the number they believe, in advance, that they will need to ask.

When there are 450 circles on the page the 9-year-old children, for example, succeed in locating the circle in only 17 questions. What is particularly interesting perhaps is the discovery that the difference in age shows itself not in the competence with which this task is actually discharged, but in the way it is conceived beforehand. (See John Cohen and Peter Cooper, 'Subjective Value of a Bit of Information', *Nature*, 1962, 196, pp. 360–1.)

Further details of the problems discussed in this chapter as a whole may be found in John Cohen, Peter Cooper and Paul Thorne, 'Les degrés d'évidence,' *J. de Psychol.*, July–September, 1962, pp. 225–38. It remains to add that the effect of 'weight of evidence' on credibility, as demonstrated, is not peculiar to adults. It appears, too, in our studies of children aged 9 to 12 years where the same type of situation has to be assessed and also in one in which the judges of a race take the place of witnesses to an accident.

5. Lord Macaulay was a small number fan. 'It is the universal law,' he wrote, 'that whatever pursuit, whatever doctrine becomes fashionable, shall lose a portion of that dignity which it had possessed while it was confined to a small but earnest minority.'

CHAPTER 3

MAKING A CHOICE

I

Life may be described as an uninterrupted sequence of choices. The suckling, in a manner of speaking, may have to choose between the right breast and the left: later he may choose between a blonde and brunette, and finally between burial or cremation. Admittedly some 'choices' are forced upon us, so much so that we say we have no choice but to accept one or other alternative. We are conceived, whether we like it or not. We get born and die whether we like it or not. In this chapter we shall consider situations in which, strictly speaking, there is really *nothing to choose* between one alternative and another, and yet many people do in fact declare a decided preference for the one or the other. Such situations, of which there are two kinds, often arise in gambling. One kind is like a lottery in which the player can only buy a random ticket from a collection of tickets and, however clever he is, he can do nothing to influence his chance of winning a prize. In the other kind of situation, he can do more than purchase a random ticket. He can, if he wishes, also use his skill to improve his chance of a prize.

We shall be concerned only with the first of these two kinds of situation, that is, with players who are always faced with a choice between different but equally likely ways of winning a prize. The chief question to which we shall seek an answer is this: do these two possible ways of winning a prize, which are objectively equal, also *seem* equal to the player himself? Several hundred people, young and old, took part in the experiments I am about to describe. Take the following example which illustrates the typical procedure: two small and identical boxes are shown to the subjects, who are told, in words to this effect:

You can choose one of two ways of possibly winning a prize. In the first box there are 10 tickets: one winning and 9 non-winning tickets. In the second box there are 100 tickets: 10 winning and 90 non-winning tickets.

You can choose to draw once, and once only, from either box. If you happen to draw a winning ticket, you can select your prize from this collection of chocolates and cigarettes.

These instructions are varied, as appropriate, from one set of circumstances to another. We can conveniently discuss the choices made in relation to a series of dilemmas which the subjects were made to confront. Let the reader imagine he is in the shoes of one of these subjects and himself must choose.

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Dilemma (i). Would you prefer to draw a ticket when all the tickets are concentrated in *one* box or would you rather draw when the tickets are divided equally between two boxes? Imagine that you *must* choose and that your life is at stake. This choice is illustrated in Fig. 1. Remember that whichever alternative you choose, whether it is 'A' or 'B', you

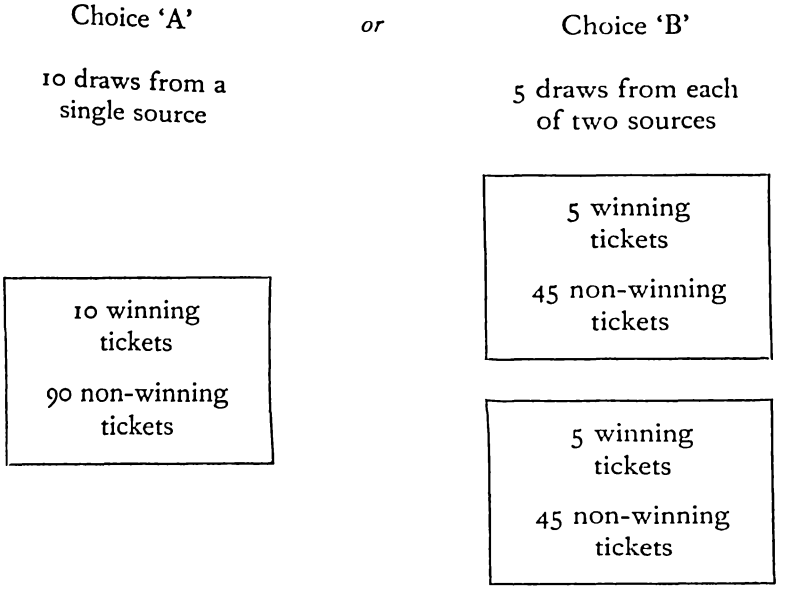

FIG. 1. Choice between a Single Source of Tickets and Multiple Sources

will have exactly the same number of draws, that a ticket drawn is always replaced, that the tickets are reshuffled before the next draw, and finally that the prize is the same.

This situation may be varied in many different ways. First, instead of dividing the tickets equally between *two* boxes in choice 'B', we could share them among *five* boxes with 2 winning and 18 non-winning tickets in each, or into *ten* boxes with one winning and 9 non-winning tickets in each. The dilemma remains the same. Is it better to rely on a *single* source or on *multiple* sources? Second, the total number of tickets could be increased from 100 to 1,000, with, say, 10 winning tickets and 990 non-winning tickets, and here, too, all the tickets could be *either* in one box *or* equally distributed over 10 boxes. A third possibility is to include an empty box in 'B', making the choice *either* a draw from a box containing 10 tickets, including one winning ticket, *or* a draw from one of 2 boxes, one of which is empty and the other containing 5 tickets including a winning ticket.

In all these diverse situations some two-thirds of the hundreds of subjects who have been faced with the choice prefer to draw from the single source.

This clear-cut preference suggests that the single source of tickets inspires a greater confidence of drawing a winning ticket, although the objective chance of drawing it is no better than in the case of the multiple sources. Why should this be so? The reason cannot be because of more winning tickets or because of more draws in one choice or the other, because these are the same in both cases. And, as a matter of fact, the single source is preferred even when there are *less* non-winning tickets altogether in the multiple sources. Perhaps the explanation for preferring the single source lies in the fact that it contains a larger number of winning tickets *in one* place. It may well be that people tend to focus their attention on the large stock of winning tickets. At any rate this might be the case when there are fewer winning than non-winning tickets. When there are more winning than non-winning tickets people seem to focus on the *non*-winning tickets and, in these circumstances, they prefer to draw their tickets from multiple sources than from a single source. Some of them explicitly state that they make this choice because their thoughts are occupied with the *non*-winning tickets. To sum up: people prefer to draw from a single source than from multiple sources provided there are, in both alternatives, fewer winning than non-winning tickets; their preference is reversed when the non-winning exceed the winning

tickets. We shall defer an attempt to explain this until a later section where the same feature crops up in another context.

Dilemma (ii). Turn now to a different situation in which the number of sources or boxes in 'A' and 'B' are the same, but the number of tickets differs. Would you prefer to try your fortune in a smaller lottery *or* in a larger lottery, where the proportion of winning tickets and the size of the prize are identical in both situations? For example, would you prefer a one in 10 chance of a prize *or* 10 chances in 100? Our adolescent subjects definitely prefer the latter. But if, instead of one in 10 for the first alternative, we substitute 5 in 50, or even 2 in 20, then the preference for the second alternative disappears; the adolescents are then indifferent. Clearly, the preference, in so far as it exists, is for the lottery with the larger number of tickets.

Imagine now two unusual lotteries in each of which there are many more winning than non-winning tickets. Suppose, for instance, you could choose to draw *either* from a box with 10 tickets including 9 winning tickets *or* from a box with 100 tickets including 90 winning tickets. Under these conditions, nearly 90 per cent of our subjects prefer to draw from the box with only 10 tickets. And they prefer to draw from a smaller lottery, even if it has as many as 20 or even 50 tickets, rather than from the larger lottery of 100 tickets.

Dilemma (iii). Let us ask now what happens when, in both alternatives, the chance of drawing a winning or losing ticket is precisely the same, because half of the tickets are winners and half losers, but the total number of tickets is larger in one case than in the other. Here, quite clearly, people unhesitatingly plump for the smaller lottery. More than two-thirds of our subjects prefer to draw from a box containing 5 winning and 5 non-winning tickets (or 10 and 10, or 25 and 25) than from a box with 50 winning and 50 non-winning tickets.

Dilemma (iv). This is a situation in which a player can choose *either* shorter odds and fewer draws *or* longer odds and proportionately more draws. Thus he can choose *either* to draw once where the chance of drawing a winning ticket is, say, one in 10 *or* to draw 10 times where the chance is one in 100. The prize is naturally the same either way; if the second alternative is chosen, tickets drawn are not replaced before the next draw, and it is only necessary to draw the winning ticket *once*.

Such dilemmas provoke no acute conflicts. Our subjects, young and old alike, show a slight but not significant inclination to prefer to draw, in some situations, where there are relatively more winning tickets combined with fewer draws, whereas in other situations this preference is reversed. It seems that women value more highly than men the possibility of repeated draws from the same source. When a ticket is replaced after a draw a decisive majority (78 per cent) incline towards a single draw coupled with a large chance of success.

Dilemma (v) is a more familiar affair. You *either* have a relatively large chance (one in 10) of winning one box of chocolates *or* a relatively small chance (one in 100) of winning ten boxes. Within the limits of such prizes offered, our results are perfectly clear: a massive preference (nearly 90 per cent) for the short odds. This preference is unaffected by the size of the lottery as such, as distinct from the chance of winning a prize.

If we replace chocolates by money, 10 shillings (or 1½ dollars) for 10 boxes of chocolates and one shilling (or 10 cents) for one box, our subjects are indifferent to short or long odds, although it seems that girls prudently prefer short odds when the prize is chocolates and long odds when it is money.

III

Let me now recapitulate and, so far as possible, interpret the principal results of these experiments:

(i) When the chance of drawing a winning ticket is very small, most of our subjects prefer to draw from a single source of tickets rather than from several sources with proportionately fewer winning and non-winning tickets in each. This preference is reversed when the proportion of winning tickets is very large.

(ii) (*a*) Granted that the tickets are all to be drawn from the same source, and the chance of drawing a winning ticket is one in 10, suppose the choice is one of drawing *either* from a source with a smaller *or* from a source with a larger number of tickets. Under these conditions most people prefer the latter, that is, they prefer to concentrate on the possibility of *winning* rather than on the possibility of *not* winning. They focus on the larger number of winning tickets, and they prefer to rely on this rather than on the smaller aggregate of *non-winning* tickets.

When, however, the chance of success is, say, 9 in 10, the majority

are concerned with the possibility of losing. They prefer to rely on a smaller aggregate of *non-winning* tickets rather than on a larger aggregate of *winning* tickets.

Let us try to understand the reasons for these choices. As we have seen, when the chance of drawing a winning ticket is only one in 10, the smaller lottery tends to be rejected. In such a situation, the fact that the larger lottery has several winning tickets seems decisive in its favour. If, however, we add one or more winning tickets to the smaller lottery and a proportionately larger number of non-winning tickets, the preference for the larger lottery is neutralized, although there are now actually *more non*-winning tickets in the smaller lottery than there were before. The neutralization of the preference for the larger lottery is also apparent when in both alternatives there are more winning than non-winning tickets. The tendency then is not to be preoccupied with the relatively large number of winning tickets, but with the relatively *small* number of non-winning tickets!

On the whole, we can say that choices are determined either by a large number of winning tickets or by a small number of non-winning tickets. When the smaller lottery offers only one chance of a prize, many reject it and choose the larger lottery which offers 10 possibilities, in spite of the presence of 90 non-winning tickets. In both alternatives, there are many more possibilities of losing than of winning, and our subjects seek to draw from the source with the larger number of winning tickets. Where, however, there are at least two possibilities of winning in the smaller lottery, the basis for preferring the larger lottery seems to vanish. It is not surprising, therefore, that when the odds in favour of winning a prize are 9 in 10 or 90 in 100, there is a decided preference for the smaller lottery, because now there is less anxiety to rely on a *large* number of *winning* tickets than on a *small* number of *non-winning* tickets.

To resume: when the chance of success is relatively small, and seems out of reach, most people look at the bright side of things, seeing it as brighter than it is, and ignoring the black side; and when the chance is relatively large, and seems within one's grasp, they look at the black side of things, seeing it as blacker than it is, and ignoring the bright side. Such a contrast might have been predicted from a variety of other experimental results which indicate that, when a task seems hard to us, we tend to overestimate the performance we shall achieve, and *vice versa* when a task seems easy to us. This phenomenon makes sense biologically, for had our ancestors faced danger and

difficulty too realistically they might have shrunk from it or lost courage. Survival might have required some excess of boldness.

(ii) (*b*) So far I have been speaking of the majority. The minority appear to be impressed chiefly by the sheer number of tickets as such. When each alternative has more non-winning than winning tickets, the alternative with the larger total number of tickets seems to them to signify almost certain failure, and they therefore decide to draw from the smaller total. Conversely, when, in both alternatives, there are more winning than non-winning tickets, the minority choose the larger total because it seems to them to offer almost certain success.

(iii) When, in each alternative, the number of winning tickets is the same as the number of non-winning tickets, the majority prefer to draw from the smaller total with its smaller number of non-winning tickets. By contrast, the minority choose from the larger total which includes, naturally, the larger number of winning tickets

What lies behind these preferences? It seems possible to identify two kinds of people: those who wish to minimize their sorrows and those who wish to maximize their joys. This is, of course, a gross over-simplification, although, perhaps, no more so than the subdivision of man into males and females, for every gradation of inter-sex can and does occur. The reader, who has doubtless already classified himself in the realm of sex, is invited to discover for himself whether he belongs to the minimizing or maximizing category in the domain of the lottery.

We can make the dilemma more dramatic by offering periods in Heaven and Hell as the prize. Suppose you were offered this choice: one year in Hell followed by 9 years in Heaven *or* 1,000 years in Hell followed by 9,000 in Heaven, which would you choose? Remember there is no third way. If you fail to choose, the penalty is eternity in Hell. More generally, you are faced with the question whether you prefer a minor struggle for a small reward *or* a major struggle for a proportionately greater reward.

The poignancy of the situation can be heightened. Let the periods to be spent in Heaven and Hell be equal in proportion: for example, 10 years in Hell followed by 10 years in Heaven *or* 100 in Hell followed by 100 in Heaven. Those who take the first alternative care less for a prolonged period of bliss than for reducing tribulation to the minimum, whilst those who take the second are not dismayed by the sufferings they are ready to endure so long as the rewards are sufficiently handsome. Among the latter we should find the monk Ambrosio (in M. G.

Lewis' eighteenth-century novel *The Monk*) who declared to his paramour Matilda, 'A moment passed in your arms in this world overpays an age of punishment in the next'. Ambrosio's moment bears comparison with the miraculous moment of Mahomet, who saw a jar slide off a table just before he entered a trance. During the trance, he enjoyed a considerable stay in Paradise, and when his consciousness returned, the jar had not yet touched the ground.

We can introduce the element of uncertainty into such situations by restating one of our questions in this way: would you prefer a one in 10 chance of spending 10 years in Heaven *or* a one in 100 chance of spending 100 years? And similarly for Hell. This type of problem often arises in even more practical situations. Paradoxically, our actions are often guided not by what we feel is *more* likely but by what we feel is *less* likely to happen. We insure our houses against fire though we flatly deny that they will in fact ever be burnt to the ground. We do not wish to live with the thought of even a remote possibility that we might be left roofless without compensation, and we prefer to pay a substantial sum for the comfort of knowing that, come what may, we shall not be ruined. With this logic the seventeenth-century French mathematician Pascal defended his theology. For he argued that if a creed promises infinite rewards and threatens infinite punishments, prudence requires that we should embrace it, even if its truth seems to us highly improbable, so long as the probabilities against it are not infinite.

Such situations may turn out to be diagnostically sensitive in discriminating between two types of person, one which is intent on the possibilities of success, even to the extent of exaggerating them, while ignoring the possibilities of failure; and the other, which is intent on discovering the fewest possibilities of failure. It is not a distinction between optimism and pessimism but rather between a predominant wish to maximize the hope of success, on the one hand, and a predominant wish to minimize the possibility of failure, on the other. Atkinson[1] has independently proposed a similar twofold classification in the motivation of choice; there are, he suggests, people who are more eager to avoid failure than to achieve success and, *vice versa*, people who are more eager to achieve success than to avoid failure. In our admittedly small samples the former group is larger than the latter.

(iv) In two lotteries which offer the same chance of winning a prize people do not consistently prefer to *draw more frequently* from a

source which has either fewer winning or more non-winning tickets than the other source. That is to say there is no stable or decisive preference for having an extra draw and accepting a smaller chance of drawing a winning ticket on any occasion. Generally speaking, draws tend to be evaluated very subjectively, as compared with winning tickets, and even more so as compared with non-winning tickets. Put the other way round, the number of non-winning tickets is most realistically judged, the number of winning tickets next, and the number of draws last. This highly subjective valuation of a draw can lead either to underrating or to overestimating its worth. One subject, for example, said that 'I am more likely to get one out of 10 than one out of 100 *however many draws I have*'. Clearly for such a person a draw is less than its true worth and what matters is the number of non-winning tickets. On the other hand, many subjects, in other experiments, prefer to draw two or three times when each draw only has one-hundredth of a chance of winning a prize, rather than draw once where the chance is one-tenth.

(v) Within the limits of the value of the prizes we have been able to offer, there seems to be a pronounced preference, on the part of both sexes, for shorter odds when the prize is chocolate. This may be due partly or wholly to the possibility that the appeal or 'utility' of chocolate is not linear; ten boxes are felt to be worth less than ten times as much as one box, perhaps because of anticipated satiation. When the prize is a sum of money, our subjects appear to be indifferent to short or long odds, which may be due to the small amounts involved; but within the limits of the sums offered, the preference for shorter odds is weaker than in the case of chocolates.

Those who prefer a large chance of winning one box to a small chance of winning 10 boxes behave as though chocolate had a diminishing utility. Another possible explanation might be that chocolate has a constant or even an increasing utility but that a 1/100th is underestimated and a 1/10th is overestimated. The evidence is, however, against this, because people usually overestimate their success in something that seems hard and *vice versa*.[2] If this applies to chance as well as to skill, 1/100th would seem less than 10 times as difficult as 1/10th. The difference between the preferences for money or chocolate prizes bears this out. There are other experiments which show that a chance of winning is overestimated when it is less than 25 per cent and underestimated when it is more than 25 per cent.[3]

On what has come to be known as the classical view (deriving

from Daniel Bernoulli), the more money we have the less value we subjectively attach to any given increase. A man who owns £1,000 values a birthday present of £1 less than a man who owns £100, and a millionaire values it still less than the man who owns £1,000. This is what we mean when we say that the subjective value of money, or its utility, is a negatively accelerating function. Such an idea of utility has nothing whatsoever to do with probability or risk.

A rival conception of utility treats it as a preference expressed under conditions of uncertainty. If a person is indifferent to two uncertain alternatives with which he is confronted, these alternatives are said to have for him the same utility. Here we require to determine the elusive subjective value of the probabilities by which the utilities must be multiplied, as well as the subjective value of the money. A way out of this latter difficulty has been adopted by those investigators who have limited themselves to the 50 : 50 case, where it is clear that the *subjective* is more or less identical with the *objective* probability. Even this device, however, does not evade the problem of measuring the specific utility of the gamble itself, that is, the fact that some levels of risk-taking may be preferred to others.[4]

However, the situation is more complex than appears from the foregoing. Experiments by Ward Edwards[5] suggest that when the player cannot lose in the game but can only *win* or 'break even', he then tends to overestimate his chance of winning; his psychological probability exceeds the objective probability. But when the game is such that the player can only *lose* or 'break even', and is never able to win, then he tends to be realistic about his chances. This indicates that what one thinks may happen depends on the nature of the outcome, in other words, on whether success is at stake but not failure, or the other way round, failure is at stake but not success.

In an admirably lucid and perspicacious analysis of the problem of measuring utility, Stevens[6] raises a number of extremely interesting points, the most important of which is his suggestion that utility might be measured (in 'utiles') in the same way as light is measured in brils and sound in sones. He suggests further that utility is a *prothetic* continuum, that is to say, it is something obtained by adding 'excitations', as in the experience of brightness, loudness and heaviness. Such quantitative continua are contrasted by him with *metathetic* continua which depend on qualitative features, as in the experience of auditory pitch and position, where one 'excitation' seems to be substituted for another. So far, however, this conception of utility

and its measurement remains an enticing programme rather than an accomplished demonstration.

(vi) Taking all the dilemmas into consideration, the choices of the majority and minority of our subjects alike are not based on the actual number of winning and non-winning tickets. Nor are they based on the proportion of winning tickets in the total. They are based on some combination of the relative and absolute numbers. This feature characterizes our use of a great many words and phrases which are also interpreted partly in an absolute and partly in a relative sense. The student of psychology may care to consider whether this marriage of the absolute and the relative may be a fusion of what have hitherto been regarded as two independent and unrelated effects. I refer, first, to the fact that, generally speaking, we do not perceive or pass judgement on isolated colours, tones or other sense impressions. We perceive a colour as brighter than, a tone as louder than, some other colour or tone, and the standard of comparison may be implicit if not explicit. Second, there is the fact that our perception of the external world is punctuated by certain *constant* properties of size, shape, colour and so on. The choices which people make in our lottery situations seem to display a coalescence of these two tendencies.

(vii) A special question arises in relation to the transitivity of preferences. Our evidence suggests that the appeal of any particular alternative is not something absolute and invariant but may be affected by the other alternative. Hence if a person prefers A to B and B to C, he is not necessarily being illogical and intransitive if he still prefers C to A. His choices may involve, as Professor Shackle puts it, 'some element beyond that of rational coping with an action-problem'.[7]

It has been argued[8] that intransitive triads ($A > B > C > A$) are attributable to random choices between pairs of indifferent alternatives. This conclusion has been reached on the ground that intransitive choices are themselves inconsistent, that is, people often do not betray the identical intransitivity, when asked to choose between A and B, between B and C, and then between A and C. However, serious doubts have been raised about the procedures on which the conclusion is based and it seems that little confidence can be placed in it.[9]

From our data it would appear that any departure from a strict transitivity in the preferences does not indicate a lack of understanding on the part of our subjects in the sense that they are acting randomly or inconsistently. Taking our experiments as a whole we

find that the preferences of some 10 to 15 per cent are not transitive in the logical sense. Thus a person may prefer A to B and B to C but C to A, where

A = one draw from a single source of 10 tickets including one winning ticket;
B = one draw from a single source of 100 tickets including 10 winning tickets;
C = 10 draws (without replacement) from a single source of 100 tickets including one winning ticket.

This apparent intransitivity may be explained on the ground that the subjective value of any alternative depends on the other alternative with which it is juxtaposed. Thus in the foregoing example, A is preferred to B because it has fewer non-winning tickets. B is preferred to C partly because of the larger number of winning tickets and partly because of the smaller number of non-winning tickets. But C may still be preferred to A because it offers more draws. Although the weighing of draws against non-winning tickets is present to some extent when B is compared with C, the larger number of draws in C is not decisive, because it is counterbalanced by a relatively large number of winning tickets in B. Since A and C have the same number of winning tickets, the greater number of draws in C decides the issue. Thus the psychological value (or utility) of each alternative is not necessarily invariant but may depend on the nature of the other alternative with which it is compared. If so, the requirement of transitivity would falsely represent the psychological situation and hence be a misapplication of a logical principle.

It is appropriate here to expand a little the view of Professor Shackle to which I have briefly referred. It derives from his conviction that conventional theories of 'choice' are really about 'acting according to necessity' which it is a misnomer to call 'choice'. But the rejection of the idea of *necessary* action does not mean that it can only be replaced by the idea of *arbitrary* action. Nor does it mean that 'rationality' (whatever that means!) must be abandoned. All that is required, he writes, is to give up the pointless assumption that ends are given to us in advance of our choice or decision. Ends, Professor Shackle argues, can be created, because they can be experienced imaginatively, by anticipation. The making of a choice or a decision, he concludes, is therefore not illusory, which it would surely be if

everything were predestined; nor is it empty, which it would be in a world of perfect foreknowledge; nor is it powerless, which it would be in a world devoid of natural order. Choice or decision is creative in face of limited uncertainty; it is a sudden, spontaneous emergence of novelty which appears when we contemplate a range of imagined outcomes of an immediate action.

IV

We have been primarily concerned with preferences found, on the average, within more or less homogeneous groups. Sometimes the members of a group are evenly divided between one alternative and the other. This does not necessarily mean that most of them are indifferent to the alternatives, in the sense that today they might take one and tomorrow the other. Indeed, in three different instances of groups evenly divided in this manner, where it was a question of short *or* long odds, some 60 per cent consistently chose either *short* odds on all three occasions or *long* odds on all three occasions. What is more, there are significant patterns in the sequences of choice made by individuals. For instance there are some people who have a particular fondness for frequently drawing from the same source of tickets. After all, each time they draw they do have a god-given opportunity of picking a winning ticket. And they are unwilling to exchange this frequency of drawing for the privilege of drawing from a source with fewer non-winning tickets or from one with more winning tickets. It happens that this type consistently prefers long odds to short odds, and also consistently prefers larger to smaller lotteries, other things being equal.

This being so, our subjects cannot be accused of deciding blindly, without rhyme or reason. Their choices are not made at random. More pertinent perhaps is the fact that they do not refuse to choose, as they would if they followed the tradition of Buridan's ass which, equally oppressed by hunger and thirst, perished from inanition due to indecision when confronted with the choice of food *or* drink. Buridan's celebrated ass must therefore be disqualified from serving as a 'model' of man, in spite of persistent claims on his behalf in high quarters both in the East and West. But we must not judge Buridan himself too harshly because of this. His energies could not be fully engaged as a fourteenth-century philosopher, for he was a favoured lover of Queen Joanna of France into the bargain. To ensure that her

lovers remained reticent, Her Majesty had them sewn up in sacks and deposited in the Seine. Buridan alone did not suffer this fate and the grateful thinker created the ass whose agonizing conflict, equidistant between a bundle of hay and a pail of water, has pricked the liveliest intellects at the older universities for five centuries. Spinoza insisted that Buridan's ass must have been a jenny because no male could be so indecisive.

If, however, we must enthrone an ass as man's 'image', we might nominate the illustrious beast of Balaam. This heroic creature found himself in a challenging predicament: hemmed in by high fences to the right and left, retreat cut off by the whip of his master, and advance barred by the outstretched sword of an angel. He resolved his conflict by discovering in himself an unsuspected faculty of speech which proved an effective instrument of communication and appeal. 'What have I done unto thee, that thou has smitten me these three times?' Unlike the ass of Buridan which succumbed to the pressures of equal and opposite forces, the ass of Balaam took action for excellent reasons contrived by himself. The players confronted by our dilemmas favour similar self-discovered strategies.

We have been concerned in this chapter with the study of experimental lotteries; let us, in the next chapter, look at natural lotteries in their historical and social aspects, and in their relationship to gambling generally.

NOTES AND REFERENCES

1. J. W. Atkinson, 'Motivational Determinants of Risk-taking Behaviour', *Psychol. Rev.*, 1957, 64, pp. 359–72; J. W. Atkinson, J. R. Bastian, R. W. Earl and G. H. Litwin, 'The Achievement Motive, Goal Setting, and Probability Preferences', *J. Abnormal Soc. Psychol.*, 1960, 60, pp. 27–36.

2. See *Risk and Gambling*, pp. 101–2.

3. M. G. Preston and P. Baratta, 'An Experimental Study of the Auction Value of a Certain Outcome', *Amer. J. Psychol.*, 1948, 61, pp. 183–93.

4. See W. Edwards, 'Probability-preferences in Gambling', *Amer. J. Psychol.*, 1953, 66, pp. 349–64; 'Probability-preferences Among Bets with Differing Expected Values', *Amer. J. Psychol.*, 1954, 67, pp. 56–67; 'The Reliability of Probability-preferences', *Amer. J. Psychol.*, 1954, 67, pp. 68–95.

5. W. Edwards, 'The Prediction of Decisions among Bets', *J. Exper. Psychol.*, 1955, 51, pp. 201–14.

6. S. S. Stevens, 'Measurement, Psychophysics and Utility', pp. 18–63 in *Measurement: Definition and Theories* (edited by C. West Churchman and P. Ratoosh), New York: Wiley, 1959. From this side of the Atlantic it looks as though Stevens allowed himself a little dig at Edwards in 1959, and Edwards

indulged in a tit-for-tat in 1961. In 1959 Stevens wrote that 'an extensive and interesting review by Ward Edwards makes it plain that the literature on utility is perhaps a match for that on psychophysics as regards the qualities about which William James so eloquently complained'. In 1961 Edwards retorted: 'Stevens reports anecdotally the results of a semi-experiment in which Galanter asked Ss how much money would be twice (or half) as desirable as 10 dollars and other amounts.'

7. G. L. S. Shackle, *Decision, Order and Time in Human Affairs*, London: Cambridge University Press, 1961, p. xiii. See also K. W. Back, 'Decisions Under Uncertainty: Rational, Irrational and Non-rational', *Amer. behav. Scientist*, 1961, 6, pp. 14–19.

8. J. M. Davis, 'The Transitivity of Preferences', *Behavioral Sci.*, 1958, 3, pp. 26–33.

9. Ward Edwards, 'Behavioural Decision Theory', pp. 473–98 in *Ann. Rev. Psychol.*, 1961, 12, p. 484.

The reader interested in a fuller technical discussion of the topic of this chapter may care to consult the following two papers, both written with Peter Cooper: 'Patterns of Preference in Equiprobable Situations', *Nature*, 1961, 190, pp. 231–2; 'A Model for Choice in Equiprobable Situations', *Acta Psychol.*, 1961, 18, pp. 181–200.

APPENDIX

A WORD ON NOTATION

All variations of the type of choice we have examined may be represented by the following symbols:

$$\overset{r}{\underset{s}{D}}\overset{w}{\underset{l}{}}$$

where D = the number of draws which the subject can make from a given source
w = the number of winning tickets
l = the number of non-winning (or losing) tickets
s = the number of sources of tickets
and the presence of r indicates that a ticket drawn from a given source is replaced at random before the next draw

Each particular lottery may be represented by substituting numerical values for the letter. For example,

$$\overset{10}{\underset{1}{10}}\overset{}{\underset{}{}}\overset{90}{\underset{}{}} \quad \textit{or} \quad \overset{r\ 10}{\underset{2}{10}}\overset{}{\underset{}{}}\overset{90}{\underset{}{}}$$

means a choice between 10 draws, with replacement, from a single source of 10 winning and 90 non-winning tickets *or* 5 draws, with replacement, from each of two sources, each containing 5 winning and 45 non-winning tickets.

The example of intransitivity in section III (vii) may be represented as follows:

$$\begin{matrix} 1 \\ 1 \\ 1\ 9 \end{matrix} \quad \text{is preferred to} \quad \begin{matrix} 10 \\ 1 \\ 1\ 90 \end{matrix}$$

$$\begin{matrix} 10 \\ 1 \\ 1\ 90 \end{matrix} \quad \text{is preferred to} \quad \begin{matrix} 1 \\ 10 \\ 1\ 99 \end{matrix}$$

$$\begin{matrix} 1 \\ 10 \\ 1\ 99 \end{matrix} \quad \text{is preferred to} \quad \begin{matrix} 1 \\ 1 \\ 1\ 9 \end{matrix}$$

The notation seems justified because its flexibility permits us to manipulate a great variety of situations. It is also an analytical tool for it enables us to resolve a complex situation into its components and this makes it possible for us to contrast it with a different situation. The reader should not be scared by this notation, with which one rapidly becomes familiar.

CHAPTER 4

GAMBLING IN A LOTTERY

I

The drawing of lots as a form of divination is familiar to Bible readers, who will recall that this method was also used for assigning land, for selecting officials, for determining the rotation of office, and for establishing the identity of a criminal. We may suppose that those responsible for the lots had it in their power to distort the shape of things to come, for they could, if they wished, confuse innocence with guilt and, no doubt, persuade the gods to support a given policy.

From lots to lotteries it is a short step and it is not surprising to find that gambling by lottery was exceedingly popular in Rome. For instance, every participant in the Saturnalian festivities received a ticket, suitably inscribed, which entitled him to a prize. Augustus, we learn from his biographer Suetonius, introduced lotteries at public entertainments. Tickets or tablets were sold which, when unsealed, entitled the purchaser to prizes of varying value—a hundred gold pieces, a tooth-pick, or a purple robe; or he could buy a painting when only the reverse side was visible, so that, if lucky, he would win a masterpiece by Apelles or Zeuxis or, if unlucky, find a daub by a novice on his hands. During the Saturnalia, Augustus distributed towels, sponges, rakes and tweezers and sundry other items of haberdashery, with equivocal tickets attached, things which, we are given to understand, 'cannot be explained with any decency'. Nero's prizes included vast sums of money, slaves, and villas. The Emperor Antoninus Heliogabalus offered other novelties by inscribing on shells the good fortune he kept in store for his guests: flies or dormice, bears, an ostrich or two, or a dead dog.

National or publicly sponsored lotteries in their present style are familiar in Western countries. At Bruges in Belgium the archives

for the year 1446 record a payment of two livres to the widow of the painter Jan van Eyck for her lottery.[1] Florence boasts one of the first, drawn in 1530, and Genoa and Venice were soon to follow, whence they spread throughout Italy, and then, like many other practices, to France where they were introduced by Catherine de Médicis in 1553. In 1572 Louis de Gonzague instituted a lottery in Paris to provide marriage portions for impoverished but virtuous young women who lived on his estates. Winning tickets were inscribed *Dieu vous a élue*, and carried prizes of 500 francs which the lady drew on her wedding day; the other tickets bore the words *Dieu vous console*. Mass was celebrated before the tickets were drawn, with great pomp and solemnity, every Palm Sunday, and Pope Sextus V granted the promoters remission of sins.

From 1758 onwards a royal lottery was held in France about which Casanova has some interesting things to say in his *Memoirs*. After Louis Philippe had suppressed it, the winning systems seem to have been forgotten. As today in Central and South America, winning numbers were believed to appear symbolically in dreams: to dream of an ostrich meant the number 73; of a barometer, 13, 17 or 49; of a negro, 18 or 68; of a squirt, 1, 2 or 48. As an insurance against not dreaming, a pious prayer, written on virgin parchment, was to be uttered and placed beneath the pillow.[2]

The first state-sponsored lottery in England was announced in 1566, in the reign of Elizabeth I, and advertised as 'A verie rich Lotterie Generall, without blancks . . .'. The proceeds were to be used for the repair of harbours and other public works. If the first prize of £5,000 was an insufficient inducement, an additional one was the royal promise that any purchaser would be free from arrest for seven days except for major crimes.[3] The next lottery took place in 1585: 'A lotterie for marvellous rich and beautifull armor was begunne to be drawne at London in St Paules Churchyard, at the great West gate (an house of timber and boord being there erected for that purpose) on *S. Peters* day in the morning, which lotterie continued in drawing day and night, for the space of two or three days.'[4]

Lotteries soon became an important feature of British public finance, and the colonization of America was in part made possible by them. James I authorized a lottery in 1612 which raised £29,000 for the Virginia Company, an agency for despatching settlers to the New World. In 1694 Parliament opened a state lottery for raising a million pounds. Tickets were sold at £10 each, with prizes in the form

of annuities. Private lotteries soon multiplied, accompanied by many abuses. In 1699 they were abolished by an Act of Parliament, but permitted again in 1710, and once more suppressed (except for official purposes) in 1721. In 1753, however, the British Museum was founded by money raised by lottery, and by 1755 the mania for lotteries was so great that the doors of ticket offices on the opening day were broken down by mobs eager to buy.[5] In other European countries lotteries had a similar history of legality alternating with suppression.

For three centuries, from the sixteenth to the eighteenth, lotteries raged intermittently in Britain, in spite of repeated attempts to suppress them. During the eighteenth century, the newspapers teemed with proposals for lotteries. All sorts of commodities—neckcloths, snuff-boxes, tooth-pick cases, linen, muslin, plate—were offered as prizes, though money remained the paramount attraction. Once, in 1774, after the winning ticket of the State lottery had been announced, the true winning ticket was found 'sticking in a crevice' of a wheel when the lottery wheels were examined in Whitehall. It was an age of gambling crazes of all kinds of which two of the most notorious are John Law's Mississippi Scheme and the South Sea Bubble. At the time of the Bubble, 'it seemed as if the whole nation had turned stock jobbers . . . the inordinate thirst for gain affected all ranks of society. Besides the South Sea, innumerable other companies started up everywhere. There were nearly a hundred of these projects or bubbles—extravagant to the last degree.'

Suicide on the part of a disappointed lottery player was by no means unknown. In the reign of George II the footman of a lady of quality lost the savings of a lifetime in two blank tickets, whereupon he put an end to his life, but before doing so, he left for posterity a description of the manner in which he had hoped to spend the prize of £5,000.

As soon as I have received the money, I will marry Grace Towers; but, as she has been cross and coy, I will use her as a servant. Every morning she shall get me a mug of strong beer, with a toast, nutmeg, and sugar in it: then I will sleep till ten, after which I will have a large sack posset. My dinner shall be on table by one, and never without a good pudding. I will have a stock of wine and brandy laid in. About five in the afternoon I will have tarts and jellies, and a gallon bowl of punch; at ten, a hot supper of two dishes. If I am in good humour, and Grace *behaves herself*, she shall sit down with me. To bed about twelve.[6]

Lotteries were declared illegal in 1802 and again in 1823, and ten years later an Act was passed which prohibited the advertising of foreign lotteries in British newspapers. The organizers of lotteries were liable to conviction as 'rogues and vagabonds'. In order to escape the designation 'lottery', the distribution of prizes had to depend on so-called 'skill', which was never defined. In 1956 lotteries reappeared in the form known as Premium Savings Bonds. Lotteries are now firmly established in a number of countries—France, W. Germany, Switzerland, Italy, Spain, Malta, The Netherlands, Scandinavia, Turkey, Australia, Russia, Poland, and many other countries. The new sovereign state of Iceland also has its lottery from which come funds for developing the University of Reykjavik. Although they vary in detail, in the manner the winner is selected, in the value of tickets and the size of the prizes, in principle they are alike.

II

I shall now briefly describe a survey[7] of certain aspects of the British lottery system. This survey involved two groups of workers, industrial and municipal respectively, who were participants in a privileged scheme whereby a Bond became eligible for a prize at the end of the month in which it was purchased, instead of at the end of six months. A Questionnaire (see Appendix I), to be completed anonymously, was distributed to the members of the two groups through the personnel departments of the two organizations.

In 1958, two years after its inception, it already seemed that the British lottery scheme was losing its appeal and that some stimulus was needed to turn the Premium Bonds into a more exciting gamble. In April 1960, therefore, the maximum prize was raised from £1,000 to £5,000 and the investor had henceforth to wait three, instead of six, months before his newly purchased Bond became eligible for a prize, although the maximum number of Bonds anyone could hold remained at 500. All this, however, made no difference to the fact that the Bonds still had to compete disadvantageously with other forms of gambling, particularly football pools. In the first place, football pools offer the possibility of winning hundreds of thousands of pounds for a stake of a few coppers. In the second place, the evidence suggests that, in general, people prefer to gamble where skill appears to play some part. Skill, however, plays no part in lotteries, and hardly anyone

could possibly imagine otherwise, whereas in football pools, while skill is negligible, many 'punters' believe that it is not.

Some 5,000 Questionnaires were distributed but not many more than 40 per cent were returned. This rather small return makes interpretation difficult, but is interesting in itself, for it seems to be a sign of secretiveness in money matters. In Britain wages and salaries remain inviolably private, and prying into personal finances is strictly taboo. In most large organizations such as newspaper offices or universities, although not in the Civil Service, no one knows how much anyone else earns. Each employee keeps his income veiled from his fellows so as to avoid comparisons which might turn out to be embarrassing. Such monetary bashfulness is not a law of nature. In some other countries, no secrecy about personal income is felt to be necessary; clients at banks discuss their affairs in the presence of strangers freely, not in a hushed whisper, and they no more hesitate to reveal their bank balance than they do to expose their faces. Another explanation for the relatively small return is sheer indolence on the part of the recipients of the questionnaires. Since the enquiry was anonymous no pressure to reply could be brought on anyone.

The main conclusions are as follows:

(i) The respondents held, on the average, between 25 and 30 Bonds, with larger holdings in the higher occupation groups. Other features of these latter groups included earlier purchase of Bonds; fewer withdrawals (or encashments); an intention to buy a smaller number of Bonds if they won £1,000; a higher valuation of the fact that each Bond could win a prize each month; and less optimism about winning a prize.

(ii) The purchase of more Bonds did not, on the whole, seem to the respondents to improve their chances of winning £1,000. One might expect that, as Bond holdings increased from, say, less than 5 to more than 50, there would be a corresponding change in the belief that the chances of winning a prize would improve. This was not the case. The chances of winning a prize were, in fact, felt to be best among respondents who held 6 to 10 Bonds. At this number of holdings, half of the respondents believed that they had at least a moderate chance of winning £1,000 and half of them believed their chances were poor or worse. When Bond holdings were less than 5 or more than 10, optimism, on the average, appeared to be less. The explanation may be that those who held only 6 to 10 Bonds had bought them

more recently than others and therefore had not yet lost as much hope of winning a prize.

We must also reckon with the fact that confidence of winning a prize does not rest solely on the number of Bonds. It also depends on the extent to which a Bond holder believes he, or his Bond number, is lucky. We know that many people do not base their confidence of winning a prize only on an attempt to calculate 'objective' probabilities; subjective considerations of luck and unluck play their part as well. At one extreme a person might consider one Bond enough to allow his luck full play and, so to speak, grant the gods an opportunity of showering their bounty on him, and at the other extreme, a 'rational' man might feel that his chance of a prize would be best if he purchased the maximum number of Bonds permitted by law. It would seem that in the group holding 6 to 10 Bonds, we have that special combination of luck and number of Bonds, that is, of subjective and objective factors, which leads to the highest optimism of winning a prize.

(iii) A relatively long interval of time since the respondents had purchased their first Bond seemed, if anything, to reduce confidence in winning a prize. This may seem surprising if we assume the Monte Carlo effect should operate. But this effect, whereby the longer the sequence of failures the greater the expectation of success, evidently does not apply here, presumably because the respondents' expectations do not relate to *repeated* gambles involving *new* stakes but to Bonds which have become stale.

(iv) Some 9 per cent of the respondents stated that they would prefer fewer prizes but of larger value. The reason for this rather small proportion may be the presence of more 'savers' than gamblers among the respondents, as is suggested by the fact that nearly half of the respondents placed 'Bonds are a form of saving' as the chief of the advantages.

(v) Among those who placed 'Bonds are a form of saving' as first among the advantages, 70 per cent believed that it was worth holding more than 100 Bonds, a rather higher proportion than among those who ranked first either 'Each Bond may win a prize each month' or 'You may win up to £1,000 with each Bond you hold'. We may take this to signify that 'savers' are more apt than 'gamblers' to think that it would be worth while holding more Bonds.

(vi) So far as the British state lottery is concerned, the sexes appear to differ in two respects. First, the statement that 'Bonds are a form of saving' is placed first among the five advantages by appreciably more

women than men. Second, a smaller proportion of female respondents said that they would buy more than 250 Bonds if they won £1,000; in this respect the females resemble the relatively higher income groups.

