From Source

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to Statement

JAMES M. McCRIMMON

with the assistance of

FLORENCE TREFETHEN

and BARBARA S. McCRIMMON

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Preface

The subject of this book is the composition process as it is revealed in its three main stages: invention, arrangement, and style. The intent is to provide freshman students with a collection of prose pieces which will supplement instruction in composition in two main ways: by illustrating the process a writer follows from source to statement, and by providing models for classroom analysis and discussion. If this intent is realized, the fifty-five selections will constitute a laboratory for the study of composition.

Part One attempts to enlarge the student's concept of the writing process by illustrating and analyzing the ways in which the raw materials of observation and experience are transformed into ideas. The opening section, "The Process of Discovery," illustrates the kind of disciplined inquiry that goes on in any creative activity. The scientist, the painter, the poet, and the prose writer work with different materials, but their intellectual processes are remarkably alike. Each is trying to understand the implications of the problem he has set for himself and to shape the answers he finds into a harmonious construct. For the student of composition Dean Rohman's essay on "pre-writing" will offer the most usable illustration, but the other essays in this first section will provide supporting insights. The second and third sections in Part One illustrate in a variety of ways how a writer gets his material and what he does with it when he has it.

Part Two deals with the structure of essays by illustrating some patterns of development widely used in expository prose: examples, comparison-contrast, definition, analysis, and argument. The essays in this part may be used to supplement classroom instruction on organization and development, or to serve as models for the student's own writing.

Part Three combines the study of language with that of style. The first section explores the relation of language and culture, from the Whorf

hypothesis about the interrelation of language and perception to McLuhan's emphasis on the potential contribution of electronic media. The second section provides a summary of the historical development of American English and of the differences between the traditional and the "new" methods of studying grammar. The third section deals with style, and puts major emphasis on some analyses of what makes a style "good" or "bad." The final section contains four pieces of satire which illustrate some uses of the satiric mode as an instrument of criticism, and give some practice in meeting the special demands a satirist makes on his readers.

With one exception, every essay in the book is followed by a series of questions. Some of these questions probe the student's understanding of the material. But some of them are designed not to test the student's reading, but rather to sharpen his recognition of the writing problems involved, and to invite his critical response. For this reason many of the questions are open-ended. The instructor need feel no obligation to provide an "authoritative" answer. If the class feels that a definitive answer is necessary, it can provide one by consensus.

In preparing this edition I have been considerably assisted by Mrs. Florence Trefethen of Northeastern University and by my wife, Barbara S. McCrimmon. Both participated in the selection of essays, in the writing of headnotes and introductory passages, in proofreading, and in editorial decisions.

J. M. McC.

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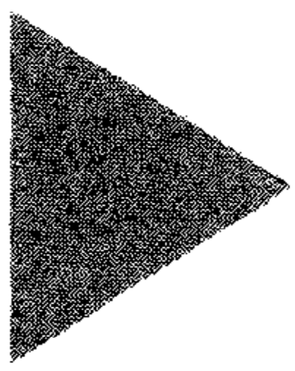

The Sources of Ideas

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The Process of Discovery

The art of persuasive speaking and writing as it was practiced in ancient Athens is known as *classical rhetoric,* and three of its main divisions were *invention, arrangement,* and *style.* Invention had to do with "the discovery of the available means of persuasion." Arrangement referred to the organization of this material into a written or spoken communication. Style was concerned with the attitude and manner of the presentation.

The essays in this book are divided into three main groups which reflect these three divisions. Thus the selections in Part One, "The Sources of Ideas," consider the ways in which writers determine what they want to do with their subjects and how they use observation and experience to generate, develop, and reshape ideas. Those in Part Two, "Patterns of Development," reveal and illustrate some important basic structures much used in expository writing. And those in Part Three, "Language and Style," focus on the interrelation of language and thought and on those considerations that affect a writer's style — his purpose in writing, for example, and the relationship he sees between himself and his readers. Each of these three parts is subdivided, and each division is preceded by a brief introductory comment.

The section which follows, "The Process of Discovery," includes six essays, the first three of which describe the process by which old and new knowledge is transmuted into new ideas. Whether this is called "creation" (Koestler), "thought" (Wallas), or "imagination" (Bronowski), it involves new insights into a subject and a reconstruction of elements, which together produce an *invention* — a new idea, theory, or technique, or a piece of art or literature. The last three essays in this section apply the general process

just described to specific kinds of composition, to the writing of an essay, the making of a poem, the painting of a picture. For each of these activities the specific procedure and the vocabulary to explain it have their own distinctive quality. But despite their differences, these three selections discuss the search for implications pursued by all investigators, regardless of their fields, as they explore a subject and progressively refine and redefine it in the light of increasing grasp and understanding.

