comic simile ← hidden analogy ← poetic image
witticism ← epigram ← trouvaille
satire ← social analysis ← allegory
impersonation ← empathy ← illusion
caricature ← schematisation ← stylisation
pun ← word-puzzle ← rhyme
riddle ← problem ← allusion
debunking ← discovering ← revealing
coincidence ← "trigger" ← fate

bathos ← shortcut ← pathos
THE ACT OF CREATION

In this major and long-awaited study Arthur Koestler advances the theory that all creative activities—the conscious and unconscious processes underlying artistic originality, scientific discovery, and comic inspiration—have a basic pattern in common, which he attempts to define. He calls it 'bisociative' thinking—a word he coined to distinguish the various routines of associative thinking from the creative leap which connects previously unconnected frames of reference and makes us experience reality on several planes at once. He also suggests that phenomena analogous to creativity are manifested in various ways on various levels of the animal kingdom, from flatworms to chimpanzees, if the experimenter knows how to look for them. The dog trained by Pavlovian methods is given a little chance to display originality as the human robots of Brave New World. But under appropriate conditions, man and animal are shown to possess unsuspected creative resources.

The problem of creativity is fundamental to the assessment of man's condition. The dominant trend in the last fifty years of academic psychology was to take a view of man which reduced him to the status of a conditioned automaton. 'I believe', Koestler writes, 'that view to be depressingly true—but only up to a point. The argument of this book starts at the point where it ceases to be true. There are two ways of escaping our more or less automatized routines of thinking and behaving. The first is the plunge into dreaming or dream-like states, where the rules of rational thinking are suspended. The other way is also an escape—from boredom, stagnation, intellectual predicaments and emotional frustrations—but an escape in the opposite direction; it is signalled by the spontaneous flash of insight which shows a familiar situation or event in a new light.'

Most of the time man is a slave of his habits. Habit and originality are opposite poles of his nature; Koestler attempts to show that they also reflect basic principles which can be traced in different guises on all levels of the organic hierarchy. In Book One of this volume, 'The art of Discovery and the Discoveries of Art', he analyses the 'bisociative' process—the way the mind of genius works in the sciences and arts. This part is written for the general reader without scientific background. In Book Two, 'Habit and Originality', he supplies the wider, scientific frame-work on which the theory rests; this part presupposes a closer acquaintance with the biological sciences and current trends in experimental psychology. Even here, however, he writes with such lucidity that the reader will be irresistibly led on to follow through his arguments.

To quote from the Foreword of Professor Sir Cyril Burt: 'It is not merely a highly original contribution to present-day psychology. It is also a richly documented study in the history of scientific discovery and an essay in the analysis of literary and artistic creation... Mr. Koestler's book will at once take its place as a classic among recent contributions to the science of the human mind.'
Also by Arthur Koestler

Novels
THE GLADIATORS
DARKNESS AT NOON
ARRIVAL AND DEPARTURE
THIEVES IN THE NIGHT
THE AGE OF LONGING

Autobiography
DIALOGUE WITH DEATH
SCUM OF THE EARTH
ARROW IN THE BLUE
THE INVISIBLE WRITING
THE GOD THAT FAILED (with others)

Essays
THE YOGI AND THE COMMISSAR
INSIGHT AND OUTLOOK
PROMISE AND FULFILMENT
THE TRAIL OF THE DINOSAUR
REFLECTIONS ON HANGING
THE SLEEPWALKERS
THE LOTUS AND THE ROBOT
SUICIDE OF A NATION? (edit.)

Theatre
TWILIGHT BAR
The Act of Creation

ARTHUR KOESTLER

HUTCHINSON OF LONDON
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FOREWORD
BY PROFESSOR SIR CYRIL BURT

From time immemorial the gift of creativity has been venerated almost as if it were divine. There is more than a grain of truth in the romance of old Euhemerus, which relates how the gods and demigods of the ancient myths were really ‘men of pre-eminent accomplishments deified out of flattery or gratitude’. Prometheus, the discoverer of fire, Vulcan, the first of the smiths, Hermes, the inventor of writing, Aesculapius, the founder of the most ancient school of medicine—each was welcomed into the classical Pantheon, much as today an outstanding scientist is elected to the Royal Society. In the Middle Ages the scientific pioneers—the leading alchemists, anatomists, and physicists—were almost as frequently suspected of owing their miraculous knowledge and skill to the devil rather than to the deity. Even as late as the nineteenth century relics of the old superstitious awe still lingered on, translated into the biological jargon of the day. These intellectual prodigies, it was argued, were plainly endowed, not with supernatural, but certainly with superhuman powers: they must therefore be either congenital sports or members of a rare anthropological species. Cynics, like Nordau and Lombroso, retorted that the much-vaunted superman was nothing but an unbalanced pathological freak, suffering from a hypertrophied cerebrum, or else the victim of some mental degeneracy, akin no doubt to the ‘sacred disease’ of epilepsy. ‘After all,’ it was said, ‘who could be more original than a lunatic, and what is more imaginative than a dream?’ Perhaps the so-called genius is just a ‘sleepwalker’ whose dreams have hit upon the truth.

As Mr. Koestler has so clearly indicated in his earlier volumes, in Insight and Outlook, and again in The Sleepwalkers, each of these views—once we have allowed for naïvetés resulting from the system of thought in which it appeared—brings out an important aspect of the problem. It is therefore curious, as he goes on to observe, that not until the close of the nineteenth century were any systematic attempts made
to investigate the matter scientifically. By collecting pedigrees, measuring abilities, and applying statistical techniques, Sir Francis Galton proved, or thought he could prove, that the most important element in genius was simply an exceptionally high degree of the all-round mental capacity which every human being inherits—'general intelligence'. And, reviving a proposal that originated with Plato, he contended that the surest way to manufacture geniuses would be to breed them, much as we breed prize puppies, Derby winners, and pedigree bulls.

Galton, however, in his later years came to lay almost equal stress on certain supplementary qualitites, which he believed were likewise very largely the outcome of innate disposition. Of these 'special aptitudes' the most important was what he called 'fluency'—that is, 'an unusual and spontaneous flow of images and ideas': the creative mind seemed 'always pullulating with new notions'. He added two further characteristics—'receptivity' and 'intuition or insight', i.e. what James has called 'sagacity' and T. S. Eliot 'sense of fact'—characteristics that are said to distinguish the 'useful inventiveness' of the genius from the 'useless fancies of the eccentric and the crank'. McDougall, Galton's most enthusiastic follower, discerned a fourth and still more elusive characteristic which he described as 'productive' or 'deviant association'. (What all these terms really cover is still a problem for intensive inquiry.) And then finally, as they all insist, there is also a motivational ingredient which Galton described by the somewhat ambiguous label—'zeal': the enthusiasm of the genius over his problems keeps him working late into the night long after the clerks and the factory-workers have gone home to their evening relaxations.

Galton's view, or rather the oversimplified version of it which appears in the popular textbooks, has of late been vigorously challenged by psychologists and educationists in America. To begin with, as might be expected in a democracy founded on the thesis that 'all men are created equal', many of them insist that genius is 'not born but made'. 'Give me', said Professor Watson, the apostle of behaviourism, 'half a dozen healthy infants and my own world to bring them up in, and I will guarantee to turn each one of them into any kind of man you please—artist, scientist, captain of industry, soldier, sailor, beggar-man, or thief.' We may willingly grant that without the necessary environment and the appropriate training even those who are most richly endowed by nature will fail to bring their gifts to full fruition. Heredity
at best can provide only the seed; the seed must be planted in suitable soil, tended, watered, and cultivated before it can mature and blossom. But the question then arises—what kind of soil is needed? What sort of a world would Watson have provided? What type of training or what special brand of education can we ourselves supply to develop these latent potentialities to the utmost?

On all these points there is a conflict of doctrine which Mr. Koestler’s arguments should do much to resolve. And there is a further point of disagreement. According to what has been called the British view, and contrary to the traditional notion, the difference between the creative genius and the plain man is not qualitative but merely quantitative: the so-called genius owes his outstanding achievements merely to the fortunate concurrence of a variety of factors, partly innate and partly environmental, all quite ordinary in themselves, but in his case developed to an exceptional degree. During the past few years, however, an alternative view has been put forward in America, which maintains that there are two distinct types of intellectual ability, differing not in degree but in kind. The commoner intelligence tests, it is argued—those, for example, which are in regular use in our 11-plus examination—measure only one rather superficial type of ability. There is a second, which Professor Guilford, as a result of his researches on ‘high-level personnel’, has suggested should be christened ‘creativity’; and this in his opinion is ‘far more fundamental’. As to what exactly is the nature of this second capacity we are still left rather in the dark. If you look up this useful word in the earlier editions of the Oxford English Dictionary you will fail to find it; and yet during the last two or three years it has attained something of the status of a glamour term among both English and American educationists.

At the moment, therefore, the views of professional psychologists regarding ‘the act of creation’ seem mainly to be in a state of bewildered confusion; and there is a crying need for an entirely fresh examination of the subject from top to bottom. However, psychologists are by no means the only people to maintain that ‘creativity’ (or whatever we like to term it) is in some sense or other an ‘individual property’. In most civilized countries the importance attached to its results has been recognized by the laws of patent and of copyright. Both in war and in peace rewards have been offered and bestowed for what are known as ‘original inventions’. And the various legal arguments to which these proprietary rights have led may furnish some preliminary notion of what such phrases are intended to convey. First, there must be the
basic idea or conception; secondly, the idea must be embodied in concrete and articulate form—a literary, musical, or dramatic work, the specifications for a machine, a manufacturing process, or a material product; thirdly, the outcome as thus embodied must be new; and finally—a point which, curiously enough, is often forgotten in psychological and educational discussions—it must have value; the novelty must be a useful novelty.

If there is such a thing as creativity as thus defined, then it is clear that civilization must owe much, if not everything, to the individuals so gifted. The greater the number and variety of genuinely creative minds a nation can produce and cultivate, the faster will be its rate of progress. However, the pastime of debunking the ‘cult of great men’, which became so popular when Spencer and Buckle were laying the foundations of social and political theory, has once again become fashionable; and in these egalitarian days it requires some courage to pick up a pen and defend the concept of ‘creative genius’ against the onslaughts of the scientific sceptic. It is, so the critics assure us, not the gifted individual, but the spirit of the age and the contemporary trends of society—what Goethe called the _Zeitgeist_—that deserve the credit for these cumulative achievements: had Julius Caesar’s grand-nephew succumbed to the illness which dogged his early youth, another son of Rome would have reorganized the State, borne the proud title of Augustus, and been duly deified. Had Copernicus, Kepler, and Newton fallen victims to the plague, one of their contemporaries would sooner or later have hit upon the scientific laws now coupled with their names. Certainly, _Aut Caesar aut nullus_ is not an axiom to which the modern historian would subscribe either in these or any other instances. Yet to build up an empire on the ruins of a republic, to devise the theories which govern modern astronomy, would still have needed the vigour and the brain of an individual genius. And can anyone believe that, if William Shakespeare, like his elder sisters, had died in the cradle, some other mother in Stratford-upon-Avon or Stratford-atte-Bow would have engendered his duplicate before the Elizabethan era ended?

However, it is scarcely profitable to discuss the relative importance of genetic constitution and social environment until we have first determined in what precisely the ‘act of creation’ really consists. Here, as it seems to me, is one of the greatest gaps in the psychology of today. It is not an issue that can be satisfactorily solved by the tools and techniques which present-day psychologists commonly employ—
mental testing, experimental research, planned observations on men and animals. What is really needed is a systematic study carried out by one of those rare individuals who himself happens to possess this peculiar gift of creativity. And here, I venture to suggest, Mr. Koestler enjoys an advantage which few, if any, of the professional psychologists who have touched upon the subject can genuinely claim. This does not mean that the book is just based on the author's 'introspective reflections' about his methods of working as an essayist or novelist; on the contrary, he has been at pains to keep personal introspection, as the phrase is commonly understood, out of his chapters. The ground which he has covered and the evidence which he offers for his main conclusions are very much wider and more varied. He has in fact undertaken a new and comprehensive analysis of the whole problem; and is, so I believe, the first to make such an attempt.

The impartial reader will scarcely need any independent witness to testify in advance that Mr. Koestler is admirably equipped for the task. Although most widely known as a creative artist in the field of general literature, he received his early training as a scientist at the University of Vienna. In the course of travels in both hemispheres he has visited most of the more progressive places of learning where psychological research is being carried out. His knowledge of the relevant literature, both psychological and non-psychological, is unusually extensive and fully up to date. Moreover, he has enjoyed the intimate friendship of some of the most original investigators in contemporary branches of science, from nuclear physics to experimental neurology; and he has thus been able to watch the daily workings of their minds.

He begins with human creativity as exemplified in art, science, and literature; and to these fascinating topics the first half of his book is devoted. But he holds that creativity is by no means a peculiarly human gift; it is merely the highest manifestation of a phenomenon which is discernible at each successive level of the evolutionary hierarchy, from the simplest one-celled organism and the fertilized egg to the adult man and the highest human genius. It is, to adopt his phraseology, an 'actualization of surplus potentials'—of capacities, that is to say, which are untapped or dormant under ordinary conditions, but which, when the conditions are abnormal or exceptional, reveal themselves in original forms of behaviour. This 'actualization' he seeks to trace through morphogenesis, neurogenesis, and regeneration, and the various departures from simple instinctive behaviour in lowlier
creatures, up to the more 'insightful' forms of learning and of problem-solving exhibited by animals and man. At every stage, so he maintains, much the same 'homologue principles', derived from the hierarchical nature of the basic part-whole relation, can be seen to operate. This is of necessity the most technical and the most controversial part of his work, but it is also the most original and illuminating. The outcome is a wide and an entirely novel synthesis; and Mr. Koestler's book will at once take its place as a classic among recent contributions to the science of the human mind.

Technicalities are unavoidable, particularly when we pass from first-hand observation to explanatory interpretations couched in precise biological, neurological, or psychological terms. Mr. Koestler has overcome the problem by relegating the more erudite and speculative parts of his exposition to the second half of his book; and in his prefatory remarks he suggests that those who feel more at home in the Arts and Humanities than in the Sciences can skip the more technical chapters. I hope, however, that all such readers will disregard this advice as merely a symptom of the author's own modesty. Psychology, more than any other branch of study, requires us to break down the barriers between the two cultures. In my youth psychology was regarded as a department of philosophy; and in my own university the only way of studying it was by registering as an Arts student and taking a degree in what were traditionally styled the Humaner Letters. But the true student of humanity must study, not the Humanities only, but the relevant branches of science as well. However, I suspect that my advice will turn out to be superfluous: most readers on reaching the end of Book One will find themselves so intrigued that they will be unable to resist pushing on to the next.

On the other hand, the specialist may perhaps feel tempted to turn to the second half first of all: for, now that the pendulum has swung in the opposite direction, the royal road to psychology usually starts from elementary science. And, since the science taught in the preliminary stages is not only elementary but too often out of date, the intending psychologist is still more severely penalized. A scientific training may suffice for studying the behaviour of rats and robots. The student of human nature is nowadays too apt to forget that most of what we know about the mind of man is to be learnt from the writings not of scientists but of men of letters—the poets and the philosophers, the biographers and the historians, the novelists and the literary critics. I tell my own students to read Pope's Essay on Man as
well as Skinner's textbook on *Science and Human Behaviour*. But
indeed the modern psychologist, like the youthful Bacon, needs to
'take all knowledge for his province'.

Many of those who find Mr. Koestler's arguments completely
convincing on all essential points may nevertheless be inclined, as I
myself, to query minor details here and there. My own hesitations
arise, not so much from definable objections, but rather from doubts
requiring further information or factual evidence which is at present
unobtainable. Indeed, the most valuable feature of Mr. Koestler's book
is that it suggests so many problems and provisional hypotheses for
direct scientific inquiry in a deplorably neglected field. In particular it
would be highly instructive to note how far the views he has independ-
dently reached resemble those already outlined, in their own cum-
bersome language, by earlier British writers such as Bain, Ward,
Stout, and McDougall, and, more important still, where precisely they
differ.

Meanwhile, his theory of the creative process carries with it a
number of practical corollaries of first importance to the teacher and
the social and educational reformer. Most of the earlier discussions of
creativity were based on accounts of the intellectual processes of
creative adults. It is, however, with the work of children in our
schools that we ought really to begin. Viewed in the light of Mr.
Koestler's analysis, three salient questions call urgently for special
investigation. How can we best detect the individuals who are en-
dowed by nature with creative ability of this or that specific type?
How are they to be trained and educated? And what are the existing
social and scholastic barriers which hide or hinder the emergence of
creative talent? Educational psychologists have of late woken up to
the fact that the kind of examinations and intelligence tests which they
still habitually employ tend to select the efficient learner and the
verbal reasoner rather than intuitive observers or constructive and
critical thinkers. With most of the mechanically scored tests handed
out year by year, the child who gives an original answer, or hits on an
alternative solution which the psychologist has missed (by no means
a rare occurrence), is automatically marked wrong. Even when by
some happy chance our methods of selection have picked out a
potential inventor or a budding genius, we still have no notion how he
should be encouraged and instructed so as to develop to the utmost
his unusual latent powers. The problem has at last been recognized;
but the remedy is still to seek. During the past year or two there have
been an increasing number of conferences and papers, especially in the United States, devoted to 'the identification of creative individuals' and 'the cultivation of creative talents'. There has, too, been a small but growing amount of experimental research. Nevertheless, apart from a few unconvincing speculations, varying with the prepossessions of each writer, there is as yet no sound psychological basis either for the theorist or the practitioner. Mr. Koestler's eclectic survey is thus as timely in its appearance as it is far-reaching in its implications. It supplies a fertile set of premisses from which the practical teacher as well as the psychological research-worker can reap a rich harvest of fruitful ideas.

But his book is not merely a highly original contribution to present-day psychology. It is also a richly documented study in the history of scientific discovery and an essay in the analysis of literary and artistic creation. It will, therefore, present an irresistible challenge, and should appeal, not only to psychological or educational specialists, but also to every cultivated reader who is interested in 'the proper study of mankind'.
AUTHOR'S PREFACE

The first part of this book proposes a theory of the act of creation—of the conscious and unconscious processes underlying scientific discovery, artistic originality, and comic inspiration. It endeavours to show that all creative activities have a basic pattern in common, and to outline that pattern.

The aim of Book Two is to show that certain basic principles operate throughout the whole organic hierarchy—from the fertilized egg to the fertile brain of the creative individual; and that phenomena analogous to creative originality can be found on all levels.

Anyone who writes on a complex subject must learn that he cannot aim one arrow at two targets. Book One is aimed at the general reader; some of the chapters in Book Two presuppose a closer acquaintance with current trends in biology and experimental psychology, and are rather technical. There is an unavoidable difference in style between the two parts: in the first I avoided pedantry at the cost of occasional lapses into a loose terminology; in the second this was not possible. Readers who find certain passages in the second part too technical can safely skip them and pick up the thread later on without losing sight of the general idea. Its leitmotifs are restated on various levels throughout the book.