III

The history of gambling, apart from lotteries as such, has been documented elsewhere and it is not necessary for me here to do more than fill in some gaps. It is unlikely that any one person can be described as the 'inventor' of gambling, but legend has awarded the palm to King Palamedes while exercising his ingenuity to relieve the tedium of the ten-year siege of Troy.

The antiquity of gambling in civilized societies is attested by the discovery in Crete of a gaming-board of gold and silver inlaid with crystal and ivory, which belongs to about 1800 BC, and regular dice have been found in prehistoric remains at Hradischt in Bohemia. In Babylon headless arrows served as gambling devices as well as for divination, and the spinning coco-nut of the South Pacific embodies the principle of the roulette wheel.[8] The divinities of India and Scandinavia were addicted to gambling, and in the Egyptian myth of Osiris, as described by Plutarch (*The Mysteries of Isis and Osiris*), Hermes (or Thoth), father of Isis, wins the last five days of the year—the so-called 'epagomenal' days—in pitting his wits against Selena, the moon, in a game like draughts.[9]

While the practice of gambling is universal it is rare to find the passion and intensity with which the Indian tribes of North America, men and women alike, indulged in it. They placed their stakes on the outcome of chance, on efforts of skill and on the results of ceremonial games. Gambling was by far their favourite pastime. They believed that it originated in a divine source and that in the hereafter the spirits of the dead would spend eternity in gaming.[10]

In our own day the free world looks to the United States for leadership in establishing a scale for the splendour and magnificence of gambling enterprises. Who has not heard of Las Vegas in Nevada where 'the sun never sets on gambling'? Other centres, a shade less renowned, include Reno, Lake Tahoe, and Carson City, the capital of Nevada. Every year Las Vegas entertains ten million visitors, and its gross revenue from gambling increased tenfold between 1946 and 1962, whilst in Nevada as a whole it exceeds 200 million dollars per annum. Imbued with the zeal of their pioneering forefathers American

business men are now busily establishing outposts of free culture in Europe: they have made a promising start by establishing a casino in the Isle of Man.

At American resorts the favourite play is dicing or 'crapshooting', which is all chance and no skill. On each roll of the dice, twenty people may bet, or even make several bets on different possibilities, thousands of dollars often being staked on a single throw. The dice-tables are ceaselessly active, without intermission, by day and by night, like the never-ending cycle of the seasons; dawn finds the crowds as alert as if it were midday.[11]

In describing twentieth-century gambling, the slot-machine or 'one-armed bandit' must receive honourable mention. Emanating from the factories of the world's greatest democracy, this splendid brain-child of modern technology has conquered South America, Europe and the Far East. A report by a U.S. Senate Investigating Committee, published in March 1957, records that 300,000 machines, the product of 15,000 workers in 50 factories, were sold in 1956. In one great New York centre of slot-machine culture, a vast room holds dozens of multi-coloured machines in orderly array. The indefatigable player sits hour by hour on a leather chair equipped with an ash tray and 'a special place for his hot dog and coca cola, the national repast of the poor in the United States, which he can order without budging . . . an infernal din muffles the recorded voice of Louis Armstrong or Elvis Presley which accompanies the efforts of the small-time gamblers'.[12] A single machine can be played a dozen times a minute, and if this is not enough, the player can take two machines, feeding one while the other is coming to rest, all the while wearing a gauntlet to protect his skin from friction.

Youth prefers to play on the atomic bomber and guided missile machines whilst the woman turns to the 'love-meter' which reveals to her confidentially whether she is still in the running for an *affaire d'amour*. Four hundred million dollars a year are spent by Americans engaged in 'projecting nickel-plated balls against luminous blocks through various obstacles'. Immense pleasure is derived in winning millions upon millions of fictitious dollars by staking a small coin.[13] In post-war Japan, slot-machines for a time absorbed 12 per cent of the national income. They found a place in doctors' waiting rooms.

In 1961, the New York State Commission of Investigation into Gambling[14] reported that: 'The major law enforcement problem in this State today is professional gambling in all its aspects and rami-

fications', but, laments the report, a high proportion of the people do not know the difference between the bookmaker and organized crime. Nevertheless New York State does not condemn gambling on principle, 'for it is in the racetrack gambling business on its own at Aqueduct, Belmont and Saratoga, and as a partner at Yonkers, Roosevelt and a bevy of smaller trotting tracks. But unless you go to these tracks, stand in line for a ticket and go through other processes you are betting illegally on the horses.'[15]

Roger Caillois[16] has recently described certain remarkable gambling practices as far apart as equatorial Africa and Central and South America. In Gabon, for instance, there is an elaborate game with dice on which are engraved a variety of curious figures and signs. In Cuba *Rifa Chiffá*, a game of Chinese origin ('Chinese Charade') based on a figure divided into 36 parts, each with some symbolic emblem, holds wide sway. The corresponding game in Brazil is called *Jogo do Bicho*, played by three-quarters of the adult population. The average player loses a third of his meagre monthly income in this game, which is linked with an intricate esoteric system of dream interpretation for guiding players in their choice of symbol.

Among contemporary peoples the Swiss stand out as somewhat peculiar, for while they are constantly playing cards, nothing is usually at stake other than victory or defeat. They seem to be playfully enquiring, through the medium of the game, how the gods would decide in a *real crisis*. It is possible that the isolation of Switzerland during the great wars and conflicts of our time, its separateness and neutrality, has engendered an amateur spirit in gambling. Their national sport is a card game called 'Jass' (supposedly a corruption of 'Ace') with several varieties which bear some resemblance to bridge. The game is less than a century old and probably derives from the much older 'Tarock', which is played with 78 cards, 'Jass' requiring only 36.

In France, at least 120 billion francs (£120 m.) are spent on state-controlled games of chance, about as much as the English devote to dog racing. The *Loterie Nationale* accounts for about a third of this amount. Britain seems to be the only civilized country in the world where an annual budget of gambling is drawn up, thanks to the Churches' Council on Gambling.[17]

Money poured into the British national lottery forms less than 2 per cent of the total amount spent on gambling in Britain. It has a new rival in bingo and in the new legalized betting shops of which there

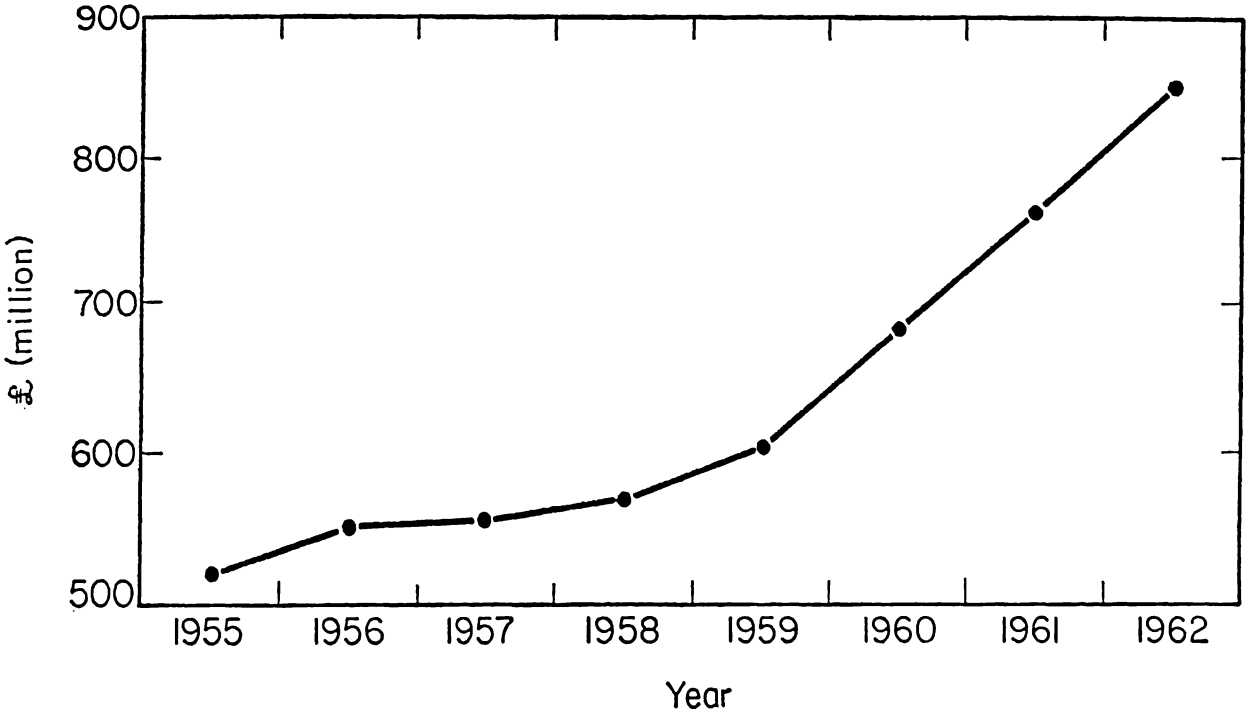

FIG. 1. Estimated Total Turnover of Gambling in Britain, 1955–1962

are some 15,000 in the country as a whole, apart from 12,000 bookmakers' permits. The main types of play and the turnover on each is shown in the table which follows. The total is shown by graph in Fig. 1. The large apparent increase is somewhat deceptive when one considers the loss of value of the pound sterling between 1955 and 1962. Taking 1939 as the baseline, the pound was worth 10s. 3d. in 1955 and 8s. 5d. in 1962. Even allowing for this devaluation, however, there was a 20 per cent increase in gambling turnover in 1962 as compared with 1955. The figure of, say, £900 m. for 1962 is, however, not all that greater than the £100 m. for 1912 when due allowance is made for growth in population as well as for the fall in the pound.

TABLE 1. *Estimated Turnover on Gambling in Great Britain*
(£ million)

	1955	1956	1957	1958	1959	1960	1961	1962
Horse racing	330	350	350	350	365	385	440	540
Greyhound racing	120	121	122	121	124	125	125	115
Football pools	68	72	74	85	98	111	101	85
Fixed Odds Football Betting	—	—	—	—	—	45	50	60
Bingo	—	—	—	—	—	—	25	30
Premium Bonds	—	—	4	6	9	10	13	15
Other forms (fun fairs, etc.)	6	5	6	6	7	7	8	8
Total	524	548	556	568	603	683	762	853

Source: Annual Reports of the Churches' Council on Gambling.

We must thank the gambling impulse for generating a rich variety of risk-taking operations which involve undertaking a task when success is uncertain. Abundant examples spring to mind from the annals of politics and crime, which are so unlike in other respects. Many a Parliamentary candidate differs from the normal voter only in cherishing a stronger conviction that he is born to lead, just as many an offender against the law differs from his law-abiding neighbour merely in being more confident of escaping detection; British Railways and the Inland Revenue offer ample scope for gamblers endowed with this degree of daring.

When we think of gambling we have a vision of those who stake their life or fortune on a throw of the die or, as in Old China, their teeth, their wives and their eyebrows. We give less thought to the zealous millions who dedicate all their leisure together with a small proportion of their incomes to dice and lotteries, to horse-racing and roulette, to football pools, to blackjack and faro, to bingo, poker and manifold other varieties of this most entrancing of all tasks.

How different is the true gambler from the casual player? The gambler's conduct is governed by the Monte Carlo fallacy: the longer the sequence of his failures, the stronger his conviction of triumph in the end. That is why he increases his stake with every loss. Eager to lose, failure to him is an essential step towards that ultimate success which paradoxically he does not in fact want. He cannot stop his play however much he has won or lost, because he is in effect challenging the gods, endeavouring to discover whether they *really* love him, just as a child tries to see how far he can go before his parents will say: 'Stop!'

The Monte Carlo fallacy is not necessarily felt to be true[18] in all circumstances. There is a story of a patient about to submit to a grave operation. The surgeon spared no effort in making the patient realize the full gravity of the situation. 'The operation', he said, 'can have fatal consequences. More than that, the majority of patients do not survive. In fact, nineteen out of twenty die.' At this point the patient's face must have presented a picture of unrelieved gloom, whereupon the surgeon cheerfully added, 'But you have nothing to worry about, because I have operated on nineteen patients and they are all dead!'

Considerations such as the Monte Carlo fallacy only weigh mildly with the ordinary player. Not that he, any more than the true gambler, is guided by mathematical calculation, though he is not so likely to contrive a 'system'. He resembles the gambler in greatly overrating his chances of success and, to a less extent, in underestimating the likelihood of failure. His decisions are founded on the *possibility*, not on the *probability*, of winning. I doubt whether one punter in twenty realistically attempts to assess the probability of success by reckoning both the *number* and the *magnitude* of his chances of winning.[19]

To make up for their lack of gambling spirit, so far as past events are concerned, British punters raise their eyes towards the future. The national lottery in Britain is not called Premium *Savings* Bonds for nothing. The moral value of saving is a dogma of the theologically minded politicians for which Britain is rightly renowned. The British

politician stands out from all others by his moral ardour, by the ease with which he can stir himself to righteous indignation, by the fervour with which he promises to eradicate social evils once the whole country is set against them. The overpowering nature of this moral fire is proved by the fact that the head of a Minister for Education and Science was reported to have changed its shape while its proprietor was giving expression to the voice of his conscience during a television interview. The great economist, Lord Keynes, taught us that when men are thinking of nothing but their own gain, and save what they are unable to spend, they are, by that act of selfless renunciation, performing a supreme public service. No one will deny that the twentieth century is indebted to the genius of the Prime Minister whose inventive mind gave birth to the idea of the Bonds. He conferred on his country a twofold blessing: the Bonds which he conceived enable the citizen to achieve affluence in the flesh as well as salvation in the spirit by one and the same coupon; and his beatific mirage of everlasting glory is greatly enhanced by the minute chance of winning £50 *en route*. The next logical step to take would be to amalgamate the National Savings Movement with the Salvation Army. The gambler's fallacy reverberates in the hearts of all, at least all who subscribe to the dictum 'things must get worse before they get better', but in this respect investors in Premium Bonds are a race apart, for they refuse to believe that the longer their coupon has been unlucky in the past the more likely it is to win a prize in the future.

The temperament of gamblers has changed very little throughout the centuries. According to Galateus, they are gay if they win but become 'choleric and testy' if they lose and they 'break many times into violent passions, and oaths, imprecations and unbeseeming speeches, little different from mad men for the time.'[20] If they continue long enough they end in the gutter, 'beggary is the common end'.

Psychoanalysis, as interpreted by Fenichel,[21] sees the gambler's passion as a displaced expression of conflict deriving from infantile sexuality, usually from guilt associated with masturbation. The pleasure in gambling is assumed to correspond to sexual pleasure, winning to orgasm, and losing to castration. The gambler compels the gods to decide whether they approve of his 'play', in all senses of the word, or whether they are going to exact a penalty for it. More generally, gambling, as I have already suggested, is essentially a provocation of fate, a contest with destiny, which is forced to decide for or against the player. When he casts the die, he is challenging the

divine powers. The alleged kinship between gambling and masturbation, to which Freud first drew attention, lies in the fact that they are both a sort of play, or foreplay, designed both to heighten and to discharge a state of tension.

We should not overlook what seems to be a difference between the sexes in fondness for gambling, though without jumping to the conclusion that the difference, if it exists, is inborn. We have found some evidence[22] that women are more influenced than men by a belief in luck. A bigger proportion of women than of men seem to think they are lucky. The proportion of women who believed they would draw the winning ticket in a lottery was nearly twice as large than the corresponding proportion of men holding this belief. This does not mean that women gamble more than men, though the growing equality of status in the two sexes suggests that they may be catching up; Bingo has a special appeal for women. It may be that people, men or women, who believe they are lucky are less inclined to gamble than those who believe that their skill, rather than luck or chance, governs their success. Simone de Beauvoir, in a shrewd delineation of her sex, points out that a woman is apt to substitute a tussle with a greengrocer for her husband's little flutter. Woman, declares Miss de Beauvoir, regards herself and her merits as *given*. If she is out to seduce, she presents herself and believes this is enough: the charm either works or not, she herself has no part in it. She tries her luck and what she actually *does* is of little consequence, for success will either come to her or not. She does not gamble like the man but 'a solid cabbage, a ripe Camembert are treasures that must be cleverly won from the reluctant shopkeeper'. She is out to get the most for the smallest payment and she 'glows with triumph as she contemplates her well-filled larder'.[23]

Gambling, in the sense of an enterprise in which something precious is hazarded, pervades the whole of our lives. The extent to which it flourishes, however, in any given society depends, though it is hard to say how much, on socio-economic conditions and values, and on the position taken towards it by the Government. When economic rewards seem to bear little or no relation to merit or hard work, the tendency to secure them by other means, by gambling or crime, will almost certainly be strengthened. And in particular, so long as the 'wants' of the working classes are excessively stimulated by powerful advertising pressures of all kinds, so long as they are made aware of all the good things that money can buy but which are beyond the reach of their limited incomes, they will be sorely tempted to gamble. For

this is the only way, other than through crime, by which the rewards which society offers and which it values so highly can possibly be attained. In a highly competitive community which lives on the extent to which the output of its factories can create and satisfy the consumer's 'wants', a balance must be struck between the intensity of these 'wants' and the capacity to gratify them by legitimate earnings. If there is too great a discrepancy between the intensity of the 'wants' and the economic capacity to satisfy them, the individual is almost bound to be attracted to gambling, in one guise or another, if he does not turn to crime.

We gamble with money, it is true, but we also gamble with health and reputation, and even with our lives. Anyone who tries to cross a busy highway with traffic speeding in both directions is staking life and limb for the prospect of reaching the other side quickly, and the smoker hazards the health of his lungs against the immediate pleasure of a cigarette. Grey Walter has suggested that the whole of evolution may be seen as a gigantic gamble: some species, like the extinct dinosaur and mammoth, preferring short odds, whilst others, like the bee and the ant, long odds.[24] The act of human procreation may be regarded as the expenditure of a relatively small amount of energy in the hope of a substantial dividend, in the shape of a child, approximately 280 days later. If it is permissible to argue by analogy from biology to history, we may now be witnessing the impending extinction of mammoth nations, armed with thermonuclear tusks, in favour of the small innocuous nations who will survive to tell the tale. In the chapter to follow we shall look at a type of 'gambling' which obeys no set rules and in which neither the reward nor the penalty is primarily financial. I refer to the hazards we incur in that ceaseless and inescapable gamble with life that daily and nightly takes place on the public highway.

NOTES AND REFERENCES

1. John Ashton, *A History of English Lotteries*, London: Leadenhall Press, 1893.

2. Grillot de Givry, *A Pictorial Anthology of Witchcraft, Magic, and Alchemy*, New York: University Books, 1958, pp. 282, 310.

3. See John Scarne, *Scarne's Complete Guide to Gambling*, New York: Simon and Schuster, 1961, pp. 127–9.

4. From Stowe's *Annales*, quoted by J. Ashton, *op. cit.*, p. 24.

5. Scarne, *op. cit.*

6. W. Hone, *The Everyday and Table Book*, London: Tegg, 1833, pp. 1447–8.

7. For fuller details of this survey see John Cohen and Peter Cooper, 'A Study of a National Lottery: Premium Savings Bonds', *Occup. Psychol.*, 1960, 34, pp. 170–83.

8. *Encycl. Rel. Eth.*, vi, p. 164.

9. W. M. Flinders Petrie, *Personal Religion in Egypt before Christianity*, London: Harper, 1909, p. 126.

10. *Encycl. Rel. Eth.*, vi, pp. 170–1.

11. See R. A. Lyttleton, 'Fortune-hunters' Oasis that Brings the Desert to Life', *Observer*, April 22, 1962.

12. R. Caillois, *Man, Play and Games*, London: Thames & Hudson, 1962, pp. 182–3.

13. Caillois, *loc. cit.*

14. *New York Herald-Tribune*, March 25, 1961.

15. *New York Herald-Tribune, loc. cit.*

16. *loc. cit.*

17. Annual Reports of the Churches' Council on Gambling, 1955 to 1962, 19 Abbey House, Westminster, London, S.W.1. In August 1963 the British Government decided to make an all-out effort to discover how much gambling went on in the country. All clubs providing facilities for roulette, baccarat, whist, solo, bridge, chemin de fer, poker, pontoon, bingo, fruit machines or any other such games, had to register at a special office or become liable to severe penalties. The report has now appeared, Cmnd. 2275, H.M.S.O., 1964.

18. Told by Lord Cohen of Birkenhead during the course of his Stopford Memorial Lecture at the University of Manchester.

19. See *Chance, Skill and Luck*, p. 96 *et seq.*

20. See Robert Burton, *The Anatomy of Melancholy*, pp. 191–2.

21. Otto Fenichel, *The Psychoanalytic Theory of the Neuroses*, New York: Norton, 1945, pp. 372–3.

22. *Chance, Skill and Luck*, p. 117.

23. Simone de Beauvoir, *The Second Sex* (translated and edited by H. H. Parshley), London: Landsborough Publications, 1960, p. 172.

24. W. Grey Walter, *The Living Brain*, London: Duckworth, 1953, but see also C. H. Hartmann's Introduction to *Games & Gamesters of the Restoration*, London: Routledge & Legan Paul, 1930, p. xvi.

APPENDIX 1

THE QUESTIONNAIRE*

1. What is your occupation (actual job?).....

2. At present every £500,000 of the prize money is shared out in 11,850 prizes as follows:

* I am indebted to Mr. H. Houston, M.B.E., Regional Commissioner for National Savings, who facilitated this enquiry and made contact with the municipal and industrial groups. I am also very grateful to the authorities and officials in these two organizations for their valuable help and advice.

GAMBLING IN A LOTTERY

50	prizes of	£1,000 —	£50,000
100	prizes of	£500 —	£50,000
200	prizes of	£250 —	£50,000
500	prizes of	£100 —	£50,000
1,000	prizes of	£50 —	£50,000
10,000	prizes of	£25 —	£250,000
11,850			£500,000

(*a*) Would you prefer that there should be fewer prizes but of larger value? .....

(*b*) If your answer is 'Yes', how much do you think the top prize should be? .....

If possible, please show how you would like the prize-money to be shared out by filling in the blank columns below:

Prize	*Number of Prizes*	*Prize-Money*
100,000		
50,000		
10,000		
5,000		
1,000		
500		
100		
50		
25		
		£500,000

Please make sure that the *total* amount of prize-money adds up to £500,000 in the third column.

3. How many Premium Bonds do you now hold? .....
4. When did you buy your first Bond(s)? .....
5. Have you ever withdrawn any Bonds? .....
6. If you won £1,000 in the next draw how many more Bonds, if any, would you buy? .....
7. Listed below are five advantages of Premium Bonds. Please put the number 1 to 5 in the brackets to show what you think is the order of importance of the advantages.

The Bonds can be withdrawn at any time without loss ( )
The prize-money is tax-free ( )
The Bonds are a form of saving ( )

You may win up to £1,000 with each Bond you hold ( )
Each Bond may win a prize each month ( )

8. What do you think is your chance of winning £1,000 in the next draw? Please reply by underlining one of the following:

Almost certain
Very good
Good
Moderate
Poor
Very poor
Almost none

9. Do you think that people win prizes because *they* are lucky or because their *coupon-numbers* are lucky?.....

.....

The members of the industrial group were asked two additional questions, viz:

10. Are you over 21?.....
11. What do you think is the largest number of Bonds that it is worth while holding? .....

APPENDIX 2

NOTE ON THE GAMBLER'S FALLACY

Some clarification is needed of the expression 'gambler's fallacy' which is used both as a synonym for the Monte Carlo fallacy and for what is sometimes known as the 'negative recency' effect. The expression 'negative recency' came into being to refer to an alleged tendency on the part of a guesser to guess, as the outcome of a binary event, not the outcome which had frequently appeared on recent occasions but the other outcome. In *Risk and Gambling* we called this the tendency to predict the non-preponderant outcome.

Strictly speaking when we refer to gambling we have in mind a situation where the gambler has something at stake, not to the guessing of outcomes as such. And if we bear in mind the mentality of a true gambler, we refer only to a situation where the gambler has experienced a run of *failures*; the longer the run of failures the more convinced he is that the next outcome will be successful. But after a run of successes he does not necessarily expect a reversal to failure. The gambler's relation to success is quite different from

his relation to failure, a point which is overlooked in studies of 'negative recency', even when it is called the 'gambler's fallacy'. The real gambler is the one who can never stop his play and however much he has won he is ready to stake it again in another gamble. Success, it is true, looks appealing to him, but only until he has won. A win is attractive prospectively but not retrospectively. The utility of the pay-off changes sign from positive to negative, at the very moment of the gambler's victory. Thus so long as he has been losing, he hopes and expects to win, but so long as he is winning he does not hope or expect to lose. This hypothesis of the gambler's mentality cannot be tested by experiments with imaginary or trivial pay-offs or in experiments on binary guessing. It can be tested only in situations when something significant is at stake in runs of losses and gains. As I have shown earlier (p. 48) even a non-winning stake, as in the British Lottery, does not give rise to the gambler's fallacy, presumably because the stake remains the same one in each lottery, and the gambler's fallacy presupposes the loss of a different stake in each play. No wonder, then, that Ward Edwards,* who discovered a positive recency effect in the later runs of a long series, speaks of the gambler's fallacy as 'a very evanescent phenomenon'. For his statement is based on guessing experiments only. Feldman found no significant negative recency in 200 trials. We have already shown (*Risk and Gambling*, Chapter 2) how feeble, relatively speaking, the fallacy is in such circumstances. I am not, of course, denying that various sequential probability effects occur in guessing situations. On the contrary I have attempted in a number of experiments to demonstrate the existence of such effects, but they should not, I suggest, be confused with the true gambler's fallacy.

* Ward Edwards, 'Probability Learning in 1,000 Trials', *J. Exper. Psychol.*, 1961, 62, pp. 385–94; Supplementary Report: 'Unlearning the Gambler's Fallacy', *J. Exper. Psychol.*, 1961, 62, p. 630; see also M. E. Narvik, 'Probability Learning and a Negative Recency Effect in the Serial Anticipation of Alternative Symbols', *J. Exper. Psychol.*, 1951, 41, pp. 291–7; D. C. Nicks, 'Prediction of Sequential Two-choice Decisions from Event Runs', *J. Exper. Psychol.*, 1959, 57, pp. 105–14; J. Feldman, 'On the Negative Recency Hypothesis in the Prediction of a Series of Binary Symbols', *Amer. J. Psychol.*, 1959, 72, pp. 597–9.

CHAPTER 5

GAMBLING WITH LIFE ON THE ROAD

1

The situation on the roads in many countries has reached such a degree of complexity and unmanageableness that it calls for a basic examination of the man-vehicle relationship in a traffic system. Only after this has been done shall we be in a position to suggest either short-term or long-term remedial measures.

The most far-reaching change that comes over a man when he drives a vehicle is a dramatic fall in his capacity for self-regulation. It is true that his body retains its steady state in relation to the control of temperature and glucose, calcium and salt, but it loses that normally displayed when walking or running. Ordinarily, no great injury can befall us if we stumble when walking or even when running at speed, but this state of affairs no longer holds when our movement is mechanized. Evolution has equipped us for bodily self-regulation by building into us a network of 'governors', known collectively as 'homeostasis', an arrangement which works smoothly enough when left to itself. In the shape of a motorist, however, it is not left to itself but placed in charge of a vehicle weighing one or more tons and capable of moving with the force of ten or twenty 'mechanized horses'. Normally, our minds can afford to be 'quiescent' so far as self-regulatory processes are concerned; we can leave everything to our built-in 'homeostats'; but the mind of the motorist becomes restive and his physical reactions fall to the mercy of the uncertainties of the moment, effects which are accentuated by alcohol. The homeostatic barrier is broken.

Even this is an over-simplification, for when our feelings are aroused, as may conceivably happen on the road, our bodies begin to speak a second tongue of their own, an obstreperous jargon of

social defiance and abuse. For our bodies may be described as bilingual; apart from their self-regulatory 'mother tongue' they also speak the language of the emotions, each organ in its characteristic dialect, style and grammar. When homeostasis is muted, this other voice makes itself unmistakably and vociferously heard. In the provocative predicaments in which the motorist often finds himself, the suspension of self-regulation in movement is thus not the only thing that happens. When we are enraged, fearful or hungry, certain hormones pour into the bloodstream which may transform what seems like a timid and peaceful citizen into a beast of prey.

If all this is not enough, the traffic in which the motorist finds himself most of the time is also largely unregulated. In such circumstances, even if his own actions were subject to an automatic safety control the motorist would still remain in the unenviable position of a factory worker exposed to mortally dangerous machinery on all sides. Compare the relatively poor traffic control in any modern city with its factories, where dangerous installations are rendered more or less fool-proof. No industrialist in his senses would take financial responsibility for the traffic in any given zone unless he could provide it with safety devices on a par with those that exist in his factories. The man-vehicle relationship in traffic is accordingly marked by a twofold failure: unself-regulating units, that is, individual motorists, are planted within a larger system of traffic which is equally unself-regulating. The hazards of the road in general and, in particular, the effects of alcohol on the motorist, arise from this twofold chaos or 'double inhomeostasis' as it may be called.

II

When built-in control is lacking, uncertainty generates its twin evils: risk and hazard. These are commonly confounded although they are entirely distinct, and the motorist should be trained to identify them. When he takes a *risk* he embarks on a task in which he is uncertain of success, although in fact he may never fail. When he incurs a *hazard* he undertakes a task in which he will sometimes fail, however great his confidence of success beforehand. *Risk* is a state of mind in which we gamble on the outcome of our action; *hazard* is the probability of what will actually take place.

The absence of automatic safety devices in vehicle and traffic

creates marvellous opportunities for such characters as the one described by Georges Duhamel in his *Scènes de la vie future.*

> This man, considered an idiot by his most indulgent friends, despised by his wife, a man to whom no one would dream of entrusting anything of the least importance, incapable of carrying his own suitcase, without sense or skill, to whom hardly anyone ever listens, whose writing cannot be deciphered, a man devoid of moral resilience or true courage, lacking authority or self-command, this man climbs into his vehicle. . . . A man who wouldn't dare to impose his will on a horse knows that he can demand everything from a machine. . . .[1]

At first sight this may seem a sketch of a high-grade imbecile. Careful scrutiny, however, will assure us that it bears a family resemblance to Mr Everyman. For where is the man whose well-disposed friends do not think him something of a fool, whose wife does not secretly harbour for him feelings of contempt masquerading as adoration, who does not loathe carrying his luggage, whose scrawl is not sometimes illegible, who without hesitation asks a favour of a horse?

Fortunately, the tendency to incur undue risk and hazard can be much reduced by suitable training in which the trainee can learn to be more precise in judging what he can and what he cannot do with his vehicle. If he is to become a really good driver he must learn never to attempt a task unless he is sure of succeeding and, by leaving adequate margins of safety and hazard, never to fail in any manœuvre he dares to undertake.[2]

There is no question, of course, of sweepingly condemning all risk and hazard, for in sport and adventure, in acts of heroism, in any worthwhile endeavour, as well as in the domain of politics, these elements of subjective and objective uncertainty are unavoidable. But they have no place on the road, where they afford tempting opportunities for self-display. Speed and acceleration are emblems of prestige and status. Every motorist or motor-cyclist constantly finds himself in a competitive situation, a contest, where the outcome, his individual triumph and superiority, turns on whether he can drive faster than his fellow, elbow him out or otherwise outwit him. His vehicle becomes for him a symbol of his own body, and he may have no other outlet for asserting his prowess. A man at the wheel is visible, as it were, through a high-powered magnifying glass. With a minute expenditure of energy he can demonstrate his manhood and

virility. Others—the horseman, the cyclist, the man in space, even the traveller on British Railways—enjoy speed, but no one can run amok like the motorist, by the gentlest pressure of his toes on the accelerator.

III

An understanding of the man-vehicle-traffic relationship may help us to assess the impairment due to the effects of alcohol on the driver. The charge is sometimes made that the tests of impairment in common use are arbitrary. This does not apply to some, at least, of the tests used in medical practice, such as the blood-count in pernicious anaemia or the blood-sugar in *diabetes mellitus*; these latter tests are not only precise in themselves, their interpretation is also generally valid. But we are on much less safe ground when determining the effects of alcohol. We cannot say with confidence that one driver is safer than another merely because his reaction time is quicker; on the contrary, this, other things being equal, may make him less safe because he dares more. Nor can we infer that he is less safe merely because his co-ordination is poor in a finger-to-finger test. In particular, a direct measure of alcohol in the blood provides a rather crude indication of its effects by contrast with what may be revealed in risk-taking experiments. Thus the blood alcohol of the most dangerous driver in our own experiments was less than half that of the safest one, although the former was 30 kg heavier, and a given quantity of alcohol might be expected to have relatively less effect on heavier people.[3]

A study of the changes in judgement that take place in the man-vehicle-traffic situation seems to lead to less arbitrary methods of assessing impairment due to alcohol. More precisely the judgement should be studied *in relation to performance* under realistic conditions. In such circumstances a measure may be obtained of the tendency to incur risk and hazard which appears to be a central feature in human behaviour. The outcome of such studies need not be seen as a description of isolated reactions to *ad hoc* tests but may be related to a wide variety of risk-taking and decision-making activities.

Let me briefly review the literature on the part played by alcohol in causing road casualties. Every day a thousand people die on the world's roads, and for every death there must be at least fifty injuries. No *official* statistics anywhere tell us what share of these casualties is due, entirely or in part, to the effects of alcohol on drivers or

pedestrians, but the evidence suggests that this share ranges from 20 to 50 per cent according to country or region. Official statistics, in so far as they tell us anything, for the most part grossly underestimate the effects of alcohol in road accidents. When police, in many countries, report a road accident, they ignore the effect of alcohol unless they arrest the driver for being drunk in charge of the vehicle. And even when the driver is suspected by the police of being under the influence of alcohol, he may not be obliged by law to submit to a blood, urine or breath test; in Norway, Sweden, W. Germany, Switzerland and many parts of the US he is obliged to do so. Furthermore, since insurance policies often do not cover accidents in states of drunkenness, there is a tendency for the evidence adduced at trials to be 'blurred'.

In one of the earliest studies[4] of alcohol and traffic, in 1938, nearly half of 270 drivers involved in accidents were found to have taken alcohol, as compared with one in 8 of a control group of 1,750 drivers; the blood alcohol level exceeded 100 mg per cent in 22 per cent of the former and in only 1 per cent of the latter. An enquiry,[5] during 1949–51, in Los Angeles County, California, revealed that about a third of all the victims in fatal traffic accidents had taken alcohol. At Toronto,[6] in 1955, the blood alcohol of 423 drivers involved in accidents was compared with that of a control group of 2,015. From this comparison it appeared that, at a blood alcohol level of 150 mg per cent, the hazard was about 10 times as great as at 50 mg per cent.

At Baltimore,[7] between 1951 and 1956, 62 per cent of the motor vehicle drivers in 500 consecutive fatal road accidents were found to have some alcohol in their blood, although it is fair to add that half of their passengers, and nearly half of the pedestrians involved had also been drinking (see Table 2).

An official British report[8] on road accidents published in 1961 quotes an estimate of 18 per cent as the proportion of fatal accidents in which someone (driver or pedestrian) had been drinking; the report adds that this proportion is much greater at certain times of the day or year. In Britain 10 per cent of all injuries treated in hospital are due to road accidents, which account for no less than one in four in-patient admissions; every year there are 100,000 severe and multiple injuries from this cause.[9] Furthermore, in Britain hospitals are refuges for drivers who have been injured in an accident after taking alcohol. In an examination of the blood of 398 such drivers (apart from 176 others whose blood, for various reasons, could not be tested) nearly 60 per

TABLE 2. *Blood alcohol of 500 consecutive road fatalities in Baltimore (1951–56)*

Blood alcohol mg per cent	Per cent accidents
0–10	47·4
10–50	4·4
50–150	16·6
150–250	21·8
250+	9·8
	100·0

cent of those admitted after midnight had a blood alcohol of at least 50 mg per cent.[10]

In the decade 1950 to 1959, 54,000 people perished on the roads of Britain, and 600,000 received serious injuries, the total casualties numbering two and a half million. In any particular year the increase in the number of killed or seriously injured sometimes exceeds the growth in traffic during the same period, as was the case from 1958 to 1959. Such an excess may have been associated with the newly awakened sense of gracious living celebrated by disposing, in 1959, of an additional million bulk barrels of beer and a further million proof gallons of spirits, some of which was imbibed perhaps to add zest to tedium of the British roads.

An investigation in New York reported in 1962 indicates that at least 50 per cent of fatal accidents involved drivers with a high blood alcohol level.[11] At Bratislava in the same year, 418 drivers involved in accidents were compared with a control group of the same size. At a blood level of 100 mg per cent there were 10 times as many drivers involved in accidents in the former group as in the latter. At a level of 150 mg per cent this ratio was more than 40.[12]

There is some evidence that the proportion of serious or fatal accidents is greater when the blood alcohol is relatively low.[13] This makes sense. The man who has drunk a lot is perhaps incapable of driving at all, or soon passes out, whereas the one who has taken a little feels he is capable of any achievement. The effect of alcohol on sexual potency shows the same disparity between aspiration and performance, a fact familiar to Shakespeare.

Drink, [says the porter in *Macbeth* (Act II, Scene 3),] is a great

provoker of three things . . . . . Lechery, sir, it provokes, and unprovokes; it provokes the desire but it takes away the performance: therefore much drink may be said to be an equivocator with lechery: it makes him and it mars him; it sets him on, and it takes him off; it persuades him, and disheartens him; makes him stand to, and not stand to; in conclusion, equivocates him in a sleep, and, giving him the lie, leaves him.

IV

Having indicated the evidence of the extent to which alcohol intensifies the hazards of the road and drawn attention to the need for a trustworthy and valid assessment of impairment, I wish now to refer to the more important specific effects of alcohol on the individual. First, we must note that alcohol is absorbed rapidly from the stomach and reaches a peak level in the blood after about half an hour, and in the urine after about fifty minutes. Some 10 per cent at most is excreted, the rest being oxidized at the rate of about 10 cc an hour. At concentrations up to 80 mg per cent the ratio of urine to blood alcohol is 1·25 : 1. As the dose of alcohol is increased, the peak concentration is reached later. The relationship between size of dose and level of blood alcohol is shown in Fig. 2,[14] for three different doses.

The top curve[15] relates to a dose (1·66 g/kg) roughly equivalent to twelve or thirteen whiskies taken by a man of average weight (70 kg). The two lower curves[16] relate respectively to doses which are approximately equivalent to five whiskies and about a pint of beer respectively (0·65 g/kg and 0·20 g/kg).

Second, individuals vary greatly in response to one and the same amount of alcohol in the blood, the habitual drinker being less affected than the occasional drinker. This is clear from the degree of impairment in skill after taking alcohol, in abstainers, moderate drinkers and heavy drinkers respectively. Let me cite the results of a dependable enquiry.[17] Six tests were given, before and after drinking: flicker fusion, corneal sensitivity, the Romberg test (steadiness while standing), finger to finger control, subtraction, and the Bourdon test (letter marking). All three groups showed impairment at levels above 100 mg per cent, but at lower levels the abstainers showed most and the heavy drinkers least effect, the differences between the groups being greatest at blood alcohol levels less than 50 mg per cent.

Third, the disturbing effects are more marked when the concentration of alcohol in the blood is increasing than when it is on the decline; and

they are greater when the concentration is increasing *rapidly* than when it is increasing *slowly*. Fourth, other things being equal, the less experienced the driver, the more his driving deteriorates from the effects of alcohol. Fifth, impairment of vision due to alcohol includes

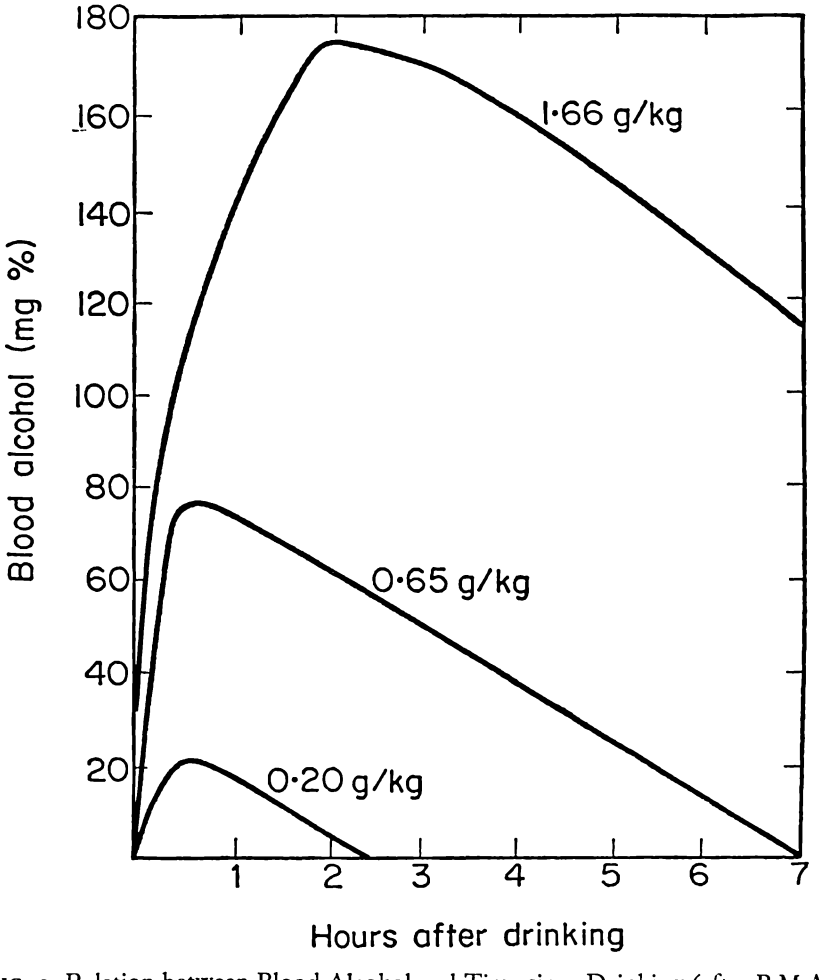

FIG. 2. Relation between Blood Alcohol and Time since Drinking (after B.M.A. Report, 1960)

diplopia, poorer visual acuity and a fall in the capacity for flicker fusion. Alcohol has the same effect on vision as grey glass placed in front of the eyes, or as sun glasses worn in twilight.[18] Another effect is the so-called 'tunnel vision', in which the visual field is steadily

reduced so that less and less is seen on either side as more and more alcohol is taken, until eventually one seems to be looking through a tube directly ahead. The consequence is a lack of awareness of hazards due, for example, to a dog or a child running into the road.[19] Sixth, the sense of hearing is adversely affected by alcohol and loses its sensitivity; taste and smell are similarly impaired. Seventh, efficiency of muscular co-ordination becomes erratic and reaction time prolonged; the average reaction time to a visual signal is 0·29 sec and to an auditory signal, 0·19 sec; both show an increase of 10 to 30 per cent when there is 100 mg per cent alcohol in the blood.[20] Finally, studies of the effect of alcohol on skills resembling driving have shown that below 80 mg per cent, deterioration is in proportion to the amount of alcohol consumed.[21] The inference to be drawn tallies with the conclusion we have drawn from our own enquiries, namely, that there is no minimum below which the alcohol has no effect, although in administrative practice it may be necessary to establish an arbitrary minimum.

