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## The Concept of Duration as Key to the Logical Forms of Reason and Their Psychological Processes

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THE CONCEPT OF DURATION  
AS KEY TO THE LOGICAL FORMS OF REASON  
AND  
THEIR PSYCHOLOGICAL PROCESSES  
BY CHRISTIAN O. WEBER

LINCOLN, NEBRASKA

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I

INTRODUCTION

TIME AND THE ANTITHESIS BETWEEN THOUGHT  
AND REALITY

1

1. The Greeks, not sparing even thought itself from their insatiable questionings, posed the problem, "How can we seek for knowledge which we do not already possess?" Human thinking, whose alleged function is to illuminate all other problems, is itself the most baffling enigma. For, if we stop to examine this commonplace experience of thinking, it enmeshes us in logical tangles so abstruse that they beggar both science and philosophy. No wonder, then, that modern psychology, so eminently successful in measuring intelligence, is yet unable to decide what intelligence is. This but verifies a familiar observation made by Poincaré to the effect that the familiar things in life are the most surprising and mysterious. Then let the logicians be unashamed of the inscrutable syllogism, which seems to shed light on all things by means of the dubious device of keeping all the darkness within itself. But this inner canker of darkness becomes apparent when we cease to think about *things* and think about *thought*; and as James inferred, it is the cause which keeps the never-stopping clock of metaphysics going.

The human mind, because the human heart is Platonic, will not cease striving for its unattainable ideal. We seek knowledge whose clarity is perfect; but before we can make assured progress in this direction, we must first of all put an end to thinking about thought. Epistemology is the inevitable *cul de sac* of our hope of attaining perfect knowledge. Poincaré somewhere observes that science, far from overcoming the complexities of nature, only transfers them to the textbooks. This is but the parallel in science of a similar *tour de force* in philosophy: We move from victory to victory in the realm of thought about things only at the cost of multiplying defects in the sphere of thought about thought. It would be unnecessary to repeat here the numberless self-contradictions which beset formal logic and higher mathematics at their best. Kant and Hegel, Bergson and Schiller have made their familiarity banal in its intensity. The *reality* of these self-defects in the theory of knowledge, however, overshadows any other vice they exhibit, if indeed, they are vices at all. That the human mind is almost invariably led to believe that antitheses in knowledge must be vices, is attested by the fact that the attempt to remedy such antitheses has brought about the main schools of thought of the present, whether pragmatic, idealistic, or realistic. In science, the advent of relativism essentially means the advent of logical devices to remedy the logical deadlocks of the Newtonian system.

2. It is the central aim of this thesis to examine the intricate factors which condition this inevitable cloud-gathering called 'epistemology.' We may distinguish two fundamental accounts which the human mind is inclined to give regarding the discrepancy between the perfect theory of knowledge for which we seek, and the circular results which we always achieve. (1) There is first the view that the obdurate self-contradictions of our ways of knowing are inevitable and unavoidable. This is the case, for instance, in Bergson's belief in an ever-growing reality which must always burst



the measures to which we would confine it. This view, in its radical form, is always dualistic or pluralistic. It regards the chasm between thought and reality, between the measured and the measuring, as evidence of a primal and incurable rift in the nature of existence itself. Our universe, it holds, is a dual and unstable one, sharing our struggle for existence. There exists in the essence of things, the irrational, the chaotic. Reality is woven of two irreducible opposites, which we meet in our experience as the opposition of truth to error, good to evil, and beauty to ugliness. We can find no common denominator to which these forces may be reduced, simply because none exists. In the last analysis, evil, ugliness, and error are not to be *understood* but to be *fought*; we seek to understand them only that we may strike. Yet, despite this dualism of theory, it leads to a curious monism of practice: Our warfare against this triune of foes will be effective to the degree that we do *understand* them; and when our enmity against them is at its best, we live as *if* they could be fully understood! Thus, in science, we act *as if* nature were *conserved*; while with Alchemists' hearts we yearn to violate her 'givenness.' Nevertheless, this 'intentional' positing of an absolute order is here at least made a *pre-condition* of thinking, not thought's *goal*. There is indeed a far cry between accepting the 'uniformity' and rationality of nature as the *guide* to thought, and in accepting them in advance as thought's assured *goal*.

The second solution is by far the favorite one. It assumes that nature embodies an 'absolute order' of things, whether in terms of the 'uniformity of phenomena' posited by science, or in terms of the 'rational ground' posited by the Hegelian idealists. According to this view, nature is such that our knowledge ought in time to exhaust it. According to this account there are two ways of interpreting our present (and historically, omnipresent) difficulty of a logic which fails to lock-step with reality. We may insist that the true logic must be uni-modal, having but *one* set of postulates, and a



unitary technique. At present, this outlook is abandoned in favor of another device: the attempt to encompass reality, not by perfecting one instrument, but rather by multiplying instruments. This is an age, not of logic, but of logics. In imitation of current mathematics, with its plurality of geometries, we tend to accept a plurality of logics. Witness Russell's distinction of 'transitive' from 'intransitive' judgments, and the erection of special logics to deal with the latter form. Today, truth, whether in geometry or logic, can only mean the consistent use of *one* set of postulates. Curiously, the ability to choose the right logic for the right problem, or a geometry of just the right number of dimensions, becomes a matter of brute 'cunning' in Samuel Butler's sense. But, this sort of thought, which really solves a problem, is left outside of both logic and geometry. The right geometry once selected, thought dies — the routine processes of geometry represent thought in the act of becoming habit. To be sure, these 'habits' are acquired at the expense of thought, but in regard to the questions: "how do new geometries evolve," the manuals of geometry are notoriously silent.

We must never, in any case, confuse this latter view with the dualistic or pluralistic one first mentioned. This age of many geometries and many logics is hardly even pluralistic in its epistemology, and perhaps never is in its ontology. That is, though we have in addition to the geometry of Euclid, the geometries of Riemann and Lobachevski, all three of them have physical situations corresponding to them. However Einstein emphasizes the relativity of physical states, he still accepts the state of light as an absolute, which binds all relative states into a unitary system. Symbolic logic does not 'oust' traditional logic but accepts it as one out of a coordinate set of logics. These 'epistemological' pluralists differ fundamentally from the ontological pluralists. Though the ontological pluralist may also multiply methods even more radically, by adding intuition to reason, metaphor to formula,

they do so only to *approximate* reality, not to come to literal grips with it.

3. The history of logic, seen in perspective, appears as a struggle between the opposed convictions mentioned above. Perhaps the opposition is one of temperament rather than of reason. Our choice of one or the other may be fundamentally a *moral* choice. For instance, the demand for an absolutely 'given' knowledge practically results in our digging for 'more' knowledge than we have. Perhaps the Bergsonian despair that nature is inexhaustible means practically that we must be content with what knowledge we have already. Only, Bergson can retort that the notion of an absolute knowledge leads us to the illusion that we have it already.

A dear ideal of knowledge awoke in the breasts of the ancient Greeks, and the struggle to attain this ideal forms the central theme which unites the history of science and the history of philosophy into one drama. Our ideal knowledge must have two traits: (1) it must be 'exact' and (2) it must be exhaustively true to reality. Knowledge becomes exact as it approaches the mathematical ideal. All sciences, born of philosophy, slowly and steadily approach the mathematical norm. Astronomy and physics are thought to have made the nearest 'approach' to it. But, never has Zeno's paradox of Achilles and the tortoise found so grim a verification. In truth, we are in a more hapless plight than was Achilles. Achilles, so some accounts have it, meets defeat at the hands of infinity — the infinite subdivisibility of the path over which he runs. Now, the human mind in its struggle for the exhaustively true and completely exact, has two infinities to conquer: for both truth and exactness, though posited as fixed goals, turn out to be ideals, ever receding from our approach. We have not actually achieved such knowledge; but this difficulty, great enough in view of the tremendous price we pay for every advance of knowledge, is a trifle in comparison with a greater difficulty, namely; that we cannot even *think* such an attainment. The attempt to

conceive of absolute knowledge brings on logical deadlock, which takes the form of the following dilemma: Mathematical formulae and logical inferences become *exact* just to the extent that they become alienated from reality. Hence Russell's humorous slander of mathematics as the one science in which we never know what we are talking about! To encompass reality, our knowledge must surrender its pretense to exactness. The history of thought exhibits the human mind grasping first one, then the other horn of this dilemma.

The ancient Greeks contrasted *sense* knowledge with *rational* knowledge; and accepted rational knowledge as embodying the loved ideals, exactness, and truth. The Sophists achieve the first revolt, insisting that sense knowledge is in touch with the realities and that it gives us no absolute. Socrates and Aristotle restore the repute of rational ideals; and Medievalism perpetuates it. But with the Schoolmen, the *exactness* of syllogistic knowledge is portrayed with such vigor that this very exactness itself begins to look like an inexhaustible source of novel exactness! The Schoolmen also exhibited the forlorn isolation of rational knowledge from reality. Then, with the advent of empirical science during the Renaissance and the Enlightenment, the pendulum of opinion swings to the other extreme. Sense knowledge, in the guise of scientific induction, again wins because of its inherent capacity to grapple with the 'realities' of the external world; but only to lose again because of its inherent inability to give absolute knowledge.

With Kant we get a new formulation of the problem which has had scant parallel in preceding times. Kant, so to speak, accepts this pendular nature of thought as natural. To him, knowledge has two forms; there is 'pure reason' opposed to 'practical reason.' Pure reason is always relative, and cannot attain the absolute because it cannot surmount the antinomies. Practical reason alone can attain the absolute.

With Hegel, a renewed endeavor to achieve the rational ideal presents itself, whose essential features are so unique that history is even more empty of parallel than in the case of Kant. Hegel, noting the inherent self-contradictoriness of knowledge, attempts to solve the difficulty by the unique device of treating this self-contradictoriness as logically necessary. The alternative, that contradiction may originate, not in *knowing* but in the nature of the world *known*, is excluded by that other device of idealism, to regard nature too as an *idea*. The universe, according to Hegel's treatment, becomes a universe of thought, evolving according to the logical necessities of 'thesis' and 'antithesis.'

To the writer, at least, the undying greatness and significance of Hegel lies in his full grasp of the predicament of epistemology. He saw, not only that the disease of self-contradictoriness is the one invariable factor which brings about the defeat of epistemologists; but (and this is his great resemblance to Kant), he accepts this contradictoriness as incurable. He is unique only in his device of treating the antitheses of thought as logically necessary steps of *one* process. He is the great Stoic of epistemology, making a virtue out of a difficulty. If only we could banish the suspicion that Hegel sought to banish difficulties by treating them as the chief symptom of clarity.

The predecessors of Hegel found an insoluble opposition between the objectivity of induction and the exactness of deduction. Deductive reasoning is exact enough, but we are not sure that it is true to the realities, i.e., that it is objective. Hegel objectifies thought, but forthwith sacrifices its exactness. For, if thought is by nature antithetical, thought is by nature unable to find absolute knowledge, i.e., it can never put an end to its own processes, since every synthesis but anticipates a new antithesis. Hegel's successors, Fichte and Schelling, exhibit the eternal opposition of Hegel's 'thesis' and 'antithesis' in terms of the oppositions of the 'self' to

the 'not-self.' Precisely as in science, we have accumulating instances, but no absolute rule about the number of instances it takes to validate a generalization. If there is no absolute end to the succession of theses and antitheses, Hegel believes that we can at least assert that thought is *absolutely antithetical*: our one absolute truth regards thought itself, not things thought about. But we dispute the claim that thought is inherently antithetical. We cannot assume that because thought has always turned out to be antithetical in the past, that this must always be the case. It is again *the reality of time*, the possibility of finding a final 'synthesis' that stands in the way of Hegel's unique attempt to achieve a present absolute knowledge, namely, that thought is eternally antithetical.

In brief, Hegel apparently discerned that it is the timefulness of reality which renders it opaque to thought; and accordingly seeks to conquer that timefulness by embodying it in the nature of thought. Time has indeed been the great *point de resistance* in nature. Only the devastations and changes wrought by the destroyer time have blocked our attempt to erect a system of order where thought and things have a one-to-one relation. To others, Hegel's method will appear like that of a wise general, who sees clearly that one and only one achievement can assure the conquest of absolute knowledge. Thought can only hope to absorb nature by conquering its strongest citadel, the reality of time.

4. The significance of time to the problem of knowledge, whether in science or philosophy, is at present in the forefront of speculation. After the advent of instrumentalism in science, and the explicit attack on the concept of time in physical relativism; after Bergson's vindication of time, and the pervasive attention which this concept gets in the writings of both realists and idealists of the present, we can have no doubt but that the logical oppositions between schools of thought can be almost completely stated in terms of their respective orientations to the problem of time. Plato ob-

served<sup>1</sup> that time is unworthy of the solicitude of immortal beings; because in the realm of perfection, the transitory is a matter of indifference. Only, we are beginning to suspect that we are not immortal beings; and that, in the language of Anaximander,<sup>2</sup> we too must atone for our "offense against the order of time."

5. It is the aim of this thesis to develop the view that there is a mode of thinking which implicitly embodies time within it, namely, the imagination. Imagination is the intermediary between formal reasoning and the reality it seeks to portray; that imagination at once partakes of the nature of *thought* and *deed*. I show that in imagination, rightly conceived, we have a generic mode of thought, suitable to all problems, artistic, moral, intellectual. But, because imagination has a multiplicity of problems, it has a multiplicity of ways of dealing with them. And, because these problems are opposed, the devices employed to solve them will be opposed also. So that, if we isolate the routine processes of thought, and erect them into logics, each with its own postulates, we have on our hands a double predicament. First, these logics will be mutually contradictory. Hence Aristotle's opposition of the active versus the passive reason, St. Anselm's opposition of faith to reason, Kant's opposition of pure to practical reason, Bergson's opposition of intellect to intuition. Second, will be the discrepancy between reality and each special system which we set up. But, if we view our special logics in terms of their generic origin out of imagination, will their opposition cease?

This is but to ask again, whether the dualist's view that reality bears within itself a clashing of forces which goes to its very depth is right or wrong. If it is right, then oppositions must always appear in thought so long as it is 'about' the whole of reality. And the author, with due regard to

<sup>1</sup> Herbert Nichols, *The Psychology of Time*, N. Y., 1891, p. 1.

<sup>2</sup> Zeller, *Pre-Socratic Philosophy*, Vol. 1, p. 256.

the declaration made by William James that in matters so obscure, we are all beggars, accepts the dualist's view. We can cover this our essential beggarmdom by an exhibition of plentiful and fairly clear details regarding more superficial matters. These, the author hopes, the reader will find in the essentially psychological and scientific (and perhaps also logical) analyses of the thought processes to be found in the following chapters. The epistemological issues mentioned in this introduction are but feeble threads holding together chapters of a much more empirical kind.