Arthur Koestler

Moments of Truth

Arthur Koestler is an international man of ideas and letters. He was born in Budapest, educated in Vienna, and spent his early professional years as a foreign correspondent in the Middle East, Paris, and Berlin. In the nineteen-thirties he joined the Communist Party and fought in the Spanish Civil War. His later disillusionment with Communism is recorded in the most famous of his novels, Darkness at Noon. *The following selection from* The Act of Creation, *1964, describes how an individual, confronted with an apparently unsolvable problem, reshuffles the problem's components until he achieves a solution.*

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 the stick much sooner, and uses it with more skill; and at a third repetition, the stick is used immediately, as on all subsequent occasions.[1]

It is obvious that Nueva was not led to her discovery by any process of conditioning, or trial and error. Her behaviour from the moment when her eyes fell on the stick was, in Köhler's words, 'unwaveringly purposeful': she seized the stick, carried it without hesitation to the bars, stretched it out of the cage, and placed it behind the banana — a smooth, integrated sequence of actions, quite different from the erratic, hit-and-miss behaviour of rats trying to find their way through a maze, or cats trying to get out of a puzzle-box. It was an original, self-taught accomplishment, which had no precedent in the chimpanzee's past. The process which led to her discovery can be described as a synthesis of two previously unconnected skills, acquired in earlier life. In the first place, Nueva had learned to get at bananas outside her cage by squeezing an arm or foot through the bars; the ensemble of variations of this simple skill constitutes matrix number one. She had also acquired the habit — matrix number two — of scraping the earth with a stick and of pushing objects about with it. But in this playful activity the stick was never used for any utilitarian purpose; to throw, push, or roll things about is a habit common to a variety of young animals. Nueva's discovery consisted in applying this playful habit as an auxiliary matrix to get at the banana. The moment of truth occurred when Nueva's

[1] W. Köhler, *The Mentality of Apes* (London: Penguin Books, 1957), p. 35. [Author's notes.]

glance fell on the stick while her attention was set on the banana. At that moment the two previously separate matrices fused into one, and the 'stick to play with' became a 'rake to reach with' — an implement for obtaining otherwise unobtainable objects.

Like many other discoveries, Nueva's seems a simple and obvious one — but only after the fact. A dog, for instance, will carry a stick between his teeth, but he will never learn to use it as a rake. Moreover, chimpanzees are not the only species which finds it difficult to apply a 'playful' technique to a utilitarian purpose with which it had not been connected in previous experience; a number of discoveries in the history of human science consisted in just that. Galileo astonished the world when he turned the telescopic toys, invented by Dutch opticians, to astronomic use; the invention of the steam engine as a mechanical toy by Hero of Alexandria in the second century B.C. had to wait two thousand years before it was put to practical use; the geometry of conic sections which Apollonius of Perga had studied in the fourth century B.C. just for the fun of it, gave Kepler, again two thousand years later, his elliptical orbits of the planets; the passion for dice of the Chevalier de Méré made him approach Pascal for advice on a safe gambling system, and thus was the theory of probability born, that indispensable tool of modern physics and biology, not to mention the insurance business. 'It is remarkable,' wrote Laplace, 'that a science which began with considerations of play has risen to the most important objects of human knowledge.' Thus at the very start of our inquiry we hit on a pattern — the discovery that a playful or *l'art pour l'art* technique provides an unexpected clue to problems in a quite different field — which is one of the leitmotifs in the history of science.

Nueva's discovery was the use of tools; the next one to be described is the making of tools. Its hero is Sultan, the genius among Köhler's chimpanzees:

> (17.2.1914) Beyond some bars, out of arm's reach, lies an objective [a banana]; on this side, in the background of the experiment room, is placed a sawn-off castor-oil bush, whose branches can be easily broken off. It is impossible to squeeze the tree through the railings, on account of its awkward shape; besides, only one of the bigger apes could drag it as far as the bars. Sultan is let in, does not immediately see the objective, and, looking about him indifferently, sucks one of the branches of the tree. But, his attention having been drawn to the objective, he approaches the bars, glances outside, the next moment turns round, goes straight to the tree, seizes a thin slender branch, breaks it off with a sharp jerk, runs back to the bars, and attains the objective. From the turning round upon the tree up to the grasping of the fruit with the broken-off branch, is one single quick chain of action, without the least 'hiatus,' and without the slightest movement that does not, objectively considered, fit into the solution described.[2]

[2] *Ibid.*, pp. 93–94.