One way of bringing out clearly the relation between blood alcohol and diagnosis of drunkenness is by combining the results of different investigations. The summary which follows is based on enquiries involving 5,850 persons.[22]

TABLE 3. *Percentage diagnosed as drunk in relation to different levels of blood alcohol*

Blood alcohol mg per cent	Percentage diagnosed as drunk
0–50	10
51–100	34
101–150	64
151–200	86
201–250	96
251+	99

The doctor who has to determine the alcohol content of the blood or urine has usually to consult publications which purport to show how much a man must have imbibed to have such and such a proportion of alcohol in the blood. He should be aware that, generally speaking, these publications give *peak* levels. They tell us the least amount of alcohol a man must have taken in order to have such an amount of

alcohol in the blood or urine. Minimum values (for a man of average weight) are purposely given to allow the individual concerned to enjoy the benefit of any doubt. It should be borne in mind, however, that individual differences in weight, the form in which the alcohol has been imbibed, and whether or not a meal was taken beforehand, may lead to an *under*estimate of the alcohol taken by anything from 50 to 100 per cent. The tables published, for instance, by the British Medical Association[23] enable us to say that an individual did not take less than a given quantity, although it is very likely that he took much more.

The abundant evidence relating to the effects of alcohol on the driver points to one conclusion: alcohol brings disaster on the road less because of lack of skill than because of defective judgement *in relation to* skill. If so, no driver should take alcohol for a given period before venturing on the road. Assuming that alcohol is metabolized at the rate of, say, 10 cc an hour, regardless of exercise or black coffee, the driver should wait an hour after one whisky or its equivalent. Administratively this means setting a minimum blood alcohol level of, say, 10 mg per cent, establishing suitable penalties if this is exceeded, and strictly enforcing the law.[24]

In this connexion I want to remark on the way standards have been made more stringent in the light of increased knowledge. In its Annual Report for 1937, the American Medical Association Committee on Medical Aspects of Automobile Injuries and Deaths gave a value of 150 mg per cent as a blood alcohol level which provides evidence of intoxication in a charge of driving whilst under the influence of drink. In its latest report (for 1961) this level is reduced to 100 mg per cent. The Committee now recommend that this lower level be accepted as *prima facie* evidence of alcoholic intoxication, while accepting that many individuals are under the influence in the range between 50 to 100 mg per cent.[25]

The idea that a man drives better after a drink is demonstrably a snare and delusion. Some people claim that their skill in driving is actually improved after imbibing a small quantity of alcohol, but it has never been made clear for how long and for what distance this alleged improvement is supposed to be sustained. In any event, no one argues against a speed limit merely because a few are able to drive safely at high speed. Why should a different principle of law apply in the case of alcohol? And let us recognize that the danger so far as non-fatal injuries are concerned may be less from the few who have imbibed a lot than from the many who have taken a little.[26]

v

The fact that we point an accusing finger at the immediate effects of alcohol does not mean that we turn a blind eye to other clandestine generators of risk and hazard: the hangover, the tranquillizer and analgesic, fatigue. Nor do we overlook the warped judgement of the motorist and the extraordinary lengths to which he is prepared to go when tormented by pangs of hunger, stirred by impatience or spleen,[27] unable to gratify the imperious demands of nature, foiled in his ceaseless search for a place in which to park, or when, as often in Britain, he finds street names deliberately concealed from his view or not displayed at all. His wife, too, languishing at home, has her unallotted part to play in this drama. If, after a night of peace or bliss, she confronts her spouse with a guileless smile at the breakfast table, she may exercise a remote homeostatic control over his sensibilities when he presently begins to speed towards his city office.

Hazards of the road are increased if the driver is incapable of continuously re-assessing the traffic situation in which he finds himself. Because action must be taken swiftly, he must arrive at decisions 'automatically'. He must, so to speak, become a programmed decision-maker, computing a complex flow of information from experiences of sight and touch and sound until some sudden unforeseen situation occurs for which he is not programmed by training or experience: at this moment he must *think*. All the information he assimilates must be correctly sorted before he acts. The leisurely decision he could have taken if time did not press must now be made with the utmost urgency. And his vigilance, which should be diffuse, must be tuned in to the unexpected, which paradoxically he must constantly expect. He dare not assume, for instance, when children cross a road, that they carefully watch oncoming vehicles: an investigation in Paris has disclosed that 80 per cent of children involved in road accidents step off the footpaths without due attention to the traffic. The driver must be alert not only to the possibility of an accident but also to the possibility of any injury should an accident occur, for the cause of an accident is not the same as the cause of an injury,[28] and it would be unwise to think only of the second and ignore the first, for example to use a safety-belt as a talisman against the dangers of the road. Accidents constitute a small sub-set of a much larger set of hazardous events. The margin of safety which the good motorist allows himself should rule out the narrow escape as well as the accident proper.

The driver should know too that in peak hour traffic, he tends to allow himself intervals of time which are less than his fastest emergency reaction time. And, finally, it is probable that drivers as well as passengers are unaware of the errors they make in estimating the speed of their own vehicle[29] or of the stopping distance at any given speed. Particularly relevant in this connexion is the tendency to underestimate speed increasingly as it exceeds about 30 mph.[30]

VI

Pedestrians, let us recall, also exist. In Britain they pay for this privilege at the price of 70,000 casualties a year. Some of these are doubtless caused by motorists who are legally entitled to drive although unfitted to do so. But it also appears to be true that some pedestrians cannot yet be said to have mastered the difficult task of crossing a road safely. One reason for this is that they are seldom granted the opportunity for acquiring this unusual skill. In most other forms of learning, the learner survives to profit from his mistakes, and his progress is made easier by his knowledge of the results of his efforts. But in learning to cross a road, the slightest error on the part of the learner may mean an end to his career as a student pedestrian. Nevertheless, when all is said, the clearest pedestrian crossings may prove fatal if they are ignored by drivers. It is not an uncommon sight in European countries to observe a terrified pedestrian scuttling over a crossing while vehicles race rapidly in both directions. Unhappily for them, pedestrians appear to be more keen on speed than on safety: they prefer to use a less safe surface crossing than a safer but slower subway or bridge.[31] Motorists should therefore be taught to imagine that every pedestrian wears a learner's plate. And they should keep in mind, when within striking distance, that 50 per cent of pedestrians who wish to cross a road will do so when a vehicle is 4·5 seconds away, and 12 per cent will cross when it is 3 seconds away.[32] In general a pedestrian, when about to cross a highway, is governed by a time-gap rather than by a distance-gap, for he acts on his impression of how long the oncoming vehicle will take to reach the site where he is, rather than in terms of its distance from him.

Let us face the fact too that the pedestrian, who may after all be the motorist without his vehicle, is inclined to exaggerate his chance of not getting hit by a car; he bears the motto 'Accidents can't happen to me'. The probability of being involved in an accident on the roads during

any week is (in Britain, for example), about one in 8,000. This seems negligible to the pedestrian by comparison, say, with his chance of winning the first prize in a lottery, where the order of magnitude of the odds belongs to the realm of radio astronomy.[33]

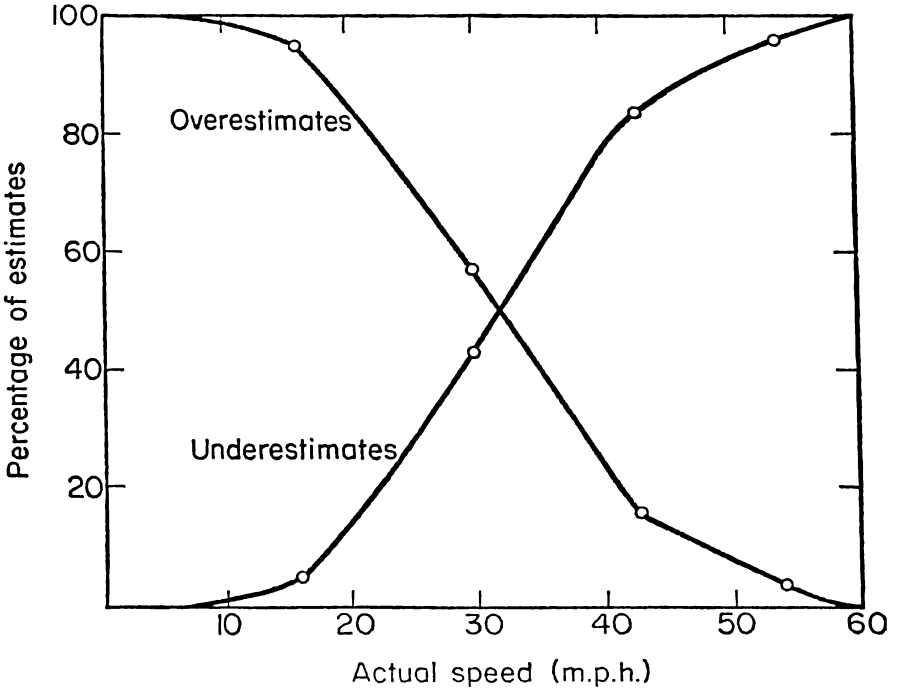

FIG. 3. Percentage of Overestimates and Underestimates at Speed (Cohen and Cooper, *Nature*, 1962, pp. 1233–4)

VII

The next decade is unlikely to see, at least in Britain, any great diminution in the production of corpses on the road, of disabled and disfigured, maimed and mutilated. Much of this could be prevented, however, even in the short term, given the will to do so. To begin with, a lesson could be learnt from Denmark where, after 1951, casualties declined sharply from the high rate of 200 accidents per 100,000 vehicles, by adding to the number of traffic police, by stricter enforcement of traffic laws, by campaigning for road safety in the press and other mass media, and by training children in road safety. A Finnish experiment in providing traffic parks with miniature streets, pedestrian crossings, cross-roads, etc., also provides food for thought.

Other steps that could be taken forthwith include the segregation of pedal cyclists from the main traffic, establishing the all-round fitness, including the visual fitness, of would-be drivers, controlling speed, and improving the safety design of vehicles. Furthermore, a *scientific* basis should be established for the training of driving instructors, for no one can yet speak with authority on what and how the instructors themselves should be taught; and there should be set up in each country a national system of driving instruction.

Other short-term measures include the selection of drivers, where possible, and temporary exclusion. There seems to be scope for choosing men with a special aptitude for safe driving where driving is their means of livelihood. Drivers of lorries, trucks, taxis and public service vehicles may be subjected to a selection procedure although no dependable procedure is generally accepted. Selection procedures cannot apply where the private motorist is concerned. Here it is only a question of *excluding* those who are manifestly unfit. In any event the low correlations found between accident frequencies and a wide range of physiological and psychomotor variables have led to a general disenchantment with the possibility that a "selection" or "quarantine" approach would appreciably reduce accidents, at least so far as the general population is concerned.[34]

It may be necessary to impose a temporary exclusion while the driver is under sedation by drugs which may impair his capacity to drive safely. The danger in overlooking the effect of these drugs is illustrated by the experience of a bus driver taking a large daily dose of chloroquine. He was advised to continue at work although this drug adversely affects the ability to focus and induces vertigo. 'Pep pills', such as amphetamine, favoured by long-distance lorry drivers to ward off sleep, should also be avoided, for when the initial effect wears off, fatigue and depression follow; when taken in large doses these pills cause headache, irritability, and poorer concentration.

The desirability of temporary or permanent exclusion should be considered in cardio-vascular disease which has been shown to constitute a special hazard for the driver, for it raises the blood pressure and pulse frequency, leads to deficiency of oxygen in the muscles of the heart, and causes arterial blockage and disturbed rhythm of the heart beat. A heart attack at the wheel can easily end in disaster. The so-called 'ganglion-blocking' agents for reducing blood pressure are to be avoided because of their side effects. Those who suffer from *diabetes mellitus* should not be permitted to drive heavy lorries, at

least while taking insulin or receiving other hypoglycaemic treatment.[35]

Drivers of advanced age should be examined with reference to speed of visual accommodation. The average adult takes 1·5 sec to adjust his vision from near to far objects, or *vice versa*. A man whose visual powers are ageing may need two or more seconds after glancing at his speedometer before he can focus on some distant object on the road in front of him. But apart from the hazards of visual senescence, there is no safety in youth as such, by comparison with middle age. Drivers aged 18 to 25 are involved in more accidents than their seniors aged 40 to 50, although the latter have a slower reaction time and poorer auditory and visual sensitivity. The sensory superiority on the part of the younger drivers is more than counterbalanced by their greater recklessness.

Long-term measures will need to be much more radical if they are to cope with the expected increase in the volume of road traffic, in industrially advanced and developing countries alike. The basic aim of these measures should be *to compensate for the loss of the self-regulating principle* in the driver and for its absence from existing traffic systems. In Great Britain, for example, the 8 or 9 million vehicles on the road in the early sixties are expected to rise to 17 million by 1970 and to 36 million by the end of the century, and there will doubtless be a similar expansion in other countries. The speed of vehicles will also leap up. The Russians have predicted that by the end of the century their cars will be travelling at the rate of 150 miles per hour, but they will not leave road safety in the hands and feet of the drivers, for the vehicles will be electronically guided and controlled. Moreover, their roads will have systems of wires built into them for providing power by means of radio waves, and vehicles will excite the current for these waves by a mechanism activated by a semi-conductor; the driver will merely have to state his destination by word of mouth.[36]

Comparable proposals have appeared in the USA. By means of cables buried in the road, the speed and spacing of vehicles, suitably equipped, would be regulated automatically. In Britain,[37] too, the Road Research Laboratory has undertaken research on guidance cables in roads. Thus an experimental car is guided by a wire on the ground, signals being transmitted to the car's instruments by means of the guide wire and two pick-up coils on either side in front. Devices of this sort could conquer fog, warn of the approach of other vehicles around corners, and yield information for controlling the flow of

traffic. Such information, automatically recorded and interpreted, could regulate acceleration and braking in relation to the presence of other vehicles in the vicinity. A motorway constructed on these lines would enjoy the advantages of a railway, so far as safety and traffic capacity are concerned, without sacrificing the pleasure and easy dispersal of the automobile.

Problems of road safety belong to operational research. They spring from the interaction and clash of physical, geographical, biological and social factors and they call for co-ordinated study by the town planner, the road engineer, the statistician, the physiologist and others. The psychologist, in this connexion, should beware of 'psychologizing' the problems and thus playing into the hands of those administrators who imagine that, if they could discover 'what makes a driver tick', they could escape large-scale and expensive enterprises in re-designing towns and highways.[38] Many psychological and other problems arise only if official responsibility is not discharged, the burden of road safety being passed to the individual motorist. The position in regard to alcohol on the road brings this home, for the evidence is conclusive, and yet in Britain no official action has been taken. To establish the facts is evidently not enough; socio-economic resistance to adequate legislation must also be overcome. This second task is more formidable than the first.

Road safety should not rest on periodic counsel from representatives of governments to the public at large. That everybody on the roads should drive as if the other chap were 'a complete fool' was the advice once given by a British Minister before a week-end when heavy traffic was expected.[39] Apparently he omitted to ask himself what would happen if the 'other chap' turned out to be the Minister himself, who is bound to drive intelligently, and therefore might be courting catastrophe if a motorist adopted his advice.

Nor should we rely on seasonal exhortations for courtesy on the part of the motorist. These appeals evoke only a feeble and ephemeral flicker of response. We do not protect out property by beseeching men not to steal. We make laws forbidding them to do so. Long-term strategy should render traffic fool-proof, so far as possible, by segregating pedestrians, by providing fly-over roads and bridges, and above all, by building automatic safety systems into the design of towns, roads and vehicles; and in the short term, legislators should endeavour to extend the frontiers of law and order beyond the side path, where they now end, to the public highway.[40]

BEHAVIOUR IN UNCERTAINTY

If safety on the road is to become a reality instead of remaining a dream we have to recognize its kinship with situations which, at first sight, seem to have nothing to do with traffic. To confine our study to the traffic situation as such would not take us far. Man not only drives automobiles. Nor is he only a pedestrian. He engages in a multitude of tasks which share something fundamental in common with his driving behaviour, in business, in sport, in social enterprises of one kind or another. These are alike to the extent that they are undertaken in some uncertainty; they are forms of risk-taking. We shall understand the behaviour of the driver better if we realize the respects in which he resembles other people in the same situations, but also the manner in which he resembles himself in different situations.

NOTES AND REFERENCES

Note on units: The British Medical Association convention has been adopted of expressing the blood alcohol concentration as the weight of alcohol in a given volume of blood, i.e. as milligrams per 100 millilitres (= mg per 100 ml or mg per cent).

1. Quoted by R. Piret, *Psychologie de l'Automoboliste et Sécurité Routière*, Paris: Eyrolles, 1952; Aldous Huxley made a similar point, some years ago, in a letter to the late C. S. Myers. 'The fact of being in control of a fast and powerful machine', he wrote, 'acts on many people almost as an intoxicant. They feel their personalities enlarged by the machine, imagine themselves in some sort superhuman. Just as dogs are loved because men in relation to dogs are god-like, so cars are loved for their ability to enhance the sense (and indeed the objective reality) of power. Moreover, it has seemed to me, from casual observation, that many people use the car as an instrument of overcompensation. They console themselves for normal inferiority by imagining themselves, and actually being, supermen in a car. There is an excellent passage in Chapter XXV of *Erewhon*, where Butler talks of the superiority of these rich men who "can tack a special train to their identity". Cheap cars have brought the possibility of enlarging the ego within the reach of a quarter of the population.'

2. John Cohen, C. E. M. Hansel and E. J. Dearnaley, 'Risk and Hazard', *Operat. Res. Quart.*, 1956, 7, pp. 67–82.

3. John Cohen, C. E. M. Hansel and E. J. Dearnaley, 'The Risk Taken in Driving under the Influence of Alcohol', *Brit. Med. Journ.*, 1958 (i), pp. 1438–42.

4. R. L. Holcomb, 'Alcohol in Relation to Traffic Accidents', *J. Amer. Med. Assoc.*, 1938, 111, pp. 1076–85.

5. H. A. Edmondson, M. E. Hall and R. O. Myers, 'Pathology of Alcoholism', pp. 233–90 in *Alcoholism*, edited by G. N. Thompson, C. C. Thomas: Springfield, Illinois, 1956.

6. G. H. W. Lucas, W. Kalow, J. D. McColl, B. A. Griffiths and H. Ward Smith, 'Quantitative Studies of the Relationship between Alcohol Levels and Motor Vehicle Accidents', *Proc. Sec. Int. Congr. on Alcohol and Road Traffic*, Toronto, 1955, p. 139.

7. H. C. Freimuth, S. R. Watts and R. S. Fisher, 'Alcohol and Highway Fatalities', *J. Forensic Sci.*, 1958, 3, pp. 65–71.

8. *Road Accidents in Britain, 1960*, Ministry of Transport and Scottish Home Department, Her Majesty's Stationery Office, 1961, quoting from G. O. Jeffcoate, 'The Importance of Alcohol in Road Accidents', *Brit. J. Addict.*, 1958, 55 (i), pp. 37–49.

9. W. Gissane and T. Bull, 'Injuries from Road Accidents', *The Practitioner*, 1962, 188, p. 489.

10. A. Cassie and W. Allan, 'Alcohol and Road Traffic Accidents', *Brit. Med. Journ.*, December 1961, 5268, pp. 1668–71.

11. James R. McCarroll and W. Haddon Jr., 'A Controlled Study of Fatal Automobile Accidents in New York City', *J. Chron. Dis.*, 1962, 15, pp. 811–26; see also W. Haddon Jr. *et al.*, 'A Controlled Investigation of the Characteristics of Adult Pedestrians Fatally Injured by Motor Vehicles in Manhattan', *J. Chron. Dis.* (St. Louis), 1961, 14, pp. 655–78; and James R. McCarroll *et al.*, 'Fatal Pedestrian Automobile Accidents', *J. Amer. Med. Assoc.*, 1962, 180, pp. 127–33.

12. M. Vamosi, *Traffic Safety Research Review*, 1961, 4, p. 8, quoted by J. D. J. Havard, 'Alcohol and Road Accidents', *The Practitioner*, 1962, 188, pp. 498–507.

13. M. Mach, *Jahrbuch für Statistik und Landeskunde von Baden-Württemburg, Stuttgart, 1957*, quoted by J. D. J. Havard, 'Alcohol and Road Accidents', *The Practitioner*, 1962, 188, pp. 504–5.

14. *Relation of Alcohol to Road Accidents*, British Medical Association, London, 1960.

15. R. F. Borkenstein, *Breath Tests to Determine Alcoholic Influence*, 2nd ed., Indiana State Police Laboratory, 1957.

16. G. C. Drew, W. P. Coloquhoun and Hazel A. Long, *Effect of Small Doses of Alcohol on a Skill resembling Driving*, Medical Research Council Memorandum No. 38, London: Her Majesty's Stationery Office, 1959.

17. K. Bjerver and L. Goldberg, 'Alcohol and Road Traffic, The Effect of Alcohol Ingestion on Driving Ability', *Proc. First Int. Conf. on Alcohol and Road Traffic*, Stockholm: Kugelberg, pp. 132–49, 1951.

18. L. Goldberg, 'Quantitative Studies on Alcohol Tolerance in Man', *Acta physiol, scand.*, 1943 (suppl. 16), 5, pp. 1–128: see also *Chemical Tests for Intoxication Manual*, Amer. Med. Assoc., 1959, Chicago: Illinois.

19. In his admirable Presidential Address to the British Psychological Society, Professor Drew rightly points out that the expression 'tunnel vision' is a misnomer because it suggests that vision is restricted to the fovea. This form of the effect, however, as he points out, is an experimental artefact. What really happens is that vision is restricted to that part of the visual field, central *or* peripheral, from which the subject expects the most important signals to come. And incidentally, such visual restriction, he adds, is not only the result of taking alcohol. It also occurs in response to certain other drugs, after exposure to a hot or humid climate, in anoxia, and, in general, as a sign of stress.

I feel, however, that I must demur at his remark that 'what matters so far as changes in behaviour are concerned is what alcohol the subject has in his blood'. This seems to me only to be true in a loose sense, as our Manchester evidence indicates. There appear to be very considerable individual variations in the effects of one and the same dose of alcohol. Hence what really matters, so it seems to me, is not only how much alcohol the individual has in his blood, but what sort of an individual he is: what distinctive pattern of changes in judgement and performance take place in him as a result of having so much alcohol in the blood?' G. C. Drew, 'The Study of Accidents', *Bull. Brit. Psychol. Soc.*, 1963, 16, pp. 1–10.

20. G. Forbes, 'The Effect of Alcohol on the Psychomotor Reactions as a possible Index of the Degree of possible Intoxication', *Medico-Legal J.*, 1947, 15, pp. 23–38.

21. See reference 16 *supra*.

22. R. N. Harger and H. R. Hulpieu, 'The Pharmacology of Alcohol', pp. 103–232, in *Alcoholism*, edited by G. M. Thompson (see ref. 5).

23. *Recognition of Intoxication*, London: British Medical Association, 1958.

24. In order to deal with the question of enforcement, the State of New York introduced, in 1953, an 'implied consent' law whereby a driver is held to have consented to a chemical test at any time a police officer has reasonable grounds to suspect him of intoxication.

The introduction in Tennessee of obligatory blood alcohol tests, associated with surprise checks on the road, led to a reduction of 16 per cent in deaths in 1956 as compared with 1955; in 40 other states, during the same period, road fatalities increased.

25. *J. Amer. Med. Assoc.*, 1961, 178, p. 129; the blood alcohol concentration taken as evidence of impairment ranges from 0·5 mg/ml in Norway and Sweden to 1·5 mg/ml in Austria, Belgium and Germany.

26. Andréasson, in his extremely valuable survey, has cast doubt on the suggestion that the severity of accidents is proportional to the amount of alcohol taken by the motorist, and he adduces Mach's report (see ref. 13) as evidence. Mach found that in Stuttgart (1955 and 1956) the more serious accidents often involve only small quantities of alcohol; in well above half of the accidents which were fatal or entailed serious injuries the alcohol content of the driver's blood was between 10 and 20 mg per cent. R. Andréasson, 'Alcohol and Road Traffic: An International Survey of the Discussions', pp. 66–78. *Proc. Third Int. Congr. on Alcohol and Road Traffic*, London: British Medical Association, 1963.

27. It has been suggested that aggressive driving is characteristic of persons with suicidal or homicidal tendencies. The evidence for this suggestion is based on the similarity of the death rates from motor accidents and those from suicide or homicide in the 60 largest American metropolitan centres in 1949–51 (A. C. Porterfield, 'Traffic Fatalities, Suicide and Homicide', *Amer. Sociol. Rev.*, 1960, 25, pp. 897–901). However the question may be more complex than appears at first sight. Thus we cannot assume, without evidence, that only those with pent-up emotions are likely to drive dangerously, for it is possible that people who are generally inhibited tend to drive cautiously. Nor can we take it for granted that there is a general factor of risk-taking such that an individual prone to incur risks or hazards in one situation tends to do so in all other situations as well. We

can imagine that a timid and diffident man, who needs to feel certain of success before undertaking an everyday task, might hazard his livelihood and reputation to maintain a cherished principle. Some insurance companies and car-hire firms seem to assume the existence of a general risk-taking factor for they refuse to accept members of certain occupational groups who are regarded as reckless; employees of television companies are sometimes included in such groups, although they are not distinguished by subdued temperaments awaiting an occasion to 'let off steam'.

The Bonn correspondent of *The Guardian* (March 25, 1960) draws attention to the fact that road casualties were at the rate of 14,600 deaths and 400,000 injuries per annum. He remarks that 'the buccaneering spirit on the German roads results in a virtual absence of helpful hand signals . . . in flagrant cutting-in and crowding out, and in frequent interchanges between disputants travelling parallel at more than 60 miles an hour'.

28. *Behavioural Approaches to Accident Research*, New York: Association for the Aid of Crippled Children, 1961.

29. John Cohen and Peter Cooper, 'New Phenomena in Apparent Duration, Distance and Speed', *Nature*, 1962, 196, pp. 1233–4; see also 'The Apparent Duration, Distance and Speed of a Journey', *L'Année Psychologique*, 1963, No. 1, pp. 13–28.

30. Although we are concerned here with motor vehicles, we should by no means overlook the disproportionately high rate of mortality from motor-cycle accidents. In Britain motor-cycles accounted for 15 per cent of the vehicles in 1960 and for 26 per cent of road deaths; comparative estimates of exposure to hazard in terms of miles travelled are unfortunately not available. (The Registrar General's *Statistical Review of England and Wales for 1960*, Pt. III, London: Her Majesty's Stationery Office, 1962, p. 94.)

31. G. Charlesworth, 'Science and the Road Traffic Problem', *Impact*, 1961, 11 (3), p. 193.

32. A study we have made of a busy Manchester road shows the following numbers and proportions of pedestrians crossing in relation to the time taken by an oncoming vehicle to reach the site.

Time (sec.)	*Total observations*	*Number crossing*	*Percentage crossing*
1	159	0	0·0
2	205	1	0·5
3	184	22	12·0
4	159	60	37·7
5	110	65	59·1
6	94	76	80·9
7	63	58	92·1
8	40	37	92·5
9	35	34	97·1
10	140	138	98·6

John Cohen, C. E. M. Hansel and E. J. Dearnaley, 'The Risk Taken in Crossing a Road', *Operat. Res. Quart.*, 1955, 6, pp. 120–8.

33. Let us take another example from the antipodes. In Australia there are some 10,000, and in New Zealand some 1,500, pedestrian casualties a year. In the ten years 1950 to 1959, altogether some 21,000 people perished on the roads of Australia and nearly half a million were injured; in New Zealand the corresponding figures were 3,200 and 90,000. The general trend during the fifties is indicated by a rise from 37,000 Australian road casualties in 1950–51 to 62,000 in 1959–60, while in New Zealand, during the same period, the number nearly doubled (from 6,000 to 12,000). The danger to life seems relatively greater in Australia and New Zealand than it is in Great Britain. During the period 1954–56, for example, there was, in each year, one death due to a motor vehicle accident for every 4,200 inhabitants in Australia, one for every 6,400 in New Zealand and one for every 9,000 in Great Britain. In 1958, there were 22 deaths per 100,000 of the population on the roads of Australia, 17 in New Zealand, and 12 in Great Britain.

34. R. A. McFarland, 'Current Research in Road Safety in the United States', *The Practitioner*, 1962, 188, pp. 457–66; 'The Epidemiology of Motor Vehicle Accidents', *J. Amer. Med. Assoc.*, 1962, 180, pp. 289–300.

35. L. G. Norman, 'Medical Aspects of Road Safety', *The Lancet*, 1960, May 6th, 1, pp. 989–94.

36. M. Vassiliev and S. Gouchev (eds.) *Life in the Twenty-first Century*, Harmondsworth: Penguin Books, 1961.

37. *New Scientist*, 1961, 233, p. 228. A recent American device is a hybrid between a plain motor car and an automated vehicle, a 'starrcar', as it is called, (self-transit rail and road car system). This may be taken from a private garage on to the ordinary road, like any normal vehicle. When the driver approaches a congested area, he can, if he wishes, join a special track which takes over complete control and electrical powering of the car and travel at 60 or 70 mph to whatever destination on the track he chooses. The track is 8 ft wide and runs along a disused railway line or is raised above the road surface. It is approached by way of a spur track, in much the same way as a motorway is approached, and this spur track takes over the steering and brings the driver on to the main track at a suitable interval in the traffic. On the track itself the car maintains its speed until it reaches a series of vehicles, at which point the automatic controls match the speed of the car with that of these other vehicles. The driver, who now resembles a 'passenger', can leave the track at any exit without disturbing the train of vehicles. All he needs to do is to instruct his automatic controls. Such 'starrcars' could operate on a hire basis. A driver on arriving at work in the morning, could leave the vehicle at a nearby garage and hire another when he has to return home at night. *New Scientist*, 1963, 347, p. 82.

38. Perhaps I may be allowed to refer here to what I have elsewhere called the two principal occupational diseases of the psychologist. The first is an ardent disposition to preach what he cannot practice: telling others how to resolve their emotional difficulties when his own are blatantly unresolved, advising parents how to rear their young when his own efforts fall far short of success, advocating remedies for sleeplessness when his own insomnia is beyond redemption, and so on. The second disease, the 'Midas Syndrome', is the passion for converting all things into psychic currency. There are psychologists who fall into a deep depression if unable to discover a ubiquitous psychological causation for ailments ranging from thumb-sucking to the pathology of international disputes.

39. This advice was reported to have been given by Mr Ernest Marples, British Minister of Transport, when inaugurating the National Road Training Year Campaign of the Royal Society for the Prevention of Accidents. (*The Guardian*, April 17, 1962.) It might be argued that drivers should be advised not only to consider the other chap 'a complete fool', but also highly intelligent, careless and careful, absent-minded and alert, sober and inebriated. Ideally, all contingencies should be allowed for, at the same time.

40. An excellent review of the entire situation which should be widely studied is *Road Traffic Accidents* by L. G. Norman, Geneva: World Health Organization, Public Health Papers, No. 12, 1962. Also to be recommended is F. McGlade, Traffic Accident Research: Review and Prognosis, *Traffic Quarterly*, October 1962, pp. 559–78.

Note: Since this chapter was written three valuable British reports on traffic have appeared: *Road Research*, 1962, *Research on Road Safety*, and *Traffic in Towns* (the Buchanan Report), all published by Her Majesty's Stationery Office towards the end of 1963. Where these documents touch on the topics discussed in this chapter they seem to be consistent with the views I have presented.

CHAPTER 6

GAMBLING WITH LIFE: SUICIDE, ATTEMPTS, PACTS

I

For the most part the act of suicide is committed by a person whose heart is drained of hope for his future, though he may still secretly nourish some hope of joy in an after life. For every individual who takes his life there may be ten or twenty or even more who, as we say, 'attempt' to take it. In some of these 'attempts', the individual is subjectively almost certain of surviving. He, or more usually *she*, leaves little to chance, fate or the gods. In other instances, the individual is almost certain, subjectively, of dying, and relies heavily on the possibility of a miraculous intervention on the part of the gods. In such circumstances it is as if the person on the point of death says: 'Look, I am still alive. You are all-powerful. Save me if you wish!' Like the gambler, he tests the love of the gods, and he stakes his all, or very nearly so. Between these extremes there is every gradation of subjective certainty of survival (or death). How much is left to the gods may be said to depend on the guilt felt by the individual or is perhaps determined by the degree of his distress and isolation. Thus the attempted suicide is engaging in a wager, for he is hazarding his life in the hope of proving that he is cherished by the gods. And at the same time he is divining their secrets.

We cannot make an accurate count of attempted suicides. Many are not known to the police, many are not even known to doctors or hospitals, and many are hidden from everyone other than the individual himself. There is no Office of Attempted Suicide where everyone who has made an attempt is compelled to register, and the 'informed' guesses made by insurance companies are almost certainly underestimates which relate to 'attempts' almost sure to succeed.[1] Some

deaths recorded as accidental may have a suicidal element in them: death by drowning may occasionally belong to this category, as well as crashes on the road: a motorist in a rage or reckless mood may deliberately imperil his life by incurring great hazards.[2] Similar confusions occur in the statistics of actual suicide, which are of course more accurate than those of attempts. An apparent suicide may have really been the victim of homicide just as, more rarely, an apparent victim of homicide may have been a suicide. Sometimes the death of a transvestite is recorded as suicide which closer analysis would have revealed as accidental. A boy or man puts on female garments, or encloses his entire body tightly in a nylon bag, binds himself with ropes and suspends himself from the ceiling while facing obscene pictures which he has placed on the wall. The cord slips, with fatal results, or death occurs during the very struggle to escape which constitutes an essential part of the individual's sexual experience.[3] Something of this sort must have been felt by the masochist who yearned to be hanged because of the pleasurable experience which he thought it would afford. His attempt was frustrated by a servant who severed the cord which held his suspended master, who later described the hanging 'as a thrilling delight which no language that he could use, could convey anything like an adequate expression of'.[4]

Few people have not, at some time in their lives, indulged in a passing reverie of suicide, a reverie too feebly motivated to lead to the bitter end, and inspired by a desire to divine the likely effect on particular persons; the individual's primary aim is not to destroy himself but to prevent himself doing so. Foresight into the probable consequences leads him to cling to life, and in this way he can both have the cake and eat it. He can remain alive while enjoying the fruits of death.[5]

Let me briefly review the main facts brought to light by diligent students of suicide. In 1761, Agatopisto Cromaziano, a Celestine monk and Professor of Theology, whose true name was Appiano Buonafede and who was among the most learned men of his age, published a historical study of suicide[6] which has never been surpassed; he produced a wealth of examples to illustrate his text. Unlike him, Jean Dumas, a Protestant divine, whose *Traité du suicide* appeared in Amsterdam in 1773, did not feel the need to cite any actual instances, and it was not until the mid-nineteenth century that the modern study of suicide began to take note of actual events. In France the leading work was perhaps Lisle's *Du suicide, statistique, médicine, histoire et*

legislation (1856), although references to the subject had appeared in statistical, psychiatric and philosophical publications during the previous ten or twenty years: in Esquirol's *Des maladies mentales* (1838), in Dufau's *Traité de statistique* (1840), and in Cabanis' *Rapports du physique et du moral de l'homme* (1843). Quetelet had discussed suicide in his statistical writings, and the topic did not escape Burdach, that monumental numerological physiologist, whose treatise on physiology ran to nine volumes between 1837 and 1841. In Italy Enrico Morselli's *Il Suicidio: Soggio di statistica morale comparata* (1879), in the tradition of Cromaziono, turned out to be a landmark in the study of the subject; an abridged English edition appeared in 1883. He followed what he called the 'synthetic and positive' line of thought laid down by Darwin, Spencer, Wallace, Buckle and Bagehot, and classified the causes of suicide as cosmic (or natural), ethnic (or demographic), social, and individual. Among his most extraordinary analyses is his attempt to discover a correlation between the suicide rate and the number of periodicals published in the given country. He succeeded! But it is only fair to add that he himself felt some misgiving about the significance of the correlation. Among the fifteen countries he examined, Switzerland led in the number of periodicals per head and ranked second in suicide, whilst Russia came fourteenth in periodicals and twelfth in suicide. He escaped by a hair's breadth the conclusion that suicides could be eliminated by banning all periodicals, but he was bold enough to declare that 'the States which are most advanced in railway development are those which generally have the larger average of suicides', though without venturing to explain how this relationship sustained itself.

In England, Elliotson's *Human Physiology* (1840) described novel methods of self-destruction, for example, by holding one's breath or by turning back the tongue so as to keep air from the larynx; but the definitive work of the period was due to Winslow whose judgement, on the whole, appears to be sound, but at times he allowed it to be veiled by fears not entirely germane to the issue. For he was firmly convinced that the increase of suicide in England was 'to a certain extent to be traced to the atrocious doctrines promulgated with such zeal by the sect of modern infidels, who falsely denominate themselves *Socialists*; a class whose opinions are subversive of all morality and Christianity, and which sap the foundation of society itself'. Such an idea would never be entertained in our own day even by the most

fierce opponent of the British National Health Service, which shows the immeasurable distance which political medicine has travelled in a mere century.

Among recent investigations we first take note of an enquiry[7] conducted by the World Health Organization into the incidence of suicide during the first half of the present century and embracing twenty-five countries with a total population of 400 million. This enquiry revealed that about 72,000 men and women take their lives each year, a rate of 17 or 18 per 100,000; in England and Wales the rate for men is about 14 and for women about 9.[8] Japan, Denmark, Austria and Switzerland had the highest rates, and Eire, Chile, Scotland and Spain the lowest, of the countries studied; in the US, the rate for the white population was about three times that for the coloured. Taking this vast population as a whole, male exceeded female suicides to the extent of three to one, ranging from less than two to one in Japan to about four to one in Holland. The male-female ratio was:

Japan	1·49
England and Wales	1·85
Denmark	2·00
Austria	2·10
Germany	2·18
Italy	2·38
Belgium	2·63
Spain	3·12
Switzerland	3·33
France	3·33
U.S.	3·70
Holland	3·70

During the first half of the present century, suicide rates in the twenty-five countries remained comparatively stable; where a decline took place, men benefited more than women. The highest rate in men generally occurs after the age of 70, and in women, between the ages of 50 and 60. In the US, the rate for white males continued to rise even in advanced age whilst, among coloured males, it reaches its highest point at about the age of 25 and remains at that level. The peak for coloured females is also reached at the age of 25, but declines thereafter, whilst in white females it continues to rise until the fifth decade of life.

In Western countries the suicide rate is higher in the 'upper' than

in the 'lower' socio-economic classes, a distinction perhaps associated with different patterns of restraint and expression of aggressiveness. In some countries the rate is higher in the poorest classes in elderly men, possibly because, once their employment comes to an end, they are thrown back upon their own meagre resources, while their more affluent, healthier and less exhausted fellow-citizens can cultivate their hobbies, engage in recreations, or travel to enliven their years of retirement.[9]

Generally speaking, where the homicide rate is low the suicide rate tends to be high, and *vice versa*; this relationship was noted in France a century ago[10] and has since been found to hold good in the United States where the homicide rate is highest in the 20–30 age group and decreases with advancing age, in inverse relation to the suicide rate. Furthermore, the US homicide rate in the coloured population is higher than in the white, whilst, as already indicated, the reverse is true for the suicide rate.

Fewer suicides occur during war-time, even in neutral countries, possibly because aggressiveness is directed towards the enemy, and the dramatic events of war perhaps make people less self-centred; personal problems may seem relatively less important than in peace-time, by comparison with the great issues of the day. During economic depression, the number of suicides increases, at least among the more prosperous classes. By and large, the suicide rate tends to be higher in Protestant than in Catholic countries, but not invariably so; Scotland is mostly Protestant and has a low rate. In so far as the correlation holds good, it is intelligible in the light of the fact that the Catholic readily releases his guilt in the confessional, while the Protestant has to carry the burden privately and secretly in his own heart and conscience.[11]

Japan seems to be the only country in the world which publishes official figures of suicide pacts. The figures in the table on facing page relate to the year 1961.

Included in the figures are a number of persons, 242 in all, who were compelled to take their own lives. Allowing for this, the rate of 'group suicide' appears to be very much higher in Japan than it is in Britain (see below). The age of those who died is not known, but since 'husband and wife' are classified separately from 'man and woman', we must assume that the latter are unmarried lovers, who constitute more than half of the total.

TABLE 4. *Multiple suicide in Japan, 1961*

Partners	No. of persons involved		
	2	3 or more	total
Husband and wife	111	—	111
Father and child(ren)	17	7	24
Mother and child(ren)	128	45	173
Parents and child(ren)	—	14	14
Others	11	5	16
Man and woman	557	3	560
Men alone	6	2	8
Women alone	30	1	31
Total	860	77	937

Source: Criminal Statistics, National Police Agency, Tokyo. I am very grateful to Mr Akio Ono, a post-graduate student at Manchester, for obtaining these figures for me.

II

The literature on individual suicide has grown apace but, so far as I am aware, the systematic study of suicide pacts seems to have escaped attention, although Winslow[12] followed his predecessors and enumerated many examples of 'mutual suicide': young men and women, found 'locked in each other's arms', literally fulfilling the destiny sketched so merrily in an old song:

Gai, gai, marions-nous—
Mettons-nous dans la misère;
Gai, gai, marions-nous—
Mettons-nous la corde au cou.

Death pacts were more common in France than in England, he thought, because his fellow-countrymen lacked the spirit of romance. Their prosaic disposition was exemplified by the man who hanged himself in order to escape the intolerable burden of dressing himself every day, and even more so by another who made it known by advertisement that he proposed to destroy himself on a certain day, in Covent Garden, for the benefit of his wife and family; tickets of

admission were to be a guinea each. How different from the passionate Frenchman who, before putting an end to his life, instructed his servant to make a candle from the fat of his dead body and to bear it lighted to his faithless mistress. An accompanying letter would enlighten her. She had long known that he burnt inwardly for her. Now she would see that his flames were real.

The expression 'mutual suicide' which Winslow uses, and its French equivalent *le suicide mutuel*, must be distinguished from the suicide pacts with which we shall be specially concerned. Mutual suicide also includes collective or mass suicide without any 'reciprocal' relationship between those involved. Such collective suicide may take the form of an epidemic and may be no more than an aggregate of individual suicides. Myth, legend and history furnish abundant examples of such mass suicide in the wider sense. In myth we have the story of Dionysus who brought his gift of wine to Attica. His host Icarius invited shepherds to take this sparkling drink and in their intoxication they murdered their benefactor. When his daughter Erigone discovered the crime she hanged herself on a tree. Then an epidemic of hanging broke out among the women of Athens which was brought to a halt only when the cause of Erigone's death became known. A festival, the *Aeora*, was instituted to her memory.[13] Another form of multiple death occurs in the myth of Samson, who is ready to die so long as he drags his enemies down with him, 'Let my soul perish with the Philistines'. Such impulses, we may note, also find non-lethal expression in our own day, as lawyers will testify, when a client declares, 'I don't care how much it costs me so long as *he* has to pay!'

Legend, if not history, tells of the epidemic of suicide that overtook the maidens of Miletus. Nothing could deter them until a resolution was made public that a woman who hanged herself would be dragged to burial through the public market-place. There have been times when the women of Marseilles and Lyons have taken to mass suicide. Indeed, history proper provides many instances of mutual suicide in the collective sense. Jean Bayet[14] gives us a fully documented account of such deaths among the Romans between 100 BC and AD 100, in particular of the military aspects. In the fourth century, the *Circumcelliones* martyred themselves in large numbers in order to make sure of eternal salvation. In their hundreds, even thousands, 'they leaped with paroxysms of frantic joy from the brows of overhanging cliffs, till the rocks below were reddened with their blood'.[15] Russia, in 1666,

was the scene of mass suicide motivated by the desire to escape the Antichrist whose coming was believed to be imminent. Similar phenomena occurred as late as the eighteenth and nineteenth centuries.[16] Towards the end of the nineteenth century, an example of collective suicide occurred in Russia at Tiraspol, where twenty-eight people buried themselves alive to escape the census, which they looked upon as wicked.