## II

### MEASURED AND MEASURING TIME

#### 1

#### MATHEMATICAL TIME VERSUS DURATION

6. If the system of formal logic furnishes its own epistemology, then its concepts must be taken just as they represent themselves; that is, as wholly timeless. But this is just the dilemma which the theory of knowledge must overcome; namely, the difficulty of how concepts bereft of time can be knowledge of a timeful object, or knowledge to a subject who never escapes time's omnipresence. This problem may be approached from the standpoint of psychology: for the concept is a product of thought, and examination may show that the static property of concepts may be only 'intentional' in Brentano's sense; or that knowledge, as the Critical Realists say, is only 'affirmed,' or is 'transitive' in nature. A possible way out of the difficulty of timeless knowledge which still represents a timeful reality is indicated by the argument that chronological time is itself a concept, which 'stands for' timelessness, but which is itself the product of a maturation or development in time.

If man is indeed the measure of all things we should expect that back of the inert symbolism of numbers there is a wealth of growing meaning which really exhibits creative activity at



high rather than at low tide. On the other hand, numbers represent the universe as all lifeless and dissected; yet the mathematical mode of thought seems to exhibit creative thinking at its best. There is a mode of thinking, the imagination, which like experience itself, is in the nature of a dream, with vital history in all its phases. But with the so-called 'higher' modes of thought, as exhibited in the special procedures of logic, mathematics, and in moral reflection, this timefulness seems to vanish. But we believe that consideration of certain psychological data will show that this timefulness has not vanished, but is only disguised. Is it possible to discover in the symbols of mathematics and logic the clear evidence of a maturation or development in time of which concepts are the fruit? Before answering this question, it is necessary to specify the exact sense of the word time which we consider an indispensable principle in the interpretation of the facts of the reasoning process.

7. Let us distinguish at the outset a mathematical and a psychological concept of time. Mathematical time is distinguished by its mathematical properties, but in opposition to it we may describe a concept of time for which there is no very satisfactory current designation. It is variously termed 'subjective' time, the 'measured' time, 'psychological' time, or 'duration.' The last term is perhaps the most suitable because Bergson has given to it the connotation we wish to emphasize. The full meaning of this theory of time will appear when it is contrasted with its opposite, which is the mathematical conception of time. After stating these theories in their fullest opposition, we will seek to determine the bearing of experimental facts upon them. Thirdly, we ought to determine by logical analysis the categories proper to each of them. Last of all we ought to indicate certain properties of time that have escaped both experimentation and logical analysis. For the innermost savor of the experience of time utterly escapes both instrumental and logical analysis. Its most vital reality escapes all technique save the

technique of our deeds. It is not improbable that the notion of a numbering time derives its intelligibility from the fact that numbers themselves are psychogenetic rather than transcendental in their meaning. H. B. Alexander has shown the futility of the attempt to impart meaning to numbers without going beyond them.<sup>1</sup> Such attempts, according to his argument, result either in a purely nominalistic mathematic or a mathematic whose realism is that of a world transcending ours. In either case number remains in as much need of explanation as before. It is the invention of counting, he maintains, and the "psychology of number consciousness"<sup>2</sup> that give meaning to numbers. "As for mathematics," he adds, "its arithmetic is *au fond* the digits of our limbs, its geometry their motions."<sup>3</sup>

But deeds, one may object, are not as such philosophical — they do not constitute knowledge, until they are given an intelligible voice. We shall see whether the dynamism of deeds is not the key to the psychological meaning of number. Besides, deeds have moral and aesthetic aspects in which we may find the continuity and the discontinuity of the clock's time reconciled. It is first necessary that we examine closely the two opposing conceptions of time which we have mentioned, in order to be assured that we have not created a fictitious problem for ourselves.

## 2

THE PROPERTIES OF MATHEMATICAL TIME AND  
THE PROPERTIES OF DURATION

8. Scientists and laymen alike entertain a certain duality of motive which leads them to employ, in their daily affairs, at least, both the mathematical and the durational concept of

<sup>1</sup> H. B. Alexander, "The Definition of Number," *The Monist*, Vol. XXV, 1915. Also in *Nature and Human Nature*, Chicago, 1923, Chap. IX.

<sup>2</sup> *Op. Cit.*, p. 352.

<sup>3</sup> *Op. Cit.*, p. 356.

time. The simple experience of drinking a cup of tea will exhibit this fact. If eager for the drink, the time taken by the lump of sugar to dissolve 'seems long' to us, while the succeeding period of satiation seems short. Meanwhile, however, the placid clock may have doled but an equal time for each moment of the act. Yet, spite of the fact that the dial contradicts experience, to think of time as a rate of motion over a dial is a deep-seated habit of every man who is synchronized to the routines of civilization; and because of this habit we speak of the time of the clock as 'real' and our inner experience of time as only 'seeming.' We treat time as a quantity all for the commercial and social advantages of doling it out in unit quantities, as for the buying and selling of labor, or for the sake of any other of our social cooperations. Nevertheless, if we give heed we shall see that the 'seeming' delay or haste of our subjective experience is probably just as important a factor in our lives as is the clock's mechanical rate. We do not note the paradox of the contradiction in our twofold view until we boldly attempt to treat all time as exclusively the time of the clock. We somehow are not persuaded when told that a period of insufferable waiting 'lasted but a moment' according to the time of the clock. To be sure, if we depended on our inner sense of time alone our cooperative life would be thrown in hopeless turmoil. From the point of view of chronometry our inner sense of time is arbitrary and lawless.

There are prevailing, therefore, two views of time. There is a 'measured' time and a 'measuring' time. In daily experience, when we are free from the sophistication of metaphysics, a mysterious synthesis seems to come about between them. Metaphysically, the practical harmony between chronometrical time and time as duration, becomes a paradox. There is danger of making this paradox an insoluble one. We are subject to the inveterate intellectual habit which tempts us to solve this problem by treating either mathematical time or time as duration as alone 'real.' We try to

make mathematical time an ontologically exhaustive account of time, but this results in making an identity where there is a difference.

The attempt to make the mathematical concept of time do service for all phases of the experience of time generally takes the form of identifying time as a dimension, coordinate with the other dimensions of space. The school of relativists in physics, make use of such a simplification of time, which has been made possible largely because of the work of Minkowski. To Minkowski, time is a 'fourth' dimension; but if we examine the logic by which he achieves such an identity, we have not far to seek for the artificial forcing of two distinct meanings under the caption of one term. Mathematical time is claimed to be representable by the properties of a line. Now, at the very start, we must distinguish between the real lines of space and the abstract and conceptual lines of science. Real lines are indeed no more than trajectories or paths, and the familiar dial of a clock is able to pass muster as a measure of time because it is eloquent with the suggestions of a journey. And a journey is indifferently gauged in either units of time or space. For example, if you are one mile from home and in good health, you are also about twenty minutes from there. The clock is able to serve as our social standard because its real rate strikes an average to which we are synchronized by our biological history: its days journey is our days journey. The unit distances of the dial of a clock represent certain basic lapses of experience which we choose to regard as mensurating intervals. So far, indeed, we are not yet beyond subjective time at all. Like subjective time, the journey of the clock's hand is continuous. That is, its transition along its pathway is such that it is impossible to state in numerical terms its progress at any given instant. No matter how small an instant we choose, so long as it has a beginning and an end, the actual position of the hand between them is problematical. Mathematics deals only with the countable, hence to subject time to mathematical treat-

ment, its flow must be rendered discrete. To this end, time is considered, not as sharing the properties of real time but of a purely conceptual one, wholly fictitious so far as direct experience is concerned.

9. The inroad of the discrete notion of time is plainly evident in the fact, that although we begin by equating so much space for so much time, in practice this resolves itself in considering only the end points of such distances as representing time. For example, the rotating earth and the moving hands of the clock are typical time instruments of science. But when the frequency of the clock's revolutions are adjusted to the revolutions of the earth, we are free to ignore entirely the real distances traversed by each. Instead, we merely count the successive recurrences of their motion. When the clock is so regulated that it makes two revolutions while the earth makes one, we disregard the actual distances traversed by each, and measure time merely by counting the revolutions of the hands. Now, a number *as such* is no specific magnitude: it may stand for any magnitude whatever. Accordingly, this time of number is free from the suggestion of either a real space traversed or of a real time consumed in doing so. We are now dealing with mathematical time proper. It has unique properties which distinguish it at once from the immediate, subjective time of experience, or the time of journeying represented by distances. The time of the clock is a fusion of the notion of mathematical time and of time as duration. Time as duration and the clock's time are alike at least in two important respects: both are continuous, and the occurrence of each is unique — unique in the sense that they occur but once. To be sure, we count each 'new' rotation of the clock's hands, as only a repetition; but this is one of the characteristic conventions of mathematics. The uniformity of the clock's motion, the equality of its hours, depend on the seeming fact that the clock does not profit from its experiences. Nevertheless, it endures in time in the sense that it progressively 'forgets' the form given it by its maker. Its

time is the time of dissolution, yet just as real, ontologically speaking, as our time of progression and growth. Now the clock's time conceived above, is not yet suited to the needs of mathematics. For this, we require a concept of time which must at least fulfill three requirements: (1) Time must consist of unit intervals subject to the operation of counting. (2) These units must be quantitatively equal so that any unit of time whatever its location in the series of time units, will be equal in value to any other time unit of its class. (3) The order of succession of these units must be subject to reversal and repetition.

These conditions once fulfilled, we have made the thinking of time in numbers possible; and this achievement marks the very apex of intellectual triumph. This potency of numbers is by far easier to employ in practice than to understand in principle. Indeed, could we unravel the mystery of their power we should be very near to the secret of all knowing. We shall find this problem challenging us in later chapters. Suffice it for our present purposes to ask whether it is possible to ascribe this triune of properties of mathematical time to time as we live it? To even a casual inspection it would seem that the properties of mathematical time mentioned above but rival each other in doing violence to our experience of time. The time we live is first of all continuous, and this is violated by all three of the properties of mathematical time. The third one might be mistaken as an exception. It does not seem to specifically deny succession to time, but only assumes any given series of time units as repeatable. But it is precisely this assumption, that all repetitions of a time interval are equal, which denies that *any given occurrence of time is real*. This belies experience, for here, nothing is real that is not particular. Real events, like real objects, are individual: nature does not supply any desired number of repetitions of them free of charge. Only that affluent nature in which the intellect makes its home is so generous. Unhappily, the scientist lives in both realms at

once. So far as his laboratory problems, i.e., his intellectual problems are concerned, the scientist may well repeat an 'afternoon' of mathematical time so often as he chooses. All that is required is to set back the hands of the clock or to set the pendulum swinging anew. Meanwhile, however, he must endure a real time which occurs but once. The time he may waste in mistakes cannot be recovered so magically.

10. In short, the mathematical conception of time is intellectually useful but ontologically false: lived time is ontologically real, but useless in intellectual operations. And we are confronted again by the master enigma of our thesis: how can mathematical time be useful if it is not also ontologically true? In attempting to answer this question, we can proceed with some hope of success only so long as we remember that the problem is not solved by denying 'reality' to either of the concepts of time which are involved. Of course, no quarrel ever arises between immediate experience and the notions that it finds useful. Epistemology does not arise in the case in hand until we raise experience to the conceptual level. Then follows the question, how can we reconcile its property of continuity with the discontinuity of mathematical time which measures it?

We shall avoid the attempt to explain both of the concepts of time with which we are dealing in terms of the logic of one of them taken alone. The logic of mathematics surely is not adequate to the explanation of a problem which it has not created. This means that mathematics, which cannot proceed at all without the materials of discrete steps, will never be able to explain the continuous. Accordingly the attempt in mathematics to define a sort of *discrete continuum* is futile. In mathematics, it is the custom to distinguish between discrete, dense, and continuous classes. The discrete class owes its distinctiveness to the fact that it satisfies Dedekind's postulate, which requires that an element of a discrete class divide it into sub-classes. A dense class is defined as one in which any two elements will always have a



third element between them. A familiar example of a dense class is the class of points forming a line. No matter how close together two of its points may be, other points nevertheless exist between them. A continuous class is defined as a dense class but which also satisfies Dedekind's postulate. That is, it must be a class between whose elements other elements always occur to infinity, yet in which any particular element will divide the whole class into two distinct subclasses. Such a series will at once be dense and discrete; and the classic example given of it is again the class of points forming a line.

Now if this conception were inviolable it would mark no small victory for mathematics: it will mean that the antagonistic notions of the continuous and the discrete have found a reconciliation. The discrete will be fused with the continuous without the sacrifice of its discreteness, and Zeno's paradoxes would be at an end. Unfortunately, when we inspect this notion of a continuous class we find that instead of solving the paradox it only conceals it, and in rather ill disguise. Consider the *line* which is supposed to exemplify the idea of the continuous class. It manages to appear at once as continuous and discrete by virtue of a certain kindly office of its points which take upon themselves the whole brunt of this miracle. When we choose to look for the property of discontinuity in our line, some of its points are required by the definition to hold themselves together by an inner force; and they thus serve as static nodal elements among the remaining points which continue in a perpetual welter of falling asunder into more and more points. In other words, we have here two radically different classes of points. Our mathematical continuum gets its validity because we employ in its construction certain points which are not mathematical points at all. On the contrary, *they have a concrete existence by virtue of the very fact that they resist division*. Their space for once is 'real' because it does not collapse into an infinity of infinitesimal spaces. Now, the difference between such

indivisible points and the infinitely divisible kind is just as great as the difference between mathematical and durational time which we have all the time been trying to reconcile. How can mathematical and durational time be parts of the same experience? This is truly the same question as to ask, "How can the infinitely divisible points of the dense class, and the indivisible points which define the discrete class co-operate with each other in producing the 'same' line? So far, mathematicians are not beyond sheer affirmation that they in fact *do* unite to form a continuum.

11. But now we are out of the realm of speculation and find ourselves again in the realms of deeds and movements. The hands of the clock makes its continuous journey along its path, and yet its progress can be measured step-wise. Here there is no opposition between the continuous and the discrete. Return once more to reflection: the mathematical continuum at once bristles with the inherent hostility between unity and multiplicity. Strange to say, we cannot traverse a conceptual path even in thought. That is, we cannot traverse the infinitely divisible points of this continuum because for every point traversed another one springs into existence at our feet. The indivisible points can be traversed, but here we never know that we make progress. In either case, we are left in a logical deadlock.