It may seem a presumptuous undertaking to inquire into the biological origins of mental creativity when we are still unable to define the chemistry of a simple muscle twitch. But often in the history of ideas we find two opposite methods at work: the 'downward' approach from the complex to the elementary, from the whole to its component parts, and the 'upward' approach from part to whole. The emphasis on either of these methods may alternate according to philosophical fashion, until they meet and merge in a new synthesis. It would have been as impossible to build theoretical physics on a foundation of its elementary particles (which turn out to be more and more baffling) as it has proved impossible to build a theory of psychology on 'elementary reflexes' and 'atoms of behaviour'. Vice versa, without the
assumption that complex matter consisted of atomic parts, whatever they are, physics and chemistry could not have evolved.

I have tried to combine both methods by choosing as my starting point a phenomenon which is at the same time complex and simple, in which a subtle intellectual process is signalled by a gross physiological reflex: the phenomenon of laughter. Humour is an elusive thing, so is the rainbow; yet the study of coloured spectra provided clues to the elementary structure of matter.

A preliminary outline of this theory was published in 1949 under the title *Insight and Outlook*. It was intended as the first of two volumes, and its preface contained the optimistic sentence: ‘Volume Two is in preparation and will, it is hoped, appear twelve months after the first.’

The twelve months have grown into fifteen years. Partly because I became involved with other subjects; but mainly because I felt dissatisfied with that first attempt, and felt the need to base the theory on a broader foundation. I kept returning to it in between other books, but each time the broadening process necessitated an excursion into some related field and, as often happens, these excursions acquired a momentum of their own. One chapter on ‘man’s changing vision of the universe’ grew into a separate book of more than six hundred pages;¹ so did another chapter, on Eastern mysticism.² And when at last I felt ready to write that long-postponed second volume I found that I had to scrap the first and begin again at the beginning. The whole theoretical framework had to be revised and even the terminology changed. Readers acquainted with *Insight and Outlook* will notice, however, that I have taken over, or paraphrased, passages from it which seem to have weathered the time; to avoid tedium I have omitted quotation marks. I have also incorporated into the text extracts from lectures given at English and American universities, with the kind permission of the authorities concerned.

Summaries appear at irregular intervals at the ends of chapters or sections where I felt that they might be helpful. Asterisks refer to text notes, index numbers to source references.

I have no illusions about the prospects of the theory I am proposing: it will suffer the inevitable fate of being proven wrong in many, or most, details, by new advances in psychology and neurology. What I am hoping for is that it will be found to contain a shadowy pattern of truth, and that it may stimulate those who search for unity in the diverse manifestations of human thought and emotion.
I am deeply indebted to Professor Sir Cyril Burt, and to Professor Holger Hyden, University of Gothenburg, for reading the manuscript, for their corrections, criticisms and encouragement; to Professor Dennis Gabor, Imperial College, London, Dr. Alan McGlashan, St. George's Hospital, and Professor Michael Polanyi, Oxford, for many stimulating discussions on the subject of this book. My grateful thanks are further due to Dr. J. D. Cowan, Imperial College, for his criticism from the standpoint of Communication Theory; to Dr. Rodney Maliphant for surveying the literature on the psycho-physiology of weeping; to Dr. Christopher Wallis for compiling a bibliography on the same subject; and to Miss Edith Horsley for her patient and careful editorial work.

London, December 1963
BOOK ONE

THE ART OF DISCOVERY
AND THE DISCOVERIES OF ART

PART ONE

THE JESTER
I

THE LOGIC OF LAUGHTER

The Triptych

The three panels of the rounded triptych shown on the frontispiece indicate three domains of creativity which shade into each other without sharp boundaries: Humour, Discovery, and Art. The reason for this seemingly perverse order of arrangement—the Sage flanked by the Jester and the Artist on opposite sides—will become apparent as the argument unfolds.

Each horizontal line across the triptych stands for a pattern of creative activity which is represented on all three panels; for instance: comic comparison—objective analogy—poetic image. The first is intended to make us laugh; the second to make us understand; the third to make us marvel. The logical pattern of the creative process is the same in all three cases; it consists in the discovery of hidden similarities. But the emotional climate is different in the three panels: the comic simile has a touch of aggressiveness; the scientist’s reasoning by analogy is emotionally detached, i.e. neutral; the poetic image is sympathetic or admiring, inspired by a positive kind of emotion. I shall try to show that all patterns of creative activity are tri-valent: they can enter the service of humour, discovery, or art; and also, that as we travel across the triptych from left to right, the emotional climate changes by gradual transitions from aggressive to neutral to sympathetic and identificatory—or, to put it another way, from an absurd through an abstract to a tragic or lyric view of existence. This may look like a basketful of wild generalizations but is meant only as a first indication of the direction in which the inquiry will move.

The panels on the diagram meet in curves to indicate that there are no clear dividing lines between them. The fluidity of the boundaries between Science and Art is evident, whether we consider Architecture, Cooking, Psychotherapy, or the writing of History. The mathematician talks of ‘elegant’ solutions, the surgeon of a ‘beautiful’
operation, the literary critic of ‘two-dimensional’ characters. Science
is said to aim at Truth, Art at Beauty; but the criteria of Truth (such
as verifiability and refutability) are not as clean and hard as we tend to
believe, and the criteria of Beauty are, of course, even less so. A glance
at the chart on p. 332 will indicate that we can arrange neighbouring
provinces of science and art in series which show a continuous gradient
from ‘objective’ to ‘subjective’, from ‘verifiable truth’ to ‘aesthetic
experience’. One gradient, for instance, leads from the so-called exact
sciences like chemistry through biochemistry to biology, then through
medicine—which is, alas, a much less exact science—to psychology,
through anthropology to history, through biography to the biographi-
cal novel, and so on into the abyss of pure fiction. As we move along
the sloping curve, the dimension of ‘objective verifiability’ is seen to
diminish steadily, and the intuitive or aesthetic dimension to increase.
Similar graded series lead from construction engineering through
architecture and interior design to the hybrid ‘arts and crafts’ and
finally to the representative arts; here one variable of the curve could
be called ‘utility’, the second ‘beauty’. The point of this game is to
show that regardless of what scale of values you choose to apply, you
will move across a continuum without sharp breaks; there are no
frontiers where the realm of science ends and that of art begins, and
the _uomo universale_ of the Renaissance was a citizen of both.

On the other side of the triptych the boundaries between discovery
and comic invention are equally fluid—as the present chapter will show
—although at first sight this is less obvious to see. That the Jester
should be brother to the Sage may sound like blasphemy, yet our
language reflects the close relationship: the word ‘witticism’ is derived
from ‘wit’ in its original sense of ingenuity, inventiveness.* Jester and
savant must both ‘live on their wits’; and we shall see that the Jester’s
riddles provide a useful back-door entry, as it were, into the inner
workshop of creative originality.

_The Laughter Reflex_

Laughter is a reflex. The word reflex, as Sir Charles Sherrington said,
is a useful fiction. However much its definitions and connotations
differ according to various schools—it has in fact been the central
battleground of psychology for the last fifty years—no one is likely
to quarrel with the statement that we are the more justified to call an
organism's behaviour 'reflex' the more it resembles the action of a mechanical slot-machine; that is to say, the more instantaneous, predictable, and stereotyped it is. We may also use the synonyms 'automatic', 'involuntary', etc., which some psychologists dislike; they are in fact implied in the previous sentence.

Spontaneous laughter is produced by the co-ordinated contraction of fifteen facial muscles in a stereotyped pattern and accompanied by altered breathing. The following is a description abridged from Sully's classic essay on the subject.

Smiling involves a complex group of facial movements. It may suffice to remind the reader of such characteristic changes as the drawing back and slight lifting of the corners of the mouth, the raising of the upper lip, which partially uncovers the teeth, and the curving of the furrows betwixt the corners of the mouth and the nostrils (the naso-labial furrows). To these must be added the formation of wrinkles under the eye, which is a further result of the first movement . . . and the increased brightness of the eyes.

These facial changes are common to the smile and the laugh, though in the more violent forms of laughter the eyes are apt to lose under their lachrymal suffusion the sparkle which the smile brings.

We may now pass to the larger experience of the audible laugh. That this action is physiologically continuous with the smile has already been suggested. . . . How closely connected are smiling and moderate laughing may be seen by the tendency we experience when we reach the broad smile and the fully open mouth to start the respiratory movements of laughter. As Darwin and others have pointed out, there is a series of gradations from the faintest and most decorous smile up to the full explosion of the laugh.

. . . The series of gradations here indicated is gone through, more or less rapidly, in an ordinary laugh. . . . The recognition of this identity of the two actions is evidenced by the usages of speech. We see in the classical languages a tendency to employ the same word for the two. . . . This is particularly clear in the case of the Latin ridere, which means to smile as well as to laugh, the form subridere being rare (Italian, ridere and sorridere; French rire and sourire; German lachen and lachen).

We may now turn to the distinguishing characteristics of laughing; that is, the production of the familiar series of sounds. . . .
But these do not concern us yet. The point to retain is the continuity of the scale leading from the faint smile to Homeric laughter, confirmed by laboratory experiments. Electrical stimulation of the zygomatic major, the main lifting muscle of the upper lip, with currents of varying intensity, produces expressions ranging from smile to broad grin to the facial contortions typical of loud laughter. Other researchers made films of tickled babies and of hysterics to whom tickling was conveyed by suggestion. They again showed the reflex swiftly increasing from the first faint facial contraction to paroxysms of shaking and choking—as the quicksilver in a thermometer, dipped into hot water, rapidly mounts to the red mark.

These gradations of intensity not only demonstrate the reflex character of laughter but at the same time provide an explanation for the rich variety of its forms—from Rabelaisian laughter at a spicy joke to the rarefied smile of courtesy. But there are additional reasons to account for this confusing variety. Reflexes do not operate in a vacuum; they are to a greater or lesser extent interfered with by higher nervous centres; thus civilized laughter is rarely quite spontaneous. Amusement can be feigned or suppressed; to a faint involuntary response we may add at will a discreet chuckle or a leonine roar; and habit-formation soon crystallizes these reflex-plus-pretence amalgams into characteristic properties of a person.

Furthermore, the same muscle contractions produce different effects according to whether they expose a set of pearly teeth or a toothless gap—producing a smile, a simper, or smirk. Mood also superimposes its own facial pattern—hence gay laughter, melancholy smile, lascivious grin. Lastly, contrived laughter and smiling can be used as a conventional signal-language to convey pleasure or embarrassment, friendliness or derision. We are concerned, however, only with spontaneous laughter as a specific response to the comic; regarding which we can conclude with Dr. Johnson that ‘men have been wise in very different modes; but they have always laughed in the same way’.

The Paradox of Laughter

I have taken pains to show that laughter is, in the sense indicated above, a true reflex, because here a paradox arises which is the starting point of our inquiry. Motor reflexes, usually exemplified in textbooks by
knee-jerk or pupillary contraction, are relatively simple, direct responses to equally simple stimuli which, under normal circumstances, function autonomously, without requiring the intervention of higher mental processes; by enabling the organism to counter disturbances of a frequently met type with standardized reactions, they represent eminently practical arrangements in the service of survival. But what is the survival value of the involuntary, simultaneous contraction of fifteen facial muscles associated with certain noises which are often irreplaceable? Laughter is a reflex, but unique in that it serves no apparent biological purpose; one might call it a luxury reflex. Its only utilitarian function, as far as one can see, is to provide temporary relief from utilitarian pressures. On the evolutionary level where laughter arises, an element of frivolity seems to creep into a humourless universe governed by the laws of thermodynamics and the survival of the fittest.

The paradox can be put in a different way. It strikes us as a reasonable arrangement that a sharp light shone into the eye makes the pupil contract, or that a pin stuck into one's foot causes its instant withdrawal—because both the 'stimulus' and the 'response' are on the same physiological level. But that a complicated mental activity like the reading of a page by Thurber should cause a specific motor response on the reflex level is a lopsided phenomenon which has puzzled philosophers since antiquity.

There are, of course, other complex intellectual and emotional activities which also provoke bodily reactions—frowning, yawning, sweating, shivering, what have you. But the effects on the nervous system of reading a Shakespeare sonnet, working on a mathematical problem, or listening to Mozart are diffuse and indefinable. There is no clear-cut predictable response to tell me whether a picture in the art gallery strikes another visitor as 'beautiful'; but there is a predictable facial contraction which tells me whether a caricature strikes him as 'comic'.

*Humour is the only domain of creative activity where a stimulus on a high level of complexity produces a massive and sharply defined response on the level of physiological reflexes.* This paradox enables us to use the response as an indicator for the presence of that elusive quality, the comic, which we are seeking to define—as the tell-tale clicking of the geiger-counter indicates the presence of radioactivity. And since the comic is related to other, more exalted, forms of creativity, the back-door approach promises to yield some positive results. We all know that there is only one step from the sublime to the ridiculous; the more
surprising that Psychology has not considered the possible gains which could result from the reversal of that step.

The bibliography of Greig’s *Psychology of Laughter and Comedy*, published in 1923, mentioned three hundred and sixty-three titles of works bearing partly or entirely on the subject—from Plato and Aristotle to Kant, Bergson, and Freud. At the turn of the century T. A. Ribot summed up these attempts at formulating a theory of the comic: ‘Laughter manifests itself in such varied and heterogeneous conditions ... that the reduction of all these causes to a single one remains a very problematical undertaking. After so much work spent on such a trivial phenomenon, the problem is still far from being completely explained.’ This was written in 1896; since then only two new theories of importance have been added to the list: Bergson’s *Le Rire* and Freud’s *Wit and its Relations to the Unconscious*. I shall have occasion to refer to them.*

The difficulty lies evidently in the enormous range of laughter-producing situations—from physical tickling to mental titillation of the most varied kinds. I shall try to show that there is unity in this variety; that the common denominator is of a specific and specifiable pattern which is of central importance not only in humour but in *all domains of creative activity*. The bacillus of laughter is a bug difficult to isolate; once brought under the microscope, it will turn out to be a yeast-like, universal ferment, equally useful in making wine or vinegar, and raising bread.

*The Logic of Laughter: A First Approach*

Some of the stories that follow, including the first, I owe to my late friend John von Neumann, who had all the makings of a humorist: he was a mathematical genius and he came from Budapest.

Two women meet while shopping at the supermarket in the Bronx. One looks cheerful, the other depressed. The cheerful one inquires:

‘What’s eating you?’
‘Nothing’s eating me.’
‘Death in the family?’
‘No, God forbid!’
‘Worried about money?’
‘No . . . nothing like that.’
‘Trouble with the kids?’
‘Well, if you must know, it’s my little Jimmy.’
‘What’s wrong with him, then?’
‘Nothing is wrong. His teacher said he must see a psychiatrist.’
Pause. ‘Well, well, what’s wrong with seeing a psychiatrist?’
‘Nothing is wrong. The psychiatrist said he’s got an Oedipus complex.’
Pause. ‘Well, well, Oedipus or Shmoedipus, I wouldn’t worry so long as he’s a good boy and loves his mamma.’

The next one is quoted in Freud’s essay on the comic.

Chamfort tells a story of a Marquis at the court of Louis XIV who, on entering his wife’s boudoir and finding her in the arms of a Bishop, walked calmly to the window and went through the motions of blessing the people in the street.
‘What are you doing?’ cried the anguished wife.
‘Monseigneur is performing my functions,’ replied the Marquis, ‘so I am performing his.’

Both stories, though apparently quite different and in their origin more than a century apart, follow in fact the same pattern. The Chamfort anecdote concerns adultery; let us compare it with a tragic treatment of that subject—say, in the Moor of Venice. In the tragedy the tension increases until the climax is reached: Othello smothers Desdemona; then it ebbs away in a gradual catharsis, as (to quote Aristotle) ‘horror and pity accomplish the purgation of the emotions’ (see Fig. 1, a, on next page).

In the Chamfort anecdote, too, the tension mounts as the story progresses, but it never reaches its expected climax. The ascending curve is brought to an abrupt end by the Marquis’ unexpected reaction, which debunks our dramatic expectations; it comes like a bolt out of the blue, which, so to speak, decapitates the logical development of the situation. The narrative acted as a channel directing the flow of emotion; when the channel is punctured the emotion gushes out like a liquid through a burst pipe; the tension is suddenly relieved and exploded in laughter (Fig. 1, b):
I said that this effect was brought about by the Marquis' unexpected reaction. However, unexpectedness alone is not enough to produce a comic effect. The crucial point about the Marquis' behaviour is that it is both unexpected and perfectly logical—but of a logic not usually applied to this type of situation. It is the logic of the division of labour, the quid pro quo, the give and take; but our expectation was that the Marquis' actions would be governed by a different logic or code of behaviour. It is the clash of the two mutually incompatible codes, or associative contexts, which explodes the tension.

In the Oedipus story we find a similar clash. The cheerful woman's statement is ruled by the logic of common sense: if Jimmy is a good boy and loves his mamma there can't be much wrong. But in the context of Freudian psychiatry the relationship to the mother carries entirely different associations.

The pattern underlying both stories is the perceiving of a situation or idea, \( L \), in two self-consistent but habitually incompatible frames of reference, \( M_1 \) and \( M_2 \) (Fig. 2). The event \( L \), in which the two intersect, is made to vibrate simultaneously on two different wavelengths, as it were. While this unusual situation lasts, \( L \) is not merely linked to one associative context, but bisociated with two.

I have coined the term 'bisociation' in order to make a distinction between the routine skills of thinking on a single 'plane', as it were, and the creative act, which, as I shall try to show, always operates on
more than one plane. The former may be called single-minded, the latter a double-minded, transitory state of unstable equilibrium where the balance of both emotion and thought is disturbed. The forms which this creative instability takes in science and art will be discussed later; first we must test the validity of these generalizations in other fields of the comic.

At the time when John Wilkes was the hero of the poor and lonely, an ill-wisher informed him gleefully: ‘It seems that some of your faithful supporters have turned their coats.’ ‘Impossible,’ Wilkes answered. ‘Not one of them has a coat to turn.’

In the happy days of La Ronde, a dashing but penniless young Austrian officer tried to obtain the favours of a fashionable courtesan. To shake off this unwanted suitor, she explained to him that her heart was, alas, no longer free. He replied politely: ‘Mademoiselle, I never aimed as high as that.’

‘High’ is bisociated with a metaphorical and with a topographical context. The coat is turned first metaphorically, then literally. In both stories the literal context evokes visual images which sharpen the clash.

A convict was playing cards with his gaolers. On discovering that he cheated they kicked him out of gaol.

This venerable chestnut was first quoted by Schopenhauer and has since been roasted over and again in the literature of the comic. It can be analysed in a single sentence: two conventional rules (‘offenders are punished by being locked up’ and ‘cheats are punished by being kicked out’), each of them self-consistent, collide in a given situation—as the ethics of the quid pro quo and of matrimony collide in the Chamfort story. But let us note that the conflicting rules were merely implied in the text; by making them explicit I have destroyed the story’s comic effect.

Shortly after the end of the war a memorable statement appeared in a fashion article in the magazine Vogue:

Belsen and Buchenwald have put a stop to the too-thin woman age, to the cult of undernourishment.
It makes one shudder, yet it is funny in a ghastly way, foreshadowing the 'sick jokes' of a later decade. The idea of starvation is bi-
sociated with one tragic, and another, utterly trivial context. The
following quotation from *Time* magazine\(^6\) strikes a related chord:

**REVISED VERSION**

Across the first page of the Christmas issue of the *Catholic Universe
Bulletin*, Cleveland's official Catholic diocesan newspaper, ran this
eight-column banner head:

'It's a boy in Bethlehem.