Had Sultan known Greek he would certainly have shouted Eureka! Köhler comments:

> For adult man, with his mechanized methods of solution, proof is sometimes needed, as here, that an action was a real achievement, not something self-evident; that the breaking off a branch from a *whole tree,* for instance, is an achievement over and above the simple use of a stick, is shown at once by animals less gifted than Sultan, even when they understand the use of sticks beforehand.[3]

It has been said that discovery consists in seeing an analogy which nobody had seen before. Solomon discovered the analogy between the Shulamite's neck and a tower of ivory. Sultan discovered that a twisted branch on a tree with leaves on it had something in common with a straight, lifeless bamboo-pole lying on the ground. What they had in common was very little: let us say that both looked 'hardish' and 'longish,' but that is all. The branch, which previously was part and parcel of the tree, was wrenched out of its visual context — both figuratively and literally speaking — and made into a part of another, functional, context.

The now familiar shift of awareness to the previously unimportant 'pole-like' aspect of the branch was very prettily demonstrated by another of Köhler's chimpanzees, Koko. It took Koko much longer to make the same discovery as Sultan; and when at last he had broken off a branch from the tree to use it as a stick, and marched with it towards the banana outside the cage, he:

> eagerly picked off one leaf after the other, so that only the long, bare stem was left. . . . The pulling off of the leaves is both correct and incorrect; *incorrect* because it does not make the stem any longer, *correct* because it makes its length show up better and the stem thus becomes optically more like a stick. . . . There can be no doubt that Koko did not pull off the leaves in play only; his look and his movements prove distinctly that throughout the performance his attention is wholly concentrated on the banana; he is merely concerned now with preparing the implement. Play looks quite different; and I have never seen a chimpanzee play while (like Koko in this case) he was showing himself distinctly intent upon his ultimate purpose.[4]

Before the chimpanzee actually broke off the branch there must have been a moment when he perceived it as a member *of both matrices at the same time* — still a part of the tree but already a detached tool. Thus one could say that Sultan had seen a *visual pun:* a single form (the branch) attached to two different functions.

The act of discovery has a disruptive and a constructive aspect. It must disrupt rigid patterns of mental organization to achieve the new synthesis. Sultan's habitual way of looking at the tree as a coherent, visual whole had

[3] *Ibid.*, p. 94.
[4] *Ibid.*, p. 97.

> to be shattered. Once he had discovered that branches can be made into tools he never again forgot it, and we may assume that a tree never again looked the same to him as before. He had lost the innocence of his vision, but from this loss he derived an immense gain: the perception of 'branches' and the manipulation of 'tools' were now combined into a single, sensory-motor skill; and when two matrices have become integrated they cannot again be torn asunder. This is why the discoveries of yesterday are the commonplaces of today, and why we always marvel how stupid we were not to see what *post factum* appears to be so obvious. . . .

Chance and Ripeness

Nearly all of Köhler's chimpanzees sooner or later learned the use of implements, and also certain methods of making implements. But a dog, however skilful in carrying a stick or a basket around, will never learn to use the stick to get a piece of meat placed outside its reach. We might say that the chimpanzees were *ripe* to discover the use of tools when a favourable chance-opportunity presented itself — such as a stick lying around just when needed. The factors which (among others) constitute ripeness for this type of discovery are the primates' natural dexterity and advanced oculo-motor co-ordination, which enable them to develop the playful habit of pushing objects about with branches and sticks. Each of the separate skills, whose synthesis constitutes the new discovery, was well established previously and frequently exercised. In a similar way Archimedes's mental skill in manipulating abstract concepts like volume and density, plus his acute powers of observation, even of trivia, made him 'ripe' for his discovery. In more general terms: the statistical probability for a relevant discovery to be made is the greater the more firmly established and well exercised each of the still separate skills, or thought-matrices, are. This explains a puzzling but recurrent phenomenon in the history of science: that the same discovery is made, more or less at the same time, by two or more people; and it may also help to explain the independent development of the same techniques and similar styles of art in different cultures.

Ripeness in this sense is, of course, merely a necessary, not a sufficient, condition of discovery. But it is not quite such an obvious concept as it might seem. The embittered controversies between different schools in experimental psychology about the nature of learning and understanding can be shown to derive to a large extent from a refusal to take the factor of ripeness seriously. The propounders of Behaviouristic psychology were wont to set their animals tasks for which they were biologically ill-fitted, and thus to prove that new skills could be acquired only through conditioning, chaining of reflexes, learning by rote. Köhler and the Gestalt school, on the other hand, set their chimpanzees tasks for which they were ripe or *almost ripe,* to prove that all learning was based on insight. The contradictory conclusions at which they arrived need surprise us no more

than the contrast between the learning achievements of a child of six months and a child of six years. This is a necessarily over-simplified description; the only point I wish to make is that the more ripe a situation is for the discovery of a new synthesis, the less need there is for the helping hand of chance.

. . . . . .