Thus, science sets out in its customary way to explain the unknown by the known; which it regards at once as the process of explaining the complex by the simple. But what is simple to experience is not simple to the intellect. Now, in experience, a pathway is indeed a simple image of time, but to scientific reflection this same pathway becomes the embodiment of bristling difficulties. Then, since we must solve the problem of time reflectively, we must turn to other forms of conscious experience for aid besides logical definition. Now, in volition and aesthetic experience, unity and multiplicity, coherence and divisibility lose the bald opposition they have so far exhibited. Stated in other and more crucial terms,

the fundamental difference between the time of science and the time of experience is that science regards the unique as inconsequential; whereas we must expect the unique in the time we live. The very reversibility of the clock and the uniformity of its time are due to its inability to profit from experience, as it were. A clock that should 'learn' its task the better from day to day would become useless for our purposes. Indeed, in this case it would have certain purposes of its own, otherwise, 'learning' has no meaning. The time of the clock is uniform because it does not have a time of waiting. It has no occasion either for delay or haste since it has no past from which it can profit. On the other hand, duration is real because it involves a real history and a real evolution. That is, it involves the striving for specific goals.

## 3

## TIME AND ITS PREDICATES

12. Just as science seeks to represent time by the simple image of a line, so it describes time by a single predicate: the category of the relative. Relativity might be termed the 'black sheep' of the categories, for the association between relativism and scepticism has been most persistent in the history of thought from the day of Heraclitus with his universe of pure change. The notion of the unreality of time is the natural counterpart of the view that time is wholly relative to the human point of view. Now, the relative, as far as thought is concerned, is just as real as the absolute. Even if it were shown that time is purely relative, that is, purely 'appearance,' ontologically considered, it is still real. And curiously enough, the 'appearances' which the philosopher and scientist would disdain, somehow get themselves talked about far more than do the eternal verities that are supposed to crowd the appearances out of existence. What the relativists must mean, then, when they call time *unreal* is that *time conceived as an absolute is unreal*, i.e., is not verified by

experience. If time is so completely relative that all of its characteristics can be represented as one dimension, then it is at least as real as the other three. In fine, the issue is solely to decide whether time is real in the sense that lines are real, or whether it possesses a sort of reality unknown to lines. Now, the lines of mathematics have only a conceptual existence. They are composed of an infinity of discontinuous points. Such lines are never met with in real experience. The lines which we experience are real paths, and it is possible to traverse them. But the points of the conceptual line can never be traversed. For no matter how many of them we scale, always an infinity of them still lies before us. But, no doubt, we really endure time, and consign it to our past. Hence, if time is to be considered a dimension, it cannot possibly be the dimension which is defined in mathematics.

13. By *relative* we mean to indicate the dependence of the meaning of anything in comparison with something else. Explanation by comparison requires that the terms of this comparison have a common denominator. For example, time and space are alike in their point successions, says the devotee of Einstein. Time and space are relative in this case because both are explained by our reliance on a third or middle concept, the concept of point. It will develop that this sort of definition is always definition by denotation; and its logic can be completely rendered in Euler diagrams. The category of the relative is therefore confined to the *quantitative* aspect of experience: it does not touch *quality*. It may be said that surely qualities are comparable in terms of their intensity, but reflection will show that in every idea of intensity there is hidden at once, as Bergson declared, the implication of space. The term qualitative intensity illegitimately embodies two contradictory ideas.

14. What must be the necessary meaning of the word absolute? If it is not to encroach on the meaning of the word *relative*, this term must mean the signification of a thing as depending on itself alone. As Bergson has it, a thing is *ab-*

*solute* by being absolutely what it is. It is at once obvious that this term is misapplied when we speak of absolute space. Space itself is none other than the field of 'any-ness' where relations are found: this is its actual service to science. The points of space may be anywhere, and actually are nowhere until they are given a locus by a relation. The sum total of the points which we have charted forms a space which is purely relative. Yet, there is a sense in which space is qualitative and absolute, and that is the space which we actually traverse. We cannot say that a single atom or the whole universe of atoms is absolute because this involves the definition of a quantity in terms of itself, and this is meaningless. We would be no wiser if a tradesman were to tell us that a lump of butter is equal to itself in weight, it is necessary to define it in terms of other measures such as pounds, and ounces. But there is a sense in which all quantities are absolute. Relatively speaking, a pound of butter is neither much or little. Its quantity can become an absolute only when the butter is lifted by someone. Its weight for each person that lifts it will be absolute: it will be absolutely the amount of effort it calls forth. Effort and the experience of time alone are undivided and this alone forbids relations. It will be objected that successive intervals of time may be related and compared, but such comparisons are always made of time which is already flown and quantified. When we declare that a certain period of time was 'short,' we still find that during this time our state of attention was intense: on the other hand, a period of time which seemed 'long' is a period of waiting. Our judgments of 'long' and 'short' are therefore derived from the degree of tension of the mental state during which the time passed. But here we take advantage of a dual signification of the term *intensity*, and it is necessary to rescue this term from equivocation. It has misled psychological labors because it implies at once the ideas of quality and quantity. It has thus been illegitimately employed as a means of measuring qualitative experience, a goal that has long

been dear, not to Weber and Fechner alone, but to scientists of all ages too enamoured of mathematics for the good of psychology. There is in every sensation a reflection of the extensity which we must meet, but we meet this extensity with effort, which is more than so much quantity. The uniformity of the limens of psychophysics are therefore wholly deceptive. Time and effort, in a relative sense, have no experiential meaning.

15. In Newtonian physics time is considered in the sense of an eternal and uniform flow. In the literature of modern physical relativism, it is common to refer to the Newtonian conception as the "relativism of Newton," to distinguish it from the "relativism of Einstein." The relativism of Newton is supposed to result from the inference that since time is uniform in its flow, its actual rate, like the actual extent of distances, is negligible. This form of relativism is supposed to be distinct from Einstein's in that the latter considers the flow of time as relative to bodies, while Newton considered the flow of time as independent of bodies. Examination will show that the difference is a verbal one. Underlying both conceptions is the notion that time is a literal flow, like that of water. Now, it is only a verbal difference whether we say that this flow is relative to bodies, as does Einstein, or that the motion of bodies is relative to the flow of time, as does Newton. A relation holds in either of its senses. If once we say, as does Newton, that time is absolute, we cannot then say that its absolute rate does not matter. Newton's time should be described as *relatively absolute*, and it would so be not one whit different from the time of Einstein which is absolutely relative. Both descriptions, as De Morgan would perhaps say, go beyond all serious paradox, and conceptually belong to the class of "round squares" and "square circles." Clerk Maxwell is the author of the paradox which holds that should all bodies receive at the same time blows that would increase their motions by proportionate amounts, the change would go undiscovered by us.

Poincaré has invented a similar paradox in which it is argued that should the universe expand and contract its dimensions uniformly, man would not be able to discover it. In either case, the reason why the change goes undiscovered is because they are supposed to occur *instantaneously*, that is, the change from the one state to the other does not consume any time. And if it consumes no time it robs us of no effort. Now, these accounts derive their whole force as paradoxes from the fact that we cannot believe that space and time should be expanded and contracted without our being alive to the change. But if it is supposed that we ourselves have changed in a manner which leaves us adapted to the new world as to the old, then indeed no change at all has occurred. The paradox arises because we imagine that we have endured the change, but still retain in memory a knowledge of the smaller world which we just left. But in this case, there will be one thing, memory, which still belongs to the world before the miracle happened. In other words, we are talking about a change which makes no difference. Now, such a change is no change at all.

16. The most fruitful lesson to be learned from all this is that the actual content of our concepts is far richer than we think. Here is a gap between our ideas and our ideas of our ideas. There is a difference between the idea of space which we really hold and the definition we give to it. We define distances in terms of the unit distances comprising them, but lurking in our minds is the notion of the effort it will require to traverse it. In exact science, distances are understood in the first sense, and are expressed by numbers. Thus, there is saved from reality only its numerical aspect. So long as numbers are regarded as symbols of pure quantity, those quantities may be increased and decreased without affecting our thinking so long as the increases and decreases are proportional. Hence the accuracy of maps. As geographers, the difference in size between the map and the area it represents is very nearly negligible. Not quite negligible, because however minute the map, its various points will still have to



be traversed when we gauge distances upon it, and hence will occasion a loss of time. As mathematicians, however, we reach the apex of the power of thought, for now distances are represented by *figures*, and these may represent any distance we please. Numbers come very near being shorn of all suggestion of time and labor. But, if we enquire into the inner meaning of numbers, we shall see that they too imply a history. Our map and our scale of miles are temporary devices, for the reason that the making of schemata is not the whole of life. As wayfarers, every distance is what it is in spite of our lordly habit of replacing it by a number in our calculations. In practice, we are bound to consider distances in terms of the efforts required to traverse them. The scale of miles we make as geographers will show the same number of units that we shall find in traveling, but in traveling we must do far more than merely count them. Counting, however, means some effort, and this accounts for the ability of numbers to form in miniature a substitute for experience. The convenient scale of miles which we store in memory has the one disadvantage that when the time for action arrives we must recall how much effort each number stands for. Each number must have restored to it, to the very end of the journey, the full measure of intension of which it was robbed for the sake of computation. This full measure must be returned in a varying proportion of intensification of effort and of extension of time.

16. In the last analysis, the image of a line has served for the idea of time with such success because the line is prolific in its suggestion of a pathway, a distant goal, and all of the toil and chance of human wayfaring. Indeed, science chose far better than it knew, for this drab image of the line is rich with reminiscence of life with its infinity of points striving haplessly at continuity; and the line eloquently bespeaks a certain characteristic of time as lived, namely, the defeats encountered along the pilgrimage and the dissolution of death. These faltering points, spinning themselves out infinitely in

bootless endeavor at progress, are indeed but the images of our own footsteps. The notion of a dead atom driven by blind forces was intended by science to transcend the human point of view; but both have betrayed their human derivation. The atom turns out to be a miniature chaldron of weltering forces; and as for the forces themselves, they are but counterfeits of the human will. We even suppose that physical forces follow the path of least resistance, as though they were obliged, like human strength, to economize in order to keep from perishing. Newton would represent the universe as existing without cost. But every fact of life, beginning with the chlorophyll of the plants, ever engaged in saving sunlight from being eternally lost in the form of heat, shows what is really going on in Newton's vain universe of silent stuff, maintaining an unchallenged reign over a realm of limitless space. Existence is not unchallenged, but hangs on a strand woven of will and thought. "No thinking without phosphorous," says the materialist: "No phosphorous without thought," answers the idealist. Both statements are true, and they portray creative imagination, the very essence of life, moving in a universe whose sole bread is the lump of necessity leavened with a little spice of freedom.

17. Thus, we might justify the precepts of Protagoras at length. Ideas which clarify our thought turn out to be fancied duplicates of our selves, whose pantomime performances we watch like so many avid crystal-gazers, waiting for a revelation of fate. And crystal-gazing and thinking are alike in that the visions attained in each are in reality but the foreshadowings from hidden recesses within our souls. It is miracle enough to learn the process by which such inner acts can clothe themselves in borrowed garb. But the greatest miracle of all is the reverence in which we hold these ideal people we have ourselves created. The perennial freshness of Plato, I imagine, lies largely in his simple and beautiful faith that ideas hail from a sacred transcendental realm. Man may create Gods in their own images, but they are Gods

nevertheless, and here we come upon a characteristic of thought concerning which neither experimentation or logical analysis will give us further wisdom. Primally, thought points not solely at truth, but at goodness; and this property is one which addresses itself, not to our reason, but to conscience.

## 4

## THE GOOD MAN AS MEASURE

18. The intellect moves by preference in a punctiform space. But this space yet has one trait which the intellect fain' would banish. The trait is the infinite extension of space and the infinite divisibility of its points. At bottom, even space is not given once for all. Now this very fluidity of the concept of space, which permits points to be anywhere indicates the existence of a conquering will which would mould reality into an exact image of its purposes. The very notion of abstract space is a superb scheme permitting the greatest range to the creative imagination, for in it, any configuration may occupy any position. So also, Minkowski's time, far from being given once for all, is as infinitely elastic as the points of its trajectory are infinite in number. The infinite subdivisibility of space-time is the conceptual symbol representing the infinite possibilities which a higher tension of life might find in any moment. Dimensionless points and instantaneous instants are surds to reason, but not to our wills, and again we arrive at the result: the inert is explained by the living. Fundamentally, then, the rule "man is the measure" does not arise out of any ontological necessity, but rather out of a teleological condition. Ontologically, we may satisfy the intellect by positing a space of limited points given once and for all, but we do so at the cost of a certain spiritual surrender. Such a space becomes lucidity to reason at the cost of becoming a prison to the creative aspects of our nature. We instinctively reason from experience to formal knowledge because experience brings certain truths to us

which formal knowledge excludes. Like an instinct, our thought moves not out of blind response to forces from behind, but because of desired ideal goals that lie ahead. Were we shorn of all capacity save that of an effortless mathematical contemplation, we could for once countenance the perfect lucidity of materialism. But so long as we contain the germ of idealization, the lucidity of materialism is all madness. And our rebellion is supported by history. Materialism has ever been the excuse of gross hedonism for its weakness, of cowards for their failure, of tyrants for their cruelty. The view that men are machines is far less an error of logic than it is an error of disloyalty to the hope of life. This hope comprises the common-sense of mankind by which Descartes, rationalist though he was, sought to be guided. Any theory of life which humanity consistently refuses to accept is subject to suspicion for error. The entire history of philosophy is monument to the fact that pure dialectic, however tireless and subtle, has failed to disturb the naïve thought stubborn conviction of mankind that men have freedom in time; and this in spite of the fact that in the academic occupations of Minkowski space has unceremoniously swallowed up everything else.

To understand the meaning of time in its fulness, we need to transcend the point of view of facts and inferences. We are bound to reality by other ties than by the ties of logical consistency. We are bound by ties of loyalty to forces in the universe which expect of us another sort of consistency. "We grant that life is mean," exclaimed Emerson, "but how did we find out that it is mean?" Indeed, how is meanness ever to be understood except through the impulse to right it? Now, to make possible a life of active loyalty it is necessary to have a conception of the universe in which we may feel "volitionally at home," as James expressed it. We demand a universe in which there will be completely satisfied our inexorable sense that we possess creative powers which must be loyal to other creative powers beyond. But such a uni-

verse is flatly denied by our modern physical cosmologists who assert that not only the quantity of the universe is given once and for all, but that the time succession of its states is rigidly fixed.