Congratulations God—congratulations Mary—congratulations
Joseph.'

Here the frames of reference are the sacred and the vulgarly profane. A technically neater version—if we have to dwell on blasphemy
—is the riposte which appeared, if I remember rightly, in the *New
Yorker*:

'We wanted a girl.'

The samples discussed so far all belong to the class of jokes and
anecdotes with a single point of culmination. The higher forms of
sustained humour, such as the satire or comic poem, do not rely on
a single effect but on a series of minor explosions or a continuous state
of mild amusement. Fig. 3 is meant to indicate what happens when a

![Figure 3](image-url)
humorous narrative oscillates between two frames of reference—say, the romantic fantasy world of Don Quixote and Sancho’s cunning horse-sense.

Matrices and Codes

I must now try the reader’s patience with a few pages (seven, to be exact) of psychological speculation in order to introduce a pair of related concepts which play a central role in this book and are indispensable to all that follows. I have variously referred to the two planes in Figs. 2 and 3 as ‘frames of reference’, ‘associative contexts’, ‘types of logic’, ‘codes of behaviour’, and ‘universes of discourse’. Henceforth I shall use the expression ‘matrices of thought’ (and ‘matrices of behaviour’) as a unifying formula. I shall use the word ‘matrix’ to denote any ability, habit, or skill, any pattern of ordered behaviour governed by a ‘code’ of fixed rules. Let me illustrate this by a few examples on different levels.

The common spider will suspend its web on three, four, and up to twelve handy points of attachment, depending on the lie of the land, but the radial threads will always intersect the laterals at equal angles, according to a fixed code of rules built into the spider’s nervous system; and the centre of the web will always be at its centre of gravity. The matrix—the web-building skill—is flexible: it can be adapted to environmental conditions; but the rules of the code must be observed and set a limit to flexibility. The spider’s choice of suitable points of attachment for the web are a matter of strategy, depending on the environment, but the form of the completed web will always be polygonal, determined by the code. The exercise of a skill is always under the dual control (a) of a fixed code of rules (which may be innate or acquired by learning) and (b) of a flexible strategy, guided by environmental pointers—the ‘lie of the land’.

As the next example let me take, for the sake of contrast, a matrix on the lofty level of verbal thought. There is a parlour game where each contestant must write down on a piece of paper the names of all towns he can think of starting with a given letter—say, the letter ‘L’. Here the code of the matrix is defined by the rule of the game; and the members of the matrix are the names of all towns beginning with ‘L’ which the participant in question has ever learned, regardless whether at the moment he remembers them or not. The task before him is to fish these names out of his memory. There are various strategies for
doing this. One person will imagine a geographical map, and then scan 
this imaginary map for towns with ‘L’, proceeding in a given direction 
—say west to east. Another person will repeat sub-vocally the syllables 
Li, La, Lo, as if striking a tuning fork, hoping that his memory circuits 
(Lincoln, Lisbon, etc.) will start to ‘vibrate’ in response. His strategy 
determines which member of the matrix will be called on to perform, 
and in which order. In the spider’s case the ‘members’ of the matrix 
were the various sub-skills which enter into the web-building skill: 
the operations of secreting the thread, attaching its ends, judging the 
angles. Again, the order and manner in which these enter into action 
is determined by strategy, subject to the ‘rules of the game’ laid down 
by the web-building code.

All coherent thinking is equivalent to playing a game according to a 
set of rules. It may, of course, happen that in the course of the parlour 
game I have arrived via Lagos in Lisbon, and feel suddenly tempted to 
dwell on the pleasant memories of an evening spent at the night-club 
La Cucaracha in that town. But that would be ‘not playing the game’, 
and I must regretfully proceed to Leeds. Drifting from one matrix to 
another characterizes the dream and related states; in the routines of 
disciplined thinking only one matrix is active at a time.

In word-association tests the code consists of a single command, for 
instance ‘name opposites’. The subject is then given a stimulus word— 
say, ‘large’—and out pops the answer: ‘small’. If the code had been 
‘synonyms’, the response would have been ‘big’ or ‘tall’, etc. Associa-
tion tests are artificial simplifications of the thinking process; in actual 
reasoning the codes consist of more or less complex sets of rules and 
sub-rules. In mathematical thinking, for instance, there is a great array 
of special codes, which govern different types of operations; some of 
these are hierarchically ordered, e.g. addition—multiplication—ex-
ponential function. Yet the rules of these very complex games can 
be represented in ‘coded’ symbols: $x + y$, or $x \cdot y$ or $x^y$ or $x \sqrt{y}$, the 
sight of which will ‘trigger off’ the appropriate operation—as 
reading a line in a piano score will trigger off a whole series of very 
complicated finger-movements. Mental skills such as arithmetical 
operations, motor skills such as piano-playing or touch-typing, tend 
to become with practice more or less automatized, pre-set routines, 
which are triggered off by ‘coded signals’ in the nervous system— 
as the trainer’s whistle puts a performing animal through its paces.

This is perhaps the place to explain why I have chosen the ambiguous 
word ‘code’ for a key-concept in the present theory. The reason is
precisely its nice ambiguity. It signifies on the one hand a set of rules which must be obeyed—like the Highway Code or Penal Code; and it indicates at the same time that it operates in the nervous system through ‘coded signals’—like the Morse alphabet—which transmit orders in a kind of compressed ‘secret language’. We know that not only the nervous system but all controls in the organism operate in this fashion (starting with the fertilized egg, whose ‘genetic code’ contains the blue-print of the future individual. But that blue-print in the cell nucleus does not show the microscopic image of a little man; it is ‘coded’ in a kind of four-letter alphabet, where each letter is represented by a different type of chemical molecule in a long chain; see Book Two, I).*

Let us return to reasoning skills. Mathematical reasoning is governed by specific rules of the game—multiplication, differentiation, integration, etc. Verbal reasoning, too, is subject to a variety of specific codes: we can discuss Napoleon’s defeat at Waterloo ‘in terms of’ (a) historic significance, (b) military strategy, (c) the condition of his liver, (d) the constellation of the planets. We can call these ‘frames of reference’ or ‘universes of discourse’ or ‘associative contexts’—expressions which I shall frequently use to avoid monotonous repetitions of the word ‘matrix’. The jokes in the previous section can all be described as universes of discourse colliding, frames getting entangled, or contexts getting confused. But we must remember that each of these expressions refers to specific patterns of activity which, though flexible, are governed by sets of fixed rules.

A chess player looking at an empty board with a single bishop on it does not see the board as a uniform mosaic of black and white squares, but as a kind of magnetic field with lines of force indicating the bishops’ possible moves: the board has become patterned, as in Fig. 4 a; Fig. 4 b shows the pattern of the rook.

When one thinks of ‘matrices’ and ‘codes’ it is sometimes helpful to bear these figures in mind. The matrix is the pattern before you, representing the ensemble of permissible moves. The code which governs the matrix can be put into simple mathematical equations which contain the essence of the pattern in a compressed, ‘coded’ form; or it can be expressed by the word ‘diagonals’. The code is the fixed, invariable factor in a skill or habit; the matrix its variable aspect. The two words do not refer to different entities, they refer to different aspects of the same activity. When you sit in front of the chessboard your code is the rule of the game determining which moves are permitted, your
matrix is the total of possible choices before you. Lastly, the choice of
the actual move among the variety of permissible moves is a matter
of strategy, guided by the lie of the land—the ‘environment’ of other
chessmen on the board. We have seen that comic effects are produced
by the sudden clash of incompatible matrices: to the experienced chess
player a rook moving bishopwise is decidedly ‘funny’.

Consider a pianist playing a set-piece which he has learned by heart.
He has incomparably more scope for ‘strategy’ (tempo, rhythm,
phrasing) than the spider spinning its web. A musician transposing a
tune into a different key, or improvising variations of it, enjoys even
greater freedom; but he too is still bound by the codes of the diatonic
or chromatic scale. Matrices vary in flexibility from reflexes and more
or less automatized routines which allow but a few strategic choices,
to skills of almost unlimited variety; but all coherent thinking and
behaviour is subject to some specifiable code of rules to which its
character of coherence is due—even though the code functions partly
or entirely on unconscious levels of the mind, as it generally does. A
bar-pianist can perform in his sleep or while conversing with the
barmaid; he has handed over control to the automatic pilot, as it were.

\textit{Hidden Persuaders}

Everybody can ride a bicycle, but nobody knows how it is done. Not
even engineers and bicycle manufacturers know the formula for the
correct method of counteracting the tendency to fall by turning the
handlebars so that ‘for a given angle of unbalance the curvature of
each winding is inversely proportional to the square of the speed at
which the cyclist is proceeding’.\(^6\) The cyclist obeys a code of rules
which is specifiable, but which he cannot specify; he could write on
his number-plate Pascal’s motto: ‘\textit{Le cœur a ses raisons que la raison ne
connait point.}’ Or, to put it in a more abstract way:

The controls of a skilled activity generally function below the level
of consciousness on which that activity takes place. The code is a
hidden persuader.

This applies not only to our visceral activities and muscular skills,
but also to the skill of perceiving the world around us in a coherent
and meaningful manner. Hold your left hand six inches, the other
twelve inches, away from your eyes; they will look about the same
size, although the retinal image of the left is twice the size of the right.
Trace the contours of your face with a soapy finger on the bathroom mirror (it is easily done by closing one eye). There is a shock waiting: the image which looked life-size has shrunk to half-size, like a head-hunter's trophy. A person walking away does not seem to become a dwarf—as he should; a black glove looks just as black in the sunlight as in shadow—though it should not; when a coin is held before the eyes in a tilted position its retinal projection will be a more or less flattened ellipse; yet we see it as a circle, because we know it to be a circle; and it takes some effort to see it actually as a squashed oval shape. Seeing is believing, as the saying goes, but the reverse is also true: knowing is seeing. 'Even the most elementary perceptions', wrote Bartlett, 'have the character of inferential constructions.' But the inferential process, which controls perception, again works unconsciously. Seeing is a skill, part innate, part acquired in early infancy.* The selective codes in this case operate on the input, not on the output. The stimuli impinging on the senses provide only the raw material of our conscious experience—the 'booming, buzzing confusion' of William James; before reaching awareness the input is filtered, processed, distorted, interpreted, and reorganized in a series of relay-stations at various levels of the nervous system; but the processing itself is not experienced by the person, and the rules of the game according to which the controls work are unknown to him.

The examples I mentioned refer to the so-called 'visual constancies' which enable us to recognize that the size, brightness, shape of objects remain the same even though their retinal image changes all the time; and to 'make sense' out of our sensations. They are shared by all people with normal vision, and provide the basic structure on which more personal 'frames of perception' can be built. An apple looks different to Picasso and to the greengrocer because their visual matrices are different.

Let me return once more to verbal thinking. When a person discusses, say, the problem of capital punishment he may do so 'in terms of' social utility or religious morality or psychopathology. Each of these universes of discourse is governed by a complex set of rules, some of which operate on conscious, others on unconscious levels. The latter are axiomatic beliefs and prejudices which are taken for granted and implied in the code. Further implied, hidden in the space between the words, are the rules of grammar and syntax. These have mostly been learned not from textbooks but 'by ear', as a young gypsy learns to fiddle without knowing musical notation. Thus when one is engaged in ordinary conversation, not only do the codes of grammar and
syntax, of courtesy and common-or-garden logic function unconsciously, but even if consciously bent on doing so we would find it extremely difficult to define these rules which define our thinking. For doing that we need the services of specialists—the semanticists and logicians of language. In other words, there is less difference between the routines of thinking and bicycle-riding than our self-esteem would make us believe. Both are governed by implicit codes of which we are only dimly aware, and which we are unable to specify.*

Habit and Originality

Without these indispensable codes we would fall off the bicycle, and thought would lose its coherence—as it does when the codes of normal reasoning are suspended while we dream. On the other hand, thinking which remains confined to a single matrix has its obvious limitations. It is the exercise of a more or less flexible skill, which can perform tasks only of a kind already encountered in past experience; it is not capable of original, creative achievement.

We learn by assimilating experiences and grouping them into ordered schemata, into stable patterns of unity in variety. They enable us to cope with events and situations by applying the rules of the game appropriate to them. The matrices which pattern our perceptions, thoughts, and activities are condensations of learning into habit. The process starts in infancy and continues to senility; the hierarchy of flexible matrices with fixed codes—from those which govern the breathing of his cells, to those which determine the pattern of his signature, constitute that creature of many-layered habits whom we call John Brown. When the Duke of Wellington was asked whether he agreed that habit was man's second nature he exclaimed: 'Second nature? It's ten times nature!'

Habits have varying degrees of flexibility; if often repeated under unchanging conditions, in a monotonous environment, they tend to become rigid and automatized. But even an elastic strait-jacket is still a strait-jacket if the patient has no possibility of getting out of it. Behaviourism, the dominant school in contemporary psychology, is inclined to take a view of man which reduces him to the station of that patient, and the human condition to that of a conditioned automaton. I believe that view to be depressingly true up to a point. The argument of this book starts at the point where, I believe, it ceases to be true.
There are two ways of escaping our more or less automatized routines of thinking and behaving. The first, of course, is the plunge into dreaming or dream-like states, when the codes of rational thinking are suspended. The other way is also an escape—from boredom, stagnation, intellectual predicaments, and emotional frustration—but an escape in the opposite direction; it is signalled by the spontaneous flash of insight which shows a familiar situation or event in a new light, and elicits a new response to it. The bisociative act connects previously unconnected matrices of experience; it makes us ‘understand what it is to be awake, to be living on several planes at once’ (to quote T. S. Eliot, somewhat out of context).

The first way of escape is a regression to earlier, more primitive levels of ideation, exemplified in the language of the dream; the second an ascent to a new, more complex level of mental evolution. Though seemingly opposed, the two processes will turn out to be intimately related.

Man and Machine

When two independent matrices of perception or reasoning interact with each other the result (as I hope to show) is either a collision ending in laughter, or their fusion in a new intellectual synthesis, or their confrontation in an aesthetic experience. The bisociative patterns found in any domain of creative activity are tri-valent: that is to say, the same pair of matrices can produce comic, tragic, or intellectually challenging effects.

Let me take as a first example ‘man’ and ‘machine’. A favourite trick of the coarser type of humour is to exploit the contrast between these two frames of reference (or between the related pair ‘mind’ and ‘matter’). The dignified schoolmaster lowering himself into a rickety chair and crashing to the floor is perceived simultaneously in two incompatible contexts: authority is debunked by gravity. The savage, wistfully addressing the carved totem figure—‘Don’t be so proud, I know you from a plum-tree’—expresses the same idea: hubris of mind, earthy materiality of body. The variations on this theme are inexhaustible: the person slipping on a banana skin; the sergeant-major attacked by diarrhoea; Hamlet getting the hiccoughs; soldiers marching like automata; the pedant behaving like a mechanical robot; the absent-minded don boiling his watch while clutching the egg, like a machine obeying the wrong switch. Fate keeps playing practical jokes
to deflate the victim’s dignity, intellect, or conceit by demonstrating his dependence on coarse bodily functions and physical laws—by degrading him to an automaton. The same purpose is served by the reverse technique of making artefacts behave like humans: Punch and Judy, Jack-in-the-Box, gadgets playing tricks on their masters, hats in a gust of wind escaping the pursuer as if with calculated malice.

In Henri Bergson’s book on the problem of laughter this dualism of subtle mind and inert matter (‘the mechanical encrusted on the living’) is made to serve as an explanation of all forms of the comic; whereas in the present theory it applies to only one variant of it among many others. Surprisingly, Bergson failed to see that each of the examples just mentioned can be converted from a comic into a tragic or purely intellectual experience, based on the same logical pattern—i.e. on the same pair of bisociated matrices—by a simple change of emotional climate. The fat man slipping and crashing on the icy pavement will be either a comic or a tragic figure according to whether the spectator’s attitude is dominated by malice or pity: a callous schoolboy will laugh at the spectacle, a sentimental old lady may be inclined to weep. But in between these two there is the emotionally balanced attitude of the physician who happens to pass the scene of the mishap, who may feel both amusement and compassion, but whose primary concern is to find out the nature of the injury. Thus the victim of the crash may be seated in any of the three panels of the triptych. Don Quixote gradually changes from a comic into a puzzling figure if, instead of relishing his delusions with arrogant condescension, I become interested in their psychological causes; and he changes into a tragic figure as detached curiosity turns into sympathetic identification—as I recognize in the sad knight my brother-in-arms in the fight against windmills. The stock characters in the farce—the cuckold, the miser, the stutterer, the hunchback, the foreigner—appear as comic, intellectually challenging, or tragic figures according to the different emotional attitudes which they arouse in spectators of different mental age, culture, or mood.

The ‘mechanical encrusted on the living’ symbolizes the contrast between man’s spiritual aspirations and his all-too-solid flesh subject to the laws of physics and chemistry. The practical joker and the clown specialize in tricks which exploit the mechanical forces of gravity and inertia to deflate his humanity. But Icarus, too, like the dinner guest whose chair collapsed, is the victim of a practical joke—the gods, instead of breaking the legs of his chair, have melted away his wings.
The second appeals to loftier emotions than the first, but the logical structure of the two situations and their message is the same: whatever you fancy yourself to be you are subject to the inverse square law like any other lump of clay. In one case it is a comic, in the other a tragic message. The difference is due to the different character of the emotions involved (malice in the first case, compassionate admiration in the second); but also to the fact that in the first case the two frames of reference collide, exploding the tension, while in the second they remain juxtaposed in a tragic confrontation, and the tension ebbs away in a slow catharsis. The third alternative is the reconciliation and synthesis of the two matrices; its effect is neither laughter, nor tears, but the arousal of curiosity; just how is the mechanical encrusted on the living? How much acceleration can the organism stand, and how does zero gravity affect it?

According to Bergson, the main sources of the comic are the mechanical attributes of inertia, rigidity, and repetitiveness impinging on life; among his favourite examples are the man-automaton, the puppet on strings, Jack-in-the-Box, etc. However, if rigidity contrasted with organic suppleness were laughable in itself, Egyptian statues and Byzantine mosaics would be the best jokes ever invented. If automatic repetitiveness in human behaviour were a necessary and sufficient condition of the comic there would be no more amusing spectacle than an epileptic fit; and if we wanted a good laugh we would merely have to feel a person’s pulse or listen to his heart-beat, with its monotonous tick-tack. If ‘we laugh each time a person gives us the impression of being a thing’ there would be nothing more funny than a corpse.

In fact, every one of Bergson’s examples of the comic can be transposed, along a horizontal line as it were, across the triptych, into the panels of science and art. His *homme-automate*, man and artefact at the same time, has its lyric counterpart in Galatea—the ivory statue which Pygmalion made, Aphrodite brought to life, and Shaw returned to the comic domain. It has its tragic counterpart in the legends of Faust’s Homunculus, the Golem of Prague, the monsters of Frankenstein; its origins reach back to Jehovah manufacturing Adam out of *adamāh*, the Hebrew word for earth. The reverse transformation—life into mechanism—has equally rich varieties: the pedant whom enslavement to habit has reduced to an automaton is comic because we despise him; the compulsion—neurotic is not, because we are puzzled and try to understand him; the catatonic patient, frozen into a statue, is tragic
because we pity him. And so again back to mythology: Lot's wife
turned into a pillar of salt, Narcissus into a flower, the poor nymph
Echo wasting away until nothing is left but her voice, and her bones
changed into rocks.