The arrangement of suicide pacts among African peoples, for example among the Pende and their neighbours in the Kwango region of the Congo, and in Angola and Rhodesia, has been demonstrated by Father de Sousberghe. These pacts are made between husband and wife, between brothers, friends and between entire villages who swear eternal fidelity and seal it with their blood. If one partner to the pact dies the other must take his life as soon as possible, otherwise he will surely be killed.[17]

III

However, nothing in the foregoing material, valuable though it undoubtedly is, tells us the frequency of death pacts in any given society, the relationship between those involved, the circumstances in which the pacts are made and the motives which appear to induce them. What follows is therefore intended to provide this information. It is based on inquests in England and Wales, during the four years 1955–58, which resulted in the registration of two deaths from suicide which, from the place and date of death, appeared to be connected. By courtesy of the coroners I was able to study the original documents (or copies) relating to the inquests, including notes and letters (or copies) left by the deceased.

What is a suicide pact? It is a mutual arrangement whereby two people resolve to die together. Perhaps the life of one is unbearable and the other can neither witness his suffering nor go on living alone, perhaps both long for death. The decision, as a rule, is mutual from the start. Quietly and unobtrusively they make their grim preparations. No one suspects their secret, guarded for weeks or months before the fateful day. Very rarely the plan miscarries and one partner survives; mostly the preparations are so meticulous that both lives are lost.

The total number of identifiable 'double suicides' in England and Wales in the period under study was 65, of which 58 were due to suicide pacts in the proper sense. In 2 of the remaining 7 instances, the death of one person was precipitated by the death of

the other, and in 5 instances the 2 deaths were coincidental individual suicides. The number of pacts, year by year, was: 1955, 11; 1956, 12; 1957, 20; and 1958, 15. January was the peak month, with February a close second, a third of the total number of pacts occurring in these two months.

Suicide pacts are commonly thought of as involving lovers who face insurmountable obstacles to marriage. In fact, only a small proportion in the present series were of this sort: 42 of the 58 pacts were made by husband and wife, and 5 by lovers. The rest included other relationships: mother-son (2), mother-daughter (1), father-son (1), brother-sister (2), sister-sister (2), male homosexuals (1) and friends (2).

The age distribution of the deceased resembles that of all suicides (20,788) in the same period (see Table 5). The average age at death of the group as a whole was 55·2 years, and of the four sub-groups: husbands 60·2; wives 56·2; males 44·1, females 50·1 years.

TABLE 5. *Age of those who died by suicide pact, England and Wales, 1955–58**

Age	Husbands*	Wives*	Others		Total	
			Males	Females	No.	per cent
under 30	1	1	2	3	7	6·1
30–39	1	2	2	3	8	7·0
40–49	2	7	6	3	18	15·8
50–59	18	15	1	2	36	31·6
60–69	11	10	3	3	27	23·7
70–79	6	5	—	4	15	13·2
80 and over	2	1	—	—	3	2·6
	41	41	14	18	114	100·0

* Excluding one married couple about whom information is not available.

Twenty of the married couples were childless. Twelve couples had one child (in one instance a stillbirth), 5 had 2 children, and one couple had 11 children. The number of children is unknown in the case of 4 couples. In the 4 parent-child pacts, the son or daughter that died with the parent was an only child. At least 16 of the husbands, in the married couples' pacts, were out of work, unoccupied or retired, a large proportion (40 per cent) of the group by comparison with the corresponding proportion (14 per cent) in the industrial male population of Britain as a whole, the excess being due to differences

in the age distribution. The suicides consisted in the main of skilled or unskilled workers or clerks, a small number of business owners or employers, a few doctors, some minor civil servants, and one company director who could not survive a love tangle which in the end cost 4 lives. In 17 of the pacts both partners were seriously ill, and in the entire group about 70 were victims of some disability, physical or mental.

The information I have been discussing excludes suicide pacts abroad by persons normally resident in England and Wales. One such pact involved a 56-year-old Englishman and his 45-year-old wife. Once wealthy, they had been caught by financial disaster, and they tried to recoup their losses in the gambling casinos of France. When their money ran out, they took their car up a mountain track where they died from carbon monoxide poisoning caused by the exhaust fumes of their vehicle.

The letters and notes left by the married couples who died, and other documents relating to them, yield a general impression of an ageing man and woman one or both suffering from grave illness which constantly occupies their thoughts. A deeply devoted pair, childless, with few friends or interests, they are profoundly absorbed in their own small world. Religious reflections hardly enter their minds, though very occasionally one of them asks for God's forgiveness. In modest or humble circumstances, they are mostly untroubled by financial difficulties. Prolonged insomnia seems to speed the decisive act. 'We are at the end of our tether' is a recurring phrase in the letters left behind.

Here is a typical situation in which both husband and wife longed to die. A 56-year-old ex-miner, with impaired vision and an injured leg, underwent an operation for cancer of the bowel. The operation was not successful and he was confined to his bed with frequent and violent attacks of pain. For twenty-five years his wife had been disabled by Parkinson's disease, and for fifteen years she had been partially paralysed.

In some instances, the wife refuses to survive her husband (or, it may be, the husband cannot live on without his wife). A 66-year-old retired chauffeur, victim of a degenerative disease, was rapidly deteriorating, and in great pain. His wife chose to die with him. 'He was such a wonderful man,' she wrote. 'I can't live without him. Please don't say I am insane. With my Dear Husband in such agony, I prefer to die with him. Please bury us in one grave. I am sorry to take my little

Blackie with us.' There are other situations in which an unforeseen event or situation brings ruin in its train. An elderly couple had devoted their entire resources to caring for a spastic son until he died at the age of 25. His death brought disillusionment and a blank that nothing could fill. 'The craving we had to provide for him', wrote the father, 'has resulted in disaster for us. The sad thing in our life was to see him powerless to enjoy the pleasures that his friends could have. He missed so much in his twenty-five years'; and the mother wrote: 'For twenty-five years we have lived a life of sadness, stress and strain, and for most of these years we have been obsessed with the need to provide for our son's future. I think now we must have been mad and only became sane when he lay dead and we realized how empty our lives were and that we had worked so hard for no real effect.' Another middle-aged couple, compelled to move their home, were unable to take roots in their new dwelling. 'Moving to this house was a dreadful mistake,' wrote the 45-year-old wife. 'Something has gone out of our lives which we can never replace. These last five weeks have been horrible. We have been reduced to such a state of unhappiness and exhaustion that we are both too tired to carry on. . . . I know he [the husband] would not have been able to carry on with anything much longer. Look after Mother. Tell her my little cat is alright.' Ageing, ill-health and low 'vitality' are also prominent factors in the pacts between brother and sister, between sister and sister, and between friends.

Inhalation of coal gas was the favoured method of dying, often with the aid of alcohol or barbiturates 'to dull the mind'. The bodies were usually found in bed in night attire, with the bed-clothes pulled over the heads, or, blanketed and equipped with a hot-water bottle, sitting in armchairs or lying with the face towards an open gas oven. Two couples chose to die from the exhaust fumes of their cars. In four pacts, death was due to barbiturate poisoning, in one pact to cyanide poisoning, and in one to drowning.

In general we are struck by the anxiety of the deceased to cope with the domestic problems that would be caused by their death: a warning about leaking gas, a note on the doorstep: 'no more milk until I let you know'; and a message 'Please bury little Pippin in the garden with all our other pets'. And in nearly every instance, the deaths take everyone by surprise, relatives, acquaintances and neighbours alike. There is no sign of any previous thought of dying by pact, although a tenth of the *individuals* had previously tried to kill themselves or

threatened to do so. This is roughly the proportion we should expect from statistics of individual suicide.

The five pacts between lovers are of special interest. In three of them, both lovers were married; in the fourth, only the man; and in the fifth, both partners were unmarried. I shall now sketch the circumstances in each of these five pacts.

(i) A man aged 31, father of four children, became deeply enamoured of a woman of 33, a mother of two, and they died together from coal-gas poisoning. In a letter left by him he wrote: '. . . I can only say I am torn in two and I feel as though I can't think any more . . . I can't concentrate on a job any more . . . I keep seeing the children in my mind and hate myself more and more . . . I've broken two homes and I feel like going out and ending everything for good. I'm no good to anyone any more. Anyway I couldn't face anyone I know again. . . .'

And this is the message the woman sent to her husband: 'By the time you receive this I shall have used the shilling [gas] slot in our room. It is all for the best, as you must see. Look after the "nips" [children]. Don't tell them, if possible. I was in love for the first time in my life, but we both find this love of ours is too big even for us. So Goodbye. Don't feel sorry for me. I'm not. It was well worth it.'

(ii) A man aged 41 fell in love with a divorced woman aged 36. He had one daughter from his marriage and she one son from hers. Their dead bodies were found in a car. 'Realizing how much we had wronged', he wrote, 'we knew that there was only one possible answer to it all. I knew that I had failed as a father and a husband. . . . Both she and I are perfectly aware of what we are doing, and are fully prepared to pay the price for our love.'

The woman wrote to her mother: 'I think you may have realized that I was deeply in love with him and he with me—love I have never, never known. We tried to fight against it but the more we did the greater our love became. We made up our minds some time ago that this had to be, otherwise we would cause everyone much more suffering. I am extremely happy and we have spent a most wonderful week with each other. . . . I'm not afraid, our love for each other is too deep for that to be so.'

(iii) A miner aged 32, father of two children, fell in love with a young married woman aged 24, who was living apart from her husband. They were found dead in bed, the woman's left arm embracing the man's neck. A note from the man to his mother stated that he did not want to end his life in this way but that his wife wanted him

to die. The young woman wrote to her mother saying 'they want me to stop seeing him and I love him with all my heart'.

(iv) A married man aged 21 fell in love with a single girl aged 26, but was unable to obtain a divorce from his wife. They died together from gas poisoning in a guest house. The man left the following note: 'All my love is for . . . [the girl he died with]. My wife will not let us be together. This way we can be.'

(v) In the case of the engaged couple, the young man's affections had weakened while those of the girl had remained unchanged. He was a struggling student, a complex and highly introverted individual, and he saw no material future for himself which could satisfy his aspirations. No one, he felt, understood him, not even his fiancée, who now seemed to him a naïve and simple girl to whom he would be tied for life in a meaningless marriage. He began to entertain agonizing doubts about his love for her, as well as about his career, but he had neither the heart to break away nor the courage to die alone. For her part, the girl remained bound to him heart and soul. They had been separated for some time by force of circumstances. Then he rejoined her, ostensibly to explain his decision to break off the engagement, but the meeting resulted in death for both. Unprepared to die alone, he was ready to go with her together. They were found dead from gas poisoning in her bedroom.

The 58 pacts do not include any of those situations, which seem rare, in which one partner dies and the other survives. In one instance a young man of 21 was accused of murder after surviving a death pact with his 19-year-old wife. It emerged afterwards that they were in considerable debt. At the husband's instigation the wife played the part of a prostitute for a few nights, in order to obtain money quickly, but this solution proved so unacceptable that they decided to put an end to their lives.

In another instance a girl aged 17 survived an attempted pact with her lover aged 21, precipitated by parental opposition to their marriage. Before the attempt, the girl had written saying: 'We were not allowed to have our only wish which was to get married so I think that explains things. . . . We both wish to be cremated together, so I hope you will do that last thing for us. . . . He and I have always done everything together and this is the last thing we will ever do. . . . He and I were different from anybody else, we handled life in our own way and now we just want to be forgotten . . . we done it because of love.' She then went on to say that after the gas jets had been turned on she sat in an

armchair by the fire 'with my eyes open for a while and then closed them. After a little while I felt very dizzy and faint. I remember saying: "I've got a headache" and [he] said: "It's nearly over now".'

IV

In these death pacts between lovers we touch an age-old belief, found in myth, legend and literature, that two people who die together are eternally united beyond the tomb, a belief which induced many a Roman wife to share her husband's death or even to instigate it, and which prompted Hero to join her Leander by throwing herself into the Hellespont. Every night Leander swam the Hellespont to visit Hero, priestess of Aphrodite, across the straits, but when a storm put out the lamp which Hero had set in her tower to guide him, Leander was drowned, and on seeing his body washed ashore, Hero threw herself into the waves. Marpessa met her end in some such manner, as Pausanias reminds us, and so did Callirrhoe, who induced her lover to bring her the peplus and necklace of Harmonia whereby she caused him to commit suicide. Then, from shame and pity, she destroyed herself too.

Many other suicides are recorded which were prompted by devotion to a leader or a loved one. Antelochus held the hands of Achilles who was ready to slay himself in grief for the death of his friend Patroclus. When Protesilaus disappeared at Troy, his wife, Laodomia, not knowing of his death, prayed to Hermes to grant his return; but when Protesilaus died a second time, Laodomia perished with him. When the body of Paris was ready to be burnt, Oenone threw herself into the flames; some say she hanged herself in her despair. According to legend, Myrra, the favourite concubine of Sardanapalus, King of Assyria, is said to have induced him to perish with her on a funeral pyre.

And we have the tale of Lycambes and his daughter Neobule who hanged themselves because of the bitter satires directed against them by the poet Archilochus, enraged by the rejection of his love suit. On the death of Cyrus, eight of his soldiers decided to share his fate.

When Arria's husband, Caecina Paetus, was condemned for his part in the conspiracy against Claudius, in AD 42, she stabbed herself, handing the dagger to her husband with the words: 'If you believe me the wound which I have made gives me no pain; but it is that which

you will make, Paetus, that pains me.'[18] (*Paete, non dolet.*) Under Tiberius, Sextia refused to survive Aemilius Scaurus, and Pascea, Pomponius Labeus, whilst Paulina opened her veins with her husband Seneca when Nero ordered him to take his own life.[19] According to Eusebius[20] a mother and her two daughters, captured during the Diocletian persecution, drowned themselves to escape dishonour. Many other incidents of a similar character are recorded by the same author, and they were for centuries a subject of heated controversy between Protestant and Catholic theologians.

The romantic literature of Germany is pervaded by a belief in the union of lovers beyond the grave. Achim von Arnim (1781–1831) was much taken by this belief. If love is absolute, it cannot remain shackled within earthly fetters.[21] True lovers cannot be divided. So the romantic search for death blends with the idea of immortal love. In dying, lovers cross the bridge which brings them to eternal reunion. Plato, in the *Phaedo* (68A), has given perfect expression to the thought of joining the dead as a motive for suicide: 'Many a man has been willing to go to the world below animated by the hope of seeing there an earthly love, or wife, or son, and conversing with them.' This self-same belief is embodied in the Japanese practice of *shinju*, 'dying between two parties' (or *aitaishi* as it was once called), a death pact between unhappy lovers who try to escape their earthly tribulations by seeking a happier life in the hereafter. The most common method used to be drowning, the lovers binding themselves together with a rope. Such pacts became so frequent in eighteenth-century Japan that in 1723 special laws forbidding them were promulgated; the bodies of the dead were refused burial and survivors were condemned to public shame or exile. In recent years methods other than drowning have become more common.

In literature the grave where the lovers seek to sleep together is sometimes symbolic of the bed. And not only in literature. We recall the celebrated suicide pact between Heinrich von Kleist and Henrietta Vogel. He yearned for death as the only form of an imperishable love, and in the end it was Henrietta's willingness to die with him that drew him irresistibly to her. 'Her grave', he wrote, 'is dearer to me than the beds of all the Empresses in the world.' For a full day and night they prepared themselves for death, by prayer, song, wine and rum, and, finally, by drinking sixteen cups of coffee. Kleist then shot Henrietta through the heart, reloaded the pistol and blew out his brains. We recall too that on his death-bed Modigliani begged Jeanne

Héburterne to follow him to the grave so that he could possess his favourite model in Paradise and enjoy with her eternal bliss.

Similar sentiments must have bound together two young lovers in Paris. 'We, H— and M—,' they wrote, 'were enamoured of each other. Circumstances beyond the control of man prevent our alliance. We have no alternative but separation or death; and believing death to be one eternal dream of bliss, we, after much meditation, have determined to kill each other.' Another young couple were found dead, clasped in each other's arms, suffocated by burning charcoal. They were most elegantly dressed, having spent many hours at their toilet preparing for their last farewell.

In poetry as in folklore, belief in the erotic insatiability of the dead, who are unwearied by lavish caresses, and in their unbroken loyalty, finds expression as a species of vampirism. Goethe's famous ballad *The Bride of Corinth* gives the idea its classic form:

> And I am driven forth from out my grave
> To seek the good that I, alas! have lost,
> Loving the man whose life I could not save,
> Sucking his very heart's blood to his cost;
> And when with him I've done,
> Must seek another one;
> And to such rage young folk succumb the most.

Heine too writes, 'Thou hast called me from the grave, By thy bewitching will. . . . The dead can never be sated.'[22] A more innocent impulse evidently inspires Sophocles' Antigone when she says: 'I shall be content to lie beside a brother whom I love. We have only a little time to please the living but all eternity to love the dead.' There is a link between vampirism and necrophilia, the mutilation of female corpses by sex perverts.[23] In folklore and myth the theme is not infrequently met of a dead woman who gives birth to a child, as well as that of a living woman who is impregnated by a dead husband. The Japanese novelist Junichiro Tanizaki gives a vivid description in *The Key* of a man's embrace of a woman in a coma. A similar situation is depicted in Bunuel's memorable film *Viridiana*. Here we have one of the principal ingredients of necrophilia, namely, the utter submissiveness of the woman to every artifice of the man.

The lively survival of such beliefs, however vaguely and innocently they may be held, is attested by the large numbers of young girls

and women who attach themselves even more to a popular idol after he is dead than while he is still alive. Many women took their lives in 1926 when the film actor Rudolf Valentino met an early death. In 1939, some time after the death of a popular musician in an air crash, two sisters wrapped themselves in petrol-soaked sheets which they set on fire so as to perish in the same manner as their hero. When James Dean died in a road accident in 1956 each of his admirers cherished the fantasy that he was hers alone and could never desert her for another. Spiritualist séances were held to communicate with his departed spirit. One thousand letters a day poured into his former film studio, and a special office was opened to deal with the posthumous correspondence. Among the periodicals launched after his demise was one entitled *James Dean is Back*, for some of his admirers denied his death and insisted that he had merely retired into seclusion. Hardly a town in the United States was without its James Dean Club. The clothes he had worn were as much in demand as the relics of a saint, and they were cut up and sold for large sums. The car in which he perished was restored and widely exhibited; for half a dollar, a citizen of the United States could enjoy the privilege of sitting at the wheel for a few all too-brief-moments. In the end, the automobile too was dismembered and its parts disposed of as relics.[24]

The idea of love made secure by death is echoed in a note left by one of our couples whose words 'This way we can be' [together] carry the romantic idea that two people who die together are not parted but travel in each other's company to a destination beyond the grave where they remain eternally one. 'We have sworn eternal love, and death, terrible death, shall find us united', was the message sketched on the wall of a room where two lovers perished together, locked in each other's embrace. On the bodies of a young woman and a man tied together, the left limbs of one to the right limbs of the other, and recovered from the Seine, the note was found, 'O you, whoever you are, compassionate souls, you shall find these two bodies united. Know that we loved each other with the most ardent affection, and that we have perished together that we may be eternally united. Know that our last desire is that you should place us, united as we are, in the same grave. Man should not separate those whom death has joined'.[25] Towards the end of 1962, a suicide pact of two lovers occurred in the north of England. The girl was 15 and the man 33, and father of five children. In a note which they left, signed by both, they wrote '. . . if we can't be happy together in life, put [us] side by side in death, that

our graves may be next to each other, as we love each other so much.'

A death pact has little in common with individual suicide, which is sometimes, though by no means invariably, an act of aggression, a hostile blow obliquely aimed at a particular person. The man who takes his life alone is commonly not troubled if others are grievously hurt or even if they are dragged to the grave with him.[26] 'Every suicide is a homicide' is a Freudian dictum; and Freudian theory assumes that self-destruction is an aggressive act directed against a loved one with whom the suicide has previously identified himself. 'Perhaps no one can find the physical energy to kill himself', wrote Freud, 'unless in the first place he is thereby killing at the same time someone with whom he had identified himself, and is directing against himself a death wish which had previously been directed against the other person'.[27] By contrast, the death pacts we have examined characteristically lack such homicidal quality. Furthermore, individual and double suicides are different in that an attempted suicide pact, in which both partners survive, rarely if ever occurs.

When a man and woman who die by pact are bound in illicit love, *his* reactions contrast sharply with *hers*. He is stricken by a fatal remorse while she meets death in exultation and ecstasy. The man is destroyed by the situation whilst the woman yields her life for the man. Byron, who was well equipped to understand this, wrote: 'For all of theirs [of women] upon that die [love] is thrown.'

V

An analysis of notes left by suicides gives some support to Menninger's[28] hypothesis that three components enter the suicide's act; the wish to die, the wish to kill and the wish to be killed. In 483[29] notes, references to these three wishes were found in the order 250 : 134 : 99. On this basis one may say that the wish to die is the strongest of the three, twice as powerful as the wish to kill and two and a half times as strong as the wish to be killed. Moreover, the intensity of these three wishes varies with age: the wish to kill and the wish to be killed decreases, and the wish to die, increases with age.

There seems to be a relationship between method of self-destruction and age, as is shown by the following figures (Table 6), but this relationship varies from one country to another.

If Menninger's supposition is correct then hanging must be a sign of a wish to die rather than to kill or be killed, whilst the use of poison

TABLE 6. *Methods of Suicide in Japan, 1960 and 1961*
(percentages)

	Age			
	Under 20	20–40	40 and over	Total
Hanging	13·5	18·2	50·2	32·9
Drowning	11·2	8·0	13·9	11·3
Poison or drugs	47·4	48·6	15·3	34·6
Being run over	14·1	10·7	5·2	8·9
Others*	13·8	14·5	15·4	12·3
Total	100·0	100·0	100·0	100·0

* Stabbing, shooting, jumping from a height, gas and miscellaneous. Source: Criminal Statistics, National Police Agency, Tokyo.

or drugs and 'being run over' are signs of a wish to kill or be killed. In respect to method, the effect of age seems to be more marked after the age of 40 since there is not a great difference in the methods used by those under 20 and those between 20 and 40. Moreover, the methods used by the youngest age group resemble those employed in the attempted suicides.

While there is no doubt some overlap between actual and attempted suicides, it seems true to say on the whole that many of those who make the attempt and survive, like those who have suicidal reveries, do not wish to die. On the contrary, they are anxious to live, but with the advantages they would have enjoyed if they had died. A housewife who places her head in the gas oven as she hears the milkman's footsteps approaching, is eager to draw neighbourly attention to the fact that her husband denies her the affection she seeks from him. But it is *affection* that she wants, not burial. If she died, the neighbours would naturally heap vituperation on the vicious husband, but she would not be there to reap the harvest of his guilt and repentance. Her attempt is accordingly a means of moral blackmail, a method of coercing love from another, of forcing capitulation, a last resort when everything else has failed. This is illustrated by the reaction of one of Esquirol's patients who had frequently threatened to take her life and one day informed him that she was about to take the final step. 'Very well,' he replied, 'it is nothing to me, and your husband will be delivered of a great torment.' The lady forthwith changed her plans.[30] In a death pact moral blackmail would be pointless, except possibly where the two persons are lovers.

The threat of suicide, Professor Stengel[31] has pointed out, is a

pervasive influence in society, since it may force, prevent or sustain a marriage, blackmail parents to tolerate their erring child, or lead to a convenient evasion of responsibility. He also speaks of the 'ordeal character' of some suicidal attempts; the individual deliberately puts himself 'on the rack' to draw a decision from the gods. One schizophrenic patient, when asked why he had 'tried' to take his life, replied that it was an act of faith on his part for he wished to prove whether God wanted him to live or die.

The proportion who wholeheartedly wish to survive, among those who attempt suicide, varies from one group to another. In a sample of attempted suicides drawn from Los Angeles County (1957),[32] rather more than a quarter of 1,824 females and rather more than a third of 828 males stated that they really wanted to die. Some 60 per cent of the women and some 50 per cent of the men either indicated that they left their survival to chance or that they expected to be saved.

There is, therefore, good reason to suppose that actual and attempted suicides differ in respect to motives and intentions. By and large, the actual suicide is determined to die, and he allows nothing to stand in his way. Indeed a man not under continuous surveillance, who is intent on taking his life, will nearly always make sure of doing so. The man who only 'attempts' to take his life and survives, is in a different and, so far as probability is concerned, in an altogether more diverse category, which includes, at one extreme, attempts that are almost certain to succeed, to attempts, at the other extreme, which are almost bound to fail, with every gradation in between. And for each objective or statistical probability of death, there exists a corresponding subjective probability.[33] Thus the statistical probability of dying after, say, inhaling a certain amount of coal gas, will usually differ from the private expectation of death on the part of the individual himself.

There may well be cultural differences in the motives for suicide, actual and attempted. In Japan, where an effort is made to ascertain the 'reasons', the contrast between actual and attempted suicide is most striking in respect to illness as a 'reason'; 39 per cent of attempts are driven by illness, physical or mental, as compared with 13 per cent of actual suicides. However, 'love and sex' account for 17 per cent of the actual and for only 5 per cent of the attempted suicides. A more detailed classification of reasons is set out in the table on page 104.

The most extraordinary 'attempted' suicide that I have come across is that of a 39-year-old man in Cheshire (Britain) who telephoned

TABLE 7. *'Reasons' for actual and attempted suicide in Japan (1940–61)** (percentages)

Reason	Actual	Attempts
Illness (physical or mental)	13·1	39·0
Weariness of life	21·6	19·8
Love and sex	17·3	4·8
Family disputes	13·7	6·2
Failure (business, school, gambling) and poverty	7·9	4·6
Anxiety about the future	9·3	5·8
Repentance for crime and other reasons	17·1	19·8
Total	100·0	100·0

* Source: Criminal Statistics, National Police Agency, Tokyo.

his mother that he was about to take his life, then swallowed 350 aspirins, cut the veins in his wrists, and set his clothes aflame. He was not yet dead when a passing lorry driver tried to rescue him, but in vain.[34] The fact that he telephoned his mother shows that he had not irrevocably decided to die, although 'objectively' there was no other possible outcome. Another man who swallowed some 10 or 20 pills and then telephoned his wife, the police and an ambulance, must have had a more substantial degree of confidence of surviving, though even here perhaps greater than the circumstances warranted, at least in Britain, where public telephone booths may be very undependable media of communication. Often many of them are not in working order. If, by good chance, one is discovered which is effective and the caller has the correct coins—the ones required may vary from one booth to another—he may find that it is occupied by a talented conversationalist. Even if the booth is vacant, the line sought may be engaged, or the person at the other end may be absent. The pill-taker may or may not have assessed all these odds realistically, probably not, and we cannot know precisely how sure he felt that he would not die. In one instance, a man gulped down what seemed to his mistress, who had threatened to abandon him, a tumbler full of iodine; in fact the iodine was heavily diluted by more than nine-tenths water. Here we can be reasonably sure that the attempted suicide almost certainly expected to live. The most remarkable method ever devised for *actual* suicide was self-crucifixion by a Venetian shoemaker, Matthew Lovat, in 1802.

His doctor always received the same reply when enquiring about his health: 'The pride of man must be mortified; it must expire on the cross.'

So far as individual attempted suicides are concerned, we must distinguish those attempts which are almost certain to succeed from those that are almost certain to fail. And among those who succeed we must not confuse those whose paramount desire is to safeguard their ultimate future with the majority who have no future, those in whom all hope is extinguished and irrecoverably lost. This difference may be fundamental, for in the former case the individual is trying to bring about his complete disorganization, the cessation of his being, whereas in the latter his aim is to reorganize his existence on a permanent and impregnable basis.

What seems to be a sub-variety of attempted suicide with the characteristic, so to speak, of slow-motion suicide, has recently been called 'submeditated death'.[35] It is, however, by no means a new phenomenon and was manifested by the early and medieval monks who cut their lives short by austerity and asceticism. The *Endura* of the Albigenses amounted to the same thing. Contemporary examples are provided by patients with cirrhosis of the liver who persist in getting drunk, or by those who persist in heavy smoking after an attack of coronary thrombosis. When such persons succumb it is difficult to apportion the causes of death as between accident and suicide. In the same class, as Shneidman and Farberow[36] suggest, belongs the 'victim' who provokes a homicidal attack on himself, and possibly also some of those who suffer from cancer and in whom the rate of growth of neoplasm may be affected by psychological factors of obscure origin.

Students of suicide have often referred to differences in age, marital status and sex ratio, as between actual and attempted suicides respectively. The same Los Angeles series (1957) to which I have already referred, brings out the salient features, which are summarized in table 8 on page 106.

The percentages in this table relate to both sexes combined. In the attempted suicides the age distributions are the same in both sexes; in the actual suicides, a somewhat larger proportion of the men (13 per cent) than of the women (8 per cent) are above the age of 70.

As to marital status, sex differences seem to be more important, as shown in table 9 on page 106.

Here it is clear that single persons figure more prominently in the attempted than in the actual suicides, but the proportion of divorced or widowed men is twice as great in the actual than in the attempted,

TABLE 8. *768 Actual and 2,652 Attempted Suicides in Los Angeles County (1957)*
(percentages)

Age	Actual	Attempted
Under 20	1	8
20–29	9	29
30–39	20	28
40–49	23	17
50–59	20	9
60 and over	27	9*
Total	100	100

* Including 3 of unknown age.

TABLE 9. *Marital Status of Actual and Attempted Suicides, Los Angeles County (1957)*
(percentages)

Marital Status	Actual		Attempted	
	M	F	M	F
Single	15	9	32	21
Married	54	48	45	58
Divorced	13	14	7	7
Widowed	6	20	3	4
Separated	8	7	6	5
Unknown	4	2	7	5
Total	100	100	100	100

and the proportion of divorced or widowed women three times as great. In the actual suicides 70 per cent were men and 30 per cent women; in attempted suicide it was the other way round, 31 and 69 per cent respectively. Thus more men than women take their own lives, but more women than men make the attempt, especially in the under-30 age group. The ratio of actual to attempted suicide grows with increase in age. Men also differ from women in using more efficient techniques.

In the same series, ill-health, physical or mental, is a much more common cause of the actual suicides than among the attempts, about 33 per cent as compared with about 7 per cent, whereas marital difficulties are more common among the women who make the attempt (29 per cent) than among the women who actually kill themselves (9 per cent).

Similar differences between actual and attempted suicide are brought out by the official statistics for Japan, the effects of age and sex being shown in the following table.

TABLE 10 *Actual and Attempted Suicides in Japan in 1961*

Age	Actual				Attempts			
	M		F		M		F	
	No.	per cent	No.	per cent	No.	per cent	No.	per cent
Under 20	1,115	10·4	797	11·0	898	16·7	1,299	23·3
20–40	4,904	45·8	3,202	44·1	3,995	74·6	3,892	69·9
40–	4,687	43·8	3,257	44·9	467	8·7	381	6·8
Total	10,706	100·0	72,56	100·0	5,360	100·0	5,572	100·0

Source: Criminal Statistics, National Police Agency, Tokyo.

So far as methods are concerned, 34·5 per cent of the actual Japanese suicides were by hanging and 33·4 per cent by poison or drugs whilst in the attempts, less than half of one per cent were by hanging whereas 78·7 per cent were by poison or drugs; hanging is, of course, a much surer way of disposing of oneself than either poison or drugs, the dose of which can be carefully graded.

While the vast majority of suicides are impelled by mundane motives,[37] there is a variety in which transcendent considerations play a part and which Durkheim therefore called 'suicide mystique'. It has been examined in detail by Gernet[38] as it occurred among Chinese Buddhists from the fifth to the tenth centuries. The method survived until the end of the Manchu dynasty in 1912, and as recently as the summer and autumn of 1963, seven such suicides took place in South Vietnam by Buddhist monks protesting against religious discrimination by the Catholic Government. The suicides took the form of self-cremation; the monks believed they achieved divine merit by being burnt to death on a funeral pyre. Death by fire followed a very precise ritual; other forms of meritorious suicide, less clearly defined in their execution, included offering oneself to tigers or to brigands, precipitating oneself from a great height, and drowning. Self-immolation could be limited to the mutilation of part of the body, especially the arms or fingers, and the entire procedure belongs to an elaborate tradition of Buddhist self-purification and 'deification'. This religious practice is not to be confused with psychopathic auto-cremation which

very rarely occurs; in August 1962, an Englishwoman aged 42 lit a bonfire and threw herself into the flames. In notes she had written from time to time she had referred to her need to be purified from sin. The coroner stated that never in his life had he heard of anyone ending life in such a fashion in Britain.[39]

The relative stability of suicide rates has often been remarked upon. Quetelet[40] a century ago was among the first to note that in any society a certain number of persons 'must', so to speak, put an end to their lives in a given period. Deaths from this cause, like those from murder, are, in fact, remarkably constant per unit of population from year to year.[41] Provided statistical records are available it is possible to predict within a comparatively small margin of error how many people in any given country will perish by their own hands in, say, the next twelve months. The forecast would be no worse than that for the number of road casualties in the same period. It would even be possible to assign the expected suicides to particular sub-groups of the population, since the suicide rate varies as between men and women, young and old, and between social and occupational classes, as well as with marital status. If we had enough information about each individual we might be able to pin-point the actual men and women. There are thus both social and personal factors at work. If suicide were purely a sociological phenomenon, we should be unable to understand why it happens to some people and not to others. On the other hand if it were purely psychological, we should be at a loss to explain why the total number of suicides remains constant in a given population. Only when we recognize both social and individual influences can we see that suicide is an event that occurs when tension in the individual reaches a pitch where, in the particular social context, there is no alternative to self-destruction. Threatened on all sides by the slings and arrows of outrageous fortune, and with no loophole of escape alive, there is only one way out: death. Some 'depth' psychologists prefer to speak of the withdrawal of 'libidinal investment' in depression as a major cause of suicide. It is characteristic of the depressed person that he loses interest in things, and the more depressed he is, the more interest he loses in things outside himself. His appetite fails, his food seems tasteless, he no longer wishes to meet people; his work and recreation lose their appeal; everything seems colourless. As he retires more and more within himself, he is said to withdraw his 'investment' of 'libido' from the outside world. When the world is emptied of all meaning, the fatal act takes place.

GAMBLING WITH LIFE: SUICIDE, ATTEMPTS, PACTS

Suicide is a freely chosen and all too human confrontation with death, for no animal, not even a scorpion, can destroy itself deliberately. Man alone of living things knows that he must die, and he carries this knowledge with him as his constant companion through his life. Death as a biological event which occurs to us once is different from the awareness that we must die, which can never be far from our daily thoughts.

> 'But life and death
> Is cat and dog in this double-bed of a world'[42]

I bring to mind a young man of 30 dying of leukaemia whose wife refused to 'release' him until he was mentally prepared for his ultimate destination. Every now and then, during his last twenty-four hours, she ran upstairs and asked him, 'Are you ready, Jim?' Once, twice, three times he replied 'No.' Then a moment came when the struggle with himself was over, and he whispered 'Yes'. There was a time when, in Europe at least, this practice would have been universal, when it would have been unthinkable to allow anyone to die without putting his spiritual affairs in order, and a doctor who beguiled his patient's thoughts away from death and thus denied him the last sacrament would have been hauled over the coals by the ecclesiastical authorities. The mystique of this preparation for the grave is largely a thing of the past, but reflecting on suicide leads us to think about our own relationship to death, which we strive unavailingly to suppress from our thoughts.[43] We come to terms with life and death alike by the exercise of that vital organ for encountering the future which we call 'hope'. Nothing is more human than to hope for the fulfilment of an ardent wish cherished with uncertainty. Like fire, it is a gift of Prometheus,[44] and when it fails, our surrender is unconditional.

Those stubborn friends, death and old age, force all of us, sooner or later, to become aware of the passage of time, which prevents us so effectually from grasping chance by the forelock. But we do not have to wait for either of them because time touches us constantly and intimately in many other ways. Ernest Jones[45] reminds us that a man likes to think that *his* watch is correct, in spite of the strongest evidence to the contrary. Only *his* time is valuable. Therefore *he* may be unpunctual, but if others keep him waiting, he has the right to be impatient. Or perhaps he prefers to demonstrate his sovereign mastery of time by perfect punctuality. He also likes to think that he has

control over the past: *his* memory cannot possibly be mistaken. And, naturally, he takes pride in his superior capacity to foretell the future.

Man can certainly claim to have achieved some triumphs in the never-ending battle with ageing and death, triumphs of fact and triumphs of fancy. It is now possible to preserve semen and even entire organisms at a lower temperature and for longer periods than had ever been thought possible. This control over fertility and longevity opens up unsuspected vistas for the transformation of social life. Mothers in future generations may be able to choose the fathers of their children from the seed-banks of history, and children may be born of fathers dead for years or even centuries; each individual may be able to spread out his life span over an indefinitely long period. This may sound like science fiction, but it would be unwise to treat it as such.

In fancy, success has been equally startling. We are told that in parts of the US, death is being conquered by ignoring its existence. People no longer die, they merely fall into a deep and tranquil sleep, and for this repose they are rendered lovely by a skilfully trained beautician. No sign of death is allowed to appear in a bereaved home; the 'sleeper' is forthwith conveyed to a cosy centrally heated community-centre there to await the cosmetic transfiguration. The corpse is hurried away 'as speedily and unostentatiously as possible—no lying in state, no dreadful tears, no cold kisses, no embarrassing eulogies, no slow processions, no endless lowerings and fillings—the simpler and cleaner, the better—ashes to the winds as if the dead were victims of a plague—the plague of finitude'.[16]

Once death is done away with, it remains to dispose of old age. This is easier. It is only necessary to avoid speaking of 'men' and 'women'. The words 'boys' and 'girls' will do equally well. Europeans are familiar with the spectacle of ageing American tourists who refer to one another as 'boys' and 'girls'. They also appear and behave as such; they dress like adolescents, wear adolescent hair styles, and share adolescent tastes. It is said that the entire population of the US is steadily being homogenized with respect to age. Children are 'teenagers' already at birth, and they remain teenagers until their 'sleeping' day. American culture is *par excellence* one which is dominated by teenage values. Let an American student of national character speak for his countrymen. 'Americans', writes Ashley Montague, 'are from the standpoint of Europeans characterized by a rather rapid maturational rate developmentally, socially. They telescope a great deal into a short

period of time and, from the point of view of some Europeans at any rate, remain rather adolescent and rarely attain the kind of maturity that the individual in Europe attains who goes through the processes, the developmental steps at a slower step-like rate.'[47]

Methods of keeping senescence at bay are, of course, nothing new. They were familiar in antiquity. In the *Book of Kings*, David is described as employing Abisag the Shunamite for this purpose. In Greek myth, Juno bathes in a stream which perpetually rejuvenates her, and the Romans believed that the maternal milk possessed rejuvenating properties when appropriately used; Marsilio Ficino had nothing but praise for this technique. Many crimes have been perpetrated in the search for the elixir of life. Pope Innocent III had the blood of three young men transfused into his veins, but he died all the same, and so did the Countess Elizabeth Bathory of Hungary in the seventeenth century, after she had slaughtered 24 peasant girls so as to rejuvenate herself in their blood.

The obscurity which envelops death and veils it from the most prying and inquisitive eye has encouraged the use of euphemisms when referring to it. Dorothy Tarrant[48] suggests that these fall into three classes of metaphor, viz. (i) as sleep or rest; (ii) as capture, summons or arrest; and (iii) as transition or departure. The representation of death as sleep is frequently found in the Bible; in Homer's *Iliad* (xvi, 681) the twin brothers Sleep and Death carry away Sarpedon after he dies in battle, and in modern guise it has reappeared, as we have just seen, in the US. Death is represented as capture or summons when it is sudden and untimely, or when it is conceived as a terrible blow. Finally, death is represented as transition physically, as by crossing the river Styx, or 'spiritually', when the soul flies to another place. The Japanese variation on this last euphemism, 'taking the lonely road', expresses the utter apartness and isolation of the individual when his turn comes.

In times when belief in the supernatural was vigorous and widespread, suicide, whether denounced as a crime or imposed as a punishment, carried for the individual some seed of hope for his future. Death was then not an end, not a great void. It was a rite of passage. This did not diminish its poignancy but charged it with the utmost significance. An Egyptian tomb engraving graphically portrays a dead man's wife and brother struggling to hold him back from the grave, their arms inextricably intertwined in his. The casualness of the death of Petronius,[49] who perished by instalments, renders him untypical:

He [Petronius] opened his veins, and closed them again, at intervals losing a small quantity of blood, then binding up the orifice as his own inclination prompted. He conversed during the whole time with his usual gaiety, never changing his habitual manners, nor talking sentences to show his contempt of death.

More representative is the widow in the Indian suttee who immolates herself on the funeral pyre of her husband, fortified by a vision of thirty-five million years of connubial bliss in the hereafter.[50] No such mirage transfigures our aged couples who decide to die together. Their lot is forlorn because they die without hope.

NOTES AND REFERENCES

1. See E. Stengel and Nancy G. Cook, *Attempted Suicide*, London: Chapman & Hall, 1958, p. 31, and the references cited there: Karl A. Menninger, *Man Against Himself*, New York: Harcourt, Brace, 1938; Karl A. Menninger, 'Psychoanalytic Aspects of Suicide', *Internat. J. Psychoanal.*, 1933, 14, p. 376; 'Why Do People Kill Themselves?' Metropolitan Life Insurance Company *Statistical Bulletin*, February 1945.

2. See M. L. Selzer and C. E. Payne, 'Automobile Accidents, Suicide and Alcoholism', pp. 104–7 in *Proc. Third Internat. Congr. Alcohol and Road Traffic*, London: British Medical Association, 1963.

3. There is, however, an opinion that such transvestite deaths far from being accidental are, in fact, deliberate (see M. D. Schechter, 'The Recognition and Treatment of Suicide in Children', pp. 131–42, in *Clues to Suicide* (edited by E. S. Shneidman and N. L. Farberow), New York: McGraw Hill, 1957).

4. Forbes Winslow, *Anatomy of Suicide*, London: Renshaw, 1840, pp. 115–16. Forbes Benignus Winslow (1810–74) was the distinguished editor of the *Journal of Psychological Medicine* which ran from 1848 to 1860 and then, for three more years, as *The Medical Critic and Psychological Journal*. He was President of the Medico-Psychological Association in 1875, owner of two private asylums, and author of *On Obscure Diseases of the Brain and Disorders of the Mind*, London: Churchill, 1860, which ran to five editions (R. Hunter and I. Macalpine, *Three Hundred Years of Psychiatry: 1535–1860*, London: Oxford University Press, 1963).

5. H. S. Sullivan, *Conceptions of Modern Psychiatry*, Washington D.C.; W. A. White, Psychiatric Foundation, 1940, p. 12.

6. *Istoria critica e filosofica del Suicidio*, Lucca, 1761 (French translation, 1841).

7. WHO report, *Epidemiological and Vital Statistics*, 1956, vol. 9, No. 4. See also Koji Sato and Taro Sonahara, 'A Proposal for an International Study of Suicide', *Psychologia*, 1, pp. 71–3, who make an interesting analysis of this report and offer valuable suggestions for future research.