My argument but repeats an ancient belief of Saint Anselm to the effect that we have a faculty within us which believes first and then understands. In this it is unlike the intellect which understands first and then believes. Our freedom, for example, certainly rests, largely if not entirely, on our conviction that we have it. It is a commonplace of every-day life that responsibility has to be taught. This issue, mechanism versus vitalism, does not rest entirely on demonstrations of fact: it is an issue whose truth is *made* either the one way or the other. The doctrine of Minkowski that time is a fourth dimension creates an utterly alien world for a normally endowed human being. Now, this is because the vital part of this 'normal endowment' consists of the healthy conviction that we are free moral agents. The deterministic cosmology, so popular in the classroom becomes from this point of view the world of the madman who is dominated by the fixed idea that his every thought and act is forced upon him. Is it possible that we possess two faculties of understanding, one suited to the formally rational pursuits of the class-room, the other suited to the demands of the life of moral achievement? This is the central theme of the following chapter.

### III

#### TYPES OF LOGIC IN RELATION TO THE CONCEPT OF TIME

##### 1

#### FORMS OF UNDERSTANDING

19. Our problem has considerably altered its dimensions. We began with the ambition to discover how a reputed timeless knowledge could portray an experience so replete with the savor of time. But now this project, so baldly and meagerly stated, is set in broader measures. For an enquiry into the nature of time has shown that bare concept, whether

of time as dimension or time as continuum, borrowing its meaningfulness from three very intimate experiences, namely: purposive pursuit of some moral or aesthetic value, toil of pursuing, risk of failure.

In short, we are face to face with the possibility that the timefulness of experience is nowhere so intensive as in the processes of our thinking; for it is just here that the vision of goals, the labor of creation, and the risks of defeat are at their height. But the formal or intellectual mode of reasoning deals only with identities existing between existential elements; therefore, the desireful, creative, and risk-bearing phases of thought remain inexplicable in its terms. *They are intelligible only to another faculty of understanding, a faculty which is exercised by our moral natures.* This, at any rate, is the thesis of our present chapter.

20. Historically, the revolt against Hegelianism marks the reassertion of the belief that the intellect is but part of a larger human understanding. This belief points at once to a principle of method, namely: that since our complete reason is moulded on an external reality, the lineaments of the latter may be to some extent inferred from the bare fact that some things are thinkable and others are not so. A profound consequence attaches to this; namely that *epistemology contributes to the content of ontology*. That is, the nature of our thinking reveals the nature of the world which we think about. Hegelianism makes a dangerous use of this principle simply because it considers formal reasoning as the only reasoning of which we are capable.<sup>1</sup> When, therefore, it infers a monism of being from its forced monism of knowledge it deceives itself about reality only because it has already done violence to human nature.

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<sup>1</sup> Professor Bosanquet, the bearer of the Hegelian intellectual tradition, seeks to regard even willing as an ideational process. In his *Psychology of the Moral Self*, (p. 79 ff.) he attempts to interpret an act of decision as "more like that of being absorbed in an idea than like that of giving effect to desire . . ."

21. However, if we begin by examining our mode of understanding we shall see that understanding makes use, not of one tool, but of several. Human minds have, not one form of understanding, they have at least three of them. St. Anselm was rightly led to infer that goodness and fact are so diverse in their natures that they must be attained by totally different logics. Yet, a most persistent attempt to make the one form of thought swallow the others has been a main ambition of philosophers since Plato. Plato was a monist in the sense that he regarded all reality as ideal in nature. But we must beware of confusing Plato's concept of the *idea* with that of certain modern schools. His ideas were at once forms and values;<sup>2</sup> and in this Plato implicitly recognizes the duality of *fact* and *value* for which we here plead. Fact and value represent two forms of knowledge, not one; their identification is impossible; considered as objects of knowledge, they are entirely unlike. What is more, each of them is attained by a unique logical procedure. In two respects, however, they are alike: both are recognized by the same mind, and both are verified in its experiences. In the end, we must ask how these two ways of knowing can function harmoniously in the same experience, and in the service of the same subject.

## 2

THE DISTINCTION BETWEEN FORMAL AND  
MORAL REASON

22. The history of epistemology presents a succession of attempts to overcome that dualism of our thinking which is represented by the contrast between our formal and our moral modes of comprehension. Aristotle wrestled with their opposition in his separation of the active from the passive reason. St. Anselm acknowledged this dualism of thought in his opposition of reason to faith. The difficulty reappears in Kant's distinction between pure reason and practical reason.

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<sup>2</sup> H. B. Alexander, *Poetry and the Individual*, 1906, p. 169.



Bergson's distinction between intellect and intuition represents a modern version of the problem and his work leaves the dualism of knowledge clearer now than ever before.

If the distinction between formal and moral reasoning is valid, it should be possible to demonstrate that they rest on entirely different psychological processes, and make use of entirely different logical assumptions. Such a differentiation between formal and moral logic is provided for by an analysis which we owe to H. B. Alexander.<sup>3</sup> He indicates two psychologically distinct modes of thought, and derives them from two equally distinct modes of experience.

"There are two habits or modes of thought essential to all reflection which are responsible for the main puzzle of philosophy and the inherent contradictoriness of reason. The antithesis to which they give rise has been variously designated. With the Greeks it was the contradiction of the one and the many, of being and becoming; with the moderns it is the problem of identity in difference, or, in natural science, of uniformity and variation. All these antitheticals arise from the contemplation of the *thing*, that which suffers change yet remains self-identical. In the mind's history the puzzle has found various solutions. In aesthetics reconciliation is effected by the notion of harmony; in psychology, by the conception of personality; in natural science, by the doctrine of evolution."

"The two habits are the instinct for identification, or the psychological experience of recognition, and the instinct for ascribing causes, due to the experience of volition,—that is, the power of thinking and willing, which in joint operation constitute human efficiency. It is the instinct of causal thinking which induces the primitive mind to animate all Nature with will and intention. In is the instinct for forming definite and responsible estimates of things which leads to those composite impressions that we call ideas."

Let us call that mode of thought which arises out of the experience of volition, the *logic of morals*. The other mode

<sup>3</sup> H. B. Alexander, *Nature and Human Nature*, Chicago, 1923, pp. 59-60.

of thought, which proceeds by finding identities, we may call *formal logic*. Can it be established that these have different objects of knowledge, are different as to their processes, and serve different functions?

23. As for the 'objects' of these two forms of thought, their 'real' object is the same: both point to things. Yet, they interest themselves in different aspects of things. Things may be regarded solely as *evistents*, as *facts* which exist *now*. On the other hand, things have *values*, and these values are independent variables. Facts, we say, *are* true. They represent reality itself; and when we ask whether a fact is true, we readily acknowledge that it is our notion of the fact which we question, and not fact as such. Values too exist, but their existential status is quite unique. They do not have a conserved and quantitative existence, but they nevertheless exist because 'they make a difference,' as the pragmatists would say. They are potent forces, and because of their significance for us, their reality is far less alien than the reality of matter which is still a stranger to physics and chemistry. Values have a certain embodiment in things. This permits us to distinguish between two aspects of 'things,' their real conformations as contrasted with the potentialities they possess. It is our moral reason which interests itself in values, and our intellect which interests itself in facts. It is the moral reason which is born of that wonder of which Plato speaks. Moral reason ever finds problems to be solved, though it is formal reason which discovers the *means* for its solution.

24. The methods of these logics are as fully at variance as their ends. Formal logic proceeds by demonstration, of which the syllogism of logic and the proposition of geometry are the models. Moral logic proceeds by a method more akin to *conviction* or *conversion*. The essential difference between these methods is, that demonstration proceeds step-wise, while conversion proceeds to belief by a continuous process resembling *growth*. For example, the syllogism breaks up

into three distinct judgments, and each judgment breaks up into a subject and a predicate. On the other hand, our allegiance to values grows upon us so continuously that we can divide it into stages only by an artificiality. The "ladder of faith" devised by William James<sup>4</sup> show how we proceed from indifference to a value to full loyalty to it. James distinguishes seven steps in his 'faith-ladder':

- "1. There is nothing absurd in certain views of the world being true, nothing self-contradictory;
2. It *might* have been true under certain conditions;
3. It *may* be true, even now;
4. It is *fit* to be true;
5. It *ought* to be true;
6. It *must* be true;
7. It shall be true, at any rate true for *me*."

If we examine these stages closely, we shall see that running through them there is a continuous augmentation of belief. Nor can we even say that our belief in an ethical truth-claim has a definite beginning and a definite end. Here, the 'truth' grows upon us by degrees; and, in fact, we are seldom if ever able to say of a moral worth whether we have realized its full meaning or not. In the moral sphere, we 'dream' our way through life in a true sense. There is, indeed, a certain characteristic of dreams which we may characterize as a certain disorganization of values. This 'displacement' of values in the dream is perhaps responsible for most of its bizarre character. One dreams, perhaps, of being in the midst of a great fire, but without the fear typical of waking life; and it is this feature of the dream which causes us to call it 'strange.' Things which in waking life arouse us to ardor may leave us indifferent in the dream; and conversely, happenings which do not stir us in waking life may pervade the dream with an atmosphere of great concern. Perhaps the bizarre events and deeds of the dream are really the consequence of these bizarre evaluations; and it

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<sup>4</sup> William James, *Some Problems of Philosophy*, 1911, Appendix.

is this 'transvaluation of values' in the dream which make the dream seem distorted to waking consciousness. Now, this characteristic of dreams differs from waking life only in *degree*. Even in our most conscious moments we are dreaming ideals. That is, we tend to weave a web of ideality about the things we encounter and the events which we endure, as though our minds would fain discover in them some worth which their appearance would seem to deny. And, as in the case of the dream, our idealizations often have a bizarre character, but like the dreamer, we cannot see this ourselves while we weave them. While dreaming, we do not call ourselves dreamers, except in those rare instances when we pass quickly from a stage between sleeping and waking. Now, there are also rare instances of waking life when we are able to catch ourselves in the midst of those fugues which haunt the moral sphere of existence. Such rare instances are *also* cases in which we awaken to a higher level of existence, or to a heightened tension of life. Illustration will make clear what we mean. There are moods which occasionally lift us out of the atmosphere of practical daily life, and during them this daily life appears curiously warped. It may impress us as a phantasy in which we see ourselves pursuing baubles whose gloss has now lost all charm for us. When we survey the pilgrimages and crusades of old we are half tempted to regard them as performed by dream-walkers, moved by an ideal that is only half-articulate. And in our own day, especially during the late war and after, we have been living in a mental state which seems to have as many difficulties with dream as with reality. Our indifference to the brutality of war and the crimes which still reverberate from it, is a complete analogy to the dreamer who mingles with ferocious beasts without thought of fear. Various occurrences in different parts of the world may be very swords of Damocles hanging over civilization. What proves us to be dreamers is our indifference to the possibility of moral gain or loss. Meanwhile, our attention is centered

upon football and radio as though destiny waited upon them. These warped values correspond to the fallacies of formal logic. They indicate a certain incompetence of thought and confusion of thought materials. It is the business of all thinking to conquer a certain chaos which confronts it: formal reason must distinguish between real facts and illusions, moral reason must distinguish between genuine values and pseudo-values.

It is indeed hard to say in real life who the dreamers are. Copernicus was hailed as a dreamer, but the outcome of his heliocentric theory clearly proves that it was his critic who dreamed. Just so, democracy is a clear idea which has emerged from many attempts to formulate it. On the other hand, the self-appraised 'reality' of the Prussian state has turned out to be a warped phantasy, wholly unsuited to life. We but flatter ourselves when we speak of 'clear consciousness.' In dreams, too, we often invent phrases which seem weighted with great truth and perfect clarity; but in waking we discern therein only obscure suggestions of meaning, which leave us astonished at their emptiness. Our ideas of value never become absolutely clear. This is to say that values never get out of the realm of *becoming*, just as facts, by definition, are confined to the world of *being*. Unlike facts, the reality of moral values is not guaranteed. Their existence depends on the unyielding allegiance of those who cherish them.

25. There are three great ideals which we regard as the most general or inclusive: *beauty*, *truth*, and *goodness*. The type of reality we ascribe to these is quite unique. The reality of physical objects is constituted by their resistance to our invasion of the space they occupy. Their very unchanging character shows that time does not affect them. They endure in time only in the sense that we provide this duration for them in our memories. A library serves as an extension of memory only because we remember where it is, and the alphabet with which it is to be interpreted. Duration in time

is always made possible by something which is not entirely inscribed in space. If memory consists of a neural impression and nothing more, we should be utterly at a loss to recall a single experience unless we "remember" where, in the brain, the "memories" are stored. That is, to remember where our many memories are located in the brain it would be necessary to have a register or 'card index' of some sort. But a register too is a material thing, and it would be necessary to have another register to inform us as to what is recorded on each of its cards, and so on to infinity. In short, to be inscribed in space is no guarantee of persistence in time. Thus, our 'wax tablet' memory is able to do service only because there exists a physical memory which is able to utilize it.

Now, the reality of ideals is not at all due to the property of unchanging duration. We acknowledge the concrete existence of goodness and beauty because of their attraction, just as we are led to acknowledge the existence of physical objects because of their *resistance* to our strength. Ideals are real, not because they are unchanging, but because they are changing. Liberty, mercy, courage, nobility, beauty, and goodness, retain always the same names, but in each of them every person may gradually see *more and more or less and less*. It is because values and ideals rest on our loyalty and faith in them, that they are always to some extent haunted by slumber and dreams. It is in the sphere of values that we are perhaps most likely to be overcome by slumber. There is a certain fugitive essence of 'make-believe' about our first devotions to ideals of all sorts. Experience of an art gallery may give evidence of this. We may gaze at a painting reputed to be great with a curious mixture of impulses; but until we actually discern its greatness, some of these impulses, representing themselves as more real, constantly obtrude themselves; so that we are not sure, so long as we are novices in art, whether we are attracted by beauty or driven by mere curiosity or by the impulse to imitate others. The

devotion of the populace to some social or political ideal involves a similar dreamy uncertainty, at the beginning. This is why great causes require great leaders; and the great leader is marked by his confidence that the cause he serves "is fit to be true." Causes are "clarified" by a sort of insight quite different from the clarity that characterizes the syllogism. A cause is made true by our devotion to it.