In the middle panel of the triptych the *homme-automate* is the focal,
or rather bi-focal, concept of all sciences of life. From their inception
they treated, as the practical joker does, man as both mind and machine.
The Pythagoreans regarded the body as a musical instrument whose
soul-strings must have the right tension, and we still unwittingly refer
to our mortal frame as a kind of stringed guitar when we speak of
'muscle tone', or describe John as 'good tempered'. The same bifocal
view is reflected in the four Hippocratic 'humours'—which were both
liquids of the body and moods of the spirit; and *spiritus* itself is, like
*pneuma*, ambiguous, meaning also breath. The concept of *catharsis*
applied, and still does, to the purgation of either the mind or the bowels.
Yet if I were to speak earnestly of halitosis of the soul, or of laxatives
to the mind, or call an outburst of temper a hummurrage, it would
sound ludicrous, because I would make the implicit ambiguities
explicit for the purpose of maliciously contrasting them; I would tear
asunder two frames of reference that our Greek forbears had managed
to integrate, however tentatively, into a unified, psychosomatic view
which our language still reflects.

In modern science it has become accepted usage to speak of the
'mechanisms' of digestion, perception, learning, and cognition, etc.,
and to lay increasing or exclusive stress on the automaton aspect of the
*homme-automate*. The mechanistic trend in physiology reached its
symbolic culmination at the beginning of the century in the slogan
'Man a machine'—the programmatic title of a once famous book by
Jacques Loeb; it was taken over by behaviouristic psychology, which
has been prominent in the Anglo-Saxon countries for half a century.
Even a genial naturalist like Konrad Lorenz, whose *King Solomon's
Ring* has delighted millions, felt impelled to proclaim that to regard
Newton and Darwin as automata was the only permissible view for
'the inductive research worker who does not believe in miracles'.
It all depends, of course, on what one's definition of a miracle is:
Galileo, the ideal of all 'inductive research workers', rejected Kepler's
theory that the tides were due to the moon's attraction as an ' occult
fancy'. The intellectual climate created by these attitudes has been
summed up by Cyril Burt, writing about 'The Concept of Con-
sciousness' (which behaviourists have banned, as another ' occult
fancy', from the vocabulary of science): 'The result, as a cynical on-
looker might be tempted to say, is that psychology, having first
bargained away its soul and then gone out of its mind, seems now, as
it faces an untimely end, to have lost all consciousness.'

I have dwelt at some length on Bergson's favourite example of the
comic, because of its relevance to one of the leitmotive of this book.
The man-machine duality has been epitomized in a laconic sentence—
'man consists of ninety per cent water and ten per cent minerals'—
which one can regard, according to taste, as comic, intellectually
challenging, or tragic. In the first case one has only to think of a
caricature showing a fat man under the African sun melting away into
a puddle; in the second, of the 'inductive research worker' bent over
his test-tube; in the third, of a handful of dust.

Other examples of Bergson's man-automaton need be mentioned
only briefly. The puppet play in its naïve Punch and Judy version is
comic; the sophisticated marionette theatre is a traditional form of
art; life-imitating contraptions are used in various branches of science
and technology: from the dummy figures of dressmakers to the
anatomical models in medical schools; from the artificial limbs of the
orthopaedist to robots imitating the working of the nervous system
(such as Grey Walter's electronic tortoises). In the metaphorical sense
the puppet on strings is a timeless symbol, either comic or tragic, of
man as a plaything of destiny—whether he is jerked about by the
gods or suspended on his own chromosomes and glands. In the neutral
zone between comedy and tragedy philosophers have been tireless in
their efforts to reconcile the two conflicting aspects of the human
puppet: his experience of free will and moral responsibility on the one
hand; the strings of determinism, religious or scientific, on the other.

An extreme variant of the puppet motif is Jack-in-the-Box, symbol
of the stubborn, mechanical repetitiveness, but also of the indestruct-
tibility, of life. Its opposite number is the legendary monster who
instantly grows a new tentacle or head when the hero has cut it off;
or the old woman in Raskolnikov's dream who, after each stroke of
the axe on her skull, turns round and laughs in his face. In the bio-
logical sciences Jack-in-the-Box is a familiar figure, represented in all
processes of the trigger-release type—the muscle-twitch, the epileptic
fit, the 'sign-releasers' of the animal kingdom, whose symbolic
message activates the springs of hopping mad or tenderly amorous,
innate behaviour patterns.
NOTES

To p. 28. ‘Wit’ stems from witan, understanding; whose roots go back (via videre and είδος) to the Sanskrit veda, knowledge. The German Witz means both joke and acumen; it comes from wissen, to know; Wissenschaft—science, is a close kin to Fürwitz and Aberwitz—presumption, cheek, and jest. French teaches the same lesson. Spirituel may either mean witty or spiritually profound; to amuse comes from to muse (à-muser), and a witty remark is a jeu d’esprit—a playful, mischievous form of discovery.

The word ‘jester’, too, has a respectable ancestry. The chansons de geste played a prominent part in medieval literature from the eleventh to the fifteenth centuries. They were epics centred on heroic events; their name is derived from the Latin gesta: deeds, exploits. With the coming of the Renaissance, satire tended to replace the epics of chivalry, and in the sixteenth century the heroic ‘geste’ turned into ‘jest’.

To p. 32. A critical discussion of both theories can be found in Appendix I of Insight and Outlook.

To p. 40. The choice of the term ‘matrix’ is less easy to explain. In an earlier version I used ‘field’ and ‘framework’, but ‘field’ is too vague, and ‘frame’ too rigid. ’Matrix’ is derived from the Latin for womb and is figuratively used for any pattern or mould in which things are shaped and developed, or type is cast. Thus the exercise of a habit or skill is ’moulded’ by its matrix. In mathematics, matrices are rectangular arrays of numbers capable of all sorts of magic; they can be subjected to various transformations without losing their identity—i.e. they are both ‘flexible’ and ‘stable’. Also, matrices have a constant attached to them, called their ‘determinant’, which remains unaffected by any of these transformations. But the analogy between ‘determinant’ and ‘code’ is extremely loose and in more than one respect misleading.

To p. 43. Congenitally blind patients, who acquire vision after surgical operations at a mature age, have great difficulties in recognizing patterns and faces, and in orienting themselves in space. Cf. Senden (1932), quoted by Hebb (1949).

To p. 44. The dual concepts of matrices and codes were designed with one eye on psychology, the other on physiology. Their theoretical implications in this wider context are discussed in Book Two.

The reader versed in experimental psychology will have been reminded by now of such old friends from the Würzburg School as Aufgabe, Einstellung, Bewusstseinslage; and of their Anglo-Saxon relatives: ‘determining tendency’, ‘expectancy’, ‘task’, ‘schema’ and ‘set’. He will probably also remember that J. J. Gibson in a famous article (quoted by Humphrey, 1951, p. 105) listed some forty different meanings in which the word ‘set’ was used. I hope to show that ‘matrices’ and ‘codes’ are concepts at the same time more precise, and of more general validity, than Aufgaben or ‘sets’.
II

LAUGHTER AND EMOTION

The sudden bisociation of an idea or event with two habitually incompatible matrices will produce a comic effect, provided that the narrative, the semantic pipeline, carries the right kind of emotional tension. When the pipe is punctured, and our expectations are fooled, the now redundant tension gushes out in laughter, or is spilled in the gentler form of the sou-rire.

Aggression and Identification

Laughter, as the cliché has it, is ‘liberating’, i.e. tension-relieving. Relief from stress is always pleasurable, regardless whether it was caused by hunger, sex, anger, or anxiety. Under ordinary circumstances such relief is obtained by some purposeful activity which is appropriate to the nature of the tension. When we laugh, however, the pleasurable relief does not derive from a consummatory act which satisfies some specific need. On the contrary: laughter prevents the satisfaction of biological drives, it makes a man equally incapable of killing or copulating; it deflates anger, apprehension, and pride. The tension is not consummated—it is frittered away in an apparently purposeless reflex, in facial grimaces, accompanied by over-exertion of the breathing mechanism and aimless gestures. To put it the other way round: the sole function of this luxury reflex seems to be the disposal of excitations which have become redundant, which cannot be consummated in any purposeful manner.

But why has the excitation suddenly become ‘redundant’; and why is it discharged in laughter and not, say, in weeping—which is an equally ‘purposeless’ activity? The answer to the second half of the question
seems obvious: the kind of excitation exploded in laughter has a different quality or chemical composition, as it were, from the emotions which overflow in tears. But the very obviousness of this answer is deceptive, for the attempt to define this difference in ‘quality and composition’ necessitates a new approach to the theory of human emotions.

At first sight there seems to be a bewildering variety of moods involved in different types of humour. The practical joke is frankly aggressive; the lavatory jokes of children are scatological; blue jokes are sexual; the Charles Addams type of cartoon and the ‘sick’ joke play on feelings of horror and disgust; the satirist on righteous indignation. Moreover, the same type of semantic pipeline can be made to carry different types of fluid under varying degrees of pressure: for instance, ‘they haven’t got a coat to turn’ and ‘I never aimed as high as that’ are both bisociations of metaphorical and direct meaning—jokes of the same logical pattern but with different emotional colouring. The more sophisticated forms of humour evoke mixed, and sometimes contradictory, feelings; but whatever the mixture, it must contain one ingredient whose presence is indispensable: an impulse, however faint, of aggression or apprehension. It may be manifested in the guise of malice, derision, the veiled cruelty of condescension, or merely as an absence of sympathy with the victim of the joke—a ‘momentary anaesthesia of the heart’, as Bergson put it. I propose to call this common ingredient the aggressive-defensive or self-asserting tendency—the reasons for choosing this clumsy term will be seen later on. In the subtler types of humour this tendency is so faint and discreet that only careful analysis will detect it, like the presence of salt in a well-prepared dish—which, however, would be tasteless without it.

It is the aggressive element, the detached malice of the parodist, which turns pathos into bathos, tragedy into comedy. It may be combined with affection, as in friendly teasing; in civilized humour aggression is sublimated and often unconscious. But in jokes which appeal to children and primitives cruelty and boastful self-assertion are much in evidence, and the same is true of the historically earlier forms and theories of the comic. ‘As laughter emerges with man from the mists of antiquity it seems to hold a dagger in its hand. There is enough brutal triumph, enough contempt, enough striking down from superiority in the records of antiquity and its estimates of laughter to presume that original laughter may have been wholly animosity.’¹ In the Old Testament there are (according to Mitchell²) twenty-nine references to
laughter, out of which thirteen are linked with scorn, derision, mocking, or contempt, and only two are ‘born out of a joyful and merry heart’. A survey among American schoolchildren between the ages of eight and fifteen led to the conclusion (which could hardly have surprised anybody) that ‘mortification or discomfort or hoaxing of others very readily caused laughter, while a witty or funny remark often passed unnoticed’.8

Among the theories of laughter that have been proposed since the days of Aristotle, the ‘theory of degradation’ appears as the most persistent. For Aristotle himself laughter was closely related to ugliness and debasement; for Cicero ‘the province of the ridiculous...lies in a certain baseness and deformity’; for Descartes laughter is a manifestation of joy ‘mixed with surprise or hate or sometimes with both’; in Francis Bacon’s list of laughable objects, the first place is taken by ‘deformity’. The essence of the ‘theory of degradation’ is defined in Hobbes’s Leviathan:

The passion of laughter is nothing else but sudden glory arising from a sudden conception of some eminency in ourselves by comparison with the infirmity of others, or with our own formerly.

Bain, one of the founders of modern psychology, followed on the whole the same theory: ‘Not in physical effects alone, but in everything where a man can achieve a stroke of superiority, in surpassing or discomforting a rival, is the disposition of laughter apparent.’4

For Bergson laughter is the corrective punishment inflicted by society upon the unsocial individual: ‘In laughter we always find an unavowed intention to humiliate and consequently to correct our neighbour.’5 Max Beerbohm found ‘two elements in the public’s humour: delight in suffering, contempt for the unfamiliar’. McDougall believed that ‘laughter has been evolved in the human race as an antidote to sympathy, a protective reaction shielding us from the depressive influence of the shortcomings of our fellow men.’6

Thus on this one point there is agreement among the theorists, ancient and modern; and not only agreement but exaggeration. One has only to think of Aristophanes or Calderon; A Midsummer Night’s Dream or Chateaubriand’s Maximes et Pensées, to realize that the aggressive charge detonated in laughter need not be gunpowder; a grain of Attic salt is enough to act as a catalyst. Furthermore, we must remember
that aggression and self-defence, rage and fear, hostility and apprehension, are as pairs of twins in their psychology and physiology. One of the typical situations in which laughter occurs is the moment of the sudden cessation of danger, real or imaginary; and rarely is the character of laughter as a discharge-mechanism for redundant tensions more strikingly manifested than in the sudden change of expression on the small child’s face from anxious apprehension to the happy laugh of relief.

Whatever the composition of the emotional charge which a narrative carries, it will produce a comic effect only if an aggressive-defensive tendency, however sublimated, is present in it. You may be deeply moved by a person’s predicament, and yet unable to suppress a smile at its ludicrous aspect; and the impression of the ‘ludicrousness’ of another person’s behaviour always implies an assertion—conscious or unconscious—of your own superiority; you smile at his expense.

The emotions which dominate on the opposite side of the triptych do not concern us as yet; but I must briefly mention them for the sake of contrast. Listening to Mozart, watching a great actor’s performance, being in love or some other state of grace, may cause a welling up of happy emotions which moisten the eye or overflow in tears. Compassion and bereavement may have the same physical effect. The emotions of this class, whether joyous or sad, include sympathy, identification, pity, admiration, awe, and wonder. The common denominator of these heterogeneous emotions is a feeling of participation, identification, or belonging; in other words, the self is experienced as being a part of a larger whole, a higher unity—which may be Nature, God, Mankind, Universal Order, or the Anima Mundi; it may be an abstract idea, or a human bond with persons living, dead, or imagined. I propose to call the common element in these emotions the participatory or self-transcending tendencies. This is not meant in a mystical sense (though mysticism certainly belongs to this class of emotion); the term is merely intended to convey that in these emotional states the need is felt to behave as a part of some real or imaginary entity which transcends, as it were, the boundaries of the individual self; whereas when governed by the self-assertive class of emotions the ego is experienced as a self-contained whole and the ultimate value.

As a rule our emotions are complex mixtures in which both tendencies participate. Thus the emotion called ‘love’—whether sexual or maternal—usually contains an aggressive or possessive, self-asserting
component, and an identificatory or self-transcending component. If emotions were represented by different colours, then the two opposite tendencies would appear as brightness values (black–white mixtures) superimposed on them.

The subject will be discussed in more detail later (Chapters XI–XV); readers irritated by these repeated anticipatory excursions may find some excuse for them in the consideration that the painful vivisection of the comic, in which they are asked to participate, is not an end in itself, but a means to uncover the pattern which unites the apparently so heterogeneous creative activities in humour, art, and discovery.

The Inertia of Emotion

The first to make the suggestion that laughter is a discharge mechanism for ‘nervous energy’ seems to have been Herbert Spencer. His essay on the ‘Physiology of Laughter’ (1860) starts with the proposition: ‘Nervous energy always tends to beget muscular motion; and when it rises to a certain intensity always does beget it. . . . Emotions and sensations tend to generate bodily movements, and . . . the movements are violent in proportion as the emotions or sensations are intense.’ Hence, he concludes, ‘when consciousness is unawares transferred from great things to small’ the ‘liberated nerve force’ will expend itself along the channels of least resistance, which are the muscular movements of laughter.

The details of Spencer’s theory (parts of which Freud incorporated into his own) have become obsolete; but its basic thesis that ‘emotion tends to beget bodily motion’ has not only been confirmed, but has become so much of a commonplace in contemporary neurophysiology that the need to qualify it is often forgotten. For there exist, of course, emotional states—looking at the sea, or engaging in religious contemplation—which, on the contrary, tend to promote relaxation and bodily passivity. The title of Walter B. Cannon’s pioneer work, which had a decisive influence on the modern approach to the problem of emotions—Bodily Changes in Pain, Hunger, Fear, and Rage—ought to have acted as a warning that the emotions which mobilize the body into action all belong to an important, but nevertheless limited, category—that which enters the service of the self-assertive tendencies. Cannon himself warned—with little success—against the lumping together of all emotions into a kind of red rag drenched with
adrenalin.* However, for the moment we are concerned only with precisely this limited category—the aggressive-defensive type of emotion which enters into the comic.

When the Marquis in the Chamfort story rushes to the window, our intellect turns a somersault and enters with gusto into the new game; but the piquant expectations which the narrative carried, including perhaps an unconscious admixture of sadism, cannot be transferred to the other, the quid-pro-quo matrix; they are disposed of through channels of least resistance. When Othello, on the point of strangling Desdemona, breaks into hiccoughs and is transformed into a poor, sodden ham, our thoughts are again capable of performing the jump from one associative context into another, but our tension, now deprived of its logical justification, must somehow be worked off. In a word, laughter is aggression (or apprehension) robbed of its logical raison d'ètre; the puffing away of emotion discarded by thought.

To give another example: one of the popular devices of sustained humour is impersonation. Children imitating adults, the comedian impersonating a public figure, men disguised as women and women as men—in all these cases the impersonator is perceived as himself and somebody else at the same time. While this situation lasts the two matrices are bisociated in the spectator’s mind; and while his intellect is capable of swiftly oscillating from one matrix to the other and back, his emotions are incapable of following these acrobatic turns; they are spilled into the gutters of laughter as soup is spilled on a rocking ship.

What these metaphors are meant to convey is that the aggressive-defensive class of emotions has a greater inertia, persistence, or mass momentum than reason. This assumption is tacitly shared by most psychological theories, but it needs to be explicitly stated in order to appreciate its consequences. The most important among these is that quite frequently our emotions are incapable of keeping step with our reason and become divorced from reason. In psychopathology this phenomenon is taken for granted, but its significance in less extreme situations is generally overlooked—although both common experience and neurophysiology ought to make it obvious. Emotions of the self-asserting type involve a wide range of bodily changes, such as increased secretion of the adrenal glands, increase of blood sugar, acceleration of heart rate, speedier clotting of the blood, altered breathing, inhibition of digestive activity, changes in electric skin resistance, sweating, ‘goose-pimples’ which make the hair of the skin stand on end, dilation of the pupils, muscle tension, and tremor. The
joint effect of these so-called emergency reactions is to put the whole organism into a state of readiness for come what may; sweating, for instance, disposes of the heat generated by fight or flight, and the abundance of blood sugar in the circulation provides the muscles with excess energy. Hence the remarkable feats of force of which people are capable in danger; but more important from our point of view is the lowering of the threshold of motor responses—the increased excitability of the muscles by nervous impulses, and the resulting tendency to violent movement, to 'work off', or at least 'shake off', the physiological effects of emotion. The chief mediators of this general mobilization of the resources of the body are the so-called sympathetic division of the autonomous nervous system, and the hormones secreted by the medulla of the suprarenal glands: adrenalin and nor-adrenalin, the 'humours' of fear and anger. Since these nervous and glandular processes are interrelated, it is convenient to refer to them jointly as activities of the sympathico-adrenal system. (To avoid confusion, I must underline that the sympathetic nervous system has nothing to do with the friendly emotion of sympathy; rather, as I have just said, with its opposites: rage and fear. However, by a lucky coincidence the initials of Sympathico-Adrenal system are the same as those of the Self-Assertive emotions which are aroused by it.)