8. The rate may be very variable even within a district in any given country.

Take, for example, the 18 Lancashire County Divisions, with a total population of more than 2 million, i.e. two-fifths of the population of Lancashire as a whole. In these Divisions, the suicide rate in 1961 ranged from 5·3 per 100,000 in Widnes (pop. 171,000) to 20·0 in Bury (pop. 145,000). In Lonsdale (pop. 41,000) there were no suicides at all during the year whereas at Blackburn (pop. 47,000) there were 9.

9. See J. E. Gordon *et al.*, *Epidemiology of Mental Disorder*, New York: Milbank Memorial Fund, 1950. See also the report of the Registrar-General for England and Wales (1927), London: Her Majesty's Stationery Office, where the frequency of suicide among labourers was below the average, and among professional people, higher. The group with the highest rates included the very rich, together with tramps, vagrants and inmates of institutions.

10. See Forbes Winslow, *op. cit.*, p. 272; V. Verkko points out, however, that in Finland, during the Prohibition period, suicide and homicide increased concurrently, *Homicides and Suicides in Finland and their Dependence on National Character*, Copenhagen: Gads, 1951, pp. 155–6. Verkko provides much other information relevant to the theme of this chapter. A-M. Guerry seems to have been the first to contrast suicides and homicides, in his *Essai sur la statistique morale de la France*, Paris, 1833.

11. See É. Durkheim, *Le Suicide: Étude de Sociologie*, Paris, 1847; English edition, London: Routledge & Kegan Paul, 1952; F. Ferracuti, 'Suicide in a Catholic Country', pp. 70–8 in *Clues to Suicide* (edited by E. S. Shneidman and N. L. Farberow), New York: McGraw-Hill, 1957.

12. Winslow, *op. cit.*

13. Virgil, *Georgics* I, v, 33; cf. Ovid, *Met.*, 6, 'Erigone to Bacchus' flame was dup'd, Beneath a wellseem'd grape'.

14. Jean Bayet, 'Le Suicide Mutuel dans la Mentalité des Romains, *L'Année Sociologique*, 1953, 3rd Ser., pp. 35–89. Among the mass suicides we must include the 960 Jews who killed themselves at Masada, near the Dead Sea, in AD 70, when the Romans finally stormed the besieged fort.

15. W. E. H. Lecky, *History of European Morals*, London: Watts, 1911), vol. 2, p. 21.

16. *Encycl. Rel. Eth.*, xii, p. 22.

17. R. P. L. de Sousberghe, *Pactes de Sang*, Acad. Royale des Sciences Coloniales, *Bull. des Séances*, New Ser., 1957, 3, Brussels, Rue de Livourne 80a; *Pactes de Sang et pactes d'Union dans la mort chez quelques peuplades du Kwango*, Acad. Royale des Sciences d'Outre-Mer, Classe des Sciences Morales et Politiques, 1960, Vol. 22 (ii). I am indebted to Dr Mary Douglas of the Department of Anthropology, University College, London, for drawing my attention to these publications.

18. *Martial*, i, 13.

19. Tacitus, *Annals*, xv 63.

20. *Eccles. Hist.*, 8, 12. Montaigne *Essays* ('A Custom of the Isle of Cea') gives vivid examples from antiquity of suicide inspired by a variety of motives. But he lacked enthusiasm for the Pelagias and Sophronias, later canonized, who flung themselves into the river to avoid being ravished by the military. 'A learned author of this present time,' (writes Montaigne), 'and a Parisian, takes a great deal of pains to persuade the ladies of our age rather to take any other course than to

enter into the horrid meditation of such a despair (i.e. suicide). I am sorry he had never heard, that he might have inserted it amongst his other stories, the saying of a woman, which was told me at Toulouse, who had passed through the handling of some soldiers: "God be praised", said she, "that once at least in my life, I have had my fill without sin." In truth, these cruelties are very unworthy the French good nature, and also, God be thanked, our air is very well purged of them since this good advice: 'tis enough that they say "no" in doing it, according to the rule of the good Marot.'

21. Beate Rosenfeld, *Die Golemsage und ihre Verwertung in der deutschen Literatur*, Breslau; Verlag Dr Hans Priebatsch, 1934.

22. *Du hast mich beschworen aus dem Grab*
Durch deinen Zauberwillen
Belebtest mich mit Wollustglut—
Jetzt kannst du die Glut nicht stillen

Press deinen Mund an meinen Mund;
Der Menschen Odem ist göttlich!
Ich trinke deine Seele aus
Die Toten sind unersättlich.

23. I. Bloch, *The Sexual Life of our Time*, London: Heinemann, 1923, p. 573.

24. R. Caillois, *Man, Play and Games* (translated by M. Barash), London: Thames & Hudson, 1962, pp. 194–5.

25. Winslow, *op. cit.*, pp. 287–8.

26. 'The ferocity with which some suicides set about their self-destruction leaves results which are sometimes terrible to behold. In a case known to us, an old man split open his abdomen from side to side with a razor, leaving a gaping wound more than a foot long, through which the abdominal viscera escaped. The mesentery was cut in two places, thus isolating a loop of bowel nine inches in length. Near by was a chamber pot, half full of blood, into which he had obviously bled himself, before his final collapse.' G. Forbes and A. Bradley, 'Some Observations on Suicide', *The Police Journal*, 1959, July–September, pp. 197–202. Suicide pacts may take place as an indirect result of frustration in love. In 1961 a girl of 14 made such a pact with her 15-year-old friend, because of a quarrel at home about their boy friends. Three times the girls attempted to die. They took 70 tablets, tried to suffocate themselves, and then one stabbed the other in the back and turned the knife on herself, *Daily Telegraph*, May 16, 1961.

27. Quoted by E. Jones, *Sigmund Freud: Life and Work*, London: Hogarth Press, 1955, vol. 2, p. 315, from a paper by Freud, 'The Psychogenesis of a Case of Female Homosexuality', *Standard Edition of Freud's Works*, edited by James Strachey, vol. 18; see also S. Freud, 'Mourning and Melancholia', *Collected Papers*, vol. 4, pp. 152–70, London: Hogarth Press, 1925.

28. K. Menninger, *op. cit.* I think there are marked cultural differences in this respect.

29. Out of a total of 619 examined, 136 being unclassifiable, *Clues to Suicide* (edited by E. S. Shneidman and N. L. Farberow), p. 45.

30. E. Esquirol, *Des maladies mentales*, Paris: 1838, 2 vols. The desire to enforce capitulation is particularly emphasised by J. A. Harrington and K. W. Cross ('Cases of Attempted Suicide Admitted to a General Hospital', *British*

Med. Journ., September 19, 1959, ii, pp. 463–7). In their series of 102 attempts only 51 freely admitted the intention to kill themselves and 22 partly admitted it. Their sample is, however, not representative of all attempted suicides; since it consists of people brought to hospital it is probably weighted with attempts likely to succeed.

31. *op. cit.*, pp. 118–19.

32. G. S. Shneidman and N. L. Farberow (editors), *The Cry for Help*, p. 25.

33. Hence the aptness of the expression of 'gamble with death'; J. A. M. Weiss' 'The Gamble with Death in Attempted Suicide', *Psychiatry*, 1957, 20, pp. 17–25.

34. *Daily Telegraph*, September 17, 1959.

35. E. S. Shneidman, N. L. Farberow and R. E. Litman, 'A Taxonomy of Suicide', in *The Cry for Help* (edited by E. S. Shneidman and N. L. Farberow), New York: McGraw Hill, 1961, p. 133.

36. *op. cit.*

37. When Lavinia was given in marriage to Aeneas, her mother, who had promised her to King Turnus, hanged herself to avoid seeing the hated stranger (Virgil, *Aeneid* Bk. 7). Ovid (*Met.*, 6; and 14) describes a number of suicides from a variety of motives: Arachne hanged herself because she failed in a test of skill in needlework. Iphis hanged himself because his love suit was rejected by Anaxarete.

38. Jacques Gernet, 'Les suicides par le feu chez les Bouddhistes chinois du V^e^ au X^e^ Siècle', *Mélanges publiés par l'Institut des Hautes Études chinoises*, vol. 2 (Bibliotèque de l'Institut des Hautes Études Chinoises, vol. 14), Paris: Presses Universitaires de France, 1960. The most recent apologia for ascetic suicide of the Stoic variety comes from Touraine, *Le Suicide Ascétique*, Paris: Nouvelles Editions Debresse, 1960.

39. A *Guardian* report (August 5, 1963), states that two Buddhist monks committed suicide by soaking themselves in petrol which was then put to flame; see also P. J. Honey, 'Smouldering Vietnam', *New Society*, October 17, 1963, pp. 9–11, and an article on the same subject by the Venerable Bhikkhu W. Rahula in the *Guardian*, October 18, 1963. Mr Honey writes that, on at least one occasion, the heart was torn from the monk's charred body and placed on the most celebrated pagoda in Saigon where it was an object of adoration by vast crowds of Vietnamese. At other times the relatives of the deceased fought for his remains with those who wished to exploit them for propagandist purposes. Mr Rahula writes that if lighting a lamp before a statue of the Buddha is meritorious, how much more so would it seem (to a devotee) to light a part, or the whole, of the body as an offering; the elaborate ritual which was once practised is exemplified by the Bodhisattva who ate only incense and sweet-scented food and drank only perfumed oil for 12 years, put on 'divine clothes', bathed in perfumed oil, and set himself alight. His body, it was believed, would burn for 12,000 years.

40. H. Quetelet, *Statistique Morale*, 1848, p. 35; see also T. H. Buckle, *History of Civilization in England*, London: Longmans Green, 1894, pp. 27–8.

41. The constancy in the suicide rates prompts us to ask whether there are any other forms of human behaviour which display a comparable regularity. Is war a case in point? Consider the following figures which show the number of years, between AD 1500 and 1931, in which war broke out 0, 1, 2, 3, 4, or more than 4 times.

Frequency of Outbreak of War (1500–1931)

No. of times war broke out	No. of years	
	Actual	Expected (Poisson)
0	223	216
1	142	150
2	48	52
3	15	12
4	4	2
4+	0	0
	432	432

The similarity between the second and third columns cannot be overlooked. As M. G. Kendall has observed, 'anyone who can reflect on this picture without disquiet is, I think, inaccessible to statistical evidence'. M. G. Kendall, 'Natural Law in the Social Sciences', *J. Roy. Stat. Soc.*, Ser. A, 124(T), 1961, also published as No. 129 in Series of the Research Techniques Division of the London School of Economics. He quotes figures which were derived by the late L. F. Richardson ('The Distribution of Wars in Time', *J. Roy. Stat. Soc.*, 1944, 107, pp. 242–50) from Quincy Wright's *A Study of War*, Chicago: University of Chicago Press, 1942.

42. Christopher Fry, *A Phoenix Too Frequent*, Act I. The theme of this play, borrowed from Petronius, is about a beautiful young widow who wished to die in the tomb of her husband and was saved in the nick of time by the appearance of a handsome lover.

43. In a memorable passage Freud has given magnificent expression to what he calls:

> our unmistakable tendency to push death aside, to eliminate it from life. We have tried to keep a deadly silence about death: after all, we even have a proverb to the effect that one thinks about something as one thinks about death. One's own of course. After all, one's own death is beyond imagining, and whenever we try to imagine it we can see that we really survive as spectators . . . nobody believes in his own death. Or, and this is the same: In his unconscious, every one of us is convinced of his immortality. As for the death of others, a cultured man will carefully avoid speaking of this possibility if the person fated to die can hear him. Only children ignore this rule. . . . We regularly emphasize the accidental cause of death, the mishap, the disease, the infection, the advanced age, and thus betray our eagerness to demote death from a necessity to a mere accident. Towards the deceased himself we behave in a special way, almost as if we were full of admiration for someone who has accomplished something very difficult. We suspend criticism of him, forgive him any injustice, pronounce the motto, *de mortuis nil nisi bene*, and consider it justified that in the funeral sermon and on the gravestone the most advantageous things are said about him. Consideration for the dead, who no longer need it, we place higher than truth—and, most of us, certainly also higher than consideration for the living.

S. Freud, 'Thoughts for the Times on War and Death', *Collected Papers*, London:

Hogarth Press, 1925, vol. 4, pp. 288–317; see also W. Kaufmann, 'Existentialism and Death', pp. 39–63, in *The Meaning of Death*, edited by H. Feifel, New York: McGraw Hill, 1959.

44. Aeschylus, *Prometheus*, 250. Dante (*Paradiso*, 15) defines hope as 'a certain expectation of divine glory, the product of divine grace and precedent merit', but Kierkegaard calls it a gift of dubious value, a poor substitute for the foreknowledge of immortals; he who wishes to live artistically must abandon hope, for hope precludes self-limitation, S. Kierkegaard, *Either/Or*, New York: Doubleday, 1959, vol. 1, pp. 288–9. (First published 1843.) Ovid took a more roseate view of the usefulness of hope. 'If only she is duly fostered,' he wrote, 'Hope holds out a long time. She's a deceitful goddess, but a very useful one. If you give your mistress something, she may give you your *congé*. She will have had her *quid pro quo*. Always make her think you are just about to give, but never really do so. Thus your farmer will keep on manuring a barren field, hoping it will produce a crop some day. Your gambler will keep throwing good money after bad, in hopes of redeeming all his losses; and thus his greed falls victim to his hope of gain.' *Ars Amatoria*, Book I, pp. 119–20, translated by T. Lewis May, London: The Bodley Head, 1925.

45. E. Jones, *Essays in Applied Psychoanalysis*, London: The Hogarth Press, 1951, pp. 257–9.

46. A. M. Kasper, 'The Doctor and Death', pp. 259–70, in *The Meaning of Death* (edited by H. Feifel), New York: McGraw Hill, 1959, p. 259.

47. M. F. Ashley Montague, in *Problems of Consciousness* (Transactions of First Conference), edited by H. A. Abramson, New York: Macy Foundation, 1951, p. 192.

48. D. Tarrant, 'The Undiscovered Country', *Hibbert Journal*, 1952, 50, pp. 269–74.

49. Tacitus, *Annals* XVI, 19.

50. Such immolation in Indian tradition is not restricted to man. In the *Mahābhārata* (xii, 143, 10) there is a story of a hunter for whom a pigeon roasts itself as a guest-offering. The bird's wife refuses to survive her noble husband, and the hunter himself, downcast by this twofold sacrifice, ends his own life by fire.

Note: for a further comparative study of suicide rates and their interpretation, written since this chapter was completed, see 'Forms of Suicide and their Significance,' *Journal Sandoz de Sciences Médicales* (1964), in the press.

CHAPTER 7

RISK-TAKING IN SPORT AND THE HAZARDS OF FANTASY

1

The degree of uncertainty we tolerate in everyday life, like the risks and hazards we incur at home or at work, change in curious fashion when we enter the world of play. One reason for this may be that in play we dispose of our energies on an entirely different principle. No one, for instance, suggests that automation should be introduced into sport. Who would dream of replacing the Oxford and Cambridge boat crews by robot crews? In work the supreme goal is to reduce the physical and mental demands of the task. In play no effort is too great; there are no restrictive practices: an athlete does not say, 'I am jumping higher than my pay warrants'.

We must not confound the risk taken by a circus performer, a trapeze artist, say, with the risk which spell-bound onlookers, gazing open-mouthed at the spectacle, think he or she is taking. The spectators are thrilled because they believe that the peril is great, but the acrobat himself generally rates his chance of failure lower than it is rated by the spectators. A young Frenchwoman, Colette Duval, who has repeatedly faced death in acrobatics, parachuting, car racing and other hazardous enterprises, and who, into the bargain, held the world record, 12,000 metres, for a free fall, has made some illuminating observations on the subject of risk. She has said that, to the public, in trapeze work or the free fall, the acrobat seems to take his life in his hand and to invite almost certain death; such exploits, for the onlooker, border on suicide. But to the acrobat the situation does not seem fraught with great danger. Miss Duval herself refuses to undergo hazards in which the outcome depends purely on chance. Generally speaking, a performer chooses the act he is to demonstrate and because

he has perfected the necessary technique the act seems to him *almost* a hundred per cent safe. Miss Duval emphasizes the *almost* because she concedes an element of subjective uncertainty on the part of the performer of about one per cent, by which, I take it, she means that, in the performer's mind, there seems one chance in a hundred of his going wrong. And here she makes a very penetrating remark, for she insists that this one per cent of subjective uncertainty is *essential* for success in the performance. It acts, she believes, as an inner stimulus, it excites the dare-devil spirit, and mobilizes all the skill and agility of which the performer is capable. Without it, insufficient effort might be forthcoming. If you are totally and absolutely convinced that you will succeed in a task you will, paradoxically, exert less (and perhaps insufficient) effort than if you do not feel this absolute assurance. The suspicion of possible failure serves to marshal all one's reserves. At the same time the element of doubt induces the performer to take every possible precaution, and he never trusts to luck. For when a performer begins to rely on luck, the rot sets in. Those whose vocation it is to 'play with death' realize that chance may be their enemy, so it is never to be trusted. This does not preclude their clinging to the universal belief that 'accidents always happen to other people'. But it does make them treat an 'accident', not as unpredictable and uncontrollable, but as something which, with proper foresight and precaution, could have been prevented. Consequently, when an accident does occur, the skilled performer's reaction is not merely to say 'Bad luck', but to seek the causes, to ask 'What precaution was overlooked?' 'Which feature was miscalculated?' 'Did the equipment fail?' The one per cent is never lost sight of, in itself it is a possible eventuality which carries certain death. The acrobat is like the patient who is reassuringly told that 99 per cent survive the operation which he is presently to undergo. 'Yes,' he may reply, 'that is all very well, but if I am that one per cent, I am sure to die!'

'Though I happily make plans for the years to come,' says Miss Duval, 'I leave my flat every day with the thought flashing through my mind: "will I ever see these rooms again?" '[1]

I propose now to consider, in Sections II and III, certain situations in a game largely depending on skill, and to show how a player's judgement and performance are related to his degree of certainty of success. In Section IV I shall comment on the experience of the spectator and finally, in Section V, discuss wider aspects of play in society.

II

The type of method which we have used in the study of risk-taking on the road may be employed to investigate skill, or particular aspects of it, including athletic skill. A study of skill in taking a high jump has already been described elsewhere.[2] I now wish to look at the skill of footballers when they attempt to score goals. An experiment will be described which was intended to discover the relationship between what a player thinks he can do and what he can actually do, or as a pedant (or psychologist) would prefer to say, the relationship between a player's assessment of his skill and his true skill, as measured by his performance.

The player's task was first to estimate his chances of shooting a goal from varying distances, and then to attempt to shoot at these same distances. The players who took part in the experiments were members of (*a*) two First Division teams in the English Football League (Manchester United and West Bromwich Albion), (*b*) Manchester University's first team, and (*c*) the first team of Manchester Grammar School.

There were four separate stages in the experiment, as follows:

(i) The player stood, with the ball at his feet, far enough away from his opponent's goal to rule out the thought in his mind that he could ever score from such a distance. He then began to move towards the goal, and the moment he moved, the opposing goal-keeper sprang into action. These two were the sole players on the field. Thus the player's task was to approach his opponents' goal down the centre of the field and to stop at the first point where he felt he had a one in a 100 chance of success. The experimenter marked this point.

Continuing down the centre of the field, the player stopped at each of the points where he first felt he could score once, twice, three times and four times respectively, in five attempts. Finally, he reached the point where he felt virtually certain of scoring, that is in 99 out of a 100 attempts. Each of these 5 points was also marked.

(ii) The player now actually took aim at the distance from the goal where he felt he could score once in a 100 attempts. In other words, he attempted his 'longest shot'.

(iii) The player made 5 shots from each of the points, in stage (i), at which he had estimated 1, 2, 3 and 4 successes respectively in 5 attempts, and 99 out of 100. In addition, the furthest distance from the goal at which he scored 5 times out of 5 was also determined.

(iv) At this stage, the aim was to discover the player's preferred strategy. He stood at the centre of the field and was told to try and make as sure as possible of scoring a goal, employing whichever method seemed to him most promising. The goal-keeper, for his part, was to be equally bent on preventing a goal.

We can now see what happened at each of these stages. The table which follows shows, for each team, the average distances from the goal at which the different estimates of success were made.

TABLE 11. *Average distances from goal (ft) corresponding to estimates of success*

Team	Estimates of success: 1/100	1/5	2/5	3/5	4/5	99/100
Manchester United	106	67	50	39	29	19
West Bromwich Albion	96	68	55	46	36	28
Manchester University	96	59	45	36	28	17
Manchester Grammar School	116	71	55	45	33	19

The figures in Table 11 tell us not only what we know already, namely, that a player believes he is more likely to score as he gets nearer the goal; they also tell us the distances, on the average, at which particular expectations of success are held by the different teams. And they also highlight the fact that, on the whole, as compared with the other three teams, the West Bromwich players arrive at any given level of confidence of success further from the goal, except when the distance from the goal is of the order of 100 ft. It would seem that West Bromwich players prefer to avoid wild shots from an impossibly far distance. The four teams vary significantly with respect to confidence in relation to distance from the goal, but it is not a question of a contrast between professional and amateur players. Of all four teams, the University players are the most cautious in that they are nearer the goal than players from other teams before they commit themselves to a given level of confidence.

So far I have spoken only of the *average* distance, for each team, which corresponds to a particular estimate of success. It must not be assumed that there was no variation from player to player. There certainly was, and there were also differences between teams in respect to the variability of their players. The players in the two professional teams were more variable than those in the two amateur teams. This may be due to the fact that no amateur player was capable of the powerful kick for which some of the professionals were famed.

The Manchester United players were found to vary more widely among themselves than did the members of the other three teams. This could be interpreted to mean that Manchester United *as a team* was more variable than each of the other three teams, but such an inference would not be justified. There is more to it than that. One cannot very well argue from differences between players within a team to differences between teams. All the same, there is some evidence —for example, the relative number of changes of position in the League table week by week throughout the football season—which indicates that the two sets of differences may not be entirely unrelated. This question of the variability of teams is of great concern to the public, and in all countries where football is a popular game. It is also of interest in *any* team game. We may suppose that the variation between football teams is a complex of many interacting factors and thus calls for a composite measure which would take into consideration:

(*a*) the number of place changes in the League table week by week,

(*b*) the number of points scored each week,

(*c*) victory or defeat in the two matches between each team and every other team,

(*d*) whether a team has a series of victories or defeats, as compared, say, with alternations of victory and defeat,

(*e*) differences in the team's record of victory and defeat between the first and second halves of the season,

(*f*) changes in the composition of teams,

(*g*) the tendency to score goals in the first or second half of the game, and,

(*h*) the number of goals scored.

An investigation into the interrelation of these (and possibly other) factors might throw considerable light on team variability.

At the second experimental stage our object was to find the furthest point from the goal at which a player is prepared to make a shot. The expectation of success at this farthest point represents what, in comparable circumstances, we have called the 'maximum risk-taking level', which is the greatest uncertainty of success a person will tolerate when he undertakes a given task. Here, too, West Bromwich Albion players differ from those in the other three teams in that their average 'longest shot' is further from the goal and, at the same time, made at greater uncertainty. The values obtained for the four teams are tabulated in table 12 on page 122.

A striking feature of Table 12 is this: it seems that the University

TABLE 12. *Longest shot (ft), estimates of success and performance**

Team	Longest shot	Estimates of success	Performance
Manchester United	59	0·29	0·16
West Bromwich Albion	83	0·08	0·10
Manchester University	51	0·33	0·16
Manchester Grammar School	68	0·27	0·16

* Expressed as fractions of unity.

players are not prepared to shoot at a goal unless they feel they have a one in three chance of scoring, whereas the West Bromwich Albion players are content with what they feel is only one chance in 10.

During the third stage of the experiment each player made 5 attempts to score a goal from each point marked at the first stage. It goes without saying that he was urged to do his best, and not to try to make his previous estimates accurate! How accurate the players' estimates were appears from the following table.

TABLE 13. *Average number of successful attempts in relation to estimates of success*

Team	Estimates of success: 1/5	2/5	3/5	4/5
Manchester United	0·3	1·5	2·5	4·2
West Bromwich Albion	1·1	2·1	3·1	3·4
Manchester University	1·0	2·4	3·0	3·6
Manchester Grammar School	0·4	1·1	2·3	3·6

The number of successful attempts at the most distant and nearest points, that is, when the estimates were one in 100 and 99 in 100 respectively, are purposely left out of the table for this reason: at the 1/100 level only one player managed to score a goal, and at the 99/100 level only 5 players failed to score at each attempt. There is no doubt that the estimates of our players, generally speaking, were substantially accurate. Of the 132 estimates made by the four teams, 45 were accurate, 58 overstated their expected performance and 29 understated it. There is a slight, but only slight, indication that Manchester United players tended to overestimate and the West Bromwich players to underestimate their expected performance.

A further point of interest emerges when we compare the accuracy of estimates far from the goal with accuracy near the goal. This comparison shows that all four teams tend to overestimate their capacity when they are at a great distance from the goal and to underestimate it when it is a question of nearly always scoring, an outcome which tallies with a feature often met in our other experiments; namely, that people tend to overrate their expected performance when they think the task is hard whereas they tend to underrate it when they think the task is easy.[3]

Comparisons between the four teams may also be made in respect to (*a*) the margin of hazard, that is, the difference between the longest shot attempted and the longest shot at which players always succeed; and (*b*) the margin of safety, that is, the difference between the longest shot attempted and the longest shot at which players *believe* they will always succeed. From these two comparisons it seems that the West Bromwich players incur the greatest hazard and, in addition, leave the smallest margin of safety.

Finally, at the fourth stage, the player's favoured strategy was determined. One of three methods was usually employed: shooting when the goal-keeper was at a great distance, watching until he was near and then making a hard shot along the ground, and trying to shoot at an undefended goal after bypassing the goalkeeper. About two-thirds of all the players chose the first method, though the West Bromwich players were more evenly balanced in their liking for the first and third methods. The fact that 29 goals were scored in 33 attempts shows that when a player can take the initiative he definitely has the upper hand.

III

So far we have been dealing with evidence derived from experiments. How does this agree with what actually occurs in a real game? In order to answer this question we filmed a First Division League match between Manchester United and another First Division team, Notts Forest. In this match Manchester United attempted to score on 22 occasions and were successful 3 times. These three successes were made at distances from the 'enemy' goal of 90, 33 and 60 ft respectively and at angles of 35, 11 and 22 degrees. Strictly speaking, we cannot compare these distances with the experimental 'longest shot' because the latter was made at an angle of 90 degrees. All the same, two of the

actual distances are within reasonable range of Manchester United's longest shot (59 ft) in the experiment. Another item of likeness occurs in attempts to score which were roughly perpendicular to the goal. All these attempts were within the penalty area, and at an *experimental* distance corresponding to not less than 2 successes in 5 attempts.

An analysis of two other films (not taken by us) of the Football Association Cup Final match between Manchester City and Birmingham City in 1956, and of the European Cup Final between Eintracht and Real Madrid in 1960, throws further light on the behaviour of players. Four distinct conclusions emerge, viz.:

(*a*) successful shots were much more frequent inside the penalty area than outside it: 13 out of 14 as contrasted with one out of 32. In the European Cup Final, 7 of the 46 attempts were made in the *goal* area and 6 of these were successful,

(*b*) fewer attempts to score were made in the second half of the game as compared with the first (34 as compared with 42),

(*c*) while winning and losing teams made the same number of attempts *outside* the penalty area, *inside* the area more attempts were made by the winning team (28 as compared with 16),

(*d*) winners differed from losers not only in making more successful shots (10 as compared with 3) but also in making more unsuccessful ones (34 as compared with 28).

How does the likelihood of scoring vary with the player's position in the team? This question may be answered by another analysis, which we were able to make, of the goals scored by 11 teams in 3,192 matches during 4 to 10 seasons, according to the team; goals scored from penalties or by the mistakes of opponents were ignored. 5,348 goals were scored in these 3,192 matches, 1·7 goals on the average by each team in each match. The goals scored by the players in each position are shown in Table 14.

Most students of football will no doubt say that the figures in the table will not come as a surprise. They are not intended to. Nevertheless they do bring to light some detailed differences, for example, between outside right and outside left, which the acknowledged expert might not have been able to guess. Goals scored by centre forwards ranged from 24 to 39 per cent, by the inside left from 11 to 25 per cent, and by the inside right from 10 to 40 per cent. Three of these extreme proportions occurred in one and the same team. The significance of this has to be evaluated in the light of the policy of the team and the strategy that follows from it. For it is the team policy and

TABLE 14. *Goals scored in 3,192 matches, 1949–59*

Position	Goals No.	Goals per cent
Right back	16	0·3
Left back	22	0·4
Right half	96	1·8
Centre half	34	0·6
Left half	90	1·7
Outside right	566	10·6
Inside right	1,086	20·3
Centre forward	1,713	32·1
Inside left	1,044	19·5
Outside left	681	12·7
Total	5,348	100·0

strategy which may primarily govern the scoring potential of the players.

IV

The satisfaction which the football player derives from his game is one thing, the satisfaction which onlookers derive is quite another. In many countries football matches draw larger crowds than any other game; in Barcelona the football stadium is now said to attract more people even than the bull-fight. All ball-playing games—Rugby, cricket, baseball, tennis, golf, hockey and many others—have an appeal, partly perhaps because a ball, with its perfect shape and remarkable physical properties, is a natural object of play; of all objects, it alone may be said to play with the player.[4] Kepler thought of 'a ball' almost as a religious object. 'In forming this [the spherical surface of the earth],' he wrote, 'the most wise creator created playfully the image of his venerable Trinity';[5] and 'as the creator played so he also taught Nature, as his image, to play; and to play that very same game that he played for her first. . . .'[6]

But why does football exert so powerful an attraction? Because each spectator considers himself the supreme authority on every detail of the game. He can identify himself with each of the players in turn, and he can tell you what all of them individually should do at any

moment. This identification with the players, coupled with an agreeably superior feeling of what *he* (the spectator) could have done had *he* been playing, constitutes his chief source of satisfaction. Each spectator can witness the excellence of a highly skilled performance, which he cannot see in his mass-producing factory; and he not only witnesses excellence, he also judges it. So he is perhaps less easily fooled in his Trade Union or elsewhere. All countries in which football is a national sport have millions of 'experts' on the game, experts not only in the sense of having a large fund of relevant knowledge but also in that they recognize no higher authority. Add to this the local pride, the sustained tension due to the unpredictable outcome, the ceremonies before the game and after a goal, the ardour stirred up by press and radio, and finally the peculiar thrill of being one of an immense crowd, and we begin to understand the magnetic appeal of a football match.[7]

Watching football may be said to have a social value beyond the realm of sport, although we must not confound the football of the Saturday crowds with school football. Educators emphasize the value of football for its camaraderie and team work, its fair play, initiative, and demands on physical agility and vigour. But it is not these qualities which draw the crowds in their tens of thousands, which fill the teeming columns of sport in the daily and weekly press, which evoke the eloquence and verve of the broadcaster, which occupy the minds of the football associations or which arouse national pride. Nor are the educators' virtues in evidence when a player is injured in League football, for then spectators display little compassion and many seem eager for him to be taken from the field so that the game can be resumed without delay.

V

From this description of an experiment on uncertainty in sport and of the possible experience of the spectators, I move to some reflections on uncertainty manifested in the broader sphere of play. This will take us far from our starting point, but I hope the reader will bear with me. Whether we gleefully chase a ball in a field, whether we swim or climb at pleasure, or join in a game of cricket according to rules, whether we are engrossed in a film or a drama on the stage, or immerse ourselves in associations and fantasies, in reflections and memories, we are in each instance moving in a zone of experience where the values are unlike the utilitarian values of daily life. And not only are the values changed, our response to uncertainty also differs. And when we go on

holiday we are like players about to play a game. We enter a more or less clearly defined region for a given period of time, and within this region our conduct is apt to undergo some startling changes. We let ourselves go. We dare more. We incur greater hazards, and we have greater confidence in our success. The make-believe topology of our private domain is strangely transformed. We wear clothes we would otherwise not dream of putting on. We are more lavish; our money values change, as if we had come into a fortune. We become grandiloquent and extravagant. Pounds are spent as if they were shillings, and this change may begin the moment we step into a travel office to buy the ticket, a fact of life that does not take sea-side hoteliers and shop-keepers entirely by surprise.

I referred at the beginning of the chapter to the free and exuberant release of energy in play in contrast to the curbed economy of effort in work. If so, play has something to offer to the worker however much joy he finds in his work; the spirit of play is by no means the same as satisfaction in work. Nor is it just 'fun'. Even those whose choice of work is entirely their own and who therefore find it perfectly congenial, even they need to play. For man is more than a worker, he is also an idler, a man of leisure, a player who, above all things, can engage in the life of the imagination, which is not at all like the exercise of intelligence and skill in work.

But what is imagination? We know from Shakespeare's Theseus that 'The lunatic, the lover and the poet, Are of imagination all compact'. He goes on to tell us how they differ, but what do they share in common? We have a clue from Dr Johnson who announced, with Boswellian finesse, that were it not for the imagination, a man could not decide whether he is in the arms of a duchess or a chambermaid. But this is a clue to little purpose, for who would dare to pursue it?

Let us then turn to Coleridge, who distinguished *primary* from *secondary* imagination, and both from *fancy*. Primary imagination is a creative force in perception, an act of Proustian penetration, swift and immediate, before the prosaic intelligence can intervene and destroy the magic of the priceless moment; *primary* imagination opens the doors of perception to yield a glimpse of heaven and hell. *Secondary* imagination is but an echo of the primary, from which it differs only in degree, whilst *fancy* is merely a shuffling of the filing cabinets of memory.

This conception, too, leaves us unsatisfied, for we know that the world of perception is tied to the here and now, whilst imagination

is unbound and free from the fetters of time and space. In perceiving, we interpret that which is outside us, although such interpretation may be directed from within the mind as well as from outside it. In imagining, we fabricate missiles of the inner life and guide them into perpetual orbit. But to speak of 'the imagination' reifies what is after all no more than a quality, besides ignoring the *varieties*, the poetic and the pictorial, the musical and the mathematical, the technical and the theological.

The art of imagining, I suggest, demands a refusal to take things only at their face value or literally. It is a search for meaning, or rather meanings, symbolical, figurative, allegorical, mystical. A search for meaning characterizes the life of all men, high and low, and informs primitive myth as much as the furthest reaches of consciousness. Even the ramblings of crazy people are 'meaningless' only if we project onto them our own ignorance; their search for meaning is sometimes far more intense than our own.[9]

If man is essentially a creature of imagination rather than of *intellect*, much of contemporary education is excessively pragmatic in overestimating what is popularly called the 'intellectual' at the expense of the 'imaginative'. It fails as well to present a coherent image of man in which biological, historical and cultural aspects all have their place, a failure revealed in the discord between the scripture lesson and the natural history lesson. Here are typical replies given by adolescents to the question, 'How do you think Man began on earth?':

God made man in his own image. He made Adam and Eve first from apes.

When men first came on the earth they did not know how to do anything and were very warlike . . . nor did they know how to hunt until Jesus came on earth and taught them.

In our science lesson we have been told that the earth is a small part of the sun. If so, I think that man originated from a monkey. But in the scripture lesson we are taught that God made a man and then a woman. I think I shall have to learn a lot before I can give a definite idea.[10]

If teachers shrink from this problem of reconciliation no wonder their pupils' notions of human origins are a curious amalgam of Genesis and prehistory or that they never acquire a sense of man's place in

nature, in history, in society, or of his limitless possibilities which have hardly yet been tapped. It may not be much of an exaggeration to say that, at least in England, a child reaches his peak of brightness, relative to age, before he begins school. The moment he enrols as a pupil his mental decline sets in and proceeds uninterruptedly until the end of his school or university career, in spite of some increase in knowledge. The vital questioning of everything familiar and unfamiliar, the uninhibited searching, the direct hit: 'The Emperor wears no clothes!'—all this disappears, never to return. Compare the free-ranging fantasy of the pre-school child, as embodied in his drawings and paintings, with the pedestrian efforts produced in most of our primary schools, which omit to teach children how to use their senses. Instead of being brought face to face with the epiphany of nature, our schoolchildren are shown a 'nature table' complete with tadpoles and buttercups.

If we are to explore and enjoy a fuller range of human resources, these resources must be made manifest to us. To start with, our primary schools should be equipped with, say, twenty or thirty simple workshop-laboratories, and art and craft rooms, each embracing a 'family' of occupations. A child could spend weeks or months in several of these and thus *discover his own potential* under optimal conditions. In this way, occupational choice could become much freer and it could achieve a far higher degree of specificity. We recognize the value of specificity in choosing professions of a high order of competence, such as civil engineering, but the same recognition should be accorded to occupations at all levels.

Sense and feeling are undervalued today, and we may be in danger of impoverishing creative effort in science as well as in the humanities, for these are not as disparate as they are sometimes made out to be. What is needed is a way of enriching the maturing imagination. Perhaps this could be achieved by films of poems which are evocative of pictorial imagery; the viewer's imagination could then be actively stimulated while listening to the recitation of the poem, to Blake's 'Tiger, Tiger', for example, as a surrealist sequence of images and scenes of tigers, forests, night and other graphic elements in the poem. Clear and definitive representations would have to be avoided, for what we are trying to teach the viewer is not how to recognize a tiger, but to arouse, stir and sensitize his imagery. Goethe's *Erlkönig* is another poem that could be treated both visually and dramatically and hence it could leave a deeper and more lasting impact on the viewer than could result from sound alone. Perhaps only by nurturing

the capacity for imaginative experience can we overcome the callousness which is blind to suffering that does not occur under our very noses, for we are far more moved by a trivial accident in a nearby street than by some fearful disaster a thousand miles away. And in the long run, our survival may depend on discovering the antidote to such callousness.

Pre-industrial societies do not have the problems of play and leisure as we understand them, for the simple reason that free time is unknown to those who work from dawn to dusk until they die; even today the farmer and the agricultural worker are tied to their soil, to their cows and pigs and to an unbroken sequence of daily and seasonal tasks. Older forms of society found release in festivities like the Saturnalia, Sigillaria and Lupercalia of Rome and the carnivals and masques of the Middle Ages, festivities which still brighten the cities of Italy and Germany; the *Fastnacht* of Basel in Switzerland is one of these occasions that preserve the original pageantry; and the social history of England offers a host of practices which once brought escape from taboo and convention in music, dance and convivial buffoonery. The ghost of these customs survives in student rag days, but these are not free from guilt, for the participants, under the vigilant eye of police and vice-chancellors, are obliged to dedicate their orgiastic spirit to a charitable purpose.

Traditional festivities are gone, possibly for ever. But the impulse which created them still lives on in the dance, which was at one time the principal rite accompanying all significant activities. Nothing of social importance took place without a dance. 'If any intercourse be necessary between two American tribes, the ambassadors of the one approach in a solemn dance and present the calumet or emblem of peace.'[11] If war is declared, if the anger of the gods is to be appeased, if the birth of a child is to be celebrated or the death of a friend to be mourned, there is invariably a dance appropriate to the gaiety or solemnity of the occasion; and if a sick person who is to be restored to health lacks the necessary skill for dancing, the physician performs in his place.

Greeks and Romans borrowed the funeral dance from Egypt where the dancer imitated the idiosyncrasies of the deceased. He was dressed in the dead man's garments with a mask that resembled his face, and as the cortège moved to the sound of a dirge he executed a pantomimic dance representing the most memorable exploits of the man who was being borne to his grave.[12] The dancers of Japan, like those of ancient

Greece, were also largely pantomimic, each gesture having a symbolic or esoteric meaning.

The sedate Cicero has the distinction of being among the first to utter a denunciation of the dance. 'No gentleman dances', he declared, 'unless intoxicated or mad', a view shared by St Chrysostom (fourth century), who also attacked the mime songs of his time, or what today are designated 'pop tunes'. 'The young people', he complained, 'are singing mime songs all day long.' And in his condemnation he did not forget the curling of hair, the painting of cheeks, and the rolling of eyes. A milder view, much later expressed by St Thomas Aquinas, led to bitter controversy. Even the despised profession of the actor, said St Thomas, was not necessarily sinful, because 'recreation is necessary to mankind'. Happily St Thomas succeeded in finding support for his liberal plea in a revelation vouchsafed to the blessed Paphnutius 'that a clown was to be his companion in heaven'.

In Britain the dance halls attract six million dancers each week, and provide the seed ground for 60 per cent of the marriages. In the fantasies aroused by the music, rhythm, whirl and colour, the dancers seek an experience free from the bleak and dismal reality that often surrounds them. They have an intimation in the dance of an existence in which illness, ugliness and death have no place, a life in which love endures, not for a brief moment, but for ever. Such an experience is equivalent to a return to the primordial beginnings, the Age that preceded the mythical Fall to which legends of all peoples testify, not as historical fact, but as 'sacred' history. They discover 'an image of Paradise Lost suddenly evoked by the music of an accordion'.[13]

In some impoverished sense the yearning for a 'Paradise Lost' is attested by the well nigh universal addiction to opiates, drugs or alcohol, for inducing a state of intoxication. The aborigines of Australia, the Hottentots, and some North American tribes seem to have been among the very few exceptions to the general rule. When Captain Cook first visited the Friendly Islands he discovered that the natives drank a potent beverage made from the juice of the *kava* root. A fermented mares' milk served the Tartars; the juice of the *aloe*, the Mexicans; and a liquor brewed from rice, the people of China and Siam. In the Vedic hymns, the god Indra reels from the effects of the sacred *soma* poured out for him by his worshippers. In Orphic eschatology, the righteous are transported to Hades where, crowned with garlands, they drink to intoxication, this being the supreme reward for

virtue. Such divine drunkenness was felt by the initiates to be a state of ecstasy of the spirit.[14]

It is easy to be contemptuous of the dance and song of the contemporary teenager, but however cheap and pathetic the medium, however vacuous the words and tasteless the tune, the underlying sentiment commands our respect. For it speaks of an unspoiled discontent with a drab routine which is devoid of significance. The dancing teenager is taken to a never-never land, to a 'once upon a time' which has no end, for everyone 'lives happily ever after'.

Forms of play are a matter of taste. Mass purveyors of entertainment, like mass-producing factories, claim to give people what they want, which is often the lowest common denominator of wants, but consumers who refuse to suppress their individuality and who are selective in their entertainment, clothes and furniture exercise a counter influence to these mass effects. They demand that producers shall have the taste as well as the skill to satisfy them as consumers. Now the modern trend is to make a man increasingly restricted as producer and increasingly diverse as consumer. For every factory worker is both. As producer he repeats *ad nauseam* some single task in the manufacture of one commodity. As consumer he can choose from the innumerable objects made by different workers all over the world. And by the range and variety of his choice he can influence the entire system. 'As producer he is "the one", as consumer "the many".'[15] What is more, the character of the demand in any society reflects its civilization more than the efficiency of its production, so that the contrast between the demand for airports and the medieval appetite for cathedrals is more impressive than the corresponding difference between techniques of production.[16]

This conflict of roles between producer and consumer in many countries is paralleled by another, namely, the continuous pressure to work which coexists with an image of conspicuous consumption attainable only with a higher income than the vast majority of people could possibly earn by honest work. Some people own cars which cost more and even seem larger than the houses they live in, for the car is an object of prestige and display, constantly on show in a hundred places, and it is of capital importance in a society which has established as its first law the principle of 'keeping up with the Jones'es. If we made an effort to cultivate individuality of taste and discrimination, people could perhaps resist mass pressures more easily. The quality of consumption would be enhanced, and the world of production would

have to change its tune. Educational 'systems' are now geared to the training of the young as *producers*. What is even more urgently needed, and not only for the enjoyment of play, is to train them as *consumers*.