26. Formal reasoning succeeds best when *wish* and *will* elements are entirely excluded. On the other hand, without wish and will we should never arrive at conviction in the moral sphere. To be convinced of the truth of a value it is first of all necessary to experience some *want* which the attainment of this value is able to satisfy. We arrive at a conclusion regarding the value in question just to the degree in which this vague and uncertain need becomes clear and certain. In the sphere of formal reasoning on the other hand, the first necessity is to be somewhat *puzzled*. One cannot solve a problem until the problem is seen, we say. Now, intelligence consists precisely in the capacity to see a problem; and intelligence alone has nothing to do with the desire to solve it. Perhaps the source of the greatest uncertainty of the 'mental-age scales' so much in vogue is that they rest upon as assumed willingness of the subject to solve the problems presented in the tests. In formal logic we go from state of being to solution by means of discrete steps, during which each step brings something conceptually 'new.' The whole process of formal education has this step-wise characteristic of the syllogism. We go to college to learn those things which we do not already know. If we learn by the method of repetition, this is for the sake of a verbal memory which cannot be otherwise acquired. That "two plus two equals four" is not made more true by repeating the statement in a loud voice; its truth is necessary and universal, as the Hagelians say. Yet, curiously enough, there is such magic in mere repetition when we come to the sphere of values. Values are made more true for us when we hear

them repeated by others. For example, the rituals of the church are the strongholds of ecclesiasticism, and we often attend services expressly to see them, though for the thousandth time. In the logic of morals, example is much more eloquent for persuasion than is precept. Not that moral conviction is carried by the fact that so many people accept a certain value. Indeed, progress in the moral sphere is often due to the fact that some one individual will conceive and adhere to some new ideal; and we are convinced by the very sincerity of his devotion. In formal logic, on the other hand, we verify the validity of a class by enumerating the cases which support it.

Satire too holds a unique place in the psychology of reasoning. In matters subject to formal demonstration, resort to sarcasm frequently results from paucity of arguments. Failing to convince the mind of an opponent, we content ourselves with belaboring him. But in the case of values, it is quite different for here satire plays a legitimate role. Cleverness has only a limited power of arousing moral insight. In fact, our intellectual ingenuity quite regularly outruns our appreciation of values. It was the danger of this that led Sir Oliver Lodge to hope that sub-atomic force may not be discovered by man, until he adds to his spiritual stature, else his cleverness may be the source of his own destruction.

27. Finally, the first principles of these logics are quite different. H. B. Alexander<sup>5</sup> indicates the basic principles assumed by each as follows:

“The assumption of human progress is to the logic of morals what the assumption of the uniformity of nature is to the logic of science. Like the assumption of uniformity, it is unprovable, and as in the case of the assumption of uniformity, there are many faults of experience that appear to go against it. Both assumptions are, in fact, articles of faith; neither is obvious fact, and neither rests upon compelling reason. Nevertheless, each is the foundation for all the rationality that is pos-

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<sup>5</sup> H. B. Alexander, *Nature and Human Nature*, 1923, p. 122.



sible in a whole department of human thought — the assumption of uniformity in the structural analysis of the world, the assumption of progress in its teleological analysis. Science and morals respectively are the births of these two great fiducial articles of thought."

We will develop these distinctions in a few paragraphs. In our moral reflection, we assume reality to be plastic, so that it can be altered to suit the ideals we cherish. We assume, not only the plasticity of the objective world, but the *efficacy* of our wills. We assume the reality of *creative power*, just as in formal logic we assume the fixity of structure. In this world of formal logic, the only kind of knowledge which is permitted is the knowledge represented by identities and differences discovered between things which in themselves exist once and for all. This sort of thinking rests on the *principle of similarity*. On the other hand, there is the *principle of causality* which lays it down that the universe is such that the unique *is* possible.<sup>6</sup> Upon this principle rests the logic of morals.

The contention that there is a *logic of morals*, having its own object of knowledge, its own processes, and its own standard of verification, is a daring departure from widespread belief, which will have it that the Aristotelian *principle of contradiction* is the accredited touchstone of all reasoning. Is it possible to establish a class of truths which the Aristotelian principle is unable to touch? It is necessary first to determine what Aristotle's conception of it is, and what is its scope.

The principle of contradiction can be stated either positively or negatively. Stated positively, it is commonly known as the *law of identity*. The law of identity assumes that *all things remain self-identical*. Stated negatively, this law

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<sup>6</sup> The problem of the meaning of causality has called forth a vast literature, and we ignore it at present only for the purpose of setting forth our view of causality. In due time, we shall consider the famous historical views of Aristotle, Hume, Bergson, and others.

reads, "It is impossible for the same thing both to be *a*, and not to be *a*; or, *a* is not *not-a*."<sup>7</sup> It is necessary to ask, first of all, whether these laws are supposed to hold true of reality, which is the object of thought; or whether they are merely conditions upon which our thinking must proceed if it is to be successful. With the claim that these are necessary laws of thought in formal logic, we have no quarrel; but we maintain that there is a mode of thinking in which this law is useless. In fact, moral reflection requires a principle which is exactly the opposite of this law; that is, it will assume that *radical change is not incompatible with identity*. As for the implications of these laws for *the reality about which we think*, it is necessary to take several distinctions into account.

If we take these laws to mean, so far as they concern reality that particular things also remain self-identical while duration is taking place, they are obviously false unless taken in one of two special senses. If a bit of wax loses its form, the change of form is absolute so far as the wax is concerned. Not so, however, for a living subject who remembers its past form, and therefore retains in imagination the power of restoring this past state ideally. It is this potency of memory which eventually enables the subject to restore the past form of an object in actuality. Again, the substance of the wax is not subject to the same sort of fortuity as is its form. Its total substantial quantity remains the same in spite of the dissolution of its particular form. Even if the bit of wax is 'lost' to human ownership, its substance is supposed to exist somewhere in the universe. But in this case, its substance is conserved only if the entire universe is, since it may be anywhere in the universe. Since the mass of our particular object has escaped to parts of the universe which we cannot designate, we can 'save' it only by 'saving' the entire universe; just as the proverbial needle lost in the hay is saved only by saving all of the hay in which it is lost. That is,

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<sup>7</sup> James E. Creighton, *An Introductory Logic*, N. Y., 1914, p. 350.

our object seems lost only to our *knowledge*, but not in reality. But is there here any possibility of maintaining the distinction between that which is *saved in reality* and that which is *saved to knowledge*? We think not; because the conservation of the total universe is a matter which formal measures are unable to determine. The conservation of the material totality of the universe, so far as quantitative determinations are concerned, *is subject to neither proof nor disproof*. For, if the universe should increase in its total amount, we should never discover this by making quantitative comparisons, since there is no outlying universe with which we can compare it. Even if there were such a standard, we would have no way of proving whether or not it was constant in its amount. The same objection applies to our scientific instruments of precision. If they contract and expand with the total universe, so far as these measures *as such* are concerned, they could not settle the question whether the universe is conserved or not. The new school of relativists in physics have made systematic use of these facts. There is another matter that deserves mention. If the increase or the decrease of the amount of the universe involved some specific part of it instead of the uniform and general change which we have heretofore supposed, we should still be in difficulty. For, to detect such a local change, it is necessary to apply our instrument of measure locally, but in this case the instrument would suffer the change which we intended to measure. Again, if our imaginary increase or decrease affected only certain *kinds of substances*, so that brass were subject to fluctuations of volume while iron were not, there would seem to be a possibility of applying an iron standard to measure the quantitative changes of the brass. However, we are of course unable to say whether it is the brass which changes or the iron, so far as the findings *as such* are concerned. To be sure, if we should visibly discern the changes in the piece of brass, we have two other interpretations open to us. First, that we suffer an hallucination, or second, that such a change

in mass is actually occurring. But in this latter case, be it noted that our judgment rests upon a most unique instrument of precision, the sense-organs, and everything appears to indicate that it does its measuring in a way which is quite distinct from that of the instrument of the laboratory. So far as instrumental measures are concerned, we are in a perpetual doubt as to the conservation of the totality of the universe. But grant that our instruments maintain constant units, we are still in perpetual doubt as to whether or not the needle is 'conserved' even while we hold it in our hands. For the increment of increase or decrease which it undergoes may be infinitely smaller than the smallest measure which we employ. Here again we are at a loss to press the distinction between *saved in reality* and *saved to knowledge*.

So much for the Aristotelian law, when applied to the total universe. It is subject to neither proof nor disproof, so far as quantitative measures are concerned; and the same is true for particular objects or for local changes. But there is still another way in which we should become aware of such changes. It is possible to gauge the permanency of a quantity, not with the balances, but with the constancy of its resistance to voluntary effort. There might be in this case an awareness of change even though the balances should change with everything else. By voluntary effort, we mean a sort of effort which involves *creative labor*: which is by definition not subject to quantitative multiplication. This last point will, of course, be disputed. But if effort be subject to the same proportionate increase or decrease as that which the objects lifted themselves endure, then we are face to face with a 'difference' which makes no difference; and if the increment of increase or decrease in the mass of the bodies were so minute as to escape detection, we are again dealing with a difference which makes no difference. Is it not possible that the sole business of the Aristotelian law, and the logical system which rests upon it, to deal only with the universe in its static aspect? That is, with such changes as

do not affect us at all, or whose effects are so small as to be of no concern to us? Before accepting this interpretation we must consider others which are current.

28. The Aristotelian principle is sometimes interpreted to mean that *there is a persistence of identity in spite of change*. Verbally, at least, this would seem to be an express denial of it, but since this version of it is given by good authorities,<sup>8</sup> it should be examined. What meanings may be attached to the notion of the persistence of identity in the midst of change? It may mean, that a thing may change in one respect but remain unchanged in others; as the frozen water of a piece of ice may change its form in melting, yet be the same quantum of substance. Now, in what sense is this true? The properties of elements are the only signs by means of which we are able to identify them. New combinations of elements invariably give new properties, and we are in a perpetual doubt to know whether they have changed in *substance* or not. Nor can chemistry help us here, for the problem is not one of identity of kind, but of individuality of quantum. We revive here the threadbare problem of substance and accident, though we need interest ourselves only in one point concerning it, and that point fairly obvious, namely, that if substance is something totally different from 'accidents,' or, in more modern terms, totally different from *properties*, then we shall never know, from instrumental measures alone, whether substances persist unchanged when they are combined. Nevertheless, there is still a legitimate sense in which we may speak of the substance of a thing. After combining substances in various ways, we are able to restore or recover each of them by chemical analysis. Perhaps the *absolute* substance of a thing is a notion which has grown out of such experiences. We do not mean that *substance* refers specifically to our *power* of creating the similitudes of the past states of objects. We do mean, that this experience of ours with things convinced us that there is

<sup>8</sup> B. Bosanquet, *Logic*, Vol. II, 1911, Oxford, p. 210.

something enduring about them, which is not destroyed by combining them with other substances. There is something within them which plays a constant role in enabling us to restore past states so successfully. Thus the Aristotelian law, assuming *the persistence of specific*, essences is made possible by that which is not so 'given,' namely, the reality of human power.

But the doctrine, identity in the midst of change, can be illustrated otherwise: we selected a case that is against it. Consider a bit of wax which retains all of its properties except that of form, which is subject to certain alterations. But in this case, the difficulty is that we really regard our object as a *situation*; and we merely say that in this situation, the form is an independent variable. That is, we secure the identity in the midst of change by taking the object as at once *singular* and *plural*. We get *change* by exclusive attention to the form, and then get identity by shifting the attention to the other properties of the wax. Our object is really a constellation of objects, and we exercise the illegitimate privilege of taking form as exclusively representing the object, only to give this up in favor of the other properties of the wax. Thus, we demonstrate a simultaneous identity and change at the expense of the untenable notion of a simultaneous unity and plurality.

But there is another way out of this difficulty. This consists in making use of the notion of successive time rather than that of simultaneous time. From this point of view we may apply the Aristotelian principle to complex objects without inconsistency. Our law will now read: *objects remain self-identical in the respects in which they do not change*. Or, if our object is indeed simple, our law says that it cannot at once be *a* and *not-a*. That is, if it is to change, this change cannot be accomplished *without the passage of time*. The Aristotelian principle, then, does not deny that change can occur; it simply states that until a change does occur, the thing remains self-identical. Is this a principle which serves

to prove itself? Rather, it is a device which verbally saves itself from the need of verification. But it is a device which may nevertheless serve to guide thought: and we think that this is really the great service which the Aristotelian law gives to formal reasoning.

29. So far, we have devoted ourselves to an analysis of what the Aristotelian law must mean. We find, that standing alone, it is the chief of those hypotheses whose great characteristic is that they serve to guide thought and research, though they are not themselves subject either to proof or disproof. These we call axioms. Axioms are by definition *self-evident*, and it will be illuminating to ask what brand of self-evidence they have. Their self-evidence does not rest on demonstration. Geometers have sought in vain to demonstrate the famous axiom of Euclid, that through a given point only one straight line can be drawn which is parallel to a given straight line. Finally, Lobachevski and Riemann found that they had better success in denying the various axioms, and from axioms based on these denials succeeded in establishing new geometries. But our confidence in the self-evidence of axioms rests on another basis, which is the unexceptional success with which they govern the very processes of thought and conduct. Are they only conventional, only useful, only 'descriptive short-hand,' as Pearson describes them? This is the confessed belief of a number of savants, including besides Pearson, Mach, Poincaré, Ostwald, and Metchnikoff. But these views leave untouched the puzzle of how knowledge could guide us aright in a world of reality if this knowledge is not somehow *true* to that reality. We should have a far more complete theory of knowledge if we could show that the principles of science are not only useful but true. Is it possible to supply this deficiency? Can we hope to give to the principle of contradiction, as the classical type of all "useful" conventions, a richness of meaning and truth in addition to the 'usefulness' which everyone grants to it already?

To this end, we may avail ourselves of another observation of Poincaré; namely, that such laws as the law of conservation, or the principle of least action are based on experiences so omnipresent that they have escaped our notice.<sup>9</sup> They are not subject to verification because they are the result of innumerable observations, so numerous that they have become unconscious. In other words, Poincaré here says, that just to the degree that demonstration becomes perfect, it gradually ceases to be subject to verification. Like the ether, the air, and the rotation of the earth, it defies perception by its very omnipresence. Water, said Bergson, is the last thing that a deep-sea fish will ever discover. Now the principle of contradiction may be regarded as a habit of thought as ancient as life itself, and it escapes our discernment *because it is a part of that discernment itself*. Back of habit there lies a necessity which drives it; and the more ancient the necessity, the more insensible to it will be the habit.

Is it possible that the principle of contradiction has a vast richness of meaning buried under such deep strata that we miss all but the bare fossil which remains in the text-books of logic? We do indeed think so, and it is because this useful habit of thought is but the tool of a greater mind which wields it, that we employ psychological rather than logical analysis to arrive at its meaning. We do not aim to give it greater *usefulness*, but greater *meaning*.