It follows from the above that these emotions involve incomparably heavier machinery, acting on the whole body, than the process of thinking which, physiologically speaking, is confined to the roof of the brain. The chemical and visceral states induced by the action of the sympathico-adrenal system tend to persist; once this massive apparatus is set in motion it cannot be called off or 'change its direction' at a moment's notice. Common observation provides daily, painful confirmation of this. We are literally 'poisoned' by our adrenal humours; reason has little power over irritability or anxiety; it takes time to talk a person out of a mood, however valid the arguments; passion is blind to better judgement; anger and fear show physical after-effects long after their causes have been removed. If we could change our moods as quickly as we jump from one thought to another we would be acrobats of emotion.

Thinking, in its physiological aspect, is based on electro-chemical activities in the cerebral cortex and related regions of the brain, involving energy transactions which are minute compared to the massive glandular, visceral, and muscular changes that occur when emotions are aroused. These changes are governed by phylogenetically much
older parts of the brain than the roof-structures which enable man to think in verbal symbols. Behaviour at any moment is the outcome of complex processes which operate simultaneously on several levels of the nervous system, from the spinal cord to our latest acquisition, the pre-frontal lobes. There is probably no formal thinking without some affective colouring; but it is nevertheless legitimate to distinguish between form and colour—in our case between the logical pattern of a comic narrative and the emotive charge which it carries.

The sympathico-adrenal system might be compared to the body of a piano which gives resonance to the cortical strings of thought. When all is well the huge wooden box lends depth and colour and warmth to the vibrations of the strings. But if you play a humorous scherzo with full pedal on, the resonating body is unable to follow the swift modulations of the chords—thought and emotion have become dissociated. It is emotion deserted by thought which is discharged in laughter. For emotion, owing to its greater mass momentum, is unable to follow the sudden switch of ideas to a different type of logic or a new rule of the game; less nimble than thought, it tends to persist in a straight line. Ariel leads Caliban on by the nose: she jumps on a branch, he crashes into the tree.

It could be objected that the faint emotive charge of a joke, the slight malice or salaciousness which it arouses, would not be sufficient to bring the massive sympathico-adrenal machinery into action. The answer lies in the anachronistic character of our autonomous responses to stimuli which carry an echo, however faint, of situations that held a threat or promise in the remote past of the species; which once were biologically relevant, though they no longer are. These reactions lag by many millennia behind the conditions in which we live: we jump at a sudden sound; we develop gooseflesh in response to a screeching noise, to make our long-lost body hair bristle at the attack of some extinct beast; we sweat before an examination—to dispose of the excessive heat our bodies might develop in the impending struggle with the examiner. I like to call these innate, anachronistic responses the over-statements of the body. One of the remarkable things about them is that they can be triggered off by certain stimuli in minute, quasi-homeopathic doses.

To sum up, the grain of salt which must be present in the narrative to make us laugh turns out to be a drop of adrenalin.
The Mechanism of Laughter

In the first chapter I discussed the logic of humour; in the previous section its emotional dynamics. Fitting the two together, we can now expand the formula on page 35 as follows: The sudden bisociation of a mental event with two habitually incompatible matrices results in an abrupt transfer of the train of thought from one associative context to another. The emotive charge which the narrative carried cannot be so transferred owing to its greater inertia and persistence; discarded by reason, the tension finds its outlet in laughter.

But that still leaves the question open why the excess energy should be worked off in the particular form of laughter and not, say, by flapping one’s arms or wiggling one’s toes. The somewhat tentative answer is that the muscular contractions and breathing actions in laughter seem to offer natural channels of least resistance for the overflow. To quote Freud:

According to the best of my knowledge, the grimaces and contortions of the corners of the mouth that characterize laughter appear first in the satisfied and over-satiated nursling when he drowsily quits the breast. . . . They are physical expressions of the determination to take no more nourishment, an ‘enough’ so to speak, or rather a ‘more than enough’. . . . This primal sense of pleasurable saturation may have provided the link between the smile—that basic phenomenon underlying laughter—and its subsequent connection with other pleasurable processes of de-tension. 8

In other words, the muscle-contractions of the smile, as the earliest manifestations of relief from tension, would thereafter become channels of least resistance.

The peculiar breathing in laughter, with its repeated, explosive exhalations, seems designed to ‘puff away’ surplus tension in a kind of respiratory gymnastics; and the vigorous gestures and slapping of thighs obviously serve the same function. Often these massive reactions seem to be quite out of proportion to the feeble stimuli which provoke them—particularly when we do not like the type of joke which causes such hilarity in others:

A thousand Edinburgh schoolchildren burst into laughter when David Oistrakh, the Russian violinist, snapped a string while playing
Schubert’s Fantasy in C Major during a recital of a city housing estate yesterday. Their studious attention broke when Mr. Oistrakh —guest of honour at the Edinburgh Festival—held up the violin and looked with consternation at his accompanist.\(^9\)

Let us try to understand what those brats found so funny. Firstly, there is the familiar pattern of the practical joke which the laws of physics play on the artist, suddenly revealing that his magic strings are made of common cat-gut—‘I know you from a plum-tree’. The ‘consternation’ on Oistrakh’s face is the consternation of the man slipping on the banana skin; exaltation is debunked by the sudden impact of triviality. But all this does not account for that unexpected, barbaric outburst of hilarity which schoolmasters know only too well—unless one realizes that what I call, somewhat abstractly, ‘the emotional charge of the narrative’ contains here a mass of resentment, mostly perhaps unconscious, at having to sit still and listen ‘with studious attention’ to that Russian with the unpronounceable name; a repressed emotion, tending to beget fidgety motions, until the tension snaps with the string, releasing the outburst, instantly transforming the hushed class into a horde of savages.

In other words, all discussions of the comic remain bloodless abstractions unless we bear in mind that laughter is a phenomenon of the trigger-release type, where a minute cause can open the tap of surprisingly large stores of energy from various sources: repressed sadism; repressed sex; repressed fear; even repressed boredom. Here is a list of ‘occasions for laughter’ recorded by American undergraduates in reply to a questionnaire:

A pillow fight in the dormitory
A girl friend tore her dress
I fell during skating
A dog came in during a lecture
A mispronounced word in rhetoric class
Being teased about my corpulence
Lizzie trying to do a fairy dance
My opponents in a bridge game bidding four spades when I held two aces and the king, jack and five of spades
An article by a priest on the sex life of H. G. Wells.\(^{10}\)

This ought to be enough to make one realize that laughter may be
entirely mirthless and humourless;* it can be contrived as a means of social communication or in lieu of a rude noise. It can also serve to cover up sexual or sadistic gloating, as in the forced, tumescent laughter of the spectators at a strip-tease—or in the jolly manifestations of English popular humour at public hangings in the last century.

Surprisingly, Bergson believed that one can only laugh in the presence of others—presumably because this fitted his theory of laughter as an act of social correction (‘one has no taste for the comic when one feels isolated. It seems that laughter needs an echo. Our laughter is always the laughter of a group.’). No doubt, collective giggling fits do occur in dormitories at girls’ schools, and no doubt one laughs with more gusto in company than alone. But the infectiousness of emotive manifestations is a well-known phenomenon in group behaviour, which equally applies to hysteria, panic, even to infectious coughing of theatre audiences; it is not a specific characteristic of laughter, and contributes nothing to its explanation.

Lastly, laughter or smiling frequently occur in response to stimuli which in themselves are not comic, but merely signs or symbols for comic stimuli, or even symbols of symbols—Chaplin’s boots, Groucho Marx’s cigar, caricatures of celebrities reduced to a few visual hints, catch-phrases and allusions to familiar situations. The analysis of these oblique cases often requires tracing back a long and involved thread of associations to its source, which is not much fun; yet the procedure is essentially the same as the literary critic’s or the art historian’s when they try to analyse the evocative power of a poetic image or a landscape. The task is made more complicated by the fact that the effect of such comic symbols—the sight of Colonel Blimp on a cartoon, the appearance of Falstaff on the stage—appears to be instantaneous; there seems to be no time for first accumulating and then discharging tension. But in these cases memory serves as an accumulator, a storage battery whose electric charge can be sparked off any time: the smile which greets Papageno strutting on to the scene is derived from a mixture of memories and expectations. All of which goes to show that to find the explanation why we laugh may be a task as delicate as analysing the chemical composition of a perfume, with its multiple ingredients—some of which are never perceived, while others, sniffed in isolation, would make us wince.
The Importance of not being Earnest

Discussing the problem of man’s innate aggressive tendencies, Aldous Huxley once said:

On the physiological level I suppose the problem is linked with the fact that we carry around with us a glandular system which was admirably well adapted to life in the Paleolithic times but is not very well adapted to life now. Thus we tend to produce more adrenalin than is good for us, and we either suppress ourselves and turn destructive energies inwards or else we do not suppress ourselves and we start hitting people.12

A third alternative, which Huxley overlooked, is to laugh at people. There are, of course, other outlets for tame aggression: sport, politics, book-reviewing, and so forth; but these are conscious, voluntary activities, whereas laughter is a spontaneous, physiological reflex, a gift of nature included in our native equipment as part of the evolutionary package deal. Not only the functions of our glands, but the whole autonomous nervous system and the emotion-controlling centres in the mid-brain, are much older than the Paleolithic Age, and reflect conditions at a stage of human evolution when the struggle for existence was more deadly than at present and when any unusual sight or sound had to be answered by jumping, bristling, fight, or flight. As security and comfort increased in the species, the affect-generating emergency mechanisms of the sympathico-adrenal system gradually became an anachronism. But organs and their functions do not atrophy at the rate at which they become redundant; and thus the biological evolution of homo sapiens (if it has not stopped altogether) lags dangerously behind his mental evolution. One consequence of this is that our brains have become ‘divided houses of faith and reason’, of thinking at odds with emotions; another, that our emotive responses have become ‘over-statements of the body’ out of all proportion with the reactions biologically required or socially permitted—and cannot be worked off through their original channels. Fortunately, at some point along the evolutionary line, the luxury reflexes of laughter and weeping emerged as overflow mechanisms for the disposal of at least part of our redundant emotions. They are obviously twin reflexes: laughter serving the disposal of aggressive emotions cast off by the intellect, while crying (to anticipate once more) facilitates the overflow of participatory emotions accepted by the intellect.
It follows that two conditions had to be fulfilled before homo ridens, the laughing animal, could emerge: first a relative security of existence, which called for new outlets for excess energies; second and more important, a level of evolution had to be reached where reasoning had gained a certain degree of autonomy from the ‘blind’ urges of emotion: where thought had acquired that independence and nimbleness which enable it to detach itself from feeling—and to confront its glandular humours with a sense of humour. Only at this stage of ‘cortical emancipation’ could man perceive his own emotions as redundant, and make the smiling admission ‘I have been fooled’.

Beneath the human level there is neither the possibility nor the need for laughter; it could arise only in a biologically secure species with redundant emotions and intellectual autonomy.* The sudden realization that one’s own excitement is ‘unreasonable’ heralds the emergence of self-criticism, of the ability to see one’s very own self from outside; and this bisociation of subjective experience with an objective frame of reference is perhaps the wittiest discovery of homo sapiens.

Thus laughter rings the bell of man’s departure from the rails of instinct; it signals his rebellion against the singlemindedness of his biological urges, his refusal to remain a creature of habit, governed by a single set of ‘rules of the game’. Animals are fanatics; but ‘O / How the dear little children laugh / When the drums roll and the lovely Lady is sawn in half. . . .’

NOTES

To p. 56. Criticizing a paper read by a neurologist to a learned society, he remarked: ‘The author spoke of emotions in very general terms. . . . There are features which he mentioned which I could recognize as characteristic of major emotions, as anger and rage; but after all, love is an emotion. . . . I think that when we discuss emotion we ought to specify the sorts of emotion we have in mind’ (Cannon, 1929).

To p. 61. The article in which this list appeared is characteristic of the behaviourist approach; it enumerated three ‘basic principles’ of laughter: (a) ‘as an expression of joy’, (b) ‘laughter makes for group cohesion through homogeneity of feeling within the group’, (c) ‘laughing can be used as a weapon in competitive situations’. The word ‘humour’ was not mentioned in the article; laughing at ‘jokes, antics, etc.’, was mentioned only in passing, as obviously not a phenomenon worthy of the psychologists’ attention.

To p. 63. Some domesticated animals—dogs, chimpanzees—seem to be capable of a humorous expression and to engage in teasing activities. These may be regarded as evolutionary forerunners of laughter.
III

VARIETIES OF HUMOUR

The tools have now been assembled which should enable the reader to dissect any specimen of humour. The procedure to be followed is: first, determine the nature of $M_1$ and $M_2$ in the diagrams on pages 35 and 37 by discovering the type of logic, the rules of the game, which govern each matrix. Often these rules are implied, as hidden axioms, and taken for granted—the code must be de-coded. The rest is easy: find the ‘link’—the focal concept, word, or situation which is bisociated with both mental planes; lastly, define the character of the emotive charge and make a guess regarding the unconscious elements that it may contain. In the sections which follow I shall apply this technique to various types of humour.

Pun and Witticism

Our spacemen, Mrs. Lamport fears, are ‘heading for the “lunar bin”’. The ageing libertine, she tells us, ‘feels his old Krafft Ebbing’. The Reverend Spooner had a great affection, or so he said, for ‘our queer old dean’.

One swallow, the proverb says, does not make a summer—nor quench the thirst. Elijah’s ravens, according to Milton, were ‘though ravenous taught to abstain from what they brought’. Not so Napoleon, who, shortly after his coronation, confiscated the estates of the house of Orléans, which caused a contemporary to remark: ‘C’est le premier vol de l’aigle.’ Equally to the point was Mr. Paul Jenkin’s discovery regarding the pros and cons of Britain’s entry into the Common Market: ‘The Cons were pro, while Lab has turned con.’

The pun is the bisociation of a single phonetic form with two
meanings—two strings of thought tied together by an acoustic knot. Its immense popularity with children, its prevalence in certain forms of mental disorder (‘punning mania’), and its frequent occurrence in the dream, indicate the profound unconscious appeal of association based on pure sound. Its opposite number is the rhyme. In between these two, on the central panel, the bisociation of sound and sense assumes a playful form in word games like Lexicon, anagram, and crossword puzzle; and a serious form in comparative philology and paleography, the deciphering of ancient inscriptions (pp. 186–7).

Whether the two meanings associated with the pun are derived from the same root as in ‘lunar bin’; or are homonyms as vol = flight and vol = theft, is irrelevant provided the two derivations have drifted apart far enough to become incompatible. In fact, there is a continuous series stretching from the pun through the play of words (jeu de mots) to the play of ideas (jeu d’esprit). Let me quote a few more examples of the latter.

‘The super-ego is that part of the personality which is soluble in alcohol.’ The concept ‘soluble’ is bisociated (a) with the context of the chemical laboratory and (b) with the (metaphorical) dissolution of one’s high principles in one’s cups. The first few words of the sentence arouse perhaps a mild irritation with the Freudian jargon—or apprehension, as the case may be; which is then tittered away through the now familiar mechanism.

Here is another sample from this game of definitions: ‘What is a sadist? A sadist is a person who is kind to a masochist.’ The link-concept is ‘kindness’, bisociated with two diametrically opposed meanings; moreover the whole definition is open to two different interpretations:

(a) the sadist does a kindness to the masochist by torturing him;
(b) the sadist is torturing the masochist by being kind to him.

In both cases the sadist must go against his own nature, and the definition turns out to be in fact a variant of the logical paradox about the Cretan who asserts that all Cretans are liars. But we can get around it by deciding that in either interpretation ‘kind’ should be understood both literally and metaphorically at the same time; in other words, by playing simultaneously two games governed by opposite rules. We shall see that such reversals of logic play a considerable part in scientific discovery (pp. 191–9). They are also a recurrent motif in poetry and literature. One of my favourite Donne quotations is a line from the Litany: ‘For O, for some, not to be martyrs is a martyrdom.’

I have given examples of the bisociation of professional with
commonsense logic, of metaphorical with literal meaning, of contexts linked by sound affinities, of trains of reasoning travelling, happily joined together, in opposite directions. The list could be extended beyond the limits of patience. In fact any two matrices can be made to yield a comic effect of sorts, by finding an appropriate link between them and infusing a drop of adrenalin. Take as a random example two associative contexts centred on the unpromising key-words 'alliteration' and 'hydrotherapy'. (The example actually originated in a challenge following a discussion; I am merely quoting it, with apologies, to show that in principle it can be done):

Gossip Column Item: Lady Smith-Everett, receiving me in her sumptuous boudoir, explained that she had always suffered from 'the most maddening rashes' until she met her present physician, a former professor of psycho-hydrotherapy at the University of Bucharest. By employing a new test which he invented, the Professor discovered that she had 'a grade 4 allergy' against sojourn ing in spas and holiday resorts with the initial letter C. No more visits to Capri and Carlsbad for Lady S-E.!

It is not even necessary that the two matrices should be governed by incompatible codes. One can obtain comic effects by simply confronting quantitatively different scales of operations, provided that they differ sufficiently in order of magnitude for one scale to become negligible compared with the other. The result is the type of joke made according to the formula: the mountains laboured, the birth was a mouse.

With an added twist you get this kind of dotty dialogue—between a nervous bus-passerger and the conductor:

'What's the time?'
'Thursday.'
'Good Lord! I must get off.'

This is a serial affair in which not two but three matrices are successively involved, each with a different scale of measurement. $M_1$ has a grid of hours and minutes; $M_2$ of days of the week. The two differ in fact only in quantity but provide qualitatively different frames of reference; the third matrix has spatial instead of temporal co-ordinates—where to get off, not when. It would be impossible to orientate one's behaviour with reference to these three different grids at the same time; yet that is precisely what the tri-sociated passenger is trying to do.
Let me repeat: any two universes of discourse can be used to fabricate a joke. Lewis Carroll sent the following contribution to a philosophical symposium:

‘Yet what mean all such gaieties to me
Whose life is full of indices and surds?
\[ X^2 + 7X + 53 = \frac{11}{3} \]

The universes of verbal and mathematical symbols are linked by pure sound-affinity—with rhyme but without reason. When T. E. Lawrence joined the ranks as Private Shaw, Noël Coward wrote to him that famous letter beginning ‘Dear 338171 (may I call you 338?)’.

**Man and Animal**

In the previous chapter I discussed the bisociation of man and machine; related to it is the hybrid man-animal. Disney’s creatures behave as if they were human without losing their animal appearance, they live on the line of intersection of the two planes; so do the cartoonist’s piggy or mousy humans. This double-existence is comic, but only so long as the confrontation has the effect of a slightly degrading exposure of one or the other. If sympathy prevails over malice even poor Donald Duck’s misfortunes cease to be laughable; and as you move over to the right-hand panel of the triptych, the man-animal undergoes a series of transformations: from the cloying lyricism of Bambi to the tragedy of Orwell’s Boxer; from the archetypal menace of the werewolf to the Metamorphosis of Kafka’s hero into a filth-devouring cockroach. As for science, the importance of learning about man by the experimental study of animal physiology need not be stressed; in psychology it has been rather overstressed to the point where the salivary reflexes of dogs came to be regarded as paradigmatic for human behaviour.