Logic and Intuition

Eighteen hundred and seventy-nine was the birth-year of immunology — the prevention of infectious diseases by inoculation. By that time Louis Pasteur had already shown that cattle fever, rabies, silkworm disease, and various other afflictions were caused by micro-organisms, and had firmly established the germ theory of disease. In the spring of 1879 — he was fifty-seven at that time — Pasteur was studying chicken cholera. He had prepared cultures of the bacillus, but for some reason this work was interrupted, and the cultures remained during the whole summer unattended in the laboratory. In the early autumn, however, he resumed his experiments. He injected a number of chickens with the bacillus, but unexpectedly they became only slightly ill and recovered. He concluded that the old cultures had been spoilt, and obtained a new culture of virulent bacilli from chickens afflicted by a current outbreak of cholera. He also bought a new batch of chickens from the market and injected both lots, the old and the new, with the fresh culture. The newly bought chicks all died in due time, but, to his great surprise the old chicks, who had been injected once already with the ineffective culture, all survived. An eye-witness in the lab described the scene which took place when Pasteur was informed of this curious development. He 'remained silent for a minute, then exclaimed as if he had seen a vision: "Don't you see that these animals have been *vaccinated!*" '

Now I must explain that the word 'vaccination' was at that time already a century old. It is derived from *vacca,* cow. Some time in the 1760s a young medical student, Edward Jenner, was consulted by a Gloucester dairymaid who felt out of sorts. Jenner thought that she might be suffering from smallpox, but she promptly replied: 'I cannot take the smallpox because I have had the cow-pox.' After nearly twenty years of struggle against the scepticism and indifference of the medical profession, Jenner succeeded in proving the popular belief that people who had once caught the cow-pox were immune against smallpox. Thus originated 'vaccination' — the preventive inoculation of human beings against the dreaded and murderous disease with material taken from the skin sores of afflicted cattle. Although Jenner realized that cow-pox and smallpox were essentially the same disease, which became somehow modified by the organism which carried it, he did not draw any general conclusions from his discovery. 'Vaccination' soon spread to America and became a more or less general practice in a number of other countries, yet it remained limited to smallpox, and the word itself retained its exclusively bovine connotations.

The vision which Pasteur had seen at that historic moment was, once

again, the discovery of a hidden analogy: the surviving chicks of the first batch were protected against cholera by their inoculation with the 'spoilt' culture as humans are protected against smallpox by inoculation with pox bacilli in a modified, bovine form.

Now Pasteur was well acquainted with Jenner's work. To quote one of his biographers, Dr. Dubos (himself an eminent biologist): 'Soon after the beginning of his work on infectious diseases, Pasteur became convinced that something similar to "vaccination" was the best approach to their control. It was this conviction that made him perceive immediately the meaning of the accidental experiment with chickens.'

In other words, he was 'ripe' for his discovery, and thus able to pounce on the first favourable chance that offered itself. As he himself said: 'Fortune favours the prepared mind.' Put in this way, there seems to be nothing very awe-inspiring in Pasteur's discovery. Yet for about three-quarters of a century 'vaccination' had been a common practice in Europe and America; why, then, did nobody before Pasteur hit on the 'obvious' idea of extending vaccination from smallpox to other diseases? Why did nobody before him put two and two together? Because, to answer the question literally, the first 'two' and the second 'two' appertained to *different frames of reference*. The first was the technique of vaccination; the second was the hitherto quite separate and independent research into the world of micro-organisms: fowl-parasites, silkworm-bacilli, yeasts fermenting in wine-barrels, invisible viruses in the spittle of rabid dogs. Pasteur succeeded in combining these two separate frames because he had an exceptional grasp of the rules of both, and was thus prepared for the moment when chance provided an appropriate link.

He knew — what Jenner knew not — that the active agent in Jenner's 'vaccine' was the microbe of the same disease against which the subject was to be protected, but a microbe which in its bovine host had undergone some kind of 'attenuation.' And he further realized that the cholera bacilli left to themselves in the test-tubes during the whole summer had undergone the same kind of 'attenuation' or weakening, as the pox bacilli in the cow's body. This led to the surprising, almost poetic, conclusion, that life inside an abandoned glass tube can have the same debilitating effect on a bug as life inside a cow. From here on the implications of the Gloucestershire dairymaid's statement became gloriously obvious: 'As attenuation of the bacillus had occurred spontaneously in some of his cultures [just as it occurred inside the cow], Pasteur became convinced *that it should be possible to produce vaccines at will in the laboratory*. Instead of depending upon the chance of naturally occurring immunizing agents, as cow-pox was for smallpox, vaccination could then become a general technique applicable to all infectious diseases.'[5] . . .

[5] R. Dubos, *Pasteur and Modern Science* (New York: Anchor Books, 1960). p. 117.