To begin with, the principle of contradiction presupposes the fact of memory on the part of the subject and employs it. Memory is indispensable in securing the self-identity of an object, for it is memory which preserves its antecedents for it. So far as the 'poor' objects are concerned, their changes are *absolute*, for they have no memory of their past locations, positions, and conformations. Atoms are transformed entirely or not at all, and the pure space which they vacate leaves no lingering impress of their occupancy. But science

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<sup>9</sup> Henri, Poincaré, *Science and Hypothesis*, N. Y., 1905, Chap. 8.



considers the changes of objects as relative. Science is right, thanks to memory; for it is our remembrance of the past position of an object that enables us to restore that past position. It will be objected that this original position might be restored by *chance*, and in this case the intervention of memory is unnecessary. But it would be a chance without a calculus, since the number of positions in the totality of space is infinite. That is, the chance that mere physical states have of restoring themselves is infinitely small. But with the intervention of memory, we are able to speak of the relativity of change. Moreover, we are also able to speak of the essence or substance of objects. Formal logic does not explain our intuition that there is something about a thing which is not an accident or a property, and to explain this 'something' we turn metaphysicians. And as metaphysicians, we call this 'something' which persists through change *substance* or *essence*. Those logicians, therefore, who interpret the Aristotelian principle to mean the persistence of identity in the midst of change are going beyond their logic, or else they take logic and metaphysics to be the same thing. Properties may change but the substance of a thing persists, we say. But, outside of the light thrown on the problem of substance by memory, we can only say that substance is to be described by the predicate *being*, but this also describes everything else.

But the role of memory in epistemology supplies another approach to the problem of ontology. It is memory that holds the power of restoring objects to their original form; and because of memory it is literally true to say that after ice has melted into water that a certain *substance* within it plays a positive role in restoring the properties of ice again. To be sure, we secure this relativity of change at the price of the absoluteness of time; for the time of memory itself is absolute in the sense that it occurs but once; and we shall see that the fact of time (in the sense of *duration*) cooperates with memory in giving meaning to the Aristotelian law.

30. The law of contradiction is often stated without any formal reference to time, but there is none the less an implicit reference to it. In fact, we have seen that this principle amounts to a positive assertion with regard to time: it definitely implies that change cannot occur without time. The law does not say that *a* can never be *not-a*; but only that it cannot become *not-a* without a passage of time. Now, what sort of time does this change to *not-a* require? Not mathematical time, because its moments do not prolong themselves into sequent moments. Sequent moments form a time in which memory cannot operate: and although *a* should be subject to millions of changes, it should never suspect that it had changed at all. Nor could we know that it changed if mathematical time were the only time of experience. Mathematical time, like the line which is its emblem, is infinitely divisible, and at infinity, its instants will be *instantaneous*, that is, occupying no time at all. Its instants, like Zeno's ill-fated arrow, can never make progress. Thanks to the real time of memory, however, this steeple-chase of instants is securely bridged. Time in the sense of duration will divide, but only at the cost of great effort. Our power to divide a period of time into smaller parts is limited by attention. Our smallest instances are no larger than a single act of attention. The time of duration is also continuous, and the proof is, that the work of memory cannot otherwise be explained. To demonstrate this was the great work of Bergson in his *Matter and Memory*. Here we may confine ourselves to the most obvious proof of the continuity of memory. Memory does not store its various ideas as apples are stored in a basket. On the contrary, each idea that enters the memory act sas a leaven: all of the knowledge already there becomes changed because of its presence, and it borrows from each element some of its native meaning. We add ideas to memory somewhat as we add grains of salt to a glass of water; soon the water is permeated through and through. We may exaporate the water and thus recover the salt in its

original form; but an idea which has mingled with a certain individual's memory can never again appear in its original form: the time of a memory is not repeatable, it occurs but once. Of course, it may be that the salt too bears somewhere within it an ineffacable record of its past; if so, this could only prove that the notion of mathematical time is a fiction, for physical objects as well as for living objects.

31. A characteristic of memory which is just the opposite of what we have just now indicated is that memory can be unrolled in an auxiliary space, so that we can divide it into the past, present, and future. Does this perhaps indicate that memory-time is symbolized by the properties of a line? We may take C. A. Strong's convictions on this matter as the point of approach.<sup>10</sup> Strong attacks the problem as to how the preservation of the past and the succession of the past, present, and future can be reconciled. The past and the future, he says, can only maintain their juxtaposition when divided by an indivisible instant " $x$ ". But at such an instant, he rightly observes, time will cease to be real, "for the flight of time will be arrested." Strong proposes to meet the difficulty by the necessary conclusion that  $x$ , if it is to be real time at all, must be " $awx$ "; that is, it is never so small "that all of its parts will be given at once." Yet, it tends to be an "infinitesimal change." That is, the transition from the past to the future is a succession "spun out infinitely fine."<sup>11</sup> In this case, the present is sharpened down to the point  $O$ , and yet having a beginning and an end, since it is "spun out infinitely fine." Strong tries to meet this difficulty, of a present which is at once spanless, but which is still "spun out," with the notion of infinity. But this is of no avail, for the present will become spanless only at infinity; and when this occurs, it ceases to be "spun out." Finally, he meets this new difficulty by distinguishing between

<sup>10</sup> C. A. Strong, "Consciousness and Time," *Psychol. Rev.*, Vol. III, 1896, pp. 149-157.

<sup>11</sup> *Op. Cit.*, p. 152.

the time in which consciousness *exists* and the time of which it is *aware*.<sup>12</sup> "The time that we are directly consciousness of it is not the real time that elapsed." The 'real' time, he says, is that of the point-instant, engaged in its infinite successions from the past to the future. This is the time in which consciousness *is*. The time of which we are actually aware is given by the memory. The time in which the mind *is* only appears to us representatively.<sup>13</sup> His representative time corresponds to what we have called mathematical time. Since he accepts this time as real, Strong is forced to deny reality to the time of memory. He concludes, "Our apparently direct consciousness of the immediate past is an illusion," and "to take this illusion seriously is to be guilty of a sort of naïvé realism in the field of time. Our consciousness of even the nearest past must be ideal, not actual; representative, not intuitive."<sup>14</sup>

We have said that the principle of contradiction definitely implies that without the passage of time, change cannot take place. Strong does not deny this, but leaves us with the result *that this passage of time is not real, but only conceptual*. The reference to time by the principle of contradiction would therefore be only a useful convention. That time should be required for *a* to become *not-a* is due only to an ideal, a representative necessity. To sum up, the Aristotelian law requires the notion of time to give it meaning. That is, when it declares that *a* cannot at once be *not-a*, it positively declares that in order for *a* to become *not-a* the passage of time is required. We have sought to determine whether the notion of mathematical time is able to fulfill this need. We find that it is utterly unable to do so. For, in order to make the notion of a change from *a* to *not-a* possible, a memory of the state *a* is necessary after the change to *not-a* has taken place. *But this remembered persistence of the past, and the*

<sup>12</sup> *Op. Cit.*, p. 150.

<sup>13</sup> *Op. Cit.*, p. 155.

<sup>14</sup> *Op. Cit.*, p. 156.

*continuous and irreversible time which it implies are themselves radical violations of the Aristotelian principle.* Both of them declare the persistence of identity in spite of radical change.

This situation presents alternatives. We may perhaps adhere to the Aristotelian principle as the only intelligible principle in existence. But for this we must pay a price, and *the price will be that the Aristotelian principle itself becomes an insoluble enigma*; it will appear to be a principle which 'works' with unerring success in our real experience; and yet, it is theoretically suited to an artificial, ideal, and wholly conceptual experience, namely, the experience measured by mathematical time. The only world with which the Aristotelian law is in logical harmony, is the conceptual world of the text-books and the classroom. Here it enjoys that freedom from inconsistency which is the academic touchstone of truth. But in the sphere of action this principle presents a baffling contradiction, for it successfully solves the problems which arise in time in that it enables us to restore order and continuity to a world which alters its form from day to day because of the transforming effects of time. But, strange to say, it is this very transforming time that the Aristotelian principle cannot touch.

There are two solutions for this difficulty. We may say, as Strong chooses to do, that the notion of this transforming time is itself an illusion. In this case, the real time for us, that is, a concept of time which obeys the Aristotelian principle, will be a time "in" which we are, but it can never be a time of which we are "aware." The time of which we are "aware," that is, the continuous time of memory which carries within it its own past, is an illusion. What have we gained by accepting this alternative? *We aimed to secure a monism of knowledge.* That is, we sought to erect the Aristotelian principle as the sole principle of intelligibility, adequate to all problems. But for this monism of knowledge, we are forced to accept our universe as one in which the

principles that are successful, are yet never true; and in which the experiences of which we think we are "aware" (experiences of duration) turn out to be illusory. We are dualists in spite of ourselves.

The other way out is to accept *duration*, the time of which we are "aware" as ontologically real. But in this case, we must acknowledge that it remains opaque to the Aristotelian principle. Its reality is vindicated by the fact of the interpenetration and yet mutual independence of the past, present, and future. Its reality is vindicated by the experience of memory which involves the persistence of identity in spite of change. The entire phenomenon of *growth* requires a principle which is exactly the opposite of the Aristotelian law. Otherwise, we cannot bridge the gap between the oak tree and the acorn, or the gap in our pursuit of a host of minor purposes which together attain an end that is entirely different from any of them. Thus, if we are to make the whole of our experience intelligible, we are obliged to accept another principle of intelligibility which is quite the opposite of the principle of contradiction. Following the usage dictated in the passage cited above, let us call this other principle, which opposes itself to the principle of Aristotle, the *principle of progress*.

Not the least of the grounds upon which we defend this principle is the fact that it is required in order to explain *how* the principle of contradiction can succeed. The Aristotelian law purports to be a law of change; but there is no point whatever in speaking of change if these changes perish the instant after they occur. *Change* is a notion which gets intelligibility only because of the fact of memory which is somehow able at once to conserve the past and still represent it as having perished. Only memory and duration enable us to speak of the relativity of all changes of physical state, for it is the memory which enables us to restore past states. This alone saves change from being *absolute*. It is the relativity of change which enables science to adhere to its assump-

tion that the universe is entirely conserved. The conservation of the universe means that time leaves no ineradicable impress on it; so that a given state of the universe or of its separate objects can occur more than once. The universe is conserved to the extent that its past states can be repeated: only in this sense can we say that it has lost nothing. But to repeat these past states presumes the reality of memory and the reality of human power. Thus, the principle of contradiction does not require for its verification a demonstration in formal logic, for formal logic is itself based upon this principle; axioms and first principles do not explain themselves. The principle of Aristotle rests upon nothing else than the *power* which we as agents exert in the world of objects; it rests on the "experience of volition."

32. We may therefore claim a certain logical priority for the principle of progress, since the Aristotelian principle presupposes it. We have rested this principle of progress on the experience of volition, and it will be instructive to enquire at more length what is implied by these terms. The Aristotelian principle rests on a certain principle of understanding, the *principle of identity*. Upon this foundation all of the processes of formal logic are based. The syllogism of formal logic is but a method of revealing to the mind of another person identities already found. When the syllogism is once formed, thought has already taken flight. When the inventor of a syllogism presents it to another mind, that mind simply follows the movement of thought which the syllogism outlines, during which he too may attain or rather *experience* that sense of clarity which is the sign that a new identity has been attained. It is typical of the intellect that it reasons from the known to the unknown by the simple device of finding identity after identity. It seems to be confined to *description*. On the other hand, we have another faculty of understanding which seeks to *explain*: it finds, not identities but *causes*. This manner of thought rests, not upon the principle of identity, but upon the principle of causality, that is,

it is "due to the experience of volition." Is it possible to establish the experience of volition as a unique source of knowledge?

Hume derives and defends his scepticism on the theory that all knowledge is confined to sensations and ideas. *His scepticism is the result of his refusal to recognize volition as a source of knowledge.* Now, Descartes, Leibnitz, Berkeley, and Locke had undertaken to establish the existence of God on the causal argument, thus making of volition a valid source of knowledge. Hume refutes them with his well-known contention that we can only know succession, not necessity; sequences, not consequences. There are relations between ideas but these relations are not causal relations. The notion of causality, he held, owes its origin to a feeling due to the constant conjunction of impression, that is, to custom. For example, we decide that fire is the cause of smoke, not because fire has some special inner potentiality, but simply because we always observe that fire precedes smoke. We are here at the crux of the problem of causality. Is there nothing more in the problem of volition than the observation of the succession of events? The issue Hume raises is really the question "Are men machines or are they not?" If Hume is right, then the terms causality and succession represent a distinction without a difference. That there is a difference the whole evolution of social, political, and religious life seems to indicate. Now, a mechanism has two outstanding characteristics: in its activity, the uniformity of succession of which Hume speaks is nearly perfect. The other great trait of the machine is its incapacity to profit from experience, that is, its incapacity to learn. On the other hand, in a living organism, these traits are reversed: the activities of the organism seem the farthest remove from uniformity, while its capacity to learn is very great. However, we think that it is impossible to show that the machine has monopolized uniformity of action, while the organism has monopolized the capacity to learn. No matter how unfore-



seen the activity of the organism may seem from an external study of it, it is still possible that the fortuity of its conduct is only seeming, and is due to our inability to discover the laws controlling it. The great success that biology and organic chemistry have had in discovering the "chemical mechanisms of conduct" lends support to this view. On the other hand, there is a sense in which we may speak of the 'learning capacity' of material substance. The new machine performs its task better after some 'practice.' The violin for the artist 'learns' to respond to harmonious combinations of tones. There are many sympathizers with Hering's notion that memory is a general property of all matter. T. Brailsford Robertson<sup>15</sup> claims, on the basis of chemical demonstrations, that memory is of the nature of an *autocatalysis*. Linseed oil, which has a fatty acid similar to one which can be demonstrated in the nervous tissue, seems to display this sort of 'memory.' It 'learns' to oxidize first more slowly, then more rapidly. If kept inactive it seems to forget how to oxidize, and its reactions become very slow. He even finds that the quantity of these changes follows Weber's law, and we thus get a hint that perhaps perception too is a similar process. Rignando<sup>16</sup> has proposed an explanation of the learning process as due to electrical processes of the nervous system. The cells are electrical accumulators, and the specific sensory processes leave in these cells a specific substance which is added to those which are already there. Under the right conditions, these substances will again give rise to their characteristic currents, which accounts for the recall of memory.