**Impersonation**

The various categories of the comic shade into each other: Disney’s animals acting like humans could as well be classified under the
heading 'imitation, impersonation, and disguise'. The impersonator is two different people at one time. If the result is degrading, the spectator will laugh. If he is led to sympathize or identify himself with the impersonated hero, he will experience that state of split-mindedness known as dramatic illusion or the magic of the stage. Which of the two possibilities will occur depends of course partly on the actor, but ultimately 'a jest's prosperity lies in the ear / Of him that hears it, never in the tongue / Of him that makes it'. The same 'narrative', a Victorian melodrama or a Chinese opera, acted in both cases in precisely the same way, will make some spectators giggle, others weep. The same dramatic devices may serve either a comic or a tragic purpose: Romeo and Juliet are the victims of absurd coincidences, Oedipus's marriage to his mother is due to mistaken identity; Rosalind in As You Like It and Leonora in Fidelio are both disguised as men, yet in one case the result is drama, in another comedy. The technique of creating character-types is also shared by both: in the classical form of tragedy, whether Greek, Indian, or Japanese, characterization is often achieved by standardized masks; in the comedy, down to Molière, by the creation of types: the miser, the glutton, the hypocrite, the cuckold. In the centre panel (where impersonation appears in the form of empathy, the act of self-projection which enables one to understand others, see below pp. 187–8) the classification of character-types has been the aim of incessant efforts—from the 'four temperaments' of the Greeks, to Kretschmer, Jung, Sheldon, and so on.

The Child-Adult

Why are puppies droll? Firstly, their helplessness, trustiness, attachment, and puzzled expression make them more 'human' than grown-up dogs; in the second place the ferocious growl of the puppy strikes us as an impersonation of adult behaviour (like the little boy with stuck-on beard and bowler-hat, pretending to be the family doctor); thirdly, the puppy's waddling and tumbling makes it a choice victim of nature's practical jokes; furthermore, its bodily disproportions, the huge padded paws, wrinkled brow, and Falstaffian belly, give it the appearance of a caricature; and so on. The delighted laughter which greets the puppy's antics seems so simple to explain; but when we try to analyse it we find several interlocking causes; and while the word 'delighted' indicates a pure emotion, free from the ugly taint of
aggressiveness, the grain of self-satisfied condescension, the conviction of our own superiority is nevertheless present, even if we are not aware of it.

A simple shift of emphasis will move the bisociation of child and adult into the centre panel where it becomes a concern of pedagogues and psychiatrists. A further shift to the right, and the relation will be reversed, the child will be seen as an adult in disguise, immersed in the hidden tragedies of the nursery and boarding school—an inexhaustible subject of the autobiographical novel.

*The Trivial and the Exalted*

*Parody* is the most aggressive form of impersonation, designed not only to deflate hollow pretence but also to destroy illusion in all its forms; and to undermine pathos by harping on the trivial, all-too-human aspects of the victim. Stage props collapsing, wigs falling off, public speakers forgetting their lines, dramatic gestures remaining suspended in the air—the parodist’s favourite points of attack are all situated on the line of intersection between two planes: the Exalted and the Trivial.

The artist reverses this technique by conferring on trivial experiences a new dignity and wonder: Rembrandt painting the carcass of a flayed ox, Manet his skinny, insipid Olympia; Hemingway drawing tragedy out of the repetitive, inarticulate stammer of his characters; Chekhov focussing the reader’s attention on a fly crawling on a lump of sugar while Natasha is contemplating suicide.

When ‘consciousness is unawares transferred from great things to small’—which Spencer regarded as the prime cause of laughter—the result will be *either* a comic or an aesthetic experience, depending on whether the person’s emotions are of the type capable of participating in the transfer or not. The artist, reversing the parodist’s technique, walks on a tightrope, as it were, along the line where the exalted and the trivial planes meet; he ‘sees with equal eye, as God of all, / A hero perish or a sparrow fall’. The scientist’s attitude is basically similar in situations where he suddenly discovers the connection between a banal event and a general law of nature—Newton’s apple or the boiling kettle of James Watt.

* When F. W. H. Myers became interested in people’s attitudes to religion he questioned an elderly widow on what she thought about
the whereabouts of her departed husband's soul. She replied: 'Oh well, I suppose he is enjoying eternal bliss, but I wish you wouldn't talk about such unpleasant subjects.' I would call this an illustration of the peaceful coexistence of the tragic and trivial planes in our humble minds. Equally convincing is this statement made by a schoolboy to his mathematics master:

'Infinity is where things happen which don't.'

Caricature and Satire

The political cartoon, at its best, is a translation into visual imagery of a witty topical comment; at its worst, a manipulation of symbols—John Bull, Uncle Sam, the Russian bear—which, once comic, have degenerated into visual clichés. The symbols trigger off memories and expectations; the narrative content of the cartoon is taken in by visual scanning, with possibly a delayed-action effect due to the time needed for 'seeing the joke'. The analysis of such mixed forms is a lengthy affair.*

The portrait caricature, on the other hand, relies for its effects on purely visual means. Its method recalls the distorting mirrors at fun-fairs, which reflect the human form elongated into a candle-shape, or absurdly compressed, or as a vague phantom with wavy outlines. As a result we see ourselves and yet something else; our familiar shapes being transformed as if the body were merely an elastic surface that can be stretched in all directions.

The mirror distorts by exaggerating mechanically in one spatial direction at the expense of others; the caricaturist distorts by exaggerating features which he considers characteristic of his victim's appearance or personality. His second main trick is over-simplification: he minimizes or leaves out features which are not relevant for his purpose. A prominent nose, for instance, such as General de Gaulle's, can be exploited to the extent that the rest of the face shrinks to insignificance: the part has been detached from the whole and has become a nose *an sich*. The product of the clever caricaturist's distortions is something physiologically impossible, yet at the same time visually convincing—he has superimposed his frame of perception on our own. For a caricature is comic only if we know something of the victim, if we have a mental image, however vague, of the person, or type of person, at which it is aimed—even if it is an Eskimo, a cave-man, or a Martian
robot. The unknown cannot be distorted or misrepresented. The caricature of the more ferocious type is the rape of an image, an optical debunking of the victim; in its gentler form, a semi-affectionate kick at the heel of Achilles.

Thus the malicious pleasure derived from a good caricature originates in the confrontation of a likeness, distorted according to the artist’s rules of the game, with reality or our image thereof. But it is a rather harmless form of malice because we know that the caricaturist’s monster with the cucumber nose or enormous belly is a biological impossibility, that it is not real. Illustrations of elephantiasis and pathological obesity are not comic because these distortions of the human shape are known to be real, and therefore arouse pity. The knowledge that the deformities of the caricature are merely pretence acquits us of all charitable obligations and allows us to laugh at the victim’s expense.

The exaggeration and simplification of features selected according to his judgement of what is to be considered relevant is a technique shared by both the caricaturist and the artist—who calls it stylization. (Needless to say, a caricature is also a form of art; but for convenience’ sake I am using throughout this book the term ‘art’ to refer to its non-comic varieties.) Stylization has been carried to extreme length in a number of ancient and modern art forms without destroying the aesthetic effect: that is to say, without sliding from art into caricature. The elongated skulls of certain Egyptian sculptures reflect a contemporary practice of deforming the princely babies’ heads, but they obviously exaggerate the result. Nevertheless it would hardly occur to one to call Tutankhamen an egghead—because one feels that the sculptor exaggerated not with a hostile but with a worshipful intent, and this attitude is communicated to the spectator. Once more the polarity between comic and aesthetic experience is seen to derive from the polarity between the self-assertive and self-transcending tendencies.

This still holds true even when communication between artist and spectator breaks down. In the eyes of the Philistine all experimental art is ludicrous, because the Philistine’s attitude is aggressive-defensive. When Picasso shuffles round the eyes and limbs of his figures in a manner which is biologically impossible and yet has a visual logic of its own, he juxtaposes the seen and the known—he is walking, precariously balanced, on the borderline between two universes of experience, each governed by a different code. The conservative-minded spectator, unable to follow, suspects the artist of pulling his leg by deliberately distorting the human shape as the caricaturist does; and
so the two-faced woman with three breasts becomes in his eyes a caricature. The ambiguity is perhaps most strikingly illustrated in some of the character-studies by Leonardo, Hogarth, and Daumier. The passions reflected in them are so violent, the grimaces so ferocious, that it is impossible to tell whether they were meant as portraits or caricatures, and the distinction becomes a purely theoretical one. If you feel that such distortions of the human face do not really exist, that Daumier, deliberately exaggerating, merely pretended that they exist, then you are absolved from horror and pity and can laugh at his grotesques. But if you feel that this is indeed what Daumier saw in those de-humanized faces, then you are looking at a work of art. The humorist thrives on deformity; the artist deforms the world to recreate it in his own image.

The technique of exaggerating the relevant and simplifying or ignoring the irrelevant aspects of reality is shared not only by the artist and caricaturist but is equally indispensable to the scientist. The motivations of each of the three differ, of course, and with them their criteria of relevance. The humorist’s motives are aggressive, the artist’s participatory, the scientist’s exploratory. The scientist’s criteria of relevance are ‘objective’ in the sense of being emotionally neutral, but they still depend on the particular aspect of reality in which he is interested. Every drawing on the blackboard—whether it is meant to represent the wiring diagram of a radio set or the circulation of the blood, the structure of a molecule or the weather over the Atlantic—is based on the same method as the cartoonist’s: selective emphasis on the relevant factors and omission of the rest. A map bears the same relation to a landscape as a character-sketch to a face; every chart, diagram, or model, every schematic or symbolic representation of physical or mental processes, is an unemotional caricature of reality. At least, ‘unemotional’ in the sense that the bias is not of an obvious kind; although some models of the universe as a rigid, mechanical clockwork which, once wound up, must follow its unalterable course, or of the human mind as a slot-machine, have turned out to be crude caricatures inspired by unconscious bias.

The satire is a verbal caricature which distorts characteristic features of an individual or society by exaggeration and simplification. The features picked out for enlargement by the satirist are, of course, those of which he disapproves: ‘If Nature’s inspiration fails’, wrote Juvenal, ‘indignation will beget the poem.’ The comic effect of the satire is derived from the simultaneous presence, in the reader’s mind, of the
social reality with which he is familiar, and of its reflection in the
distorting mirror of the satirist. It focusses attention on abuses and
deformities in society of which, blunted by habit, we were no longer
aware; it makes us suddenly discover the absurdity of the familiar
and the familiarity of the absurd.

The same effect is achieved if, instead of magnifying objectionable
features in customs and institutions, the satirist projects them by means
of the allegory onto a different background, such as an animal society—
e.g. Aristophanes, Swift, Orwell. In either case we are made suddenly
conscious of conventions and prejudices which we have unquestioning-
gly accepted, which were tacitly implied in the codes in control of
our thinking and behaviour. The confrontation with an alien matrix
reveals in a sharp, pitiless light what we failed to see in following our
dim routines; the tacit assumptions hidden in the rules of the game are
dragged into the open. The disjunctive shock shatters the frame of
complacent habits of thinking; the seemingly obvious is made to yield
its secret.

‘In this world of perfect justice, rich and poor alike have the right to
sleep under bridges.’ Anatole France’s classic epigram is a confrontation
of abstract democracy with the brutal facts of life; it conjures up the
image of a well-dressed bourgeois making use of his constitutional
rights to doff down, in the name of Liberté, Egalité, and Fraternité,
under the arches of the Pont de la Concorde. In its higher reaches the
satirist’s art merges into the social scientist’s quest for truth; Brave New
World and 1984 are extrapolations of present trends into the future;
Gulliver’s Travels and Erewhon, on the other hand, follow the method
of the anthropologist, who deepens our understanding of our own
society by confronting it with the equally ‘self-evident’ beliefs and
customs of exotic civilizations.

Thus, as we travel across the triptych, satire shades into social science;
and this, in turn, branches out into the tragic allegory—Plato’s Cave
and Kafka’s Castle—or into poetic Utopia. The artistic hazards of
the latter are perhaps due to a conflict of emotions. Writers of Utopias are
motivated by revulsion against society as it is, or at least by a rejection
of its values; and since revulsion and rejection are aggressive attitudes,
it comes more naturally to them to paint a picture of society with a
brush dipped in adrenalin than in syrup or aspirin. Hence the contrast
between Huxley’s brilliant, bitter Brave New World and the goody-
goody bores on his Island.

The satirist’s most effective weapon is irony. Its aim is to defeat the
opponent on his own ground by pretending to accept his premisses, his values, his methods of reasoning, in order to expose their implicit absurdity. ‘All animals are equal, but some are more equal than others.’ Irony purports to take seriously what it does not; it enters into the spirit of the other person’s game to demonstrate that its rules are stupid or vicious. It is a subtle weapon, because the person who wields it must have the imaginative power of seeing through the eyes of his opponent, of projecting himself into the other’s mental world. The psychiatrist who goes patiently along with the patient’s fantasies, the teacher who adapts his language to the level of comprehension of the child, the dramatist who speaks through his characters’ voices, employ the same procedure with the opposite intent and effect.

The Misfit

Both Cicero and Francis Bacon gave deformity a high place on their lists of causes for laughter. The princes of the Renaissance collected midgets, hunchbacks, monsters, and Blackamoors for their merriment. We have become too civilized for that kind of thing, but children still jeer and laugh at people with a limp or a stammer, at foreigners with a funny pronunciation, at people oddly dressed—at any form of appearance or behaviour which deviates from the familiar norm. The more backwoodish a social group, juvenile or adult, the stricter its conception of the normal, and the readier it will ridicule any departure from it.

Consider for a moment the curious fact that to a civilized person a stutterer causes sympathetic embarrassment, whereas a person of normal speech giving an imitation of stuttering makes us laugh. So does the youngster in love who stutters only under the effect of a momentary surge of emotion. Again, a person with a foreign accent is accepted with tolerance, but the imitation of a foreign accent is comic. The explanation is that we know the imitator’s stutter or mispronunciation to be mere pretence; this makes sympathy both unnecessary and impossible, and enables us to be childishly cruel with a clear conscience. We have met the same phenomenon (page 71) in our attitude towards the bodily deformities imputed by the caricaturist to his victim.

The tolerant acceptance of physical or mental malformations in our fellow creatures, though of relatively recent origin, has become deeply engrained in Western society; we are no longer aware of the
fact that it requires a certain imagination and a good deal of empathy to recognize in a dwarf, or a ‘thick-lipped Blackamoor’, a human being which, though different in appearance, exists and feels as oneself does. In the small child this kind of projective mechanism is absent or rudimentary. Piaget, among others, has strikingly shown how late the child accords to its fellow beings a conscious ego like its own. The more a person deviates from the familiar norm of the child’s surroundings, the more difficult it is for the child to project into him life and feelings, to grant him the faculty of having experiences like his own. The same applies to the attitudes shown by tribal or parochial societies to foreigners, slaves, members of the ‘lower classes’ (almost inevitably treated as comic figures in literature up to and including Dickens); as well as to criminals, the mentally disordered and physically deformed. The creature who does not ‘belong’ to the tribe, clan, caste, or parish is not really human; he only aspires or pretends to be ‘like us’. To civilized man, a dwarf is comic only if he struts about pretending to be tall, which is he not; in the primitive’s eye the dwarf is comic because he pretends to be human, which he is not. The Greek word ‘barbarian’ means both foreigner and stutterer (bar-bar-ous); the uncouth, repetitive, barking sounds he uttered were a grotesque imitation of true human speech. Bodily and functional deformities are laughable to the uncouth mind for the same reasons as impersonation and caricature.

*The Paradox of the Centipede*

However, an additional factor enters into the comic effect of some disorders of behaviour such as stuttering, mispronunciation, misspelling: one might call it the bisociation of structure and function, or of part and whole. The stammering barbarian was a comic figure to the Greeks for reasons just mentioned; but the comedian’s stage-stutter is funny in a different way. When he struggles with a consonant, trying to take the same hurdle again and again, eyes bulging and face convulsed, we become suddenly aware of the complicated motions of lips and tongue required to produce the sound ‘M’; our attention becomes focussed on these physiological details torn from their functional context and placed under a magnifying glass, as it were. Much the same happens when the gramophone needle gets stuck in a groove, and the soprano’s voice keeps repeating the same word on the same quaver. The part has
become detached from the whole and monopolizes attention as if it existed in its own right, as an independent structural entity, regardless of its function in the larger context from which alone its meaning is derived. In one of Silone's novels an innocent peasant boy from the Abruzzi drifts into a crowd in front of Mussolini's new forum, and cannot understand why everybody keeps chanting in a chorus: 'Ce-du, ce-du, ce-du, ce-du...'. The isolated quaver or consonant which has made a declaration of independence, the syllables 'du' and 'ce' torn from their context, are examples of the conflict which can arise between part and whole, structure and function, when—to put it in a different way—the dependent part pretends to be an independent whole and forces our attention to regard it as such.

When we exercise a well-practised skill the parts must function smoothly and automatically—they must never occupy the focus of attention. This is true whether the skill in question is riding a bicycle, playing the violin, enunciating the letter 'M', or forming sentences according to the rules of grammar and syntax. The code which controls the performance functions, as we repeatedly saw, on a lower level of consciousness than the performance itself—on the fringes of awareness or, in completely automatized skills, even beyond the fringe. The moment attention is focussed on a normally automatized part-function such as enunciating consonants, the matrix breaks down, the needle gets stuck, and the performance is paralysed—like the centipede who was asked in which order he moved his hundred legs, and could walk no more.

The paradox of the centipede is a consequence of the hierarchic organization of the nervous system which demands that the highest centres should be occupied with the task in hand conceived as a whole, and leave the execution of the component sub-tasks and sub-sub-tasks to the sub-centres, etc., on lower levels of the nervous system. A brigadier does not give orders to, and concentrate his attention on, individual soldiers during action; if he does the action goes haywire. The paradox of the centipede will be seen to play an important part in discovery and the theory of thinking in general; in humour, apart from the examples mentioned, it accounts for the comic effect of the 'self-conscious' (in fact, detail-conscious) behaviour of the person who does not know what to do with his hands; and also explains why the comedian's clothes, and some foreign or bygone fashions, are funny. Conventional articles of apparel are perceived as parts of a person's appearance as a whole, whereas the comedian's checked
trousers and the Victorian lady's bustle disrupt the unity and force attention on textiles and starched draperies leading an independent life. Except when we are in a romantic mood: then a historical costume on the stage is no longer seen detached from its wearer but attaches him to the period.

Since I mentioned mispronunciation, I must add the obvious remark that if the maltreated word assumes a different meaning, we get the involuntary pun; and even if it does not, mispronunciation can be funny if it follows its own logic which exposes the absurdities of conventional spelling. Try on an innocent foreigner the sequence: a coughing plough and a soughing trough; then see what happens.

Displacement

A car dealer is boosting a new sports model to a prospective client:

'You get into this car at midnight and at 4 a.m. you are in Grimsby.'