What unsuspected resources for engaging in play still lie dormant within us? This question can find no proper answer unless we bring to it an image based on an understanding of his humdrum activities as well as of his spectacular achievements, and on an acknowledgment of the diversity of his struggles, mistakes, aspirations and values in different times and places. There is something which we can learn from Plato (*Laws*, vii, 10) who tells us that man is God's plaything, and this is the best part of him. 'Therefore every man and woman should live life accordingly, and play the noblest games and be of another mind from what they are at present. . . . For they deem war a serious thing, though in war there has never been either play or culture worthy of the name, nor is there, nor will there be. But this we say is a thing to us the most serious, that every one ought to pass through life for the most part and the best in peace. What, then, is the right way of living? Life must be lived as play, playing certain games, making sacrifices, singing and dancing, and then a man will be able to propitiate the gods, and defend himself against his enemies, and win in the contest.'

NOTES AND REFERENCES

A praiseworthy effort has been made by Roger Caillois (*op. cit.*) to envisage all forms of play and make-believe under a fourfold rubric; (i) contest, (ii) chance, (iii) mimicry, and (iv) 'vertigo'. Sometimes, he suggests, two of these four components go in couples as, for instance, in the linkage between masks and states of trance or possession in parts of Africa or the kinship between contest and chance in Old China and Rome. This pioneer attempt at a taxonomy of games certainly deserves careful thought, although it seems to me that contest and chance are perhaps more closely related than Monsieur Caillois allows for. Thus a contest, a duel for instance, may be an appeal to 'chance' = unpredictable fate, just as an appeal to chance in the form of gambling or tossing a coin to decide an issue may signify a contest with the gods. Indeed a contest with the gods may most suitably take place on the battlefield of chance, though prayer can also serve; there are legends of holy men who, by their insistent prayers and unconquerable virtue, compelled the gods to yield; this, of course, is magic. Beliefs and practices of this kind still survive in the civilized world. Religious leaders encourage their followers to believe that if they pray hard enough and long enough, rain is bound to come. Oddly enough, churches never pray for more sunshine; though in many parts of England this is far more urgently needed than rain, of which there is more than enough. Still less, as Ernest Jones

once remarked, are churchgoers encouraged to pray for a change in the landscape though to the omnipotent deities this should not be a much more difficult task (except when it is a question of doing away with the slums in the North of England) than to cause a downpour of rain.

The idea of an investigation into football arose out of a discussion with Mr William Grundy about the way the loyalties of the inhabitants of a city are divided when the city has two celebrated football teams. What are the selective factors that draw some people towards one team and some towards the other? The discussion somehow prompted the suggestion that the technique we had previously employed for measuring risk-taking on the part of the motorist could be adapted to study the skill of the football player. The investigation was eventually conducted with the collaboration of Mr E. J. Dearnaley, and published as 'Skill and Judgement of Footballers in Attempting to Score Goals', *Brit. J. Psychol.*, 1962, 53, 1, pp. 71–88. It only remains to add that the conversation with Mr Grundy was fortunately made possible by the long delayed arrival of Sir Hugh Casson who was to address the 51 Society!

The experiment itself would not have been possible without the kindness and help of many people. It is a pleasure to thank them once again, in particular Mr Matt Busby, CBE, manager of Manchester United, Mr Gordon Clark, manager of West Bromwich Albion, and their respective teams, Lord James of Rusholme, former High Master of Manchester Grammar School, and his pupils, the players of Manchester University first team, Mr Alan Hardaker, Secretary of the Football League, and the managers of the teams in the First Division, especially Mr L. MacDowall, former manager of Manchester City, Mr Peter Dimmock, CBE, of the BBC Sportsview Unit, and Dr R. R. Skemp for expert help in filming a match.

1. *World Health*, March–April 1961, p. 36.

2. John Cohen and C. E. M. Hansel, *Risk and Gambling*, London: Longmans Green, 1956.

3. See, for example, John Cohen and C. E. M. Hansel, 'Experimental Risk-taking', *Jahrbuch für die Psychologie und die Psychotherapie*, 1956, Winter, pp. 382–8.

4. F. J. J. Buytendijk, *Le Football*, Paris: Desclée de Browe, 1952.

5. J. Kepler, *Ad Vitellionem paralipomena*, 1604, pp. 6–7 (quoted by W. Pauli,) 'The Influence of Archetypal Ideas on the Scientific Ideas of Kepler', in C. G. Jung and W. Pauli, *The Interpretation of Nature and the Psyche*, London: Routledge and Kegan Paul, 1955, p. 168.

6. J. Kepler, *Tertius interveniens*, 1610, Sect. 126; also quoted by Pauli, *op. cit.*, p. 172.

7. See Buytendijk, *op. cit.*

8. This section is adapted from an address I gave in March 1963 at the Hatfield College of Technology and published as 'The Scientific Revolution and Leisure', in *Nature*, 1963, 198, pp. 1029–33.

9. Other facets of this question are considered in 'A Perspective for Psychology' in *Readings in Psychology*, edited by John Cohen, London: Allen and Unwin.

10. E. Tuke, 'Teaching Evolution to Young Children', *Biol. and Human Affairs*, 1952, 17, p. 160.

11. Lubbock, *op. cit.*, p. 247.
12. E. L. Urlin, *Dancing, Ancient and Modern*, London: Simpkin, Marshall (undated).
13. M. Eliade, *Myths, Dreams and Mysteries*, London: Harvill, 1960.
14. J. Harrison, *Prolegomena to the Study of Greek Religion*, London: Cambridge University Press, 1903.
15. J. A. Hobson, *Work and Wealth*, New York: Macmillan, 1916, p. 75.
16. C. Delisle Burns, *Industry and Civilization*, London: Allen and Unwin, 1923, p. 193.

CHAPTER 8

PATHOLOGY OF DECISION-MAKING IN UNCERTAINTY

I

On a bitingly cold day, a man decided to go for a stroll. He proceeded by fits and starts and presently found both his feet in a muddy pool. Realizing the pointlessness of remaining stuck in the puddle, he lifted one foot to go, but nevertheless stood fast, carefully weighing, at great length, the reasons for not standing there.[1] This episode of indecision is no rare freak. It illustrates the *folie du doute* of obsessives, the nagging and inescapable tendency to be unsure of anything and everything. Another man used to commit himself to certain acts by vowing that if he did not perform them, he would surrender his money to God. He was then tortured by doubts whether he had vowed or not, and because of this, he gave sums of money for religious purposes which were well beyond his means. Thousands of examples could be given from life and literature of the inability to make up one's mind when it would seem to be the easiest thing in the world to do so. Most people surely know from their own experience what this feels like, and to many it must cause great distress. Decision-making, like every other mental act, has its characteristic pathology. I propose to refer briefly, with illustrations, to the commonest features.

First then is the *folie du doute* which is often associated with the *folie du toucher*, the fear of touching anything which might be contaminated by disease. If, for example, an obsessive by chance touches someone in the street, he may begin to fear that he might have injured the other person, and in his mind he may exaggerate the touch into a violent push. If he has touched a woman, he may be afraid that she is pregnant and that the child is hurt.

Here is an example[2] of a man who presented, together with the

folie du toucher, many of the typical signs of obsession as well as compulsive behaviour and, at the same time, betrayed a need to reinforce his decision-making powers by vows. This man, 40 years of age, had since childhood attached a premonitory significance to trivial events. To wear one necktie was a presage of happiness, to wear another was an omen of misery. If he failed to touch a certain boundary stone, he would come to evil. He must re-read a particular line on a page, and when writing, make a given letter thicker than the rest, otherwise something dreadful would happen. For twenty years he regularly made a pilgrimage to the railway station every Sunday in order to kick a certain wooden post three times with each foot. If he failed to do this he was convinced his father would die. He tried to rid himself of these compulsions by making vows, linked with threats. 'If I yield to one of my caprices in the course of an hour, I shall have apoplexy before the day is out.' But these vows soon lost their binding force, just as, for the obsessive person, the retreat from things to words is of little avail because in time the names acquire the significance of the things themselves.[3] So he strengthened his vows. He stood for fifteen minutes muttering fearful imprecations to give himself the strength for the simplest task. If he omitted this ritual, other compulsions crowded in upon him: he had to come to a halt before a particular house, retrace his steps, touch boundaries, stop passers-by or finger their clothes.

Secondly, there is the inability to finish a task on the part of individuals who are prone to an extreme perfectionism. Consider a man of 33 burdened with four compulsions, each one as disabling and time-consuming as the rest: (i) wherever he walks, he feels compelled to clear the path, pavement or road of every small stone or scrap of paper; (ii) he is unable to close a door or remove his hand from the knob without repeatedly testing the door to make trebly sure that it is closed; (iii) he must tap his cigarette innumerable times before lighting it; and (iv) on top of this, his dread of germs makes him wash his hands countless times a day.

A more familiar form of inability to finish a task is exemplified by a student who had worked for several years on a project which needed no more than two weeks' effort to complete the task. This she was totally unable to do, and the reason later came to light. Her procrastination was an unwitting attempt to ward off the day when she would have to leave the protected environment of the student and face life in the raw.

Perfectionism is exemplified in another patient of 33 who had since

early childhood felt obliged to ask herself all sorts of unanswerable questions, especially those with a cosmic import. Did all things make themselves? Did God create everything? Did not the world make itself? Is there a God? How can one go on dividing objects into an infinite number of small parts, when each smaller part can still be divided? How is it that an object infinitely divided can still be divided, in spite of the fact that one cannot divide it any more? Is God able to divide it still further? Only God can divide it and yet it cannot be divided![4] In another guise perfectionism appears as a magic ritual, often in the form of counting: having to think of a number before performing a task, thinking the opposite of what one has to think about, making a genuflexion at every seventh step, or avoiding a place with a dangerous number on the door.

Among the numerous compulsions of this sort with which the famous Dr Johnson was afflicted was one the explanation of which none of his friends dared to ask him. He always left or entered at a door by a fixed number of steps from a given point, so that either his right or left foot regularly made the first movement. Boswell watched him suddenly stop and then, with deep earnestness, seem to count his steps. If he failed to do this, or somehow went wrong, he would return, 'put himself in a proper posture to recommence the ceremony, and having gone through it, break from his abstraction, briskly walk on, and join his companions'.

Thirdly, there is the self-centredness of the obsessive which makes him invest all impersonal things with a private meaning. Neutral 'signals' from the external world are translated or 'transduced' into a message of personal moment, everything non-personal being filtered out. A patient when asked to explain the meaning of 'A rolling stone gathers no moss', replied with great dignity, '*I* am a rolling stone; *I* gather no moss'. Another, a homosexual aged 28, gave this interpretation of 'You can take a horse to the water but you cannot make him drink'—'You might take, say, a homosexual to get him married, but he would still be a homosexual. And *vice versa*. In other words, a leopard cannot change his spots.'

Fourthly, obsessives are apt to engage in wagers with God and to consult private oracles of their own devising. They do this in order to shift the burden of responsibility of a decision, or for the guilt that may ensue, on to the broad shoulders of the gods. They try to coerce the gods to permit them to commit an act normally forbidden.[5] In so far as the obsessive creates his own ambiguous oracles, he represses

his own guilt and is therefore unaware of the significance of his own actions. But he is not so much intellectually stupid as emotionally blinded. And when events show that he has misinterpreted the oracle this means that he has misread a warning as an assurance; he has seen a red light as green. Otto Fenichel[6] has described how a patient habitually performed an oracular ritual to decide whether he should yield to the temptation to masturbate just once more. If luck was with him, he gave way, hoping to unload his guilt on the gods; if it was against him, he invented an excuse for repeating the ritual until divine permission was granted. Another patient divided all his activities into those that brought 'good luck' and those that brought 'bad luck'. It was fate, not his own conduct, which determined whether any action belonged to the first or to the second category.

A similar dichotomy of luck and unluck characterized the life of a man aged 32 who was plagued by doubts and fears that if he did anything contrary to popular superstitution something disastrous would befall the Almighty. He could see that this was absurd when it was pointed out to him, but soon the idea returned and took control over his actions. Every new superstition he came across was added to his list; and in due course he compiled so many unlucky days and places by doing or not doing things in conformity with, or against, these superstitions, that his mode of life was severely disrupted. Months passed before he could hit upon a propitious day for the purchase of an article of clothing, or for putting it on after he had bought it. There were times when he was at a complete loss for something to do or for some place to go to.[7]

Fifthly, there is a reliance on the magic of symmetry. If the right elbow has compulsively twitched, the left elbow must be allowed to do so as well. The late Robert Eisler[8] described a young girl with such a passion for symmetry. She had read Hans Andersen's *The Princess on the Pea* and she put pebbles into her shoes to induce a physical pain which would balance her mental suffering. 'Number magic', which appeals so strongly to obsessives, makes them prefer even numbers because these do not upset the balance as odd ones do.[9]

II

Our understanding of obsessive disorders is principally due to the work of Freud,[10] Janet[11] and Stekel.[12] What seems clear is that each minor issue which the obsessive cannot resolve except with the

greatest effort, or not at all, is a façade for some hidden conflict of great personal significance. This underlying conflict, the more urgent it is, may be 'referred' to *any* situation. A minor dilemma may thus develop into a crisis. Whether to take a cup of tea or not becomes a fateful question agonizing to decide. The person rehearses interminably and inconclusively all the conceivable advantages and disadvantages of a projected course of action down to the last syllable of possible difference. We may with justice describe the obsessive as the world champion splitter of hairs. It is not *he* who decides, but his hands or feet. His inconclusiveness arises from the fact that he poses false antitheses and false dichotomies, what Janet called '*la manie de tout ou rien*'. Elton Mayo[13] refers, by way of illustration, to an 80-year-old obsessive who had not succeeded particularly well either with women or men. Women he divided into two contrasting categories, the thin and virtuous, and the fat and vicious. He felt that he ought to get married but could not bring himself to unite with a thin virtuous lady. On the other hand, he found that fat women held a strong appeal, and he exhausted himself in conducting an internal debate on this somewhat unrealistic dichotomy of womanhood.

III

We may now briefly glance at the decision-making process in general. The act of deciding is qualitatively different from the weighing up of pros and cons which precedes the act, and it differs from the state which follows it. A decision may be regarded as a bridge between thinking and doing, the thinker being engaged in considering which of many possible bridges to cross. To be fully effective, he must, first, take all the bridges into account, and second, attach 'probabilities' of success and failure to crossing at each bridge. A failure in decision-making may take place at any stage in the process: for example, in unduly prolonging the pre-decision phase; in lingering too long on the bridge, or in retreating before the bridge is fully crossed. These various failures may be due mainly to the nature of the particular decision to be taken, where the individual's *capacity* for making decisions is otherwise unimpaired, or they may be attributable to the individual's mental 'structure', which may be incapable of standing the strain of making even a trivial decision. There are people, for instance, whose powers of bridge-crossing are faulty because there are no clear dividing lines in their 'minds' between the bridge itself and the two

zones on either side. Such people may fully intend to cross a bridge but because of a defective inner map they do not know that they are still on this side of the bridge when they believe they have crossed it. Their inner topography is insufficiently well-marked and signposted.

Lastly, we must not omit to note that just as there are indecisive people who can never make up their minds and who are in a perpetual state of doubt, so there are people, at the other extreme, to whom doubt in any shape or form is an utterly alien experience. Such unfortunate people are afflicted by a disorder which should perhaps be designated Dante's Disease since it was Dante in his *Convivio* (*c.* 1308) who first identified what he called 'this terrible malady'. The victims, he declared, are 'so presumptuous that they suppose themselves to know everything; and therefore they affirm uncertain things as certain . . . everything is true that approves itself to them, and everything false which does not'. Hence such people never learn, 'believing that they are learned enough of themselves, they never ask questions, they never listen, but desire that questions should be asked of them, and before the question is well out they give a wrong answer'.

Dante also identified two related diseases. One of these makes people so obstinate in their abasement that they cannot believe that anything can be known either by themselves or by any other person; the result is that they never search nor argue. Victims of the other malady arrive at their conclusion 'before they have formed their syllogism'. They fly from this conclusion to another and fancy all the time that they are engaged in subtle argument. When all three maladies meet in the same person there results a formidable mentality which bears a curious resemblance to that which we associate with the professional politician.

I have attempted in this chapter to sketch all too briefly perhaps, some manifestations of decision-making in uncertainty when the individual concerned is mentally disturbed. An adequate theory of behaviour in uncertainty must reckon with these phenomena as well as with those that can be artificially produced in laboratory experiments.

NOTES AND REFERENCES

1. William James, *The Principles of Psychology*, vol. 2, London: Macmillan, 1901, pp. 284–5.

2. J. Milne Bramwell, *Hypnotism*, London: Thomas Yoseloff, 1960 (first published 1903), pp. 242–3.

3. See J. Cohen, 'Thought and Language', in *Thinking and Speaking* (edited by G. Révész), Amsterdam: North Holland Publ. Co., 1954; also O. Fenichel, *The Psychoanalytical Theory of the Neuroses*, New York: Norton, 1945, p. 295 *et seq.*

4. Bramwell, *op. cit.*, p. 249.

5. Fenichel, *op. cit.*, pp. 302–3.

6. *op. cit.*

7. See Bramwell, *op. cit.*, p. 244.

8. R. Eisler, *Man Into Wolf*, London: Routledge and Kegan Paul, 1951, p. 25.

9. Fenichel, *op. cit.*, p. 154.

10. Freud's theory of obsessive thinking as the representation of an act regressively is illuminatingly set forth in his 'Notes upon a Case of Obsessional Neurosis', *Collected Papers*, London: Hogarth Press, 1946, vol. 3, pp. 293–383.

11. P. Janet, *Les Obsessions et la Psychasthènie*, Paris, 1903.

12. W. Stekel, *Compulsion and Doubt* (translated by E. Gutherl), London: Nevill, 1940.

13. Elton Mayo, *The Psychology of Pierre Janet*, London: Routledge and Kegan Paul, 1951, pp. 80–1.

14. In an investigation of the 1959 House of Commons we have discussed the question of selecting and training Members of Parliament for their work. The following quotation from our report indicates the possibility that professional politicians may be selected from those with a particular type of mentality with respect to states of uncertainty. 'That there may be scope for training [of Members] is brought home to us if we reflect on the extraordinarily bizarre spectacle of two rival political blocs cherishing with equal passion the most divergent beliefs based on one and the same basis of fact. . . . Such an impasse might be explicable in terms of the very nature of the political mentality. Possibly candidates would not present themselves for Parliament in the first instance unless they were sublimely insensible to the possibility that they could ever be mistaken, and unless they enjoyed a capacity for transcending all uncertainty and misgivings, unencumbered by that gift for suspending judgement which hampers the ordinary man. Perhaps candidates dare not admit political ignorance because they are, by definition, well-informed men. Perhaps they must deny any inability to foreshadow the state of things to come for they are, again by definition, political seers, clinging to their political creed with overwhelming intensity, because in so far as they allowed any shadow of doubt to enter their minds, they would be accepting the possibility that their opponents might conceivably be correct, and this must at all costs be ruled out.' (John Cohen and Peter Cooper, 'The 1959 House of Commons', *Occupat. Psychol.*, 1961, 35, pp. 181–212.)

This mentality has apparently been encountered in other spheres: 'Many men and most women,' wrote Lecky, 'though completely ignorant of the very rudiments of Biblical criticism, historical research, or scientific discoveries, though they have never read a single page, or understood a single proposition, of the writings of those whom they condemn, and have absolutely no rational knowledge either of the arguments by which it has been impugned—will nevertheless

adjudicate with the utmost confidence upon every polemical question; denounce, hate, pity, or pray for the conversion of all who dissent from what they have been taught; assume, as a matter beyond the faintest possibility of doubt, that the opinions they have received without enquiry must be true, and that the opinions which others have arrived at by enquiry must be false; and make it a main object of their lives to assail what they call heresy in every way in their power, except by examining the grounds on which it rests.' (W. E. H. Lecky, *History of European Morals*, vol. 2, London: Watts, 1911, p. 149.)

CHAPTER 9

POSSIBILITY, PROBABILITY AND ACTUALITY

I

In this chapter we have to knit together the many threads that we have woven in the previous pages into some more coherent pattern. Our task is to highlight and clarify, if possible, the basic ideas of psychological probability which are common to the discussion of the previous themes in Chapters 2 to 8. For we are less interested in each theme in itself as a separate topic of investigation than in the common framework of concepts to which they all belong. And we are not exclusively concerned with a narrowly technical discussion of behaviour in uncertainty but equally with the social repercussions and ramifications, especially in the realm of gambling, in problems of traffic control, in the sphere of suicide, and in the domain of sport and play. Since the notion of chance lies at the heart of the themes which have occupied us so far, let us take a glance at this elusive notion.

II

'If I had chance by the throat', declared D'Albert, 'I think I should strangle her.'[1] There are many who would share his bloodthirsty sentiments, although not, one would suppose, members of the London Stock Market, which, in a sense, thrives on uncertainty. Yet even the Stock Market draws the line somewhere: we are told that when the rejection of Britain's application to join the Common Market was announced, there was a brisk rise in Government securities and industrial share prices because 'the Stock Market always prefers certainty, however grim, to prolonged uncertainty'.[2] For entirely different reasons the tough and incorrigible criminal likewise prefers a sentence that he knows in advance is fixed and unalterable, such as a

stay in prison for a definite period, rather than to be uncertain of the length of a sentence which carries the possibility of remission.

But what do we understand by 'chance'? 'Though it is glorious to make conquests [of love] it is still more glorious to retain them. The former is sometimes the work of *chance*, the latter is always the work of *skill*.'[3] In drawing this distinction, Ovid reminds us that we are disposed to explain the predicament we find ourselves in *either* by reference to some inexplicable good or bad luck over which we have no control *or* to our own ingenuity.

There is also a suggestion of luck's fickleness and caprice and possibly the notion that a man's store of luck may become depleted or 'run down', if it is excessively drawn upon, whereas another, who has had a bleak period, may find that his store of luck has been growing in the interval; his 'luck-battery' has been re-charging and will soon be ready for action once again. 'I think you look very ruthless and formidable', says Snorri to Skarp-Hethin (in *Njal's Saga*), 'but my guess is that you have exhausted your store of good luck and that you have not long to live.'[4]

There seems to be no general rule. Many a business tycoon, partly to allay envy and partly to ease his conscience, will say that his success is due to thrift and industriousness. Oil millionaires, it seems, attribute their triumph to luck. 'Whatever else it takes to win in the oil game, the *sine qua non* is luck. One successful oil operator said: 'Luck has helped me every day of my life. And I'd rather be lucky than smart, cause a lot of smart people ain't eatin' regular.'[5] When we reflect that it was *chance* which gave the oilmen land with buried treasure their belief is not so strange as it may seem at first sight.

There are a great many others apart from the candid oilmen who know perfectly well that they are outshone in all sorts of ways by their fellow citizens. For this reason, they seek in the principle of chance a kindlier and less discriminating law. They cannot win in a contest of skill or strength or ability or beauty, so they turn to Fortune, to the lottery, the football pool or the horse race where they hope to find 'the miraculous blindness of a new kind of justice'.[6] Whether or not the belief of the oilmen is true that they owe their success to luck, in the sense of favourable operations of chance, it does not follow that chance as such is to be taken as playing an exclusive or even a significant part in human society.

This idea has been vigorously rejected so far as the growth of civilization is concerned, for example, in tool making, the discovery of

fire, the invention of cooking, pottery, the bow, the boomerang or the blow pipe.[7] Chance, as in the discovery of penicillin, favours the prepared mind, but only when conditions are propitious. The growth of a particular civilization is like a bet on a long consecutive series of outcomes. All cultures are cumulative. There are none which are absolutely stagnant or static; cultural differences are only a matter of degree. Societies with cumulative culture are those which have succeeded in their bet on long odds.

The *belief* in chance and luck, however, undeniably plays a part in everyday life. Thus, for example, patients who are aware that they have 'lumps' and do nothing about it may suddenly decide to seek treatment as a result of passing a door with a doctor's name on it.[8] A number of patients refer to such chance events as instigating their decision to take medical advice.[9] The possibility of falling back on 'luck' may also be a great comfort in other circumstances. In 1962, British universities rejected some 20,000 applicants for entry. Many of them reconciled this rejection with their pride by saying that the offer of a university place depends as much on luck as on merit. The rejects are described as 'submitting applications, like a gambler putting coins into a fruit-machine, sure that the jackpot must come up at last'.[10] Vilhelm Aubert[11] has suggested that even in the lofty domain of science the belief in bad luck serves as balm for the wounds of the experimenter who fails; he need not decide that he is incompetent. And the belief in good luck protects the Nobel prize winners from the green-eyed envy of their fellow workers who feel that they are equally deserving of the laurel wreath.

There are other situations where the attribution of an effect to chance or luck may have considerable economic repercussions. This is illustrated in the 'gamble with nature' in which the managers of flood plains engage. The provision they might make against flooding is hampered by the degree to which they project their 'psychological probabilities' on to the situation, as R. W. Kates[12] has pointed out in his investigation of the action taken by flood-plain land managers when facing uncertain but recurring natural disasters.

At a profounder level, as Friedrich Dürenmatt[13] the Swiss dramatist has said, all of us today abuse the idea of luck when it comes to the question of assuming responsibility for the predicament in which the world finds itself. No one wants war, no one, and least of all the responsible and high-minded statesmen who make the decisions, want the murderous thermonuclear weapons, no one wants to witness

semi-starvation over half the globe, yet in spite of lofty sentiments on all sides, the state of the world is vastly different from what we all wish it to be. We divest ourselves of responsibility and guilt by putting it all down to bad luck. We may be collectively at fault, but not individually, because nobody feels blameworthy. We are fit only for comedy.

III

The ancients were familiar with the idea of chance or fortune in Ovid's sense. Political elections of magistrates and other public officers in Greece amounted to an appeal to chance made by drawing lots (*klēros*); voters cast beans into a helmet. Only the military were elected by vote, that is to say, by deliberate choice (*hairesis*) on the part of the citizen.[14] Since the Greeks employed chance devices for decision-making, the interesting question has been raised (by Sambursky[15]) why they never made the decisive step into the realm of probability. The Stoics had even made some headway in the logic of disjunction and in the theory of the possible. However, their theoretical path was blocked because they managed to combine an extreme determinism and faith in universal causality with an equally firm belief in artificial divination as illustrating the principle of induction and as proving causality. They were convinced of the empirical basis for divination provided by repeated observation of signs and their consequences.[16] For the Pythagoreans, the fellowship between man and the gods, manifested in natural divination, was made possible by the existence of an all-pervasive 'world soul', an idea which remains in the Stoics in the form of a physical theory. Since, they believed, all events are predetermined and are only 'unfolded' in time, it is possible to foresee the future, granted that we have an understanding of causality. The Stoics persisted in their defence of inductive inference by divination in spite of attacks against this view by powerful thinkers. There was no question for them of chance events. Nothing could happen by chance. They could neither admit randomness in nature nor the existence of laws of probability. Artificial divination, in their eyes, was therefore not a device for generating or exemplifying events with outcomes unpredictable by man because they were merely 'probable'. It was a device, on the contrary, which exemplified strictly predetermined outcomes of which man was ignorant.

Nevertheless, since the modern theory of probability arose out of

the consideration of games of chance the Greeks had excellent opportunities from this point of view for they were much addicted to gaming. It is remarkable, Sambursky goes on to say, that games of chance prompted neither the speculative Greeks nor the more practical Romans to formulate principles of probability. The reason for this cannot be that gambling was confined to the 'lower' classes. Even in the fifth and fourth centuries BC all classes of Greek society gambled, and the wealthier Romans were exceedingly fond of dice and other games of chance. In Plato's *Lysis* Socrates describes a visit to the palaestra where the Festival of Hermes was being celebrated: 'On entering we found that the boys had finished their sacrifices, and, the ceremony being now pretty well over, were playing together at knuckle-bones, all in their holiday dress. The greater part were carrying on their game in the court outside but some of them were in a corner of the undressing room, playing at odd and even with a number of bones which they drew out of small baskets.' The dice of the Greeks were marked as ours are today, and they also used the astragalus, made from the ankle-bone of a sheep, as described in Aristotle's *Historia Animalium*. The astragalus was oblong and could rest on four surfaces only, two broad marked 3, 4, and two narrow marked 1, 6. These numbers bore no relationship to the frequency of their occurrence, otherwise the broad surfaces should have been given smaller numbers than the narrow surfaces. Nor was there any element of probability built into the rules of the game; in fact, the thirty-five possible combinations were named after gods or heroes of mythology.[17] Neither Greeks nor Romans ever considered the ratio of *favourable* to all *possible* outcomes, which is the crucial point. The player relied on manual adroitness, that is, on skill in throwing the die, or he trusted to chance or luck. Aristotle, however, seems to have come close to the idea of an independent event when he wrote (*De Caelo*) that 'to succeed in many things, or many times, is difficult; for instance, to repeat the same throw ten thousand times with the dice would be impossible, whereas to make it once or twice is comparatively easy', but he was unable to grasp the underlying principle which was within his reach.

This failure of the ancients has been plausibly attributed by Sambursky to the fact that they had little or no experimental science. It is no coincidence, he argues, that the seventeenth century witnessed, at the same time, the rise of modern experimental science and the establishment of the concept of probability, for it was a century in

which the barrier between 'celestial' and 'terrestrial' laws finally collapsed. Probability could be understood only when 'fate' became, so to speak, an empirical issue.[18]

We must not forget the earlier discoveries of that extraordinary man Cardano (1501–76) in his *Liber de Ludo Aleae* (Book on Games of Chance) published about three hundred years ago, in 1663. His erratic genius seems to have hit upon the notion of probability as a 'weighted possibility', and therefore to have anticipated Pascal and Fermat by a century. Even before Cardano, an unknown commentator on Dante had, already in 1477, come within sight of 'the idealization of the die and the concept of equiprobable throws',[19] but the step which Cardano (or his gifted pupil Ferrari) took was 'to introduce the idea of combinations to enumerate all the elements of the fundamental probability set, and to notice that if all the elements of this set are of equal weight, then the ratio of the number of favourable cases to the total number of cases gives a result in accordance with experience. . . . There is no doubt about it . . . here the abstraction from empiricism to theoretical concept is made and, as far as I know, for the first time . . . Cardano was the first mathematician to calculate a theoretical probability correctly'.[20] Among seventeenth-century mathematicians, those to whom our understanding of probability owes most are Fermat (1601–65), Pascal (1623–62), Huygens (1629–95), James Bernoulli (1654–1705) and especially De Moivre (1667–1754).

The pagan notion of Fortune had been repudiated by Christianity, which reinstated the idea of Providence in its place; a belief in divine concern with individual detail had, however, antedated Christianity by several centuries, for it is implicit in the books of the Biblical prophets. But the pagan Fortune was not so easily done away with by the theologians, as may be seen from the twelfth-century troubadour poem *Fortuna Imperatrix Mundi* which Carl Orff has put to such splendid music in his *Carmina Burana*. I quote one verse[21] only, translated freely:

O Fortune,
Ever inconstant
Like the moon,
Now waxing
Now waning,
Detestable life
Mockingly

Now thwarting
Now nourishing
The heart's desire
Dissolving like ice
Power and poverty.

Several centuries later, during the rule of the Inquisition, it was decidedly imprudent to pay tribute to the goddess of chance. When Montaigne, travelling in Italy, reached Rome, his books, including the *Essays*, were confiscated by the censor, the *Maestro del Sacra Palazzo*. Eventually the books were returned with a word of advice from the censor 'not to be too lavish of the word *Fortune* (chance) where *Providence* would be more in place'.[22]

The seventeenth century yielded at least one man, John Arbuthnot, who saw more sharply than Ovid the distinction between chance, on the one hand, and skill (which he called 'conduct') on the other; and he saw in luck (or fortune) nothing but a welcome offering of chance. 'Every man's Success in an affair', he wrote, 'is proportional to his Conduct and Fortune. Fortune (in the sense of most People) signifies an event which depends on Chance, agreeing with my Wish; and Misfortune suggests such an Event contrary to my Wish: an Event depending on Chance, signifies such a one, whose immediate causes I don't know, and consequently can neither foretel nor produce it.'[23] Arbuthnot is ready with practical applications of the laws of chance: 'It is 1 to 18 if you meet a *Parson* in the street that he proves to be a *Non-Juror*. . . . It is hardly 1 to 10 that a *Woman* of Twenty Years old has her Maidenhead, and almost the same Wager, that a *Town-Spark* of that Age has not been clap'd'.[24]

IV

During the eighteenth century French mathematicians attempted to draw a clear line between a bare possibility and a probability, a bare possibility being, so to speak, below the threshold of a probability worthy of being reckoned with. D'Alembert (1717–83) stated, in 1761, that if the probability of an event is very small it should be treated as zero.[27] But how small must it be for people to be willing to neglect it? As an illustration he supposes that Peter plays Paul a game of coin-tossing. At the start Peter gives Paul £1. The coin is to be tossed 100 times, and if head appears on the 100th trial and not before, Paul

pays Peter $£2^{100}$. D'Alembert declares that Peter should not play because he will *certainly* though not *necessarily* lose. The 'metaphysical' possibility of an event is consistent, according to D'Alembert, with its 'physical' impossibility, for while it is possible 'metaphysically' to throw two sixes with two dice in 100 consecutive throws, it is physically impossible to do so, because it has never happened and it never will. It is strange that a man with the acumen of D'Alembert should not merely fall a victim to the fallacy of 'negative recency' but project it into his theory of probability. If head has appeared three times in succession, he says, it is more likely that tail will appear on the fourth throw, and indeed the likelihood of the appearance of tail at any throw grows with the increasing length of a previous run of head.

Buffon (1707–88) assessed the value of a small probability as one in ten thousand. He argued that people cannot distinguish 1:10,000 from zero: this is the actuarial probability that a 56-year-old man will die in the course of a day, yet no man takes this chance seriously. Condorcet (1743–94) took this a step farther by proposing 1:144,768 as the negligible probability. Tables of mortality showed that the prospect of sudden death in the course of a week for a man aged 37 is 1:52,580. For a man aged 47 it is 1:52,480. Since nobody takes any note of the difference between these two fractions Condorcet assumes that a man would regard it as zero so far as his own life is concerned. He argued, however, that the small chance which we may safely neglect varies with the circumstances, and he drew practical conclusions from his deliberations. Thus, he said, capital punishment should be abolished because however high the probability that the verdict is correct in any particular case there is an equally high probability that in a large number of such verdicts, some innocent person will be pronounced guilty.

The late Émile Borel[28] added further refinements by distinguishing probabilities which are negligible on the human, cosmic and supercosmic planes respectively. Such probabilities are negligible in their respective spheres if the most prudent people treat them as zero and are ready to incur the 'risk' of an event bearing the probabilities in question. Thus if the chance of a road accident is one in a million, it may, he thinks, be reasonably disregarded; and a typist who only made one mistake in a million words could be regarded (at least so far as her craft is concerned) as a paragon of excellence. All these assessments of Buffon and his successors are arbitrarily imposed norms.

They are not derived from what people actually feel it is wise to ignore. Furthermore, such norms can be dangerous if misinterpreted, if for instance, a motorist said to himself: 'on this stretch of road the accident rate has only been one per million vehicle miles. Therefore I can afford to drive as recklessly as I please.' A typist who adopted such a line of reasoning might soon find that she has to seek another post.

We are indebted to Professor Shackle[29] for a more recent clarification of the relationship between the possible and the probable. There are situations where, if the number of possible outcomes is increased, this does not necessarily reduce the psychological probability of any one outcome. Suppose I am told that one of 10 candidates will be appointed to a post and that, so far as is known, all are equally likely to be appointed. I shall not then be surprised if one rather than another is appointed. Suppose now I am told that the number of candidates is *20* (instead of 10). My surprise when I hear that any one of them is appointed will be no more and no less than it would be if there were only 10 candidates. The probability that any given candidate will be successful diminishes as the number of candidates increases, provided all are equally good candidates, but any increase in the number of candidates has no effect on the degree of my surprise if any particular one is appointed. The number of possible outcomes *in such circumstances*, however large it is, is no measure of the potential surprise linked with the realization of any one possibility; otherwise expressed, the potential surprise associated with each possibility is unaffected by the number of possibilities. More generally, potential surprise is the measure, devised by Professor Shackle, which can be allotted to a given hypothesis regardless of the number of alternative hypotheses, a measure which is not bound by the additive rule of the traditional theory of probability. The traditional theory retains its value for situations where the alternative hypotheses may be described as 'harmonious members of a team' as distinct from situations in which the hypotheses are mutually exclusive rivals. The former is *distributional* and the latter *non-distributional.* To adopt an example given by Professor Shackle, the hypothesis that it will rain in Liverpool from September to April is compatible with the optimistic hypothesis that the weather will be fine from May to August. On the other hand, the hypothesis that it will be wet on Christmas Day excludes the hypothesis that it will be dry on that day. In a *distributional* situation every additional hypothesis deprives the others of some share of the

total probability. But in the case of *non-distributional* situations we may allow any number of additional hypotheses without reducing in the slighest degree the potential surprise, ranging from zero to the maximum, relating to each one. If we did otherwise in this second situation, we should be, as Professor Shackle remarks, withholding praise for a star actor for no other reason that there are a number of extras on the stage.

V

The distinction between distributional and non-distributional probability may hold of psychological probability as well as of mathematical probability. If so, this would make sense of the experimental fact that additivity is not invariably a feature of psychological probability. Even so, we may still ask ourselves whether this brings us any nearer to reconciling the idea of psychological with that of mathematical probability. If we are prepared to follow Professor de Finetti he will succeed in persuading us that there *is* no problem. He takes the view that our evaluations of probability are, so to speak, 'non-logical', and that the theory of probability is merely a rational aid to avoid making inconsistent evaluations; the theory is not a device for replacing intuitive beliefs about probability. There is no theory, he believes, either of logic or of probability, outside the domain of the psychologist. And just as logic is the study of the necessary relations which must hold between sentences, asserted as true or false, if they are to be mutually consistent, so the theory of probability is concerned with consistency among sentences which assert degrees of probability. So-called mathematical probability is simply psychological probability characterized by special features such as symmetry or frequency. Moreover, additive (and similar) properties do not belong to 'privileged' mathematical probabilities, but merely represent conditions for consistency among psychological probabilities. The difficulty that remains, as I see it, is this. The study of psychological probability itself has nothing to say about norms of reasoning while the theory of probability in mathematical statistics must establish not only a formal system of inductive inference but also principles for the design and interpretation of experiment throughout the entire domain of scientific enquiry. Nevertheless, in so far as 'no problem can be correctly stated in statistics without an evaluation of "initial probabilities" ',[30] as claimed by advocates of subjective probability, the tendencies disclosed by the study of psychological probability cannot be ignored when

'initial probabilities' have to be stated. 'The subjective point of view', say the exponents of subjective probability, 'sees all probabilities as the opinions of some person and initial probabilities as his initial opinions, that is, at the beginning of some context under discussion.'[31] This is much further than the psychologist, as such, dares to go. The subjectivist viewpoint has the advantage that it does not restrict the definition of probability to situations governed by impressions of symmetry or frequency, but this does not necessarily signify that 'psychological' is identical with 'subjective' probability. An illustration will bring out the distinction I wish to make. 'A person', write Professors de Finetti and Savage, 'may have opinions about certain events such as the outcome of a long calculation, or a half-forgotten name or telephone number that cannot be rigorously assigned subjective probabilities, because a thorough confrontation of these opinions with what the person regards as facts will eventually remove all doubts about them.' Now although this eventual confrontation is beyond the scope of psychological probability, it is no barrier to the rigorous assignment of psychological probabilities however vague the opinion or half-forgotten the telephone number. Indeed the psychologist is expressly concerned with measuring vagueness as rigorously as possible. Let me remind the reader at this point that by 'psychological probability' I mean a measure between 0 and 1 of a mental state of uncertainty as expressed in a sentence.[32] This is, I submit, a wider definition than that proposed by Ward Edwards, namely, subjective probability is 'a number between zero and one which describes a person's assessment of the likeliness of an event'.[33] The latter is a special case of the former. An example of a psychological probability as an assessment of the likelihood of an event is my statement: 'I think it might rain within the next hour.' But there are other categories of psychological probability which are not assessments of the likelihood of an event, but which may relate to assertions, suppositions, beliefs and inferences, for instance:

(i) I feel reasonably sure that this is a piece of Danish cheese.

(ii) I feel reasonably sure that your theory of the origin of the universe is true.

(iii) I feel reasonably sure that your belief that the end of the world is nigh is true.

(iv) I feel reasonably sure that you have never had any intention of buying my horse.

All four examples relate to mental states of uncertainty verbally expressed, but none of them is an assessment of the likelihood of an event.[34] We can, without altering their meaning, rewrite the four examples thus:

(i) I feel reasonably sure that the statement (that this is a piece of Danish cheese) is true.

(ii) I feel reasonably sure that the statement (describing your theory of the origin of the universe) is true.

(iii) I feel reasonably sure that the statement (embodying your belief that the end of the world is nigh) is true.

(iv) I feel reasonably sure that the statement (that you have never had any intention of buying my horse) is true.

If we represent 'I am reasonably sure' as, say, $\Psi o \cdot 8$ and the clause in parenthesis as P, the four examples all reduce to $\Psi o \cdot 8P$.

VI

In Chapter 3 I referred briefly to different interpretations of utility which have been proposed to explain behaviour in various gambling situations. We are now in a position to draw an analogy between gambling proper and other risk-taking behaviour, for example, when driving a vehicle on the road, in attempting suicide, and in sport. If such an analogy is justified, we may seek a common theoretical pattern or 'model' for all these apparently disparate types of conduct, for in spite of the differences between them, there might be a structural core shared by all. Of the principal 'models'[25] which have been considered, the one which seems to me to be most satisfactory, as a first approximation, is that which assumes that people, either explicitly or, more usually, implicitly, wish to achieve that goal which seems to them subjectively the most appealing and which, again subjectively, seems to them most likely to materialize. This is the model frequently known as SEU ('subjectively expected utility', see *Notes and References*). In driving a vehicle, in attempted or actual suicide, and in sport, the individual, before acting, has somehow to reckon with the range of possible outcomes, to each of which he crudely or otherwise assigns a subjective value or utility. He then presumably has to assign a psychological probability to each of these utilities. Of course, this is not necessarily done consciously or accurately or adequately, but the utilities and psychological probabilities may be taken somehow to

'merge' in the individual's mind. I am not asserting that this 'model' can claim experimental support of its applicability to the diverse types of behaviour I have mentioned. It is plausibility on the ground of qualitative rather than quantitative considerations which I wish to emphasize at this stage. We should, I submit, strive to set up a 'model', the applicability of which is not restricted to trivial or artificial conditions such as can be realized in the laboratory. To do justice to the facts of human experience our 'model' should combine, in a phrase used by Dr Leo Apostel, 'the extreme of subjectivity with the extreme of objectivity'. We can borrow some hints from his illuminating analysis of the use of 'models' in science.[26] Many of the purposes which, he suggests, are served by them, are relevant here. Thus, since we have no adequate theory of the behaviour of a motorist, we can look to another domain of behaviour which seems to resemble that of the motorist (or suicide or sportsman). In this way a theory for the different domains may be expressed through a common 'model'. And in particular, since we are dealing with problems which cannot be represented quantitatively if we are to do justice to their complexity, there is no alternative to a process of simplification whereby the essential elements are highlighted to form the nucleus of a manageable 'model'. My proposal then is to regard 'subjectively expected utility' as a provisional 'model' for integrating the themes of Chapters 3 to 7.