Valuable as these researches may be for science, we must nevertheless insist that they neither prove nor disprove the existence of some vital entity which may be present in addi-

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<sup>15</sup> T. Brailsford Robertson, "Sur la Dynamique Chimique du Système Nerveux Centrale," *Archiv. de Physiol.*, Vol. VI, 1908, p. 388.

<sup>16</sup> E. Rignando, *Upon the Inheritance of Acquired Characters*, Tr. by B. C. H. Harvey, 1911.

tion to the chemical processes described. We believe that mechanism and vitalism are but points of view so long as we bring to bear upon them, only the data of chemistry and physics. These are necessarily limited to the discovery of material states. But material states, like the atoms which compose them, may be infinitely refined. That is, no matter how minutely we trace the inter-locking of physical forces in the organism, we are still beset with the doubt, that if our analysis had only been more minute, we would have discovered breaks of continuity and sources of indetermination in the protoplasm. But it will be objected that the scientific method is bound to find law-abiding reality, however minute its researches. This amounts to saying that the scientific method is incapable of recognizing any sort of reality except that which is true to the principle of mechanical determinism. In this case, then, *it is wholly inadequate to the problem, mechanism versus vitalism*. Physical principles are of necessity limited to the discovery of physical states. Hence, the absurdity of Laplace's rejection of God: because he searched the heavens with his telescope without being able to find Him. In the last analysis, we are only able to speak of the 'living' because of our inward experience of it. As Hoernlé observed, a living body falls just as rapidly as a dead one: gravity finds no difference between them.

33. However, though experimentation cannot tell us the difference between an organism and a chemical machine; introspection is fully able to do so. For, there is one aspect of inner experience which is our daily lot, and which possesses such realism that it leaves the hypothesis of mechanics futile when applied to the living. I refer to the experience of *effort*: of this the machine is incapable by its very definition. We mean, that mechanical explanation owes its distinctiveness to nothing else than the elimination of the notion of *effort*. A volitional act possesses a unique character to which mechanical schematism is wholly inadequate. It is impossible to imagine that the units of an interacting system exert

effort; on the contrary, *each is completely yielded to its own inertias. To be in space is to be of necessity subject to all of the enforced movements of space.* Every body follows the path of 'least resistance'; but even here we dramatize, for the 'least resistance' is still some resistance. There is here an intrusion of our ineradicable belief that where there is motion there is life.

Persisting in the mechanical mode of thought, let us examine changes of physical states. In doing so all we shall find will be other intermediate states, and so on to infinity. Thus, if we say that the cause of an event is a preceding state we are logically compelled to retrace all such states to the very beginning of things. Because of this necessity J. S. Mill concluded that the universe is the cause of all things. Of course, this leaves us none the wiser concerning particular problems of causation that trouble us. Practically, *we are forced to terminate this regress of states somewhere.* We never look for all of the antecedent conditions of an event; but instead select a few that must serve by proxy for the whole universe. In the classic example of the cow that set a city on fire by kicking over a lantern, we single out the cow and the lantern as the causes, and wholly ignore the city and the rest of the universe. Yet, logically, no fire could have occurred without these. Is this selection of causes then entirely arbitrary? This is not at all the case, for in selecting the proximity of cows and lanterns as the cause of fires we are led to prevent such misfortunes in the future. We are unwilling to prevent fires by preventing the building of cities because the cities are worth the risk. What rule do we employ in selecting the 'right' cause out of that immensity of causes which Bosanquet calls the 'ground' of the universe? Clearly, *we designate that antecedent as cause which our human power can control.* It is a volitional cause which terminates our search for the causal *nexus* of an event; and volitional acts are ever engaged in changing physical states, whether of the nervous system or of the world at large. It

is only mind that can cause and it is only mind that can be affected in any intelligible sense, so long as we insist that matter has only mechanical properties. For, so long as matter is true to mechanical principles it is only the path for the transmission of effects. This view obliges us to define a body as an aggregation of points where a multitude of forces intersect: the body itself neither terminates nor initiates anything.

To be a cause in the psychological sense is far more than being an antecedent state. To cause is to labor, and to labor is to overcome resistance. Labor is the price of all creative effects. The God of the theologians is said to create worlds at the behest of thought. The perfection of this miracle is spoiled by the circumstance that thought too costs an effort. Moreover, like physical acts, an act of thought is paid without the assurance of victory. We have here the realism of life and the realism of chance.

34. And with the reality of effort and risk, goes the reality of *duration*. True causation is not constituted by an alignment of physical states, but involves a creative development in time. Hence, the volitional, and consequently moral scepticism of Hume and all others who seek to comprehend the nature of life and responsibility without admitting the reality of time in the sense of a duration. The timelessness of scientific principles means no more than a certain deliverance from the fortuity of time to be obtained through their employment. This is in part key to the fact that science is the most formidable instrument in the hands of men. Our freedom becomes greater the more we are able to represent nature mechanically; but this is only because we "run the machine" as it were. Electricity becomes a human agency just to the extent that we are able to discover the 'invariable' principles that govern its activity. We are able to prevent infectious diseases just to the extent that we discover the fatalistic processes which underlie it. This 'invariable,' 'fatalistic,' and 'static' property of scientific laws constitutes their

'timelessness.' and their 'timelessness' is the symbol of their power to deliver us from the risks which the future conceals. That is, principles of science foretell the future so accurately, that we are able to say that time does not exist for them. Their mathematical exactness is the badge of their usefulness. But the several natural sciences tend always to create ulterior difficulties for themselves by their very insistence that the formulae with which they garb nature are garments of nature's own choosing. The geometry of the classroom has all of the exactness which is required to make the intellect 'feel at home.' But the intellect, not satisfied with the classroom, seeks to enforce its circles and triangles upon nature at large. But nature chooses otherwise, and she refuses to supply us with a single triangle whose angles are actually in accordance with the intellect's specifications. Geometry requires that objects be perfectly rigid, otherwise, they cannot take on perfectly geometrical forms. But such bodies exist only as ideal possibilities, just as a perfect triangle has only an ideal existence.

35. The experiences of choice, chance, and of effort, lead us unerringly, we believe, to a logic which is quite different from the logic of formulae: a logic which moves in a world of its own. The logic of causality testifies to a world of *becoming* just as faithfully as formal logic testifies to a world of *being*. We have suggested in some incidental paragraphs the manner in which these two ways of thought mutually imply and support each other. Here again we see them cooperating in presenting reality in a light that must often impress those who have acquaintance with the strife and instability of existence: Soldiers on the battle front, toilers in the earth and on the treacherous sea. We mean the thought that the existence of the universe is just as possible as its non-existence. The intellect declares, "Being is forever guaranteed." But the logic of causality converts this into the resolve that being shall endure. Being hangs on the feeble thread of our loyalty and faith, and the intellect, too, depends upon this thread

when it declares the universe to be eternally conserved. You have ascribed to the intellect the function of guiding motive in its work of transforming reality. Formal logic and mathematics are instrumental: they are 'unmoved-movers.' The relation between formal and moral logic is therefore a moving or dynamic relation. They seem destined to perpetual opposition to each other; and William James discerned the reason for this when he declared that the never-stopping clock which keeps metaphysics going is the conviction that the existence of the world is just as possible as its non-existence.

## 3

EXPERIENCE AS THE UNIFIER OF FORMAL AND  
MORAL REASONING

36. Our heuristic use of the concept of teleology has been rather one-sided in this discussion; for we have almost constantly employed it to throw into relief the differences between the *formal* and the *causal* mode of thought. This analysis has gone hand in hand with the distinction between value and fact. But in actual life, value and fact inhere in the same 'things,' and formal and causal reasoning are indulged by the same 'self.' Without values, the formal operations of the intellect would be stranded for want of a problem. Without intellect, all paths leading to the realization of values would be blind ones. Impulse is not free without reason to guide it; and the reasonableness of conduct as well as its freedom is made possible, as Milton and Dante discovered, by the *rational* choice of alternatives.

We must then return to the world of particular objects and deeds, with their particular loci in time and space, to see how impulse and reason work out their mutual destiny. We shall see that here they play into each other's hands, as it were. Impulse, never pure, will harbor unawares the results of past reasoning. Reason, never quite succeeding in "loving truth for its own sake," will linger about those problems which value lends the spice of interest. Their dualism of

function again leads to that continuity of process which is smoothly and imperceptibly that the unreflective life of common-sense knows nothing of the contradiction between the intellect which posits reality as static, and our moral sense which nevertheless always thinks in terms of transformation. It is indeed, as James said, as though we lived in two worlds, and that these worlds are equally possible. Our formal logical powers have developed to orient us to the world of being; and our moral sense adapts us to the world of becoming. But we have still to see how two modes of thinking, so diverse as these, are able to cooperate with each other. In our discussion we have so far contrasted them, perhaps too sharply, in the interests of analysis. We are now willing to say that this analysis, like most of the work of science and philosophy, substitutes artifice for reality. The formal and moral modes of thought are perhaps never exercised in pure isolation. They are but two opposing tensions of the same movement of thought. The form of thought which we normally exercise, whether philosophizing or not, is *imagination*; and imagination is that potent muse who weaves garments of intelligibility with which we clothe the many dark things of the world about us. *Fact* and *value* are but the warp and woof of these garments, and formal and moral reasoning are but the two hands with which the imagination weaves. The manner of this weaving is the theme which will next occupy our attention.

#### IV

#### TIME AS THE UNIFIER OF THE FORMAL AND MORAL ELEMENTS OF REASON

##### 1

#### IMMEDIATE EXPERIENCE AND REFLECTION

37. There is a certain magic lamp, like that of Aladdin, by means of which we may cause certain chronic difficulties of thought to vanish. This lamp is the body, by means of whose

action the chasm which reflection finds between concepts and things is securely bridged. Immediate experience knows nothing of the stubborn problems that confront us when we philosophize about experiences. But immediate experience causes the problems of reflection to vanish without giving them a dialectical solution, which is what the philosophers require. Immediate experience is mute: is its silence that of wisdom or of ignorance?

Our previous discussions have been in the main critical accounts of some of the ways in which immediate experience has been interpreted as knowledge. The philosophies of the schools desire to render immediate experience articulate, and especially to prove that their voice is its very own. Hegel would interpret all experience in terms of formal ideas. Schopenhauer saw in experience only the manifestation of blind will. Behaviorism contends that the richness of immediate experience may be reduced to articulations of reflex arcs. Of common sense we had little to say, for common sense does not explicitly require immediate experience to have any intelligibility other than that which is constituted by our successful actions. Yet, common sense implicitly uses immediate experience as knowledge and it does so particularly with regard to the difficulty we have all the while emphasized: that of the opposition between *fact* and *value*, between *being* and *becoming*. We believe that there is an important thought neglected datum of experience which serves as the meeting ground for these apparently inimical concepts: that datum is the *reality of effort*. It mediates between our antitheticals as the principle of growth in the acorn mediates between the soil and the living oak tree. We do not propose, as did Condillac,<sup>1</sup> to assume a statue, endow it with the sense of smell, and thereby secure 'from mere stone' a complete soul. If but the statue have smell, the rest is comparatively easy. Condillac's assumption is typical of many bootless attempts to derive the living from the inert,

<sup>1</sup> Condillac, *Traité des Sensations*, Pt. 1, Chap. 11, Par. 6.



by surreptitiously endowing the latter with a mite of sensibility and then invoking 'evolution' to complete its endowment. The feeblest sentience of which we can conceive is already at an impassable distance from matter. Matter and life differ, not in *degree*, but in *kind*. Life, materialism tries to say, is "matter which has passed over and recognized itself." Here is the absurdity of every attempted monism: we set out to resolve mind to matter, but end by endowing matter with the very psychic properties we desire to banish. We should accept matter and experience as equally real and should attempt to compel immediate experience to yield us the mystery of their union. There is one experience in particular which should carry us far into the analysis of immediate experience, perhaps to the very heart of it. That is *imagination*, which is at once a way of experiencing and a way of knowing.

38. Imagination, we believe, is a generic type of experience in which we are led at one extreme to literal contact with things, and at the other to literal contact with ideas. Imagination is to us a sort of thinking which must have been present at the first breath of life. It is the first articulation of experience. Indeed, our imagination is free from the keen sense of estrangement from reality which is typical of conceptual thinking. There are numerous occasions when we are in a quandary as to whether our experience is real or fancied. Perhaps, if we look closely at the matter, we shall see that we move continually in a medium in which ideas hold commerce with things. Imagination is action grown somewhat abstract and symbolic, but is still so near to experience that it bears much of the character of deed. Out of primal imagination formal and moral reasoning have developed. The most essential property of imagination is *creative inventiveness*. Now, this creative inventiveness of imagination touches its own forms as well as everything else. For, imagination has its own principle of thought, as basic as are the principles of contradiction and of progress to reason

and will. This principle of the imaginative faculty is the principle of *conceivability*.

What is the relation between the principle of conceivability and the principle of contradiction and the principle of progress? What is the relation of imagination to the formal and moral modes of thought? Finally, what inference does the nature of imagination lead us to draw regarding the ontological character of the world in which imagination moves? These are the major problems which occupy us in the present chapter.

## 2

## CREATIVE IMAGINATION

39. The subject of imagination is somewhat neglected in current psychology.<sup>2</sup> Its discussion often appears as though incidentally under headings devoted to "thought," "representation," "feeling," and "memory." Current separations of the imagination from reason are far from satisfactory; in most discussions of the subject we are either burdened with unworkable definitions, or else we fail to carry them through consistently. For instance, imagination is frequently spoken of as dealing with 'imaginary' objects, in contrast with reason as dealing with 'real' ones. We have indeed some occasion for holding that mathematics is even more successful with its imaginary entities. But it is not alone

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<sup>2</sup> Coleman R. Griffith (*General Introduction to Psychology*, N. Y., 1923) gives a single index reference to it which falls in a chapter on "Body-Mind" capacities in general. McDougall (*Outline of Psychology*, N. Y., 1923) treats imagination in a chapter on "anticipating" and "recollecting." W. B. Pillsbury (*Fundamentals of Psychology*, N. Y., 1916) discusses it with memory. This is also the case with E. B. Titchener (*A Text-Book of Psychology*, N. Y., 1913), and with H. C. Warren (*Elements of Human Psychology*, N. Y., 1922). Imagination is given a separate chapter by the following authors: R. S. Woodworth, (*Psychology*, N. Y., 1921); M. W. Calkins, (*A First Book in Psychology*, N. Y., 1919); by J. R. Angell, (*Psychology*, N. Y., 1908), and by James in his *Principles*, Vol. II.

careless usage that is to blame for the failure to keep imagination distinct from reasoning. The fact is that the nature of reasoning is such that *reality* and *unreality* must enter into all forms of it. There is no sharp line of separation between fact and inference. Accordingly, it is not permissible to assume that one sort of reasoning deals with the 'real' things and another sort with 'imaginary' things.