The customer is indignant: 'And what am I to do in the middle of the night in Grimsby?'

The question is perfectly logical, but irrelevant to the subject under discussion, which is the speed of the car. The link-concept is 'Grimsby at 4 a.m.'—which in one context plays the accidental part of an improvised example, in the second an essential part. This sudden shift of emphasis—or displacement of attention—to a seemingly irrelevant aspect of a bisociated concept is frequently found not only in humour, but also in art and discovery (Chapters VIII, XXIII). It is related to the paradox of the centipede, but instead of displacing attention from the whole to the part it is displaced from a dominant to a previously neglected aspect of the whole, showing it in a new light.

In the Ballad of Reading Gaol there are two unforgettable lines:

How else but through a broken heart
May Lord Christ enter in?

The broken heart has become such a cliché that its physical implications—splitting apart and creating a gap—are never thought of. Wilde shifts our attention to that forgotten physical image; he lets salvation enter through the aching gap, like a thief in the night. When the White
Queen complains: ‘It’s a poor sort of memory which only works backwards,’ she is putting her finger on an aspect of reality—the irreversibility of time—which we normally take for granted; her apparently silly remark carries metaphysical intimations, and appeals to our secret yearning for the gift of prophecy—matters which would never occur to Alice, that little paragon of stubborn common sense.

Coincidence

It was once usual to classify comedies into those relying on situations, manners, or characters. In his discussion of the first, Bergson came closest to the essence of humour: ‘A situation is always comic’, he wrote, ‘if it participates simultaneously in two series of events which are absolutely independent of each other, and if it can be interpreted in two quite different meanings.’ One feels like crying ‘Fire’, but a couple of pages further on Bergson has dropped the clue and gone back to his hobby: the interference of two independent series in a given situation is merely a further example of the ‘mechanization of life’.

In fact the crossing of two independent causal chains through coincidence, mistaken identity, confusion of time and occasion, is the most clean-cut example of bisociated contexts. The chance-coincidence on which they are hinged is the *deus ex machina*, the intervention of providence in both tragedy and comedy; and, needless to say, lucky hazards play an equally conspicuous part in the history of scientific discovery.

Nonsense

One type of comic verse lives on the bisociation of exalted form with trivial content. Certain metric forms, such as hexameter and Alexandrine, arouse expectations of pathos, of the heroic and exalted; the pouring of homely, trivial contents into these epic moulds—‘beautiful soup, so rich and green’—creates a comic effect of the same type as the parody. The rolling dactyls of the first line of the limerick, carrying, instead of Hector and Achilles, a young lady from Stockton as their passenger, make her already appear ridiculous, regardless of the calamities which are sure to befall her. In this atmosphere of malicious expectation whatever witticism the text has to offer will have a much enhanced effect.
Instead of an epic mould, a soft, lyrical one will equally do:

... And what could be moister
Than tears from an oyster?

Another variant is what one might call the pseudo-proverb: 'The rule is: jam tomorrow and jam yesterday—but never jam today.' Two logically incompatible statements have been telescoped into a line whose rhythm and syntax gives the impression of being a popular adage or golden rule of life. Sometimes the trick is done by the substitution of a single word in a familiar text: 'One should never work between meals.' The homely, admonitory structure lulls the mind into bored acquiescence until the preposterous subterfuge is discovered. Oscar Wilde was a master of this form: 'In married life three is company and two none'; 'the only way to get rid of a temptation is to yield to it', etc., etc. My own favourite coinage is: 'One should not carry moderation to extremes.'

Nonsense humour—as Max Eastman has pointed out—is only effective if it pretends to make sense: 'It's a fact the whole world knows That Pobbles are happier without their toes.' Even with rhymed gibberish the illusion of meaning is essential. 'The slithy toves' that 'gyre and gimble in the wabe' evoke sound associations which suggest some kind of action even though we are unable to say what exactly the action is—perhaps some small creatures gyrating and gambolling on a brilliant day in the web of some flowery bush. The meaning varies with the person as the interpretation of the ink blots in a Rohrschach test; but without this illusory meaning projected into the phonetic pattern, without the simultaneous knowledge of being fooled, and of fooling oneself, there would be no enjoyment of 'the jabberwock with eyes of flame' who 'came whiffling through the tulgey wood/And burbled as it came'.

**Tickling**

The harmless game of tickling has resisted all attempts to find a unitary formula for the causes of laughter; it has been the stumbling block which made the theorists of the comic give up, or their theories break down.

It was at one time believed that the laughter caused by tickling is a purely mechanical reflex in response to a purely physical stimulation.
But—as Darwin has pointed out—the response to tickling is squirming, wriggling, and straining to withdraw the tickled part—activities which may or may not be accompanied by laughter. The squirming response was interpreted by Darwin and Crile as an innate defence mechanism to escape a hostile grip on vulnerable areas which are not normally exposed to attack: the soles of the feet, the neck, arm-pits, belly, and flank. If a fly settles on the belly of a horse a kind of contractile wave may pass over the skin—the equivalent of the squirming of the tickled child. But the horse does not laugh when tickled, and the child not always. As Gregory has put it:

A child finger the pepper-pot, waves pepper into its nose, and sneezes violently. Touch it under the arm-pits, or finger its waist, and it wriggles vigorously. It sneezes to dislodge the pepper from its nose, and its wriggle suggests a sneeze to relieve its whole body. The violent squirm of the tickled child so obviously tries to avoid the tickling hand that, when the truth is perceived, it is difficult to understand how tickling and laughter could ever be identified or confused.³

Thus tickling a child will call out a wriggling and squirming response. But the child will laugh only—and this is the crux of the matter—if an additional condition is fulfilled: it must perceive the tickling as a mock attack, a caress in a mildly aggressive disguise. This explains why people laugh only when tickled by others but not when they tickle themselves. (The question why this should be so was once put to a B.B.C. Brains Trust which, after some humming, hawing, and giggling, decided that it was one of the insoluble mysteries of human nature.) Not only must there be a second person to do the tickling, but her expression and attitude must be mock-aggressive—as mothers and nurses instinctively know. Battle cries like ‘peekaboo’ and ‘bow-wow’ pay guaranteed dividends, like the comedian’s imitation of the lion’s roar. As in every attack, the element of surprise plays an important part: the expert tickler’s tactics never let the victim guess when and where the next pressure or pincer movement will occur. Experiments in tickling on babies under one year old showed that babies laughed fifteen times more often when tickled by their mothers than when they were tickled by strangers. For naturally the mock-attack will make the baby laugh only if it knows that it is a mock-attack; and with strangers one never knows. Even with its own mothe
there is an ever-so-slight feeling of uncertainty and apprehension, the expression of which alternates with laughter in the baby’s behaviour; and it is precisely this element of apprehension between two tickles which is relieved in the laughter accompanying the squirm. The rule of the game is ‘let me be just a little frightened so that I can enjoy the relief’.

Thus the mechanism is essentially the same as in comic impersonation: the tickler impersonates an aggressor, but is simultaneously known not to be one. It is probably the first situation encountered in life which makes the infant live on two planes at once, the first delectable experience in bisociation—a foretaste of pleasures to come at the pantomime show, of becoming a willing victim to the illusions of the stage, of being tickled by the horror-thriller.

In adolescence, erotic elements enter into the game, and tickling assumes the role of a sexual mock-attack—acknowledged with giggles which betray their origin in infantile apprehensions. Some homosexuals claim to be extremely ticklish and display a tendency to squirming and wriggling as an expression of mock-fright. But these are secondary developments which partly illuminate, partly confuse the original pattern—the tickled child’s laughter is a discharge of apprehensions recognized as unfounded by the intellect.

*The Clown*

Most of the comic techniques I have discussed can be found in the repertory of the circus clown—the classic incarnation of the coarser type of humour. His face is a richly exaggerated caricature of stupidity, sometimes with an infectious grimace of laughter painted on it; in each piece of his apparel form battles against function; each of his movements is a parody of grace. He is the victim and perpetrator of preposterous practical jokes; he is both human and inert matter, for to survive all the slaps, whacks, and cracks, his skull must be made of ebony. He is the image in the distorting mirror, the clumsy impersonator of acrobats, ballet dancers, and fairies: Caliban imitating Ariel. He is a collection of deformities, bodily and functional; he stumbles over obstacles and words; he is timid, gauche, eccentric, and absent-minded. Above all, he is the man of gigantic efforts and diminutive accomplishments: the midwife who aids the mountain to deliver the mouse.
The clown's domain is the coarse, rich, overt type of humour: he leaves nothing to be guessed, he piles it on. A good deal of the enjoyment he causes is a mild gloating, the discharge of sadistic, sexual, scatological impulses by way of the purifying channels of laughter. One means of producing and prolonging this effect is repetition. The clown and the clowning kind of music-hall comedian will tell, or act out, a long-drawn narrative in which the same type of flash, the same pattern, the same situation, the same key-words, recur again and again. Although repetition diminishes the effect of surprise, it has a cumulative effect on the emotive charge. The logical pattern is the same in each repeat, but new tension is easily drawn into the familiar channel. It is as if more and more liquid were being pumped into the same punctured pipeline.

Originality, Emphasis, Economy

I have discussed the logic of humour and its emotive dynamics, and have tried to indicate how to analyse a joke. But nothing has been said so far about the criteria which decide whether it is a good, bad, or indifferent joke. These are, of course, partly a matter of personal taste, partly dependent on the technique of the humorist; only the second is our concern.

There are, I shall suggest, three main criteria of comic technique: originality, emphasis, and economy. In the light of the previous chapters we shall expect them to play also a significant part in the techniques of scientific theorizing and artistic creation.

An art dealer (this story is authentic) bought a canvas signed 'Picasso' and travelled all the way to Cannes to discover whether it was genuine. Picasso was working in his studio. He cast a single look at the canvas and said: 'It's a fake.'

A few months later the dealer bought another canvas signed Picasso. Again he travelled to Cannes and again Picasso, after a single glance, grunted: 'It's a fake.'

'But cher maître,' expostulated the dealer, 'it so happens that I saw you with my own eyes working on this very picture several years ago.'

Picasso shrugged: 'I often paint fakes.'
One measure of originality is its surprise effect. Picasso’s reply—as the Marquis’ in the Chamfort story—is truly unexpected; with its perverse logic, it cuts through the narrative like the blade of the guillotine.

But creative originality is not so often met with either in art or in humour. One substitute for it is suggestiveness through emphasis. The cheap comedian piles it on; the competent craftsman plays in a subtler way on our memories and habits of thought. Whenever in the Contes Drolatiques Balzac introduces an abbé or a monk, our associations race ahead of the narrative in the delectable expectation of some venal sin to be committed; yet when the point of the story is reached we still smile, sharing the narrator’s mock-indignation and pretended surprise. In other words, anticipations of the type of joke or point to come do not entirely destroy the comic effect, provided that we do not know when and how exactly it will strike home. It is rather like a game: cover my eyes and I shall pretend to be surprised. Besides, the laughter provoked by spicy jokes is, as already said, only partly genuine, partly a cloak to cover publicly less demonstrable emotions—regardless whether the story in itself is comic or not.

Suggestive techniques are essential; they create suspense and facilitate the listener’s flow of associations along habit-formed channels. A comic idea of a given logical pattern can be transposed into any number of different settings; local colour and dialect help to establish the atmosphere. The most effective stories are regional: Scottish, Marseillais, Cockney; the mere mention of ‘a man from Aberdeen’ establishes the matrix, the desired frame of mind. Thus suggestiveness depends firstly on the choice of relevant stimuli—as the biologist would say. Next, all non-essential elements should be omitted, even at the price of a certain sketchiness, otherwise attention will be sidetracked, the tension frittered away: this is the technique of simplification. In the third place the effect is increased by certain emphatic gestures, inflections, a stress on dialect and slang: in a word, by exaggeration. We have met these three related factors: selection, exaggeration, simplification, in the technique of the caricature (and of the portrait and blue-print); taken together they provide the means of highlighting aspects of reality considered to be significant. It is not surprising that the same techniques enter into the artist’s and humorist’s efforts to communicate with his audience.

However, except in the coarsest type of humour and the trashiest forms of art, suggestion through emphasis is not enough; and it can
defeat its own purpose. It must be compensated by the opposite kind of virtue: the exercise of economy, or, more precisely: the technique of implication.

Picasso’s ‘I often paint fakes’ is at the same time original, emphatic, and implicit. He does not say: ‘Sometimes, like other painters, I do something second-rate, repetitive, an uninspired variation on a theme, which after a while looks to me as if somebody had imitated my technique. It is true that this somebody happened to be myself, but that makes no difference to the quality of the picture, which is no better than if it were a fake; in fact you could call it that—an uninspired Picasso apeing the style of the true Picasso.’

None of this was said; all of it was implied. But the listener has to work out by himself what is implied in the laconic hint; he has to make an imaginative effort to solve the riddle. If the answer were explicitly given, on the lines indicated in the previous paragraph, the listener would be both spared the effort and deprived of its reward; there would be no anecdote to tell.

To a sophisticated audience any joke sounds stale if it is entirely explicit. If this is the case the listener’s thoughts will move faster than the narrator’s tale or the unfolding of the plot; instead of tension it will generate boredom. ‘Economy’ in this sense means the use of hints in lieu of statements; instead of moving steadily on, the narrative jumps ahead, leaving logical gaps which the listener has to bridge by his own effort: he is forced to co-operate.

The operation of bridging a logical gap by inserting the missing links is called interpolation. The series A, C, E, . . . K, M, O shows a gap which is filled by interpolating G and I. On the other hand, I can extend or extrapolate the series by adding to it R, T, V, etc. In the more sophisticated forms of humour the listener must always perform either or both of these operations before he can ‘see the joke’. Take this venerable example, quoted by Freud:

The Prince, travelling through his domains, noticed a man in the cheering crowd who bore a striking resemblance to himself. He beckoned him over and asked: ‘Was your mother ever employed in my palace?’

‘No, Sire,’ the man replied. ‘But my father was.’

The logical pattern of the story is quite primitive. Two implied codes of behaviour are brought into collision: feudal lords were
supposed to have bastards; feudal ladies were not supposed to have bastards; and there is a particularly neat, quasi-geometrical link provided by the reversible symmetry of the situation. The mild amusement which the story offers is partly derived from the malicious pleasure we take in the Prince’s discomfiture; but mainly from the fact that it is put in the form of a riddle, of two oblique hints which the listener must complete under his own steam, as it were. The dotted lines in the figure below indicate the process (the arrow in $M_1$ may be taken to represent the Prince’s question, the other arrow, the reply).

![Diagram of interpolation and extrapolation]

**Figure 5**

Incidentally, Wilde has coined a terser variation on the same theme: ‘Lord Illingworth: “You should study the Peerage, Gerald. . . . It is the best thing in fiction the English have ever done.”’

Nearly all the stories that I have quoted show the technique of implication—the hint, the oblique allusion—in varying degrees: the good little boy who loves his mama; the man who never aimed as high as that; the kind sadist, etc. Apart from inter- and extrapolation (there is no need for our purposes to make a distinction between them) a third type of operation is often needed to enable one to ‘see the joke’: transformation, or reinterpretation, of the given data into some analogous terms. These operations comprise the transformation of metaphorical into literal statements, of verbal hints into visual terms, and the interpretation of visual riddles of the *New Yorker* cartoon type. A good
example (‘good’, I am afraid, only from a theoretical point of view) is provided by another story, quoted from Freud:

Two shady business men have succeeded in making a fortune and were trying to elbow their way into Society. They had their portraits painted by a fashionable artist; framed in gold, these were shown at a reception in the grand style. Among the guests was a well-known art critic. The beaming hosts led him to the wall on which the two portraits were hanging side by side. The critic looked at them for a long time, then shook his head as if he were missing something. At length he pointed to the bare space between the pictures and asked: ‘And where is the Saviour?’

A nice combination of transformation with interpolation.

Economy, in humour as in art, does not mean mechanical brevity but implicitness. ‘Implicit’ is derived from the Latin word for ‘folded in’. To make a joke like Picasso’s ‘unfold’, the listener must fill in the gaps, complete the hints, trace the hidden analogies. Every good joke contains an element of the riddle—it may be childishly simple, or subtle and challenging—which the listener must solve. By doing so, he is lifted out of his passive role and compelled to co-operate, to repeat to some extent the process of inventing the joke, to re-create it in his imagination. The type of entertainment dished out by the mass media makes one apt to forget that true recreation is re-creation.

Emphasis and implication are complementary techniques. The first bullies the audience into acceptance; the second entices it into mental collaboration; the first forces the offer down the consumer’s throat; the second tantalizes, to whet his appetite.

In fact, both techniques have their roots in the basic mechanisms of communicating thoughts by word or sign. Language itself is never completely explicit. Words have suggestive, evocative powers; but at the same time they are merely stepping stones for thought. Economy means spacing them at intervals just wide enough to require a significant effort from the receiver of the message; the artist rules his subjects by turning them into accomplices.

NOTE

To p. 70. Cf. the analysis of an Osbert Lancaster cartoon in Insight and Outlook, p. 80 f.
IV
FROM HUMOUR TO DISCOVERY

Explosion and Catharsis

Primitive jokes arouse crude, aggressive, or sexual emotions by means of a minimum of ingenuity. But even the coarse laughter in which these emotions are exploded often contains an additional element of admiration for the cleverness of the joke—and also of satisfaction with one’s own cleverness in seeing the joke. Let us call this additional element of admiration plus self-congratulation the intellectual gratification offered by the joke.

Satisfaction presupposes the existence of a need or appetite. Intellectual curiosity, the desire to understand, is derived from an urge as basic as hunger or sex: the exploratory drive (see below, XI, and Book Two, VIII). It is the driving power which makes the rat learn to find its way through the experimental maze without any obvious incentive being offered in the form of reward or punishment; and also the prime-mover behind human exploration and research. Its ‘detached’ and ‘disinterested’ character—the scientists’ self-transcending absorption in the riddles of nature—is, of course, often combined with ambition, competition, vanity. But these self-assertive tendencies must be restrained and highly sublimated to find fulfilment in the mostly unspectacular rewards of his slow and patient labours. There are, after all, more direct methods of asserting one’s ego than the analysis of ribonucleic acids.

When I called discovery the emotionally ‘neutral’ art I did not mean by neutrality the absence of emotion—which would be equivalent to apathy—but that nicely balanced and sublimated blend of motivations, where self-assertiveness is harnessed to the task; and where on the other hand heady speculations about the Mysteries of Nature must be submitted to the rigours of objective verification.