VII

Looking back on the book as a whole we are now able to see that enterprises of all sorts in everyday life, at work and at play, wherever skill finds some scope or chance plays its part, have this in common that they are undertaken with subjective uncertainty as to the outcome. And to each subjective uncertainty there is often, but not always, paired an objective uncertainty which may be of a different degree. If you put your foot off the curb with the intention of crossing a busy street you may have some uncertainty of ever reaching the other side, or of reaching it with limbs intact. Your psychological probability of crossing the street safely may turn out to be unrealistic. Similarly, if you propose to overtake another motorist in front of you; if, in a game of football, you kick the ball in the direction of the goal; if, in cricket, you try to spreadeagle a batsman's wickets; if, in a fit of depression, you contemplate doing away with yourself and swallow a handful of tablets; if you take your place in a queue in the hope of

mounting a bus when your turn comes; if you post a letter with the expectation that it will arrive; if you stand for election as a parliamentary candidate with the ambition of being elected; if you invest, if you gamble, if you undergo the rites of marriage or divorce, you may, in all these circumstances, entertain some doubt about the outcome of your efforts, and this degree of doubt may not mirror or presage correctly what will actually happen. In principle, every choice or decision that is made, every preference that is expressed, every conclusion arrived at or inference made, every generalization attempted, and every opinion uttered, is subject to some measure of uncertainty, and this uncertainty may be one of two kinds: it may reflect the world outside us or it may be generated within, from personal experience and reflection. My guess about tomorrow's weather illustrates the first kind, my doubts about survival after death illustrates the second. This twofoldness of our uncertainties mirrors the two-sidedness of mental life, which combines an inner representation of the *external* world with an outer representation of the *inner* world.

Psychologists have been mostly concerned with those uncertainties which arise is us when we try to interpret the external world. This is the meaning of uncertainty in information theory and in what goes by the name of the theory of 'calculated risk'. For this reason, psychological probability is often too narrowly interpreted to mean merely an estimate of objective probability, although there are private uncertainties which are unrelated to any interpretation of the external world. In the study of psychological probability our task is to ascertain the levels of subjective uncertainty at which people are prepared to take action, in the diverse circumstances of life and, where possible, to relate these levels to corresponding levels of objective uncertainty.

NOTES AND REFERENCES

1. In Théophile Gautier's *Madamoiselle de Maupin.*
2. *The Guardian*, January 30, 1963.
3. *Ars Amatoria*, Book II. For the manner in which uncertainties associated with chance and those associated with skill are subjectively combined, see *Chance, Skill and Luck*, Chapter 4, and for preferences for particular chance-skill combinations in gambling situations, see Chapter 5. More recently, J. Mehl ('Über Erfolge und Misserfolge im Leistungs- und Zufallsbereich', *Zeit. für Psychol.*, 1962, 167, pp. 177–267) has investigated the manner in which people of different ages react to success and failure due to chance or skill respectively.

Children who are just starting to attend school treat failure and success, which are really due to chance, as the result of their own skill or lack of it. They behave in this way both in everyday life and in experimental situations. Older children treat chance and skill differently. If they succeed in a situation the outcome of which depends on chance they tend to incur bigger 'risks' subsequently in a situation which requires skill; but if they fail in the former situation they later become more realistic in a situation requiring skill. They respond in this way in spite of the fact that they understand what is involved in the two different situations. Furthermore, target setting in chance situations is affected by previous outcomes; a run of failures generates hope of success (Monte Carlo effect) and *vice versa*. In skill situations this does not occur, if subjects succeed in a situation demanding skill they put down their success to skill, but if they fail they attribute their failure to chance, not to lack of skill. This differentiation is less marked among students than among non-students of the same age.

4. *Njal's Saga* (translated by Magnus Magnusson and Hermann Pálsson), Harmondsworth: Penguin Books, 1960. The notion of luck as a quality inherent in an individual also frequently occurs in Njal's saga. 'Ultra-sensitive' men, like Njal or Hrut, could detect it in others, like an aura. Skarp-Hethin is 'ill-starred' but Kari is 'lucky'. Some men brought ill-luck to everything they touched. Divinatory dreams, visions and portents were treated with the utmost seriousness (*op. cit.*, Introduction, pp. 16–17).

5. John Bainbridge, *The Super-Americans*, London: Gollancz, 1962.

6. Caillois, *op. cit.*, p. 114.

7. Claude Lévi-Strauss, *Race and History*, UNESCO, 1958, pp. 31–8.

8. H. C. Shands, J. E. Finesinger, S. Cobb and R. D. Abrams, *Cancer* (N.Y.), 1951, 4, p. 1159.

9. J. Aitken Swan and R. Paterson, 'The Cancer Patient: Delay in Seeking Advice', *Brit. Med. J.*, 1955 (i), p. 623.

10. Ruth Adam, 18-plus: 'The Misses', *The Observer* (Weekend Review), October 14, 1962.

11. V. Aubert, 'Chance in Social Affairs', *Inquiry*, 1959, 2, p. 15.

12. R. W. Kates, *Hazard and Choice Perception in Flood Plain Management*, Department of Geography, University of Chicago, 1962, Research Paper No. 62. In a private communication he remarks that flood-plain managers are governed by 'focus values' (G. L. S. Shackle) or 'sensitivity points' (G. White) in looking at their environment; that is, they concentrate on floods of a particular magnitude and periodicity.

13. In an interview reported in *The Guardian*, January 10, 1963.

14. E. Barker, 'Elections in the Ancient World', *Diogenes*, 1954, 8, pp. 1–12. See also I Sam. xiv. 14, for the use of the Biblical *Urim* as lots: 'Give a *perfect lot*'. The miniature state of San Marino provides a contemporary example of the use of chance for election purposes. 'An innocent child of San Marino draws from an urn one of three scraps of paper furnished with two names—and the republic has been provided with two new governors.' V. Aubert, *loc. cit.*

15. S. Sambursky, *The Physical World of the Greeks*, London: Routledge and Kegan Paul, pp. 179–81.

16. S. Sambursky, *Physics of the Stoics*, London: Routledge and Kegan Paul, 1959, pp. 67–71.

17. S. Sambursky, 'On the Possible and Probable in Ancient Greece', *Osiris*, 1956, 12, pp. 35–48.

18. How slow and hesitant was this theoretical grasp of the 'uncertain', even in the seventeenth century, may be illustrated by a reported change of mind on the part of the great Galileo himself when faced with the following problem. A horse is really worth a hundred crowns, one person estimated it at ten crowns and another at a thousand; which of the two made the more extravagant estimate? When this question was first posed to him, Galileo replied that the higher estimate was more extravagant because the excess of a thousand over a hundred is greater than that of a hundred over ten. Only after further reflection did he pronounce both estimates to be equally extravagant because the ratio of a thousand to a hundred is the same as the ratio of a hundred to ten. The problem, however, has little to do with the idea of probability. I. Todhunter, *A History of the Mathematical Theory of Probability*, London: Macmillan, 1865, pp. 5–6.

19. F. N. David, *Games, Gods and Gambling*, London: Griffin, 1962, p.35.

20. David, *op. cit.*, pp. 58–60.

21.
O Fortuna,
velut luna
statu variabilis,
semper crescis
aut decrescis;
vita detestabilis
nunc obdurat
et tunc curat
ludo mentis aciem
egestatem
potestatem
dissolvit ut glaciem.

22. *The Diary of Montaigne's Journey to Italy* (translated by E. J. Trechmann), London: Hogarth Press, 1929, pp. ix–x.

23. John Arbuthnot, *Of the Laws of Chance, Or, a Method of Calculation of the Hazards of Game*, London: 1692; see also R. L. Colie, 'Some Paradoxes in the Language of Things', pp. 93–142 in *Reason and the Imagination*, edited by J. A. Mazzeo, London: Routledge and Kegan Paul, 1962.

24. Arbuthnot, *op. cit.*

25. These models have been most clearly discussed in a valuable series of papers by Ward Edwards ('Probability-Preferences in Gambling', *Amer. J. Psychol.*, 1953, 66, pp. 349–64; 'Variance Preferences in Gambling', *Amer. J. Psychol.*, 1954, 67, pp. 441–52; 'The Theory of Decision-Making', *Psychol. Bull.*, 1954, 51, pp. 380–417; 'The Reliability of Probability-Preferences', *Amer. J. Psychol.*, 1954, 67, pp. 68–95; and 'The Prediction of Decisions among Bets', *J. Exper. Psychol.*, 1955, 50, pp. 201–14).

The four 'traditional' models may be represented, following Edwards, as follows:

$$EV = \sum_i P_i \mathcal{L}_i \quad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

$$EU = \sum_i P_i U_i \quad \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

$$SEM = \sum_i \psi_i \pounds_i \quad \ldots\ldots\ldots\ldots\ldots\ldots (3)$$

$$SEU = \sum_i \psi_i U_i \quad \ldots\ldots\ldots\ldots\ldots\ldots (4)$$

where EV means 'expected value'; EU means 'expected utility'; SEM means 'subjectively expected money'; and SEU means 'subjectively expected utility'. The other symbols refer to objective or subjective values. $\pounds$ and P refer to actual money values and 'objective' probabilities, whilst U and ψ refer to subjective values of money and psychological probabilities. In critically assessing the evidence for these four models and showing their shortcomings Dean G. Pruitt ('Pattern and Level of Risk in Gambling Decisions', *Psychol. Rev.*, 1962, 69, pp. 187–201) has recently proposed a modification which he calls the 'pattern and level of risk model' or PLR, which applies only to bets which have at least one negative outcome.

26. Leo Apostel, 'Towards the Formal Study of Models in the Non-Formal Sciences', *Synthese*, 1960, 12, pp. 125–61; see also G. P. Meredith, 'Models, Meanings and Men', Chapter 3 in *Readings in Psychology* (edited by John Cohen, London: Allen and Unwin, 1964).

27. Todhunter, *op. cit.*, p. 262.

28. É. Borel, *Probabilities and Life* (translated by Maurice Baudin), New York: Dover Publications, 1962 (from 4th ed. of *Les Probabilités et la Vie*, Paris: Presses Universitaires de France, 1943).

29. G. L. S. Shackle, *op. cit.*

30. B. de Finetti and L. J. Savage, 'Sul modo di scegliere le probabilità iniziali', pp. 81–154 in *Sui Fondamenti Della Statistica* (English resume by L. J. Savage), Istituto di Statistica (University of Rome), 1962. In his final sentences, Dr Savage makes a remark, veiled in mystery, which, to say the least, provokes great curiosity in the reader. He writes that Bayesian statistics offer no formal recommendation for the use of random samples, but that there are yet important reasons for doing so, reasons which are ill formulated and which have to do with 'self-discipline and interpersonal relations'. This seems like subjectivism with a vengeance!

31. de Finetti and Savage, *loc. cit.*

32. J. Cohen, C. E. M. Hansel and E. J. Dearnaley, 'Measures of Subjective Probability: Estimates of Success in Performance in Relation to Size of Task', *Brit. J. Psychol.*, 1957, 48, pp. 272–5.

33. W. Edwards, 'Subjective Probabilities inferred from Decisions', *Psychol. Rev.*, 1962, 69, pp. 109–35.

34. For a discussion of this problem from the point of view of a logician see J. P. Day, *Inductive Probability*, London: Routledge and Kegan Paul, 1961, pp. 27–8.

CHAPTER 10

THE UNCERTAIN FUTURE: A SURVEY OF DIVINATION

I

Divination follows naturally from a belief in gods and spirits, for once man acknowledges the existence of superhuman beings whose will governs his fate he feels irresistibly driven to decipher their intentions. Eager to free himself from the uncertainties and hazards of daily life, archaic man sought to become captain of his fate by gaining knowledge of future or obscure events. He felt himself lucky if the secret designs of the gods, as unveiled by the diviner, proved favourable, and unlucky if they were unfavourable. Divination and luck are thus next of kin. To write a complete history of divination in all times and places and in its countless forms and manifestations would be a gigantic task. Here I shall content myself with indicating the extensive range of beliefs and practices and their significance.

The ancients, among them Plato, Aristotle, Cicero and Plutarch, distinguished divination by natural events from divination by events deliberately contrived to penetrate the unknown. Divination by natural events included a variety of categories, viz. (i) by the oracle of sybil or prophet (*theomancy*) or by the inspired dream (*oneiromancy*); (ii) by meteors (*meteoromancy*), winds (*austromancy*), shapes in the air (*aeromancy* or *chaomancy*), and similar celestial and terrestrial 'freaks'—comets, thunderbolts, lightning, eclipses, earthquakes and, of course, the stars; (iii) by reading the entrails of a human sacrifice (*anthropomancy*) or, more generally, the entrails or movements of beasts (*theriomancy*), birds (*ornithomancy*) or fishes (*ichthyomancy*); (iv) by the hand (*chiromancy*), and (v) by enquiry of the dead (*necromancy*). Of these, oracles, dreams, divination by beasts and birds, and seeking the dead are the most celebrated and therefore call for some comment.

First comes *theomancy*. In ancient Greece people flocked to the oracles[1] to resolve their doubts and seek guidance in private or public affairs, for nothing of moment was undertaken, no war waged or treaty concluded, no form of government instituted or law enacted, without oracular approval. From the gifts of the suppliants the oracular centres amassed great wealth. When Delphi, the most celebrated of the oracles, was plundered by the Phocians they were enabled to sustain an army of 20,000 mercenaries on double pay for nine years. The priestess (*pythoness*[2] or *pythia* as she was called), through whom the gods conveyed their messages, was in the earliest times expected to be a virgin, but after one of them had been violated, only women who had passed child-bearing age were allowed to officiate. When inspired they began to foam at the mouth and tear their hair. If the spirit was in gentle humour, all went well; if not, the priestess might become malignant, and thrown into extreme fury. Plutarch describes one so terrifying that the priests themselves fled from her presence. Phoemonoe, the first pythia, uttered her oracles in heroic verse.

Before her performance, the priestess bathed in a fountain at the foot of Mount Parnassus, a favoured spot for poets. Then she ascended a tripod, the precise nature of which is somewhat obscure, placed at the mouth of the cave. Some say it was no more than a dust-filled pot through which the divine afflatus passed into her belly and thence to her mouth. Others say it was filled with pebbles, the movements of which guided her utterances. Others, again, hold that it was a large vessel on three legs into which the priestess plunged when the inspiration was about to come. But this inspiration could not be evoked by anyone's whim. Even Alexander the Great was peremptorily refused enlightenment by a pythia until she was forcibly made to ascend the tripod, where she announced to him: *Thou art invincible.*

The entrance to the cave of Trophonius, another famous centre, was so narrow that the suppliant had to lie on his back with his feet facing the cave. A powerful and invisible force then drew him forcibly into the cave from which, after a time, he was expelled in the same way.

We have it on the authority of Herodotus that an empirical test of the genuineness of oracles was made by Croesus who simultaneously asked several distant oracles to reveal what he himself was doing at the time. Only the oracle at Delphi guessed successfully, replying that Croesus was boiling a lamb with a tortoise, in a brazen vessel, with a

cover made of the same metal. The reply has been translated by Sir Thomas Browne:

> I know the space of sea, the number of the sand,
> I hear the silent, the mute I understand,
> A tender lamb joined with tortoise flesh,
> Thy master, King of Lydia, now doth dress,
> The scent thereof doth my nostrils hover,
> From brazen pot closed with brazen cover.

Apart from the pythonesses possessed of prophetic 'daemons', which were rather like the controls of present-day mediums, there were others merely raised to a high pitch of enthusiasm without embodying a daemonic spirit, and some who fell into a trance or ecstasy and who related their experiences on regaining consciousness. Such a trance might be of brief duration or it might last as long as seventy-five years, as happened to Epimenides of Crete. Heromodorus the Clazomenian was undoubtedly the most illustrious exponent of the divinatory trance. Accustomed to abandoning his body for days at a stretch, he roamed in the meantime through remote territories. When he returned, his wife listened attentively to his tales of marvellous adventure, but eventually she came to resent her enforced solitude and decided to put a stop to her husband's exploits by burning his body in his absence. Two thousand years later the mathematician Cardano (*De Varietate Rerum*, Basel, 1556) claimed that he too had the power of passing ecstatically out of his senses at will; he felt a kind of detachment in the region of the heart, as if his soul were leaving him, and he was 'out of himself'.

An early form of divination was the consultation of heads, images,[3] or household deities, such as the *teraphim* of the Bible, which were inscribed with incantations and which were 'enquired of' by Nebuchadnezzar (*Ezek.* xxi. 21); the *papsukkal* of Babylon may also have been prophetic idols worn on the body.[4] Images and statues of this sort were familiar in ancient Egypt and their movements were felt to be intimations of divine assent. For this reason they were essential for ratifying marriages and legal contracts. The soul of the statue (the *Ka* or 'double'), which might represent a god or a deceased person, could pronounce an oracle at the instigation of the officiating priest. The statue of Ammon chose a new king by stretching out its arm and picking one of the male members of the royal family who passed in

procession in front of it. The interrogatory procedure in Egyptian divination followed strict rules and was based on a binary system. A series of clear and precise questions was prepared to be presented to the statue in a prescribed order. The statue answered 'Yes' (by *hanu*= a nod) or 'No' by remaining unmoved. Each reply brought the ultimate solution a step nearer. The Egyptians seem to have anticipated the technique of modern information theory in which information is sought in 'bits'.[5] Mechanically operated images (*neuropastes*) pronouncing oracles may also have been used at Rome.

Oracles may be grouped into several distinct categories: (i) ambiguous, giving replies in a form that the inquirer could easily use to his own purpose; (ii) enigmatical, but conveying old tradition in a popular form; (iii) predetermined by the suppliant who influences the source; and (iv) what might be called 'hindsight' or 'post-dictions', that is, wisdom after the event. Ambiguous oracles could be specially convenient when they encouraged the suppliant to do what he wanted. When Pyrrhus was about to wage war against Rome he was told by the oracle 'I say, Pyrrhus, that you the Romans will conquer'. Ambiguous oracles could also lead to disaster, for when Philip of Macedon enquired whether his expedition to Russia would succeed, he received the reply: 'The ready victim crowned for death, Before the altar stands', and he mistakenly took 'victim' to refer to the King of Persia. The ambiguity of oracular utterances may be said to correspond to the contradictory demands of the seeker who wants to be told 'Yes' and 'No', to be allowed to gratify his needs and to be forbidden to do so. He interprets an equivocal prediction as a licence but he cannot rid himself of the feeling that he should have treated it as a prohibition.[6]

In *oneiromancy*, divination by dreams, it is not the dreamer but the interpreter who divines, and his task might sometimes be fraught with danger. For what could an interpreter safely say to the mother of Paris when she dreamt that she was delivered of a firebrand which consumed the city of Troy? Or to Astyages, King of the Meads, who dreamt that his daughter gave birth to a deluge which flooded the whole of Asia, and then to a vine that cast a shadow over it? Some divinatory dreams may be said to have an 'artificial' element, if the dreamer purposely induces them. It was, in fact, a practice in Mesopotamia as well as in Greece and Rome to make elaborate preparations for the enjoyment of a dream with a specified content; a sleeper might spend the night in a temple hoping that the will of the gods would be revealed in a dream. Premonitory dreams are an accepted fact of life even today among

'simpler' peoples everywhere, in Australia and the Far East, in Africa and in the Americas, as well as among the less simple people of Europe. Sometimes what is actually seen in the dream is expected to come true, but more usually it is the proper interpretation that will be fulfilled. The range of interpretations parallels the range of content, and the idea that the contrary will happen seems as common as the belief in a straightforward rendering.

One of the best specimens of an ancient post-Biblical prophetic dream and its interpretation is this one from Ovid (43 BC–AD 18).

It was night, and sleep had weighed down my weary eyelids, when this vision came to terrify my soul:

On the hillside looking towards the south was a grove thickly planted with oaks, and multitudes of birds found shelter in their branches. Beneath was a wide expanse clad in freshest green, watered by a stream which flowed on with a sweet murmur.

Beneath the shade of a leafy oak I was endeavouring to avoid the heat, but it was hot even in the shade of the tree. And lo, gazing on the jewelled meadow, a white heifer came in sight, a heifer whiter than fresh-fallen snow before it has melted into clear water; whiter than the foam on the milk of the ewe that has just been milked.

Near her was a bull, her happy mate. He lay down beside her on the thick green carpet; and as he lay thus at his ease, he slowly chewed the cud of tender grass. Soon, sleep robbing him of his strength, he lay his horned head upon the ground for very weariness.

Hither came a crow swiftly cleaving the air and, croaking hoarsely, lighted upon the green meadow. Thrice she plunged her ravening beak into the breast of the snow-white heifer, and then at length she flew away. A black stain was on the breast of the heifer. And when she saw afar off bulls browsing on the pastures (for afar off other bulls were browsing on the pastures) she rushed away and mingled with them and sought a spot where the soil was more fertile.

'Come,' I cried, 'Come, interpreter of dreams, and tell me what, if indeed it hath a meaning, this dream of mine betokens.' Then did the interpreter of the dreams of night ponder upon my dream, and thus at last he made reply.

'The heat which you wished to escape in the leafy shade and which you could not avoid, was the heat of love. The heifer is thy mistress, for of such whiteness is she. You yourself are the bull which was following his mate. The crow whose sharp beak tore at the

heifer's breast was that old procuress who will corrupt your loved one. The long hesitation of the heifer and her final abandonment of the bull means that you wilt be left cold on your solitary couch. The wound of the dark stains beneath her breast show that she is not free from adultery.'

Thus spake the reader of dreams, my cheeks were white and cold and the dear night spread out before mine eyes.[7]

Archaeological records bear witness to the vital role of *theriomancy* in the earliest civilizations. In Sumeria, for example, about 3000 BC, one of the most trusted devices was *hepatoscopy*,[8] inspection of the liver of a sacrificial animal; the liver was believed to be the seat of life. If the victim was accepted by the gods, it became part of them, and hence, by interpreting the liver, the diviner could read their intentions. Elsewhere, the diviner studied the heart, gall, spleen, lungs and the membranes covering the bowels, taking note of the animal's movements, the manner in which it was eaten by the flames, the speed with which the incense caught fire, the direction of the smoke, the movement, noise and colour of the wine, and curious features of the libations of water, cakes, flour and other elements in the ritual. He supplemented natural with artificial forms of divination (see below) employing *pyromancy* (by fire), *capnomancy* (by smoke), *oenomancy* (by wine), etc. The outlook was bleak if a beast approached the altar with obvious reluctance, escaped on route, tried to avoid the fatal blow, refused to fall down quietly, kicked, jumped or bellowed, did not bleed freely, expired slowly, showed signs of suffering, died in convulsions, or otherwise acted in abnormal fashion or, above all, if it perished before receiving the knife.

Diviners could improve their powers of interpretation by consuming the entrails of prophetic birds and beasts, especially the hearts of crows, vultures and moles, a custom which the ancient Greeks shared with some North American tribes. Among the Crow Indians there was a society of Liver Eaters, and a Dog-Liver Eaters' Dance Association flourished in East Dakota. During the dance, a dog, with its legs bound, was cast among a group of dancers, and despatched by a medicine-man. The side of the animal was slit, the liver removed, cut into strips, and hung on a pole about five feet in length. Then the dancers began to perform, smacking their lips and making grimaces in preparation for devouring the strip of liver. Only consumers of the same sex as the dog could participate. Linked with *theriomancy* was

inspection of the shoulder-blade (*omoplatoscopy*) the colour, spots and lines all being noted; the breast-bone of the fowl was used for the same purpose. This art flourished until recently in Western Macedonia and Albania, and in England it survives in the snapping of the 'wishing-bone'.

Divination by birds, *ornithomancy*, had a wide vogue. Because of their constant and perpetual flight over wide territories, peeping into crevices and houses, upstairs and downstairs, at all hours of the day and night, birds were believed to pry into the most secret activities of men, and to know all that transpired. Because birds live in the air they were thought to be more sensitive to celestial influences, and to become aware, before men, of impending changes. Rarely was a high official appointed in Greece without feathered approval. Other divinatory methods might even require endorsement by birds before being regarded as authentic. At Lacedaemon, the kings themselves were zealous students of the art. Some people feigned to understand the language of birds and, as Democritus claimed, to be able to teach it to others. Apollonius of Tyana, born *c.* 4 BC, sitting with his friends, once overheard a conversation between a flock of birds and a sparrow which had invited them to feast at a place where a mule had dropped its load of grain. The friends of Apollonius immediately went to the spot and confirmed the sparrow's claim. Legend credits King Solomon with a knowledge of the language of birds which he used to good purpose. On one occasion he heard a swallow brag to its female friend that with a single kick it could destroy the Temple. Naturally the king was moved to register a mild protest and the bird replied: 'Should I not boast before my wife?'

Ornithomancy assumed a special significance for the shaman during his trance. The bird cries he emitted were a language for communicating with creatures who possessed the secrets of life and immortality. Something of this shamanic gift was possessed by medieval saints who could converse with beasts of the field and birds of the air. Let the exploits of St Cudberct (AD 676), as recorded by the Venerable Bede, serve as an illustration. Observing two crows tearing with their beaks at the roof of a house designed for monks, he reproved them with a gentle gesture of the hand. 'Depart forthwith', he said, 'and presume not henceforth to abide in a place where you have wrought an injury.' Mournfully they took their leave but after three days one of them returned, spreading its wings and bowing its head, and uttering a humble note. By these tokens, writes Bede, 'it seemed to solicit

forgiveness to the best of its ability', whereupon Cudberct permitted it to come again. Having obtained its wish, the bird departed to fetch its companion and shortly they appeared together with a suitable gift, namely, 'half of a flitch of fat bacon', which St Cudberct presented to the monks for greasing their shoes.

Crows, owls, eagles and vultures were credited by the Romans and other peoples with possessing supernatural powers. Swallows, heralds of the spring, were treated as sacred to the *penates* or household gods, and it was unlucky to molest them; according to Athenaeus, the people of Rhodes had a song for welcoming the swallow. To this day in many countries the flight of a bird into a house is felt to be a sign of ill luck. Different peoples cherish different birds. In ancient Egypt the hawk was sacred and it was a capital crime to kill one; in Cornwall choughs are favoured, because the soul of King Arthur is said to have entered one. The robin has a special place in Christian tradition, and the stork is sacred in Sweden. Even the bat has had its admirers who regarded it as a guardian angel at night.

Some birds, such as the dove, were believed to be intrinsically lucky. The dove and raven were possibly sent from the Ark by Noah as divinatory envoys. The Greeks held the raven sacred to Apollo; in the vicinity of an army it was considered a dangerous omen if a raven croaked on the left, but a good omen if the croak took place on the right. The raven, perhaps because of its human voice, has widely been looked at as a prophetic bird;[9] it was the fluttering of ravens that forewarned Cicero of his death, for on the day of his murder, according to legend, a raven entered his chamber and dragged the covering from his bed.

A particular type of *ornithomancy* was entrusted by the Romans to a special official, the *pullarius*, whose task it was to feed premonitory chickens. If the chickens came out of their cage too slowly or refused to eat, this was a bad omen; but if they ate greedily, the omen was good. The esteem in which the *pullarius* was held is demonstrated by an incident during the first Punic War. When P. Claudius Pulcher was told by the *pullarius* that the chickens refused to eat, he took this as ominous and ordered them to be cast into the sea, accompanying this command with the words 'Then let them drink'. In the subsequent naval engagement with the enemy, Claudius lost his fleet, in 249 BC. In spite of the fact that some Roman writers held up the method to scorn, it was held in high esteem by the army, possibly because a hen's appetite could be regulated. If it was starved for a

time a general could easily produce evidence that his military adventures would meet with success.[10]

The earliest known instance of *necromancy* is described in the story of Gilgamesh, King of Ur, who sought the secret of eternal life. Unsuccessful among the living, he turned to the dead and attempted to communicate with Enkidu, his departed friend, but the gods Bel and Sin refused to raise Enkidu's spirit. Then he prayed to Ea, who commanded Nergal, the god of war, to open a shaft in the ground through which the spirit of Enkidu passed into this world 'like a breath of wind'. Nergal may have been a medium who induced Gilgamesh to see a figure in the smoke of the incense, a method employed perhaps by the witch of En-dor when she revealed the dead Samuel to Saul.

And when Saul enquired of the Lord, the Lord answered him not, neither by dreams, nor by Urim, nor by prophets. Then said Saul unto his servants, Seek me a woman that hath a familiar spirit, that I may go to her and enquire of her. And his servants said to him, Behold *there is* a woman that hath a familiar spirit at En-dor. And Saul disguised himself, and put on other raiment, and he went, and two men with him, and they came to the woman by night: and he said, I pray thee, divine unto me by the familiar spirit, and bring me *him* up, whom I shall name unto thee. And the woman said unto him, Behold, thou knowest what Saul hath done, how he hath cut off that have familiar spirits, and the wizards, out of the land: wherefore then layest thou a snare for my life, to cause me to die? And Saul sware to her by the Lord, saying, As the Lord liveth, there shall be no punishment happen to thee for this thing. Then said the woman, Whom shall I bring up unto thee? And he said, Bring me up Samuel. And when the woman saw Samuel, she cried with a loud voice: And the woman spake to Saul, saying, Why hast thou deceived me? for thou art Saul. I *Sam.* xxviii, 6–13.

Famous necromancers of history, like Apollonius of Tyana, Jamblichus (*c.* AD 260–330) and Porphyry (*b.* AD 233) doubtless made use of such techniques which are vividly described in the book *Asmodeus* by Alain Réné Le Sage, a seventeenth-century French writer, better known as the author of *Gil Blas.*

In *necromancy*, the various procedures include the opening of a vein or bone of a corpse. Lucan (AD 39–65) describes such a practice:

> While she seeks answers from the lifeless load,
> The congealed gore grows warm with reeking blood,
> And cheers each ghastly wound.[11]

When the ghosts of the dead are actually supposed to appear and reveal the secrets of past and future, the procedure is called *psychomancy*.

The Biblical *'oboth* and *yidd'onim* may have been necromantic spirits or phantoms believed to be under celestial influence who could exercise sway over men. The Romans employed a necromantic incantation in which apparitions of the male sexual organ (or *fascinum*, i.e. 'charm', as it was called) were passed before the eyes of the seeker.[12,13]

One other natural divinatory method should perhaps be added to those already described, namely, sneezing. The idea that sneezing is an evil omen which requires to be counteracted is found in most parts of the world. It was necessary to bless the sneezer otherwise his convulsion might inadvertently expel his soul. The celebrated sneeze of Telemachos in the *Odyssey* (xvii, 541 ff.) is a sign that the gods endorse Penelope's words. A sneeze for Xenophon is ominous and public prayers must be said to annul its effect. Aristotle declares that to sneeze between midnight and noon is lucky, between noon and midnight unlucky; on the left unlucky, on the right lucky. One or three sneezes denotes unluck, two or four, luck, and more than four is neutral. If two people sneeze simultaneously the omens are favourable. The *Sadder*, a sacred book of the Parsees, requires all people to pray when someone sneezes, for sneezing is a proof that the 'evil spirit is abroad'. The benediction 'God bless you', after sneezing, is said to have been enjoined by St Gregory during a plague when the 'sneeze of death' was a common event, although Aristotle refers to the same practice among the Greeks; and Thucydides observes that sneezing was a sign of crisis during the great Athenian plague. The Romans had the custom of uttering 'Absit omen!', and a similar form of words is used among tribes of South America. In modern Greece and elsewhere a sneeze is taken as a sign of the truth of a remark made by the last speaker. In Germany the words 'zum Wohl' or 'Gesundheit' (= good health) are still said to the sneezer, just as among the Nandi they say 'ko'-weit-in asis' (= God be with you).

It must not be assumed that any particular event of nature was universally given the same interpretation. In fact one and the same event

might be treated as a crime in one place and as an omen in another. Needham[14] has given us a remarkable illustration of this contrast in cultural styles. During the Middle Ages it was possible to bring a criminal prosecution against an animal in a court of law, and sometimes magistrates concluded preventive treaties with harmful animals.[15] The number of prosecutions reached a peak in the sixteenth century when the witch hunt was at its height; individual domestic animals were tried and could be sentenced to death for attacking human beings, and entire species of insects and birds were anathematized. Apart from these two categories there was the freak of nature (*lusus naturae*). At Basel in 1474 a cock was sentenced to be burnt alive for the 'heinous and unnatural crime' of laying an egg. Another cock was sentenced in Switzerland for a similar crime in 1730. One reason for this rather severe treatment, Dr Needham suggests, was the belief that a cock's egg was used as an ingredient in witches' unguents, and another might have been the belief that the formidable basilisk was hatched from it. But there also seems to have been an assumption that men in Europe knew the divine laws which cocks should obey. This is where the cultural difference arises. The Chinese made no claim to know the laws which the gods had laid down for non-human beings. So they treated the laying of an egg by a cock as an omen, a reprimand from the celestial powers, and while the cock itself would have been left unharmed, the governor in whose territory the unpropitious event occurred would have been made to pay the penalty for what was presumed to be *his* misdemeanour.

It would not be necessary to say anything at all about divination by the stars, on which so much has been and continues to be written, were it not for the fact that astrology still holds a place of honour in East and West alike. The astrologer's column is known to every reader of newspapers and magazines in Western countries. In Britain such columns are estimated to have at least 20 million such readers a day;[16] and apart from the regular space given to the 'stars' by the popular press, there are not less than five periodicals exclusively devoted to the subject. In the US there are reported to be 30,000 professional establishments for astrology, with 20 special magazines providing for half a million readers; 2,000 American periodicals publish horoscopes. All told, 200 million dollars are spent annually on appeals to the stars. France also has its specialized periodicals, one of which prides itself on a circulation of 100,000; *Elle* claims to be more successful than any other in attracting readers to its horo-

scopes.[17] In India astrology, until recently at least, appeared to play a part in the political life of the country. In 1957 the President of India was said to consult an astrologer on every important occasion,[18] and his respect for the stars was apparently shared by a vast number of his countrymen.

Astrology has left a lasting mark on the English and Romance languages and to this day we use an astrological term whenever we 'con-sider' what we are going to do, ' "con-sideration" being nothing but the act of contrasting the influence of the various stars (*sidera*) on the "contemplated" decision, *con-templation* itself meaning originally the construction of a diagram quartering the sky—called *templum* by the old Etruscan augurs—and designed to facilitate the systematic interpretation of the portents observed by the skywatcher'.[19] All this goes to show how powerful is the tendency, even in countries where science and technology flourish, for people to believe that their destinies are shaped by the stars in the skies. It also goes to show the extent to which the press, with its deep concern for the satisfaction of human needs, provides opportunities for the stars to perform their social functions.

II

The number of devices deliberately devised for artificial divination is by no means exhausted by the alphabetical list at the end of this chapter. Nor does the list tell us anything about the logical structure of the methods, or their formal properties and affinities. Since most of the methods have not been restricted to any particular time or place, there is little point in giving a historical or geographical classification. In describing natural divination I have given prominence to ancient Greek practice. A more balanced picture will be given by referring to customs in the Roman Empire and in cultures outside its influence.

The Romans chiefly drew their knowledge of divination from Etruria where, by decree of Senate, the sons of prominent citizens of Rome were sent for training in Etruscan techniques. The people of Etruria viewed all human activities as touched by something sacred; 'the most frequent and explicable phenomena, both in inanimate and in animate nature remained, in their eyes, indissolubly linked with the presence and constant action of the mysterious forces of Heaven and Hell';[20] they were forever detecting 'the serene or violent imprint of divine intervention' in the affairs of everyday life. Their religious

spirit revealed itself in a special type of *discipline* to which they subscribed, a discipline that was embodied in a system of rules governing the relationship between men and gods. Hence their eager and persistent questioning of the will of the gods by all the means at their disposal, in particular by examination of the entrails of animals and by their study of lightning. Professor Pallottino,* a distinguished Etruscan scholar, tells us that the impression given by these and other Etruscan practices is one of utter surrender to the will of the gods, and of abdication of the human will. The gods were felt to be everywhere, inescapable, vague and mysterious, beyond human understanding, and yet it was desperately urgent to discover their intentions. Hence the entire Etruscan energies were directed to attempts to force the gods to speak, to uncover their dark secrets.

Already in the sixth century BC Etruscan soothsayers were spread throughout the length and breadth of Italy.[21] They inspected the entrails (or *exta*) of victims, or divined from the flame, the smoke, and the flow of blood of the sacrificial victim. A bas relief of ancient Tuscany survives which represents one of them in the act of doing so. After a long interval they reappeared in Rome, the demand for their services having increased greatly in the third century when the city was in danger, and they began to concern themselves with the future destiny of Rome.

The Roman diviner (*augur* or *auspex*) belonged to a college of priests holding posts of the highest rank and entrusted with imperial secrets. Nothing of consequence was done without consulting them, and nothing, not even serious crime, could disqualify them from office. The *augur* interpreted portents from inanimate things, 'miracles' or *monstra* related to man and animal, and other prodigies, signs or tokens; the *auspex* was restricted to divination by birds, other than chickens. Strictly speaking, they did not look into the future but sought divine approval of an enterprise or plan already conceived, content to discover whether this had won the favour of the gods. More than other peoples of Italy, the Romans were reluctant to peep behind the curtain of time or to enquire of the gods about the state of things to come.[22] It would not be correct, however, to say that they entirely refrained from enquiring into the future for Ovid says explicitly (*Fasti*, 175) 'Omens of the future are wont to be derived from beginnings. To the word just spoken, ye mortals, turn your timid ears: and the augur observes the bird that is first seen by him.'

* See reference 20.

Dressed in purple and scarlet, with a cone-shaped cap, and carrying in his right hand a crooked staff with which to mark out the quarters of the heavens, he took up his position in the dead of night, like Balaam, on a high place. Here he uttered a prayer and made sacrifices. Then, with covered head he 'contemplated' or determined with his wand the region (or *templum*) of the heavens from east to west as far as the eye could reach. Omens on the left were generally, though not always, lucky, and those on the right, were usually lucky.

In the days of the Empire, the Romans turned increasingly to soothsayers for advice in all sorts of difficult situations including the purchase of property, tracing a runaway slave and forecasting the course of an illness. Other categories of soothsayers later came into being notably those called the *chaldaei* (later *mathematici*) who professed a knowledge of Babylonian astrology, and who foretold the future by observation of the stars. The diviners by dream were called *conjectures*, and by inspiration, *harioli* or *divini*.

One or two examples from other times and places will suffice to show the far-flung character of divinatory practices. In West Africa it is common to use the 'odd or even' device, with nuts, to predict the future or to identify guilt. Among the people of Egba, sixteen pierced cowries were thrown, if all fell with teeth to the ground, this signified war; if eight fell with teeth upwards and eight with teeth down, this meant peace. Interpreting the arrangements of cracks in a shoulder-blade placed in a fire (*omoplatoscopy*) was practised by Lapps, Mongols, Afghans, Bedouins, and the Chipewyans of North America.[23] Before the Maories embarked on a warlike expedition, they placed sticks in the ground in two rows, one representing each side; if the wind blew the enemy's sticks backward, this signified victory; if forward, defeat; and if sideways, indecision. However, the transition from divination to sorcery must have been easy, for the sticks had only to be pushed backwards to ensure a triumphant issue. The Zulus divined by sticks which, after a certain ritual, rose and jumped about by way of saying 'Yes', and lay still for 'No'. If the question was 'where is the sick part of the body?', the body of the questioner would be struck on the appropriate spot. The Khasis did nothing of any importance without breaking eggs. An egg was thrown on a board to the accompaniment of magical utterances, and divination followed the disposition of the shell fragments.

Pliny was so impressed by the divinatory arts cultivated by the Druids in Britain and Gaul that he felt the Persians themselves were

outdone. The Druids, who were well remunerated for their services, excelled in *anthropomancy*, the examination of the entrails of human sacrifices. After striking the victim above the diaphragm, they presaged, according to the rules, by watching the posture of the dying man, his convulsions, the quivering of his limbs, and the direction in which his blood flowed. Druids in Britain were not alone in using this method. Cimbrian priestesses, in the wars against Rome, sacrificed their prisoners to the gods and foretold the future from the streaming blood.[24] It cannot be said with any certainty how widespread this particular custom was, but the Germans, so Tacitus informs us, were passionately devoted to other forms of divination. They cast lots by cutting a twig from a fruit tree and dividing it into small pieces which they marked in prescribed fashion. The pieces were then thrown at random on to a white garment. With eyes turned heavenwards the priests then took each piece three times and interpreted the marks. They also divined from the song and flight of birds, and from the movements and neighing of milk-white horses kept for the purpose in sacred groves and yoked in chariots reserved for kings and priests. The British Queen Boadicea is said to have drawn a favourable omen from the direction taken by a hare, a divinatory animal, which she had hidden in her clothes and then set free. Her faith in hares was shared a millennium and a half later by the astronomer Tycho Brahe. The Irish have long believed witches changed themselves into hares, an idea which is also met in the Isle of Man and Somerset.

Like their counterparts in the East the native tribes of North America indulged in a variety of divinatory measures by dreams and visions, by drug-induced trance, by birds, by the stars and by calling on the dead.[25] Among the Cherokees, to cite one of the many procedures that have been described, the diviner took a water-filled bowl in which he placed a magical black substance, and made it move from side to side and from top to bottom. The manner in which the substance avoided his knife or clung to it was interpreted as an omen of war or peace.

Old Ireland was well stocked with soothsayers. In the south this was usually a nomadic woman (the *islain ceallmhuin* = humble oracle). In the north the vocation was followed by roving men who were supposed to have 'second sight', called 'spaemen' (= diviners), and by women who were known as 'spaewives'. Both men and women were consulted on the uncertainties of marriage, and they were supposed to have access to ancient traditions and the prophecies of the Irish saints. In many European countries gypsy fortune tellers to this

day remain a familiar sight. Their prey is the housewife who can be easily persuaded that her fortune is bound up with a handsome man who keeps her constantly in his thoughts.

III

I now add a comment on the methods of artificial divination about which something is known.

In *alectromancy*, letters are placed in a circle on the ground with a grain of corn against each letter. A white cock, ritually prepared with claws cut, is then allowed to pick the grains, and the order of the letters corresponding to the grains gives the word required. By this method Iamblichus is said to have discovered the name of the successor of the emperor Valens. His cock consumed the grains over the letters t,h,e,o,d, = Theod(orus). On discovering this, the enraged emperor unleashed his wrath on a number of others charged with making similar attempts. Iamblichus miraculously escaped torture and death, but some of his learned contemporaries were less fortunate; Hilarius of Phrygia, Patricius of Lydia and Andronicus of Caria all came to an untimely end. It is conceivable that, by judiciously placing the cock in relation to particular letters, one could experimentally determine in advance the probable words which would be formed by picking grains, but whether this empirical approach was ever actually used is impossible to say; there seems to be scope for an enterprising experimental alectromancer who could expect to be lavishly sponsored by the Parapsychology Foundation of the USA.

In *belomancy*, labels on which advice is written, are attached to a given number of arrows which archers let fly, the advice of the furthest arrow being accepted. This method was practised by the Scythians, Turks, by the ancient Germans, and by certain African tribes. It was also used, together with hepatoscopy and other divinations, by Nebuchadnezzar: 'The king of Babylon stood at the parting of the way, at the head of two ways, to use divination, he made his arrows bright, he consulted with images, he looked in the liver, at his right hand was the divination of Jerusalem . . .' (*Ezek.* xxi. 10).

In *bibliomancy* (or *sortes*) an attempt is made to foresee future events by opening the Bible or other sacred volume at random and treating as prophecy the lines which catch the eye or on which the finger happens to be placed. Before they were destroyed, in 82 BC, the Sibylline books were consulted in this fashion by the Romans.