We shall see that there are two sides to the manifestation of emotions at the moment of discovery, which reflect this polarity of motivations.
One is the triumphant explosion of tension which has suddenly become redundant since the problem is solved—so you jump out of your bath and run through the streets laughing and shouting Eureka! In the second place there is the slowly fading after-glow, the gradual catharsis of the self-transcending emotions—a quiet, contemplative delight in the truth which the discovery revealed, closely related to the artist’s experience of beauty. The Eureka cry is the explosion of energies which must find an outlet since the purpose for which they have been mobilized no longer exists; the cathartic reaction is an inward unfolding of a kind of ‘oceanic feeling’, and its slow ebbing away. The first is due to the fact that ‘I’ made a discovery; the second to the fact that a discovery has been made, a fraction of the infinite revealed. The first tends to produce a state of physical agitation related to laughter; the second tends towards quietude, the ‘earthing’ of emotion, sometimes a peaceful overflow of tears. The reasons for this contrast will be discussed later; for the time being, let us remember that, physiologically speaking, the self-assertive tendencies operate through the massive sympathetic-adrenal system which galvanizes the body into activity—whereas the self-transcending emotions have no comparable trigger-mechanism at their disposal, and their bodily manifestations are in every respect the opposite of the former: pulse and breathing are slowed down, the muscles relax, the whole organism tends towards tranquillity and catharsis. Accordingly, this class of emotions is devoid of the inertial momentum which makes the rage-fear type of reactions so often fall out of step with reasoning; the participatory emotions do not become dissociated from thought. Rage is immune to understanding; love of the self-transcending variety is based on understanding, and cannot be separated from it.

Thus the impact of a sudden, bisociative surprise which makes reasoning perform a somersault will have a twofold effect: part of the tension will become detached from it and exploded while the remaining part will slowly ebb away. The symbols

![Figure 6](image)

on the triptych are meant to refer to these two modes of the discharge
of tension: the explosion of the aggressive-defensive and the gradual catharsis, or 'earthing', of the participatory emotions.

'Seeing the Joke' and 'Solving the Problem'

The dual manifestation of emotions at the moment of discovery is reflected on a minor and trivial scale in our reactions to a clever joke. The pleasant after-glow of admiration and intellectual satisfaction, gradually fading, reflects the cathartic reaction; while the self-congratulatory impulse—a faint echo of the Eureka cry—supplies added voltage to the original charge detonated in laughter: that 'sudden glory' (as Hobbes has it) 'arising out of our own eminency'.

Let our imagination travel once more across the triptych of creative activities, from left to right, as it were. We can do this as we have seen, by taking a short-cut from one wing to another, from the comic to the tragic or sublime; or alternatively by following the gradual transitions which lead from the left to the centre panel.

On the extreme left of the continuum—the infra-red end of the emotive spectrum—we found the practical joke, the smutty story, the lavatory humour of children, each with a heavy aggressive or sexual or scatological load (which may be partly unconscious); and with a logical structure so obvious that it required only a minimum of intellectual effort to 'see the joke'. Put into a formula, we could say that the ratio A : I—where A stands for crude emotion, and I for intellectual stimulation—is heavily loaded in favour of the former.

As we move across the panel towards the right, this ratio changes, and is ultimately reversed. In the higher forms of comedy, satire, and irony the message is couched in implicit and oblique terms; the joke gradually assumes the character of an epigram or riddle, the witticism becomes a challenge to our wits:

'Seeing the Joke' and 'Solving the Problem'

'Psychoanalysis is the disease for which it pretends to be the cure.'

'Philosophy is the systematic abuse of a terminology specially invented for that purpose.'

'Statistics are like a bikini. What they reveal is suggestive. What they conceal is vital.'

Or, Heine's description of a young virgin:

'Her face is like a palimpsest—beneath the Gothic lettering of the monk's sacred text lurks the pagan poet's half-effaced erotic verse.'

The crude aggression of the practical joke has been sublimated into
malicious ingenuity; gross sexuality into subtle eroticism. Incidentally, if I had not mentioned that the last quotation was by Heine, whose name combined with ‘virgin’ arouses ominous expectations, but had pretended instead that it was from a novel by D. H. Lawrence, it would probably have impressed the reader as profoundly poetic instead of malicious—a short-cut from wing to wing, by reversal of the charge from minus to plus. Again, imagine for a moment that the quotation occurred in an essay by a Jungian psychologist—and it will turn into an emotionally neutral illustration of ‘the intrusion of archetypes into perception’.

In cases like this the wording of the narrative (or the picture on the canvas) can remain unaltered, and its transformation from a comic into a poetic or intellectually enlightening message depends entirely on the subjective attitude of the peripient.* However, the lines of correspondence across the panels are meant to indicate more general patterns of creative activity. Thus, as we move from coarse humour towards the neutral zone, we find the bisociation of sound and meaning first exemplified in the pun, then in word games (ranging from the crossword puzzle to the decyphering of the Rosetta stone); lastly in alliteration, assonance, and rhyme. The mind-matter theme we found expressed in countless variations on all three panels; and each variation of it—the puppet on strings or Jack-in-the-Box—was again seen as tri-valent. Impersonation is used both in comedy and tragedy; but in between them the medicine man in his mask, the cassocked priest in the confessional, the psychiatrist in the role of the father, each impersonate a person or power other than himself. The distorting mirror, with its emphasis on one significant aspect to the exclusion of others, is used alike in the caricature and in the scientist’s diagrams and schemata; when Clavdia in the Magic Mountain offers her lover an X-ray portrait of her chest as a souvenir we hardly know on which of the three panels we are. Nor can we draw a sharp line between social satire and sociological discovery: Animal Farm and 1984 taught a whole generation more about the nature of totalitarianism than academic science did. One last example:

In 1960 an anecdote in the form of an imaginary dialogue circulated in the satellite countries of the East:

‘Tell me, Comrade, what is capitalism?’
‘The exploitation of man by man.’
‘And what is Communism?’
‘The reverse.’
The double entendre on ‘reverse’—‘it pretends to be the opposite, but it comes down to the same, only the exploiting is done by a different gang’—casts a new, sharp light on a hoary problem; it has the same power of sudden illumination as an epigram by Voltaire.

Similar borderline cases are brain-twisters, logical paradoxes, mathematical games. Even chess problems can be both ‘witty’ and ‘funny’ if they contain some sudden reversal of logic, an ironical twist, or an affront to chess common sense; the connoisseur will smile, or even laugh, when he is shown the solution, and the tension suddenly snaps. His laughter may signify ‘how stupid of me not to have seen it’ or ‘not to have seen it at once’ or ‘how clever of me’, etc. To distinguish between these cases would be splitting hairs, for the basic process is the same: the tension has been dissociated from its original purpose and must find some other outlet. When the string of the guitar snaps it gives out a twang—for precisely the same reason.

But this tension is no longer comparable to the emotions aroused in the grosser types of humour. The intellectual challenge, which in the coarse joke played such a subsidiary part, now dominates the picture; the A : I ratio has been reversed. There may be vanity and competitiveness in rising to the challenge; but they are sublimated and held in balance by a self-forgetting absorption in the problem.

As we cross the fluid boundary leading into the central panel of the triptych, the task of ‘seeing the joke’ becomes the task of ‘solving the problem’. And when we succeed we no longer roar with laughter as at the clown’s antics; laughter gradually shades into an amused, then an admiring smile—reflecting the harmonic balance of opposites, the sudden glory and quiet glow of intellectual satisfaction.

The Creation of Humour

Up to now I have been discussing the effects of humour on the audience: the reader, listener, spectator. Let me turn from the consumer’s reactions to the processes which go in on the mind of the producer—the inventor of the joke, the creator of humour.

Humour depends primarily on its surprise effect: the bisociative shock. To cause surprise the humorist must have a modicum of originality—the ability to break away from the stereotyped routines of thought. Caricaturist, satirist, the writer of nonsense-humour, and even the expert tickler, each operates on more than one plane. Whether his
purpose is to convey a social message, or merely to entertain, he must provide mental jolts, caused by the collision of incompatible matrices. To any given situation or subject he must conjure up an appropriate—or appropriately inappropriate—intruder which will provide the jolt.

The first schoolboy to have the idea of sawing through the legs of the master’s chair must have been a genius (such practices were not uncommon in my school-days in Hungary). His habitual outlets for aggression being barred by the heavy penalties they would entail, he must have been labouring under a creative stress which initiated his search for an original solution of his problem. A chance observation—like the fall of Newton’s apple—may have provided the link to a different frame of reference, where the object of his resentment was merely a mass subject to the pull of gravity. Now all he had to do was to transfer the scene of operations from the blocked matrix \( M_1 \) to this auxiliary matrix \( M_2 \). If this sounds facetious let us remember that Bergson’s theory of humour is based on this single facet.

In all forms of malicious wit there is an aggressive tendency at work which, for one reason or another, cannot be satisfied by the usual methods of reasoned argument, physical violence, or straight invective. I shall call a matrix ‘blocked’ when its ‘rules of the game’ prove inapplicable to the existing situation or problem in hand; when none of the various ways of exercising a skill, however plastic and adaptable that skill is, leads to the desired goal. The young officer in the Viennese anecdote, resenting the courtesan’s pretentious reply, is in the same position as the frustrated schoolboy: he cannot reply: ‘Come off the high horse, I know that cash is all that matters to you,’ without incurring the penalties of vulgarity. Chamfort’s Marquis cannot kill the Bishop—it would be an unpardonable lack of savoir-faire. Picasso cannot tell the dealer that he is an insufferable bore who does not know a Kokoschka from a Klee; that would be unkind.

But how do they discover the inspired reposte which saves the situation? It sounds a simple question, but if psychology knew the answer to it there would be no point in writing this book.

As a first step let us note a trivial fact: the officer’s mental leap from the metaphorical to the literal plane indicates a phenomenon already discussed: the displacement of attention to a seemingly irrelevant feature—in this case from the poetic connotations of the lady’s heart to its concrete spatial location. (We remember that Wilde used a similar displacement effect for a different purpose in ‘How else but through a broken heart . . .’). The Marquis achieves his aim—to kill by ridicule—
by transferring his attention from the glaringly obvious consideration that the Bishop is usurping his privileges, to an irrelevant side-line—that he is doing another man’s job; as if the issue were a demarcation dispute between the Boilermakers’ and the Shipwrights’ Unions on who should drill the holes.

Thus in some of the cases we have discussed, the solution is arrived at by a kind of ‘thinking aside’, a shift of attention to some feature of the situation, or an aspect of the problem, which was previously ignored, or only present on the fringes of awareness. The humorist may stumble on it by chance; or, more likely, guided by some intuition which he is unable to define. This gives us a first intimation of unconscious processes intervening in the creative act. The humorist’s achievement, represented on the neat diagrams in previous chapters, appears as an exercise in pure intellectual geometry: ‘Construct two planes inclined at a given angle and generate two curves which intersect in a given point.’ In actual fact, however, the bisociative act, in humour as in other branches of creativity, depends in varying degrees on assistance from fringe-conscious or unconscious processes. Picasso’s illuminating grunt was certainly inspired by a process of this kind. On the other hand, the mediocre cartoonist and other professional craftsmen of the comic operate mostly with the same familiar matrices, fixed at a given angle, as it were, governed by familiar rules of the game; and their task is reduced to devising new links—puns, gags, pegs for parody. It is a mechanized kind of bisociative technique, which also has its practitioners in science and art.

**Paradox and Synthesis**

There is an obvious contrast between the emotive reactions of creator and consumer: the person who invents the joke or comic idea seldom laughs in the process. The creative stress under which he labours is not of the same kind as the emotions aroused in the audience. He is engaged in an intellectual exercise, a feat of mental acrobatics; even if motivated by sheer venom it must be distilled and sublimated. Once he has hit on the idea and worked out the logical structure, the basic pattern of the joke, he uses his tricks of the trade—suspense, emphasis, implication—to work up the audience’s emotions; and to make these explode in laughter when he springs his surprise-effect on them.

Now the humorist may also experience surprise at the moment
when the idea hits him—particularly if it was generated by the unconscious. But there is a basic difference between a shock imposed from outside and a quasi self-administered shock. The humorist has solved his problem by joining two incompatible matrices together in a paradoxical synthesis. His audience, on the other hand, has its expectations shattered and its reason affronted by the impact of the second matrix on the first; instead of fusion there is collision; and in the mental disarray which ensues, emotion, deserted by reason, is flushed out in laughter.

In the humorist's mind no such divorce occurs; he has nothing to laugh about. At most he may, at the moment of inspiration, hit his desk: 'I have got it.' But the creative stress which is relieved in such minor gestures, symbolic of victory, of opposition vanquished, is of a sublimated nature—quite unlike the more primitive emotions puffed away in the massive laughter of the audience. The contrast is further illustrated in situations where a person fails to find the solution of a brain-teaser—and, on being told it, starts hitting, not the desk, but his own benighted head. The redundant tension is worked off in a symbolic gesture of self-punishment—again a more specific outlet for energies harnessed to intellectual tasks, than the laughter-channels of least resistance.

The less suggestive and the more implicit the joke, the more will the consumer's reactions approximate the producer's—whose mental effort he is compelled to re-create. When the witticism is transformed into epigram, and teasing into challenge, the overflow reflex for primitive emotions is no longer needed, and de-tension assumes more individualized and sophisticated forms; the roar of Homeric laughter is superseded by Archimedes's piercing cry or Kepler's holy ravings.

The creative act of the humorist consisted in bringing about a momentary fusion between two habitually incompatible matrices. Scientific discovery, as we shall presently see, can be described in very similar terms—as the permanent fusion of matrices of thought previously believed to be incompatible. Until the seventeenth century the Copernican hypothesis of the earth's motion was considered as obviously incompatible with commonsense experience; it was accordingly treated as a huge joke by the majority of Galileo's contemporaries. One of them, a famous wit, wrote: 'The disputes of Signor Galileo have dissolved into alchemical smoke. So here we are at last, safely back on a solid earth, and we do not have to fly with it as so many ants crawling around a balloon.'
The history of science abounds with examples of discoveries greeted with howls of laughter because they seemed to be a marriage of incompatibles—until the marriage bore fruit and the alleged incompatibility of the partners turned out to derive from prejudice. The humorist, on the other hand, deliberately chooses discordant codes of behaviour or universes of discourse to expose their hidden incongruities in the resulting clash. Comic discovery is paradox stated—scientific discovery is paradox resolved.

But here again we find, instead of a clear dividing line, continuous transitions. The paradoxes of Achilles and the Tortoise, or of the Cretan Liar, have, during two millennia, tickled philosophers and teased mathematicians into creative efforts; and Juvenal’s *Si Natura negat, facit indignatio versum* remains as true as ever.

**Summary**

I have started this inquiry with an analysis of humour because it is the only domain of creative activity where a complex pattern of intellectual stimulation elicits a sharply defined response in the nature of a physiological reflex.

The pattern underlying all varieties of humour is ‘bisociative’—perceiving a situation or event in two habitually incompatible associative contexts. This causes an abrupt transfer of the train of thought from one matrix to another governed by a different logic or ‘rule of the game’. But certain emotions, owing to their greater inertia and persistence, cannot follow such nimble jumps of thought; discarded by reason, they are worked off along channels of least resistance in laughter.

The emotions in question are those of the self-assertive, aggressive-defensive type, which are based on the sympathico-adrenal system and tend to beget bodily activity. Their counter-parts are the participatory or self-transcending emotions—compassion, identification, raptmness—which are mediated by physiological processes of a different type, and tend to discharge not in laughter but in tears. As a rule our emotions are a mixture of both; but even in the more subtle or affectionate varieties of humour, an element of aggression—a drop of adrenalin—must be present to trigger off the reaction. Laughter is a luxury reflex which could arise only in a creature whose reason has gained a degree of autonomy from the urges of emotion, and enables him to
perceive his own emotions as redundant—to realize that he has been fooled.

After applying the theory to various types of the comic, I discussed the criteria of the humorist’s technique: originality or unexpectedness; emphasis through selection, exaggeration and simplification; and economy or implicitness which calls for extrapolation, interpolation and transposition.

The term ‘matrix’ was introduced to refer to any skill or ability, to any pattern of activity governed by a set of rules—its ‘code’. All ordered behaviour, from embryonic development to verbal thinking, is controlled by ‘rules of the game’, which lend it coherence and stability, but leave it sufficient degrees of freedom for flexible strategies adapted to environmental conditions. The ambiguity of the term ‘code’ (‘code of laws’—‘coded message’) is deliberate, and reflects a characteristic property of the nervous system: to control all bodily activities by means of coded signals.

The concept of matrices with fixed codes and adaptable strategies, proposed as a unifying formula, appears to be equally applicable to perceptual, cognitive, and motor skills and to the psychological structures variously called ‘frames of reference’, ‘associative contexts’, ‘universes of discourse’, mental ‘sets’, or ‘schemata’, etc. The validity of the formula will be tested in the chapters which follow, on various levels from morphogenesis to symbolic thought.

Matrices vary from fully automatized skills to those with a high degree of plasticity; but even the latter are controlled by rules of the game which function below the level of awareness. These silent codes can be regarded as condensations of learning into habit. Habits are the indispensable core of stability and ordered behaviour; they also have a tendency to become mechanized and to reduce man to the status of a conditioned automaton. The creative act, by connecting previously unrelated dimensions of experience, enables him to attain to a higher level of mental evolution. It is an act of liberation—the defeat of habit by originality.*

NOTES

To p. 90. This, of course, equally applies to pictures. The same Rubens nude will call forth different responses from a schoolboy, an art critic, and a nun. In the National Gallery in Vienna there was once to be seen an admirable Leda of the Venetian school, which bore the inscription: Nackend Weib von böser Gans Gebissen (Naked Wench Bitten by Angry Goose).
To p. 96. As this book was nearing completion, Professor Burt kindly brought to my attention a paper he wrote on 'The Psychology of Laughter' for a seminar of his post-graduate students, in which he had come to somewhat similar conclusions:

'Laughter may be regarded as providing a safety-valve for the overflow of emotional energy, instinctively excited by the perception of some specific situation which automatically tends to stimulate the instinct, but which on closer examination is seen not to require energetic action. . . . Every stimulus to laughter thus involves a double-entendre: there is first the superficial or manifest meaning which tends to arouse an emotion appropriate to some serious situation (and thus momentarily disturbing equilibrium), and secondly the deeper or latent meaning (which contradicts the first impression); and the outlet of laughter is provided to give immediate relief to the superfluous emotional excitement. . . .'
(Burt, 1945).
PART TWO

THE SAGE
V

MOMENTS OF TRUTH

The Chimpanzee and the Stick

That animals can display originality and inventiveness has been asserted since Aesop, but experimentally demonstrated for the first time by the German psychologist Wolfgang Köhler. In 1918 Köhler published The Mentality of Apes, an account of his experiments with chimpanzees on Teneriffe, which has since become a classic. Here is a characteristic description of an animal discovering the use of tools (my italics):

Nueva, a young female chimpanzee, was tested 3 days after her arrival (11th March, 1914). She had not yet made the acquaintance of the other animals but remained isolated in a cage. A little stick is introduced into her cage; she scrapes the ground with it, pushes the banana skins together in a heap, and then carelessly drops the stick at a distance of about three-quarters of a metre from the bars. Ten minutes later, fruit is placed outside the cage beyond her reach. She grasps at it, vainly of course, and then begins the characteristic complaint of the chimpanzee: she thrusts both lips—especially the lower—forward, for a couple of inches, gazes imploringly at the observer, utters whimpering sounds, and finally flings herself on to the ground on her back—a gesture most eloquent of despair, which may be observed on other occasions as well. Thus, between lamentations and entreaties, some time passes, until—about seven minutes after the fruit has been exhibited to her—she suddenly casts a look at the stick, ceases her moaning, seizes the stick, stretches it out of the cage, and succeeds, though somewhat clumsily, in drawing the bananas within arm’s length. Moreover, Nueva at once puts the end of her stick behind and beyond her objective. The test is repeated after an hour’s interval; on this second occasion, the animal has recourse to