Later, Homer's *Iliad* and *Odyssey* and Virgil's *Aeneid* took their place. Hence the name *sortes Homericae* and *sortes Virgilianae*. The Romans also employed the *sortes* as a lottery. Words and letters were inscribed on tablets made of wood or gold which were placed in an urn and a boy or priest was appointed to make the draw; the word *sortes* could, however, refer as well to the utterance of an oracle. Tacitus describes as *sortes* the conjectures about the future made by the Teutonic tribes.

St Augustine in the fourth century, and Gregory of Tours in the sixth, made divinatory use of the Bible, and the career of St Anthony in the third century was decided by the words that a deacon happened to read as he entered the Church. Nevertheless the practice was prohibited by the councils of Vannes (AD 461), of Agde (AD 506) and of Auxerre (AD 585); and both Pope Gregory II and Charlemagne forbade it. We learn from Aubrey, a seventeenth-century writer, that Charles I in 1648, while awaiting his trial, consulted *Virgil* to see what his end would be. The king pricked a pin in the fourth book of the *Aeneid* and came upon the ominous lines:

> Nor, when he shall to faithless terms submit,
> His throne enjoy, nor comfortable light,
> But, immature, a shameful death receive,
> And in the ground th'unbury'd body leave.

The use of the Bible as *sortes* is illustrated in Tennyson's *Enoch Arden* and in Scott's *Woodstock*. The Mohammedans use the *Koran* and the poems of Hafiz as sacred *sortes*. Rabelais's Pantagruel, when advising Panurge about marriage, recalls many a Virgilian and Homeric *sortes* of this kind: the captive Socrates foretelling his death from a verse in the ninth book of the *Iliad*, and Roman generals and emperors seeking to learn their fate—Opilius Macrinus, Brutus, Alexander Severus, Hadrian, Claudius and many others. Panurge rolls three dice and casts five, six and five. Then he opens Virgil and finds, at the sixteenth line, the following verse:

> The god him from his table banished
> Nor would the goddess have him in her bed

which does not, declared Pantagruel, make much for his benefit: 'for it plainly signifies and denoteth, that your wife shall be a strumpet, and yourself by consequence a cuckold'.

A reference to *botanomancy*, divination by flowers and herbs, is found in Theocritus (third century BC):

I learned the truth of old, when amid thoughts of thee, I asked, 'Loves she, loves she not?' and the poppy petal clung not, and gave no crackling sound, but withered on my smooth forearm, even so.[26]

A fuller description comes to us from Ferrand's *Love's Melancholy* published in 1640. Some silly wenches, he wrote, out of a foolish curiosity 'must needs be putting in practice some of those feats that they have received by tradition from their mother, perhaps, or nurse, and so, not thinking forsooth to doe any harme, as they hope, they paganize it to their own damnation. For it is most certain that *botanomancy*, which is done by the noise or crackling that kneeholme, box, or bay-leaves make when they are crushed betwixt one's hands, or cast into the fire, was of old in use among the Pagans, who were wont to bruise poppy-flowers betwixt their hands, by this meanes thinking to know their loves.'

Catoptromancy means a self-induced vision or sight of an apparition which results from gazing into mirrors, crystal, spheres of glass, or shining brass, a method allied to *hydromancy*, peering into a pool or a bowl filled with gleaming liquid. It is one of the oldest forms of divination, originating, according to Varro (116–28 BC), called 'the most learned of the Romans', in Persia. Possibly the Biblical *urim* and *thummim* formed part of the High Priest's catoptromantic kit, for they shone brightly and helped him to explain the past, foretell the future, determine innocence and guilt, apportion land and decide issues of war and peace. Many classical authors refer to magic mirrors, among them Apuleius (*b.* AD 130) and Pausanias (second century AD). Pythagoras, already in the sixth century BC, is said to have owned a mirror which he held up to the moon when reading the future, thus imitating the ancient sorcerers of Thessaly. Pausanias (*Achaia*, 7, 22) describes one which was attached to a thread immersed in the water of a spring; the diviner could predict from the images whether a sick person would recover. Those who employed this method in the middle ages were known as *speculatorii*.[27]

Grillot de Givry[28] remarks that *catoptromancy* is, in a sense, the reverse of *necromancy* since it enables the diviner to see the unborn or the performance of an action which has not yet in fact taken place. The technique, he writes, was popular in sixteenth-century France

when Catherine de Médicis' mirror enabled her to watch everything taking place in France as well as to see all that the future had in store. Père Cotton, confessor to Henry IV, could reveal to him in a mirror all the plots being laid in Europe. If a thief had to be identified, a holy candle was lit and a virgin uttered the words: 'White angel, holy angel, by thy sanctity and my virginity show me the thief!' *Catoptromancy* could be used in conjunction with divination by water and wine in the system known as the 'three vases of Artephus' whereby the past is revealed in the first vase, made of earthenware, the present in the second, made of copper, and the future in the third, made of glass.[29] Representations in art include one by Rembrandt figuring Dr Faustus and another by Leonardo in which two witches appear. Contemporary practitioners, held in high regard in Britain, though not invariably for their political foresight, are known as crystal-gazers.

Interpretation of the shapes formed by melted wax (*ceromancy*) is still in widespread use in the Near East, or was until comparatively recently, for medical diagnosis and prognosis. In *cleidomancy*, a key was suspended by a thread from the third finger of a young virgin and a verse from the *Psalms* was recited; the key rotated in affirmation of a statement. The antiquity and popularity of divination by a sieve (*coscinomancy*) is indicated by the way Theocritus[30] speaks of it.

'And she too spoke sooth, even Agroeo, she that divineth with a sieve, and of late was binding sheaves behind the reapers, who said that I had set all my heart on thee, but that thou didst nothing regard me.'

According to Cornelius Agrippa (*Opera Omnia* ii, chap. 21) the sieve is suspended by a forceps held by the middle fingers. Six special but unintelligible words are then uttered which force the powers that be to make the sieve turn at the sound of a guilty name.

Divination by a ring (*dactylomancy*), according to Plato (*Dial.* 10), was employed by Gyges who descended into a chasm where he discovered a brazen horse within which was a huge man with a gold ring on his finger. Gyges took the ring, which made him invisible when he wore it, and turned it towards his palm. By this method he appeared to the wife of Candaules, married her, dethroned her husband and became King of Lydia. Another version of this story is given by Herodotus (I, 8–9): Candaules, he tells us, exposed his naked queen in her bedchamber to his hidden friend Gyges. On discovering the trick, she

offered Gyges the somewhat invidious choice of murdering her husband or of destroying himself. In *geomancy*, of which Cardano was so fond, a handful of soil is thrown on the ground and the figures which are formed are inspected. Alternatively, dots are marked at random on paper and their positions are interpreted. *Hydromancy* (to which I have already referred) may also be performed with rain-water or with water from a spring, when it is known as *pegomancy*. A ring is dangled from a thread in a pot of water and a study is made of the noises made by the ring when striking the sides of the pot. Another method is to watch the circles formed when three small stones are cast into still water. *Hydromancy* survived for a long time in the 'water of silence' by which the success of a love venture was divined on Christmas Eve, Hallowe'en, St Mark's Eve and Midsummer Eve.

Onychomancy is the interpretation of the marks on the finger-nails of an unpolluted boy. His nails are covered with soot and oil and, when turned towards the sun, reflect an image. The method found a powerful advocate in Cardano's *De Varietate Rerum*, to which I have already referred, as presaging most things that happened to him. Spots at the top signified things past; in the middle, things present; and at the bottom, things to come. White spots mean happiness, blue ones sorrow; those on the thumb-nail honour, on the forefinger riches. By watching the spots on the growing finger-nail one can discover when good-fortune has passed or danger averted. In the Faroe Isles, the white spots on the nails of the hands are still called 'Norn-spots', that is, spots of Fate or Luck. Cardano's contributions to divination include a work on *metoposcopy*, which traces a man's character and destiny from his face, the lines on the forehead, and physical signs such as warts, which carry a particularly sinister meaning: 'a woman with a wart upon her left cheek, a little to the left of the dimple, will eventually be poisoned by her husband.' Such speculations of Cardano may have influenced Lombroso's views on criminal typology.

The origin of the divining rod (*rhabdomancy*) was traced by Sir Thomas Browne to the pagan *virgula divina*, the magical rods of Pallas Athene, Mercury and Circe. That it was known in antiquity is shown by the reproach made by the prophet Hosea (iv. 12), the people, he complains, 'ask counsel at their stocks, and their staff declareth unto them'. This belief dies hard. We can still find in many parts of the world the idea that a slight, forked hazel twig is sensitive to a source of water, a vein of lead ore or a seam of coal. The diviner takes one branch in each hand and, holding the stem straight in front of

him, moves slowly over the spot where the water or metal is believed to lie hidden.

The use of a divining rod is in a class by itself because of its highly specific character and goal, which is, moreover, precisely the same for everyone. The divining rod is a kind of primitive tool, a sort of natural Geiger counter. It is employed, not to discover the will of the gods, but as a prospector's aid. So it is not surprising that scientists of the calibre of Boyle and Gassendi should have believed in the value of dowsing, though they were sceptical about the use of the rod for locating metal. Aubert[31] has indeed suggested that a divining rod legitimizes behaviour that would otherwise be random, because it seems the only rational thing to do; mere trial and error would be too costly.

Divination by shadows (*sciomancy*) means scrutinizing one's shadow on a moonlit night. A man who lost his shadow on such a night would die during the year, for the shadow was believed to embody the soul, an idea encountered in folklore and myth, and immortalized in Chamisso's *Peter Schlemihl*. In *margaritomancy* an enchanted pearl is placed in a pot which is then sealed; the pearl is supposed to leap at the sound of a thief's name. In *molybdomancy* drops of molten lead are put into water and the diviner interprets the hissing noises.

These various modes of divination were not all invariably accorded the same status. On Varro's authority the early Church recognized four principal types, by earth, water, air and fire, corresponding to the four elements.[32] These and other methods were, as we have seen, known to the diviner in ancient Greece. How he could exercise a composite skill by the employment of multiple rituals is described by the blind prophet Teiresias[33] in the *Antigone* of Sophocles (495–406 BC).

> I will; and show you all that my skill reveals,
> At my seat of divination, where I sit
> These many years to read the signs of heaven,
> An unfamiliar sound came to my ears
> Of birds in vicious combat, savage cries
> In strange outlandish language, and the whirr
> Of flapping wings; from which I well could picture
> The gruesome warfare of their deadly talons.
> Full of foreboding then I made the test
> Of sacrifice upon the altar fire.

There was no answering flame; only rank juice
Oozed from the flesh and dripped among the ashes,
Smouldering and sputtering; the gall vanished in a puff
And the fat ran down and left the haunches bare.
Thus (through the eyes of my young acolyte,
Who sees for me, that I may see for others)
I read the signs of failure in my quest.[34]

IV

Divination has a judicial aspect in the ordeal, which belongs to a particular stage in the development of society and which has been employed sometimes as a 'lie-detector' and sometimes as a punishment. Two disputants, or a suspect and his accuser, submit themselves to a common peril, a battle contest, or to some magical device which only injures the guilty. When the ordeal is such that it takes immediate effect, a suspect has good reason for telling the truth, but when the terrors of the moment are replaced by suffering in the remote future, it becomes tempting to evade the truth.

Unknown among the Australian aboriginals and other archaic peoples, the ordeal is familiar in the diverse cultures of Africa, India, China and Europe, as well as among the peoples of antiquity. In Africa ordeal by poison has long been the recognized method of identifying criminals and witches. The medicine-man or witch-finder, garbed in the skins and entrails of animals, dances before the assembled tribe, working them up to a pitch of frenzy by questions to which they reply in unison. He then denounces the accused and incites the crowd to attack him. If the victim is not immediately lynched, he is forced to swallow a nauseating drink, although a cock may sometimes serve as a deputy; if the cock vomits the suspect is held to be innocent. For stealing, lying or adultery, the accused must hold a hot knife or immerse his arm into boiling water or oil; a woman charged with adultery must lick the hot blade of a hoe; only the guiltless are unharmed by the heat.

The Indians seem to have adopted the judicial ordeal from Northern invaders of their country. A curious practice was ordeal by weight. Two posts were set up and a beam placed across them from which a balance was suspended, the accused being placed in one scale and a balancing weight of stone or soil in the other. He was then re-weighed If he proved to be lighter than on the first trial he was acquitted,

otherwise he was condemned, according to Vishnu and Narada, but according to Brhaspati, he had to be weighed once again and condemned only if the scales broke down, in which case he was acquitted, by Narada, and re-weighed, by Vishnu. An ordeal in Brahmanic law requires the suspect to drink three handfuls of water into which a holy image has been dipped; by another procedure the suspect has to drink a beverage made from aconite root; if he vomits he is guilty.

An ordeal peculiar to Old China takes the form of behaviour in a totally unexpected situation. If a man discovered his wife in the arms of her lover and slew her he was not guilty of homicide provided he acted forthwith, before his rage had a chance to cool down, and provided also that he killed the lover at the same time. The correct thing to do was to cut off both heads in a single sweep of the sword. If only one head was removed, this was proof that there had been some restraint and hence, if the husband had wished, he could have held back completely; he was accordingly pronounced guilty of homicide. Ordeal by oath was also a Chinese custom: the supernatural powers were invoked to bring sudden calamity on the swearer if his words were false. Confucius himself is said to have uttered such an oath after visiting a lady of doubtful reputation. When a disciple remonstrated with him, he replied, 'If I have done anything wrong, may God strike me dead, may God strike me dead!'[35]

In Greece, as later in Rome, ordeals by fire or water were a privilege of the lower classes. A Greek accused of a crime could clear himself by creeping on all fours through a fire or by grasping a red-hot iron; a sacred oath served the same purpose. The oath as 'lie detector' was employed at Palice in Sicily where there was a fountain into which a tablet was thrown on which an oath had been inscribed. If the tablet floated, the accused was acquitted; if it sank, he was cast into the flames which straightaway rose from the fountain. If anyone swore falsely, he was struck blind, lame, or dead, or was swallowed up and drowned.[36] The Romans eventually abolished the ordeal as a formal legal practice, and in post-mediaeval Europe it very gradually disappeared.

A type of ordeal once common in Ireland, as well as in certain other parts of the world, required the accused to eat a morsel of bread or cheese called *corsned* (= 'trial-portion') or *nedbread* (= 'forced bread'); presumably, fear and guilt would make the throat so dry that it would be impossible to swallow. The Earl of Kent is said to have choked under this ordeal when charged with the murder of the brother of Edward the Confessor. Ordeal by Eucharist, restricted to the clergy,

served the same purpose. Not so long ago the Indian police used to make a suspect chew and spit out a mouthful of rice and then examine it for moisture. Another Old Irish procedure, known also in Brittany, was ordeal by casting lots. It was called *crann-chur*, perhaps because small pieces of wood were used (*crann* = 'tree', 'wood', 'stick'), or possibly because the *crann-chur* consisted of black and white pebbles placed in a vessel from which the accused drew until either black or white appeared, black indicating guilt, and white innocence.

In England ordeals had been legally instituted long before the Conquest and they were not abolished until the reign of Henry III, between 1215 and 1219, although trial by battle was last waged in England in 1638, in County Durham, and was not expunged from the legal code until 1819. As late as 1818 a murderer escaped the rigour of the law because the brother of his victim rejected a challenge to single combat. The ordeals were various, the most common being a battle wager, by fire or by water. A wager of battle was permitted only to men of rank. This also applied to ordeal by fire, which did not actually form part of Old English law and which evidently could be performed by proxy. The accused, with eyes covered, passed barefoot over nine red-hot plough-shares. Our expression 'to haul over the coals' is a relic from the days when this was a reality. Emma, mother of Edward the Confessor, is said to have undergone this trial to defend her honour from the charge of adultery with Alwyn, Bishop of Winchester. Before realizing what had happened, she had passed over the iron and cried out 'When shall I come to the place of my purgation?' Queen Kunigund, wife of the Emperor Henry the Second, was likewise accused and she decisively proved her innocence by grasping a red-hot iron and carrying it nine steps. Sometimes the hot iron was in the shape of a gauntlet into which the hand had to be placed.

In the ordeal by water the right hand was bound to the left foot and the left hand to the right foot. Ordeal by hot or cold water was reserved for the common people. The accused plunged his bare arm into boiling water or was tossed into a river. If he sank he was innocent, if he floated he was guilty. This latter method was favoured for witches and it persisted long after other ordeals were forbidden.

The bier ordeal is a later English practice at the trial of a murderer. Scott's ballad of Earl Richard (*Minstrelsy*, ii, 421) refers to the idea that the wounds of the dead body would 'open their congeal'd mouths and bleed afresh' in the presence of the murderer or at his touch. The same idea is mentioned by James I (*Demonology*, III, vi), and a Shrop-

shire villager was put to this test as recently as the nineteenth century; at that time it was still the custom in Durham for anyone who came to see a dead body to touch it, even if the death was not due to violence. Among the less frequently employed methods was ordeal by the cross, in which the plaintiff and defendant stood with arms crossed over the breast; the one who outlasted the other won the suit.

Ordeals were not necessarily painful, though the outcome may have been of great consequence: if, for, example, an unchaste woman entered a grotto near the statue of Diana, discordant sounds were said to be heard and the woman was never seen again; if, however, musical sounds were heard, the woman was proved to be a virgin and she emerged unharmed. During the Middle Ages, doubt concerning a point of doctrine could be dispelled by putting it to the test of ordeal.

On the face of it most ordeals could have only one outcome: the death or mutilation of the suspect. In practice, however, it was different. For one thing, the presiding official or priest often had it in his power to arrange the acquittal of those in his favour; we know this could be done, until comparatively recently, for many sentenced to death by hanging. Secondly, techniques have long been known, and have lately been substantiated, whereby a person is able to emerge unscathed from an apparently terrible ordeal; for example, it is possible to render the skin insensible to intense heat and thus safely plunge the arm into molten metal.[37]

The ordeal, by virtue of its appeal to a supposedly unpredictable outcome, was a step towards justice. Hence the idea of what is fair grew from the notion of chance, as embodied in the ordeal. Belief in luck must also have played a part, for the man who voluntarily entered the ordeal must have relied on his luck to see him through.

Akin to the ordeal is the riddle, of which there are many forms and which may be thought of as a contest or battle wager of the intelligence; the outcome here too may be a matter of life or death. Like ordeals, riddles may be traced to the remote past and are encountered in all parts of the world. One of the most ancient riddles is preserved in a Babylonian tablet:

> 'Who becomes pregnant without conceiving?
> Who becomes fat without eating?' The answer is 'Clouds'.

The oldest known Greek riddle is associated with Minos, King of Crete, who consulted an oracle when his son, Glaucus, disappeared. The reply came in the form of an enigma which was solved by a soothsayer.

In some Indian and Nordic legends a suitor has to guess the solution of a riddle before he wins his bride. Thor promises his daughter, a 'fair-bright snow-white maiden', to Alvis the dwarf, on condition that he answers the questions put to him. In Greek legend, Creon, King of Thebes, promises his sister, Jocasta, to the man who can solve the famous riddle of the Sphinx and hence free the land from a monster. Oedipus undertook the task and when asked 'What animal is four-footed in the morning, two-footed at noon, and three-footed in the evening?', replied: 'Man who, as a babe, crawls, and as an old man, leans on a crutch.' The Sphinx was so distressed that it threw itself from a precipice and was dashed to pieces.

Sometimes the riddle takes the form of action rather than words. In a northern saga, King Ragnar bids Aslang come to him clothed yet naked, accompanied yet alone, fed yet empty. She complies by casting off her garments but covering herself with her golden hair that flows to her feet, taking with her only a dog, and chewing a blade of garlic. Ragnar marries her.

Many illustrations of riddles as ordeals are found in English and Scottish ballads, for example, the ghost of a dead lover declares that the girl must join him in his grave unless she can solve a riddle. A collection of riddles published in 1517 is attributed to Hans Sachs, the Nuremberg cobbler and mastersinger. It includes the following: 'After Adam had eaten the forbidden fruit did he stand or sit down? Neither: he fell.' 'How can a farmer prevent the mice from eating his corn? By giving them his corn.' A riddle is much more than a yes-no question, since the correct reply may be one out of a large number of possible ones. It is a legitimizing device whereby the status or claims of a person may be affirmed if he succeeds in mastering the uncertainty by tuning himself in to the gods.

To the psychologist, the riddle is the prototype of the modern intelligence test, just as the ordeal is the prototype of the 'stress situation' for the assessment of personality, and the so-called lie-detector test.

V

Scepticism about the claims of divination crept in at an early stage, not to speak of opposition on 'religious' grounds in the Bible. While no less a man than Aeschylus (525–456 BC) described the art of divination as a gift to mankind from Prometheus, on a par with the arts of building, metal-making, sailing, and the sciences of arithmetic and astronomy, Aristophanes (444–380 BC) pokes fun at it.[38]

On us you depend, and to us you repair
For council and aid, when a marriage is made,
A purchase, a bargain, a venture in trade;
Unlucky or lucky, whatever has struck ye,
An ox or an ass, that may happen to pass,
A voice in the street, or a slave that you meet,
A name or a word by chance overheard,
You deem it an omen, and call it a bird.
(*Birds*, 717)

Like Aristophanes, many Greek thinkers, among them Heraclitus (sixth century BC), Anaxagoras (500–428 BC) and Epicurus (342–270 BC) denounced the popular belief that events could occur which were contrary to nature; the Stoics, however, were, in this instance, on the side of popular opinion.

But while traditional Greek myth still preserved its vitality and held sway over men's minds, the art of divination was truly an appeal to the gods who could will this or that. It was only when the Olympian religion collapsed and belief in Fortune or Chance took its place that divination, especially astrology, degenerated into superstition of a low order. Gilbert Murray[39] rightly remarks 'the best seed-ground for superstition is a society in which the fortunes of men seem to bear practically no relation to their merits and efforts'. The Hellenistic period of Greek history was a time when such a society flourished. Everything that happened was attributed to chance or fortune. Hence the widespread recourse to divination. Pliny (AD 23–79), a Roman writer who, as Gilbert Murray suggests, seems to be harking back to Greece, thus describes the situation:

Throughout the whole world, at every place and hour, by every voice Fortune alone is invoked and her name spoken: she is the one defendant, the one culprit, the one thought in men's minds, the one object of praise, the one cause. She is worshipped with insults, counted as fickle and often as blind, wandering, inconsistent, elusive, changeful, and friend of the unworthy.... We are so much at the mercy of chance that Chance is our god.[40]

The denial or removal of the Olympian gods accordingly landed men in the worship of fortune or fate.[41] Farrington has made much the same point.

Here, then, is a subject supremely worth pondering. The astrological view of the universe presented, in a degree unapproached by any other ancient system, the aspect of an exact science. Yet despite its scientific aspect and the fascination exercised by the exactness of its procedures, it represented a decline in culture, an impoverishment of personality, an enslavement of the will, a diminishment of man's moral and spiritual nature. Man had previously been understood in terms of what the poets, historians, and philosophers had made of him—a being not exempt from weakness and villainy, but yet versatile, adventurous, resourceful, enterprising, adaptable, aspiring and in great measure his own master. Now he had shrunk to being the puppet of the stars, whose relation to the powers that rule his destiny could be represented in a mathematical diagram.[42]

The period in question was a time when men felt helpless in the presence of forces over which they had no control, the whims of despotic rulers, the caprices of alien armies fighting for possession of the soil, pestilence and earthquakes.

It was not, however, until the fourth century that measures were taken, by Constantine (AD 272–337), to prohibit divination in all its forms. After his conversion, Constantine decreed that any diviner who celebrated his rites in the house of a citizen should be burnt alive, his employer's property should be confiscated and his accuser rewarded.[43] Constantine and his successors (Theodorius, Arcadius and Honorius) did not ban the soothsayer because they thought he was an imposter. On the contrary, as recorded in the Constitution of AD 395, they believed that divination was an impious tampering with the secret Laws of Nature.[44] This occult knowledge and the powers of prevision they wished to monopolize for themselves.

When the stress of the times is great the diviner comes into his own. For it is then that man is sensitized to omens of all kinds; in a moment of peril, the mind catches at any straw. Men who follow a hazardous calling, airmen, racing motorists, gamblers, are the ones who cling to a talisman. During the Peloponnesian War there were more earthquakes and eclipses of the sum than ever before. While Xerxes was marching into Greece, a mare gave birth to a hare, and a mule brought forth a hermaphrodite colt. Many prodigies were seen when the Persian army approached the temple at Delphi: thunder struck two mountain crags which fell upon the invading army, and the sacred vessels were miraculously conveyed outside the precincts.

Two thousand, five hundred years later, during World War II, omens spread throughout Japan. 'The war will end in the eighth month', it was rumoured, 'because the cherry blossoms in the Yasukuni Shintoist Temple have bloomed with eight petals'; 'soon the war will end because we had flowers of Udambara which blossom once in three thousand years'; 'a new-born baby that weighed over 16 pounds announced, after first seeing the light of day, "the war will end in April!", and then it died'.[45]

VI

In bringing this survey to a close I wish to draw the reader's attention to a few points which seem to deserve further consideration. It needs an effort on our part today to realize the enormous influence of divinatory rituals in archaic peoples at all levels of civilization. There can be little doubt that their preoccupation with these rituals expressed their relationship with the unknown powers that 'rule' the universe. Not only celestial events but everything mundane was the intimate concern of the gods. The overriding need was to know what lay ahead in time, and to obtain approval for an action already completed.

We are not yet able to 'formalize' the domain of divination, that is to say, to identify the logical structure and algebraic properties which the methods, or some of them, may possess in common, although Monsieur G. T. Guilbaud has made a promising start in his analysis of *geomancy*. And we have an important clue to common patterns in diverse divinatory rituals, as suggested by Professor Pallottino[46] in his study of Etruria. In Etruscan culture the supernatural and the natural seem to mirror each other in every detail according to a preordained unitary system in which the manner in which space is structured is of paramount significance. On the surface of a bronze liver, a model for hepatoscopy (divination by inspection of the liver), found at Piacenza, there are a number of compartments in which are inscribed the names of the gods. The spatial distribution of the names of the deities on the bronze liver is related to the astrological partitioning of the heavens about which ancient writers speak (e.g. Pliny, *Nat. Hist.* II, 54, 143). I have already referred earlier to the *templum*, when speaking of astrology. I now wish to take up Professor Pallottino's idea that this same spatial pattern appears in the structure of the divinatory liver. Hence, the formal kinship between astrology and hepatoscopy. The *templum* may mean either the sky itself or any sacred zone on earth, including the liver of a

divinatory animal. The diviner orientates himself by determining the four cardinal points, North, South, East and West, the two opposite points being joined by lines which intersect. The heavenly vault (or other consecrated space on earth) is thus divided into quarters which are further subdivided into four parts making sixteen subdivisions in all, each subdivision being occupied by a separate deity. The friendly gods, the highest and powerful, are located in the eastern sectors, especially in the north-east; the gods of nature are assigned to the southern sectors; and the gods of destiny, the 'inexorable and fearful' deities dwell in the inauspicious west, especially in the north-west. It was on this basis that omens and *ostenta*, the flight of birds and thunderbolts, for example, were interpreted. The god responsible could be identified by the direction of the source, and since his disposition was known, the signs could be pronounced as good or bad. In addition to this system of zonal arrangement there was also an elaborate lore, a body of doctrine, for interpreting the qualitative character of the particular signs, such as their size, shape or colour. This supplementary information was indispensable for pinning down the precise import of a divine message. In Etruria the terrestrial and celestial systems were so intimately and closely related that the same official could serve as inspector of the liver and interpreter of lightning (*fulguriator*). Professor Pallottino declares that the Etruscan religion was, in a sense, the antithesis of the Greek, in that the gods of the latter were human and their motives and actions were intelligible on a human plane, by contrast with the remote and supernatural character of the gods of Etruria. A passage from Seneca which he quotes brings home to us the effect of this contrast in religious belief. 'The difference between us [the Graeco-Roman world] and the Etruscans . . . is the following: that whereas we believe lightning to be released as a result of the collision of clouds, they believe that clouds collide so as to release lightning (for they attribute all to the deity, they are led to believe not that things have a meaning in so far as they occur, but rather that they occur because they must have a meaning) . . . .'

Divination may be regarded as an archaic method of decision-making. It is based not on the intrinsic properties of the situation, on whether, for example, one army is in better fighting trim than another, on whether the accused is really innocent or guilty as judged by the evidence, or on whether a sick person is actually suffering from a fatal disease or not, but on extrinsic considerations, on a message purporting to come from the gods whose will decides the issue. The limitations

of the methods were not due to any defect on the part of the individuals who lived by them, but to the pre-scientific character of the assumed 'model' of the universe. According to the lights of the times, then, the methods were not irrational; they were the best that could be done within the existing framework of knowledge and understanding.

APPENDIX I

ARTIFICIAL METHODS OF DIVINATION

alectromancy	by a cock
aleuromancy	by flour (wheat mixed with oatmeal)
alomancy	by salt
alphitomancy	by barley meal
anthracomancy	by live coals
arithmomancy	by numbers
astragalomancy	by knuckle-bones or dice
axinomancy	by the quivering of an axe or hatchet fixed into a stake
belomancy	by an arrow
bibliomancy	by consulting the Bible
botanomancy	by plants
capnomancy	by smoke
cartomancy	by maps or papers
catoptromancy	by a mirror
cephalomancy	by an ass's head
ceromancy	by melted wax
chiromancy	by the hand
cleidomancy	by a key
cleromancy	by casting lots or by dice
coscinomancy	by a balanced sieve
crithomancy	by the dough of barley cakes
cromniomancy	by placing onions on names on Christmas Eve
crystallomancy	by a crystal or lens
cylicomancy	by cups
dactylomancy	by a ring suspended from a hair or thread
daphnomancy	by the crackling of burning laurel
gastromancy	by the sound of the belly
geomancy	by earth, or by dots made at random on paper
gyromancy	by circular motion
hidromancy	by sweat
hydromancy	by water or other liquid
idolomancy	by idols or images
lampadomancy	by lamps
lecanomancy	by dropping precious stones into a basin of water and listening to the resulting noises
libanomancy	by libation or the smoke of incense

lithomancy	by precious stones
machairomancy	by knives and daggers
margaritomancy	by a pearl
metopomancy	by the forehead (or face)
molbydomancy	by molten lead
nomancy	by the letters forming the name of a person
oenomancy	by wine
omphalomancy	by the navel
onomomancy	by names
onychomancy	by finger nails
ovomancy	by the germ of an egg
paedomancy	by the feet
pegomancy	by fountains
pessomancy	by pebbles
pharmacy	by drugs
psephomancy	by pebbles drawn from a heap
pyromancy	by fire
rhabdomancy	by a forked hazel branch (as divining rod)
sciomancy	by shadows or by the shades of the dead
sideromancy	by stars; also by the twisting of straws on red-hot iron
spatilomancy	by excrement
stareomancy	by the elements
sternomancy	by marks on the breast
sycomancy	by fig leaves
tephromancy	by ashes
tyromancy	by cheese

APPENDIX 2

De Quincey in his *Confessions of an English Opium-Eater* has an interesting footnote on divination which I venture to quote in full.

'*Divination*', he writes, 'expresses an idea ampler by much than the word *prophecy*: whilst even this word *prophecy*, already more limited than divination, is most injuriously narrowed in our received translation of the Bible. To unveil or decipher what is hidden—that is, in effect, the meaning of divination. And, accordingly, in the writings of St Paul, the phrase *gifts of prophecy* never once indicates what the English reader supposes, but *exegetic* gifts, gifts of interpretation applied to what is dark, of analysis applied to what is logically perplexed, of expansion applied to what is condensed, of practical improvement applied to what might else be overlooked as purely speculative. In Somersetshire, which is a county the most ill-watered of all in England, upon building a house, there arises uniformally a difficulty in selecting a proper spot for sinking a well. The remedy is to call in a set of local rhabdomantists. These men traverse the adjacent ground, holding the willow rod horizontally: wherever that dips, or inclines itself spontaneously to the ground, *there* will be found water. I have myself not only seen the process tried with success, but have witnessed the enormous trouble, delay, and expense, accruing to those of the opposite faction who refused to benefit by this art. To pursue the tentative plan (i.e. the plan of trying for water by boring at haphazard) ended, so far as I was aware, in multiplied vexation. In reality, these poor men are, after all, more philosophic than those who scornfully reject their services. For the artists obey unconsciously the logic of Lord Bacon: *they* build upon a long chain of induction, upon the uniform results of their life-long experience. But the counter faction do not deny this experience: all they have to allege is that agreeably to any laws known to themselves *a priori*, there ought not to be any such experience. Now, a sufficient course of facts overthrows all antecedent plausibilities. Whatever science or scepticism may say, most of the tea-kettles in the vale of Wrington are filled by *rhabdomancy*. And, after all, the supposed *a priori* scruples against this rhabdomancy are only such scruples as would, antecedently to a trial, have pronounced the mariner's compass impossible. There is in both cases alike a blind sympathy of some unknown force, which no man can explain, with a passive index that practically guides you aright—even if, Mephistopheles should be at the bottom of the affair.'

De Quincey, *The Confessions of an English Opium-Eater*, London: Dent, 1961, pp. 84–5.

NOTES AND REFERENCES

1. The Greeks were reputed to have had more than 250 oracular centres, but little or nothing is known about most of them. Delphi, which was sacred to Apollo, and the cave of Trophonios are referred to in the text. In addition there was an oracle of Venus at Paphos, of Diana at Colchis, of Hercules at Athens, of Mars in Thrace, of Minerva at Mycenae, and of Aesculapius at Epidaurus. A particularly celebrated one was the oracle of Dodona in Epirus sacred to Zeus. Legend tells us that Zeus presented his daughter Thebe with two speaking doves. One flew to Libya and established the oracle of Zeus Ammon, and the other founded the oracle at Dodona, where priests interpreted the sound of the wind among the trees, or the noises emitted by plates or brass or cymbals struck by thongs blown by the wind.

2. The pythoness was named after a district, Pytho, in the neighbourhood of Delphi. Python was the serpent slain there by Apollo, known as the Pythian.

3. The general connection in the Bible between such images and divination is indicated by the stories of Rachel's theft, *Gen.* xxxi. 34, and of Michal's images I *Sam.* xix. 13.

4. See John Cohen, 'Automata in Myth and Science', *History Today*, May 1963, pp. 340–6 for a brief discussion of the relationship between divination and automata, including the 'oboth and yidd'onim of the Bible.

5. See *Encycl. Rel. Eth.*, iv, p. 794.

6. O. Fenichel, *The Psychoanalytical Theory of the Neuroses*, New York: Norton, 1945.

7. *Ars Amatoria*, Elegy B, Book III, A Dream. Here are some examples of later attempts to induce divinatory dreams. St Catherine's charm (for November 25th) is this:

> Let a number of young women not more than seven and not less than three, meet in a room by themselves, just as the clock strikes eleven at night. Someone then takes from her bosom a sprig of myrtle which she has worn all day, and folds it up in a piece of tissue paper, and then lights a small chafing-dish of charcoal. Each girl throws on it nine hairs from her head, and a paring of each of her toe- and finger-nails. She then sprinkles a small amount of myrrh and frankincense on the charcoal, and while the vapour rises, fumigates the myrrh with it. The young women retire to bed while the clock is striking twelve, and place the myrtle exactly under the head. They can then be sure to dream of their future husbands.

This device originates from Mother Bunch's *Golden Fortune Teller* (see John Brand, *Observations on the Popular Antiquities of Britain*, London: Bohn, 1849, p. 411).

A typical French recipe 'for youths who wish to know by a dream the woman they will marry' is this one found in an old French manuscript.

> They must have powdered coral and some fine powdered lodestone, which they shall mix together and dilute with the blood of a white pigeon, and they shall make a dough of it, which they shall enclose in a large fig after having wrapped it in blue taffeta; they shall hang this round their neck, and when they

go to bed shall put the pentacle for Saturday under their bolster, saying a special prayer the while.

(Grillot de Givry, *A Pictorial Anthology of Witchcraft, Magic and Alchemy*, New York: University Books, 1958, p. 325; the manuscript is No. 2790 in the Bibliothèque de l'Arsenal.)

Among amatory divinations, other than by dreams, we must not omit to mention the use of the dumb cake, which had to be prepared in silence. The individual then went upstairs backwards, put the cake under the pillow, and dreamed of his (or her) love. The significance of the silence derives from the fact that it was to Harpocrates, god of silence, that the rose, flower of Venus, was dedicated, hence the expression *sub rosa*. 'The host', Ovid tells us, 'hangs the rose over his friendly board, so that the guests know how to keep silence upon what is said beneath it.'

8. In 1962, a French archaeologist, M. Charles Virolleaud, reported his discovery the previous year of a large collection of clay models of sheep's livers probably used by priests to instruct their students in the art of divining from the liver. The finds are dated about 1400 BC and come from the coast of Syria opposite Cyprus. (*The Guardian*, March 31, 1962.)

9. Shakespeare often refers to the raven, owl and other ominous birds:

> The raven himself is hoarse
> That croaks the fatal entrance of Duncan
> Under my battlements.—*Macbeth*, i, 5.
>
> Augurs and understood relations have
> By magot-pyes and choughs and rooks brought forth
> The secret'st man of blood.—*Macbeth*, iii, 4.
>
> Oh it comes o'er my memory
> As doth the raven o'er the infected house,
> Boding to all.—*Othello*, iv, 1.
>
> Thou ominous and fearful owl of death,—*Henry VII*, iv, 2.
>
> The bird of night (owl) did sit
> Even at noon-day upon the market-place,
> Hooting and shrieking.—*Julius Caesar*, i, 3.

10. F. E. Zeuner, *A History of Domesticated Animals*, London: Hutchinson, 1963, pp. 449–50.

11. *Pharsalia*, 6, v, 750.

12. See E. Partridge, *Origins*, London: Routledge and Kegan Paul, 1958.

13. See *Chance, Skill and Luck*, pp. 130–1, note 17.

14. J. Needham, 'Human Law and the Law of Nature', pp. 3–27, in *Technology, Science and Art: Common Ground*, a Lecture Series at the Hatfield College of Technology, April–June 1961.

15. See H. Kelsen, *Society and Nature*, London: Routledge and Kegan Paul, 1946, p. 76 and pp. 320–1, where there is a discussion of Karl von Amira's *Tierstrafen und Tierprocesse*, 1891.

16. See a survey by Miss A. Scott-James in *The Observer*, February 24, 1963; several of my students have made studies of the astrological interests of the British public which bear out her statements.

17. R. Caillois, *Man, Play and Games* (translated by M. Barash), London: Thames and Hudson, 1962, p. 48.

18. See a report in *The Guardian*, August 10, 1957.

19. Robert Eisler, *The Royal Art of Astrology*, London: Herbert Joseph, 1946, p. 261. This etymology may be disputed, in particular the alleged link between 'considero' and 'sidero'. It has been suggested, for example, that 'considero' may be related to 'de-sidero' ('ardently desire').

20. R. Bloch,* 'Marvels and Divination in Ancient Italy', *Diogenes*, Winter, 1956, 16, pp. 39–58; M. Pallottino, *The Etruscans*, Harmondsworth: Pelican Books, 1955 (first Italian edition, 1942), p. 166.

21. Theodor Mommsen, *The History of Rome*, London: Dent, 1911, vol. 2, p. 379.

22. Bloch, *loc. cit.*

23. Sir John Lubbock, *On the Origin of Civilization and the Primitive Condition of Man*, London: Longmans Green, 1875.

24. Theodor Mommsen, *The History of Rome* (translated by W. P. Dickson), London: Dent, 1921, vol. 3, p. 169.

25. See *Encycl. Rel. Eth.*, iv, p. 781.

26. *Theocritus, Bion and Moschus*, translated by A. Lang, London: Macmillan, 1901, pp. 21–3 (Idyll III).

27. Grillot de Givry, *op. cit.*, p. 304.

28. Grillot de Givry, *op. cit.*, p. 304.

29. Grillot de Givry, *op. cit.*, pp. 305–8.

30. *op. cit.*

31. Vilhelm Aubert, 'Chance in Social Affairs', *Inquiry*, 1959, 2, p. 12.

32. *Encycl. Rel. Eth.*, iv, p. 789.

33. Tiresias, in Greek legend, was a native of Thebes, blind from his seventh year, either because he saw Athena whilst she was bathing, or because he revealed forbidden secrets of the future. He was the counsellor of Oedipus and his sons, and of Creon; and Ulysses descended into Hades to pay him a visit.

34. *Antigone* (translated by E. F. Watling), Harmondsworth: Penguin Books, pp. 152–3.

35. H. A. Giles, *Confucianism and its Rivals* (Hibbert Lectures, 2nd ser.), London, 1915, p. 71, quoted in *Encycl. Rel. Eth.*, ix, pp. 516–7.

36. J. Potter, *Antiquities of Greece*, Edinburgh: Stirling and Kennedy, 1832, vol. 1, pp. 303–4.

37. See M. R. Coe, 'Fire-walking and Related Behaviours', *The Psychological Record*, 1957, 7, pp. 101–10.

* I regret that I came across R. Bloch's instructive monograph, *Les Prodiges dans l'Antiquité Classique*, (Paris: Presses Universitaires de France, 1963) too late for discussion in the text.

38. See G. Lowes Dickinson, *The Greek View of Life*, London: Methuen, 1941, p. 20.

39. *Five Stages of Greek Religion*, London: Watts, 1935, p. 130.

40. Pliny, *Natural History*, ii, 22: see G. Murray, *op. cit.*, pp. 132–4.

41. *op. cit.*, p. 135. Pliny's use of the words Fortuna and Sors interchangeably shows how little people distinguished between fortune and fate.

42. B. Farrington, 'Science and the Classics', pp. 77–90 in *Technology, Science and Art: Common Ground*, a Lecture Series at the Hatfield College of Technology, April–June 1961. See also the references cited by Professor Farrington, namely, O. Neugebauer, *Exact Sciences in Antiquity*, London: Oxford University Press, 1951, pp. 163–4; and M. Hadas, *Humanism*, London: Allen and Unwin, 1961.

In Greece, Tyche, daughter of Oceanus was worshipped as goddess of luck. She was represented with a rudder to guide the ship of life, or with a ball or wheel, or with Amalthea's horn of plenty. Often she is blindfold to prove her impartiality.

Of all the Roman gods, Fortuna, goddess of 'luck', seems to have been the most popular. Every market-place had its little altar of Fortuna; the one at Pompeii is still there. In the Forum a splendid temple was dedicated to Fortuna, a favoured spot for women seeking 'husband's good luck', the retention of their husband's affection by unfading charms.

43. W. E. H. Lecky, *The Rise and Influence of the Spirit of Rationalism in Europe*, London: Longmans Green, 1910, pp. 27–8.

44. Needham, *loc. cit.*

45. Otayo Miyagi, 'La notion de normalité-anormalité', *Proc. 13th Int. Congr. Appl. Psychol.*, Rome, 1958, pp. 329–30.

46. *op. cit.*, pp. 163–7.

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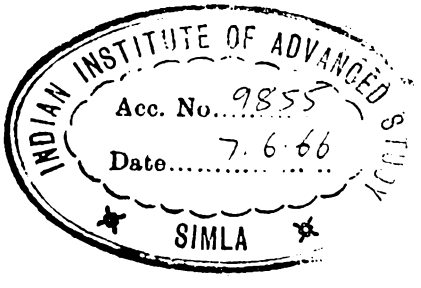

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