Again, it is frequently said<sup>3</sup> that the aim of imagination is to discover some new object, such as is involved in mechanical invention, while it is the purpose to discover relations between things which exist already. But was there ever a new object invented without a basis of real relations obtaining between things? And was there ever a relation discovered which is not in some sense a 'new' relation? Or indeed a relation observed without at least some notion that the objects related play a part in the process? Actually, we cannot employ the external objects of thought as the basis for discriminating modes of thinking, because in every case the 'thing' thought is complex: It holds within itself something of interest for every possible note of comprehension. A 'thing' is at once a unity and a multiplicity, a fact and a value, a form and a potentiality, a matter and an idea. Nor can we distinguish modes of thought on the supposition that one discovers relations and the other the objects related; for relations and the things related mutually imply each other.

There is yet another way in which we may distinguish the work of imagination from the work of formal thought. We may say that the analogies and the resemblances with which the imagination deals are 'remote' while those involved in reasoning are 'exact.' But if we say only that the work of imagination is characterized by the looseness of its analogies we are simply saying that imagination is characterized by its proclivity for error. We must supplement this by saying that imagination is characterized also by potency in discover-

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<sup>3</sup> E. B. Titchener, "Thought," *New International Encyclopedia*, 2nd ed., XXII, (1914), p. 249.

ing exact and minute resemblances. That is, imagination is a sort of thought where the maximum of exactness and inexactness mingle. In short, it is the lively realm of discovery, where bare conceivability is brought into touch with the world of the concrete. But this is to regard imagination and reason different only in degree. In this view, imagination is characterized by its fecundity, and reason is noted for rigid censorship over the work of imagination, rejecting such of its products as are not suited to reality. But there is yet another difference between reason (including both the formal and moral aspects of it) and imagination, one which is more than a difference of degree: we refer to the circumstance that the forms of reason deal either with facts or values taken alone, while imagination addresses itself to both at once. This is but to reiterate our former statement, that imagination is a form of thought which is as rich and complex as experience itself. Experience and imagination are each acquainted with the antithesis of *fact* to *value*. Now, fact and value are both modes of thought and ontological traits of the world in which thought moves. Their opposition in thought points to a similar opposition at the very heart of things. And if thinking aims at the comprehension of reality then the duality of *fact* and *value*, of what *is* and what *ought to be*, will never be lost to sight in any successful thinking whatsoever. It is this *full* reasoning, primary in both the logical and chronological sense, which we choose to call *imagination*. Imagination is the generic mode of thought which mediates between the world of *being* and the world of *becoming*. But, with the passing of time, imagination specializes its work, and gradually develops special ways of comprehending the antithesis between fact and value. Hence, formal and moral logic, special modes of dealing with facts and values respectively. These special forms of thinking have developed from imagination by a process of growth; but we believe that each bears within itself the reminiscence of the other, and that when they unite, we have primal im-

agination, capable of dealing with a world sundered between that which *is* and that which *ought to be*. Formal and moral reasoning are only opposite tensions of the same movement of thought, and we shall see the proof of their genealogy in the fact (which we hope to establish) that when we deal with facts, values are implicit, and *vice versa*.

40. To demonstrate that imagination resolves the antithesis between fact and value is a meaningless undertaking, unless we first describe the nature of this antithesis.<sup>4</sup> We have already described fact and value as different objects of thought and also as objects of different kinds of thinking. Nevertheless, the contrast between fact and value is a matter far easier to experience than to describe; and although we may assign contrasting properties to them, analysis shows that this procedure is somewhat artificial. In the end, we are forced to rest our distinction of fact and value on intuition rather than on conceptualization, and our statement of the antithesis must accordingly be in the nature of a description of the two types of intuition involved. Intuition is not taken here in any cryptic or occult sense. By intuitive knowledge we mean that knowledge which is constituted by the direct experiencing of something; and it is a form of comprehension upon which even the most *a priori* of concepts must depend for their claim to intelligibility.

There is one point of contrast obtaining between fact and value which seems, to be sure, at once conceptual and intuitive: this is their very duality itself. But of course this dualism *as such* has no content outside of the intuition of it. That is, to achieve a conceptual contrast between fact and value it is necessary to give a content to their dualism. But this procedure will never escape artificiality because fact and value are unstable as existents. For instance, we may enumerate the individual properties of gold and brass with some certainty, because they are free from the effects of

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<sup>4</sup> The concepts, *fact* and *value* are analyzed in Chapter III, division 38, but their full opposition is best indicated by Chapter III as a whole.

time, at least, so far as all observational intents are concerned. But fact and value represent, not only the properties within an object, but points of view in the subject who contemplates and handles the object. Consequently, the same 'thing' is subject to both formal and moral judgments. Logicians have long since observed the dual significance of the copula. To say that "snow is white" constitutes two judgments in one: the statement posits, not only that snow "is," but also that it "is white." We distinguish between the material substance of a thing and its qualities. The existential status of material substance, that is, of quantity, rests on the intuitive experience of its resistance to our wills. Snow exists for us when we discern that it blocks our progress or *will* block our progress if we invade it; just as a phantom is 'unreal' because it does not *resist* us. But what of the existence of values? We are convinced of their existence because they *attract* us. Now, it is by the qualities of things that we are able to identify them as values. For instance, the qualitative properties of snow enable us to distinguish its potential values from that of other things which may nevertheless be quantitatively equal to it. Any given quantity is a value, but this is only when we gauge it by means of muscular effort in place of the balances. That is, a given quantity becomes a value by making a qualitative appeal (in this case, kinaesthetic) to us. Qualities are the symbols of value; and this holds for all the senses. Only those things which possess a significance for us are able to arouse qualitative experience.

It is because the apprehension of facts and values depend on experience of resistance and attraction that we are obliged to say that their distinctiveness can be verified only by an intuition. Only immediate experience can tell us what resistance and attraction mean, and we could never reveal their distinctiveness to a person incapable of experiencing them. We may recognize in Plato's departure from the teaching of the Pythagoreans as an early recognition of the distinction

we here make between resistance and attraction.<sup>5</sup> The Pythagoreans had taught that things exist by "imitation" of numbers. These thinkers were interested in the quantitative status of existent things. It is the mutual externality of things which leaves us only one resource when we wish to take quantitative account of them, and this is to say that they "imitate" each other. Indeed, the device of counting is a process based on this generic idea of the "imitation" of similars. On the other hand, Plato, very much alive to the reality of values and ideals, conceived that things exist by "participation" in a form, and forms to Plato are ideal existences in the sense of 'ends.' The Pythagorean and the Platonic account represent two basic ways in which we apprehend the duality of our world: the world which *resists* us as against the world which *attracts*.

But the world of experience is a world of particulars, and unfortunately for the ideal of 'system' in philosophy, we are unable to classify some things as 'facts,' only resisting us in the sense that the proverbial table of Thomas Reid resisted him; and other things serving as 'values' in which we may participate in the Platonic sense. Thinghood, Aristotle reminds us, is always a compound of matter and form. This is to say that things are at once facts and values. They are facts in the multiform ways in which they are invariably presented to us. They are values to the extent that they promise to satisfy demand. But it is necessary to specify just what is implied by *demand*. A demand is always the requirement of something which lacks the existential characteristic of facts. To be sure, three sides are 'necessary' to a triangle, and six sides are necessary for a cube. But this sort of necessity is purely logical: it is not at all of the nature of a 'want' such as we experience in moral matters. It is because of this that the axioms of formal logic appear as distinguished definitions. That is the formal sense that

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<sup>5</sup> Aristotle, *Metaphysics*, tr. by J. A. Smith and W. D. Ross, *The Works of Aristotle*, Vol. VIII, Oxford, 1908, 987 b.

this defines the triangle. But the necessity which leads us actually to draw triangles is quite different: here for once is a kind of necessity which is more than a convention. It is the fascination or the need of geometry, an ideal goal, which leads us to the self-imposed 'necessity' of studying Euclid. In short, things have value to the extent that they offer to fulfill certain wants. Things indeed form the battleground where is waged the issue between being and becoming; and the line of combat is determined by our standards of significance.<sup>6</sup> We choose the significances which are to be real for us, and in time, this choice delimits our very world of perception for us. Our perceptual world, which constitutes the 'world of fact' *par excellence*, rests on our interests: The world which we reject we will some day be unable even to see.

It is this circumstance which justifies the inference which we have several times drawn regarding the ontological status of our world: being and non-being are equally possible. And this is why we are eventually led to acknowledge that the reality of facts and values rest on the "experience of volition" as truly as they do on the principle of resemblance. Imagination is able to 'resolve' the antithesis between the logic of fact and the logic of value. But we must understand the term 'resolve' in an unwonted sense. We do not mean that imagination resolves moral concepts to the concepts of formal logic. To achieve this sort of simplicity has been the futile hope of many philosophers. They forget that the dualism of thought points to a dualism in reality: the reality of becoming cannot be banished by denying it on the conceptual level. But there is another kind of simplicity which imagination provides. It enables us to pass successfully from concepts of value to concepts of fact; although this cannot be achieved without the expenditure of effort, the loss of time, and the risk of failure. Effort, time, and chance are the in-

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<sup>6</sup> H. B. Alexander, *Nature and Human Nature*, Chicago, 1923, p. 72.



exorable conditions which surround both thought and action; and this is only to repeat that our world is not given once for all, but is compounded of being and becoming. In imagination as in experience, the real and the fictive enter into the same drama; and it is this union which enables imagination to solve life's problems. To the intellect, in its unimaginative forms, this is incomprehensible. For the long and explicit acquaintance with material reality leads this uncolored intellect to say that the real and the fictive cannot "hang together." "Real coats cannot hang upon the ideas of pegs," it will say; it cannot see as does the moral reason (because of its acquaintance with purpose) that we learn to hang real coats upon real pegs only because we hang them there in thought first. Again, the intellect has been too vaunting in its self-assurance of familiarity with the real: it was through reasoning from formal principles alone, ignoring volition as a source of knowledge, that Berkeley and Hume arrived at a scepticism concerning the existence of the reputedly 'real' material world. Thanks to the striving motives of our moral nature, the precepts with which the intellect is content are supplemented by action, and then scepticism is dispelled by the admission of new data, the data of volition. We must regard imagination as the archetype of all reasoning. Formal and moral reasoning are but its special forms. This is our thesis. Possibly as definition it does not possess the structural simplicity which the current logics require. But our point is that the imagination must satisfy the requirements of life in general, and not merely the requirements of text or classroom alone. We suspect that the great virtue of structuralism is after all the rest that it gives to fatigued minds. The ledger of being and becoming for the imagination is never balanced; and in this its activities are like those of life, for we dwell in a world whose ledgers are never balanced. Everywhere in life it is plainly written that simplicity is not the essence of being, however convenient it may be thought. Formal simplicity is after all,

only relative; but there is another simplicity which successful thinking absolutely requires, and that is simplicity of functioning. That is, thought must be capable of that simplicity of movement which leads the mind smoothly from the virtual world of memory to the real world of things, from the moral realms of values to the intellectual realm of facts, the moral realm of values to the intellectual realm of facts, from the discontinuous world of perception to the continuous world of deeds. This simplicity imagination possesses; and our central contention is that epistemology has involved itself in difficulties, not because it thought about things, but because it thought about thinking; and in so doing, it attempted to make one device of the imagination preëempt the rest of them. We think that the arch example of this is the attempt to make *reasoning by similarity* the exclusive type of all reasoning. But to do this leaves us confronted with the disheartening array of opacities which we have already enumerated.<sup>7</sup> Our only hope of restoring consistency is by restoring imagination to its own, capable not only of assimilating the unknown to the known on the basis of *similarity* but also of assimilating the known to the unknown in terms of *causality*. Let us see whether we can support our view by the facts.

## 3

## FACT AND VALUE AND IMAGINATIVE THOUGHT

41. Let us consider first the omnipresence of fact and value in imaginative thought. We may use here Spencer's principle that the final test of truth is the "inconceivability of the opposite." But the principle of inconceivability of the opposite is fraught with both virtues and dangers. It is a very basic rule of thought, and the Aristotelian principle of contradiction is but one side of it. The Aristotelian principle seizes one phase of it, and what we have termed the "principle of progress" seizes the other. The law of contradiction

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<sup>7</sup> Chapter III, Divisions 53 to 59.

declares, "This is a truth which we cannot but believe."<sup>8</sup> The principle of progress replies, "Unless we can conceive the opposite." In imagination, these two principles are bound together in an ever-moving unity. Imagination at once creates and obeys this basic law of conceivability. Its task is to find the balance between discovering and making truth. The inconceivable is untrue, but only so long as it is inconceivable. Here we have both rigidity and flexibility at their height. A most illuminating example of its working is the thinking of the mathematician. His is a unique combination of freedom and necessity. He may conceive with all freedom, but must adhere to his conceptions when once they are made and accepted. Thus, Riemann and Lobachevski created new geometries by arbitrarily denying the validity of the axioms which are basic to Euclid's system. It is by this dual freedom and necessity of procedure that the imagination carries on its work. Imagination is the experimental method *par excellence*. It obeys a rule of thinking which is as rigid and as flexible as life itself, at once strong and yet changing in its devotions. Yet it is a principle which reveals to us a prime characteristic of the world in which thought moves. The fact that this manner of thinking 'succeeds' (in any sense whatever) shows that the world is also compounded of *being* and *becoming*. The labor of conceivability is but the parallel in thought of the fact that we live in two worlds, a world of fact and a world of value. We mean, that the presence of this principle of conceivability at the root of all thinking points to an immutable condition of existence, namely, that existence and non-existence are both among the possibilities.

In applying this test of conceivability, the imagination moves from the temporary rest which is called fact to that temporary strife which is called inference. The great danger consists in resting with a given horde of facts forever, as

<sup>8</sup> Durant Drake, "The Approach to Critical Realism," *Essays in Critical Realism*, 1920, London.

some of those do who take for their measure the law of contradiction without its complement. Franklin, Arago, Galileo, Copernicus, and Bruno could testify that the principle of inconceivability of the opposite will find treacherous uses unless we have a certain humility without which we should not enter the kingdom of science. That *we* "cannot conceive of the opposite" does not prove that others cannot do so. Current psychology affords numberless instances of the denial of entities which the intellect is unable to comprehend. The soul is a myth since no 'structural components' can be found for it: this illustrates the tendency of the intellect to deny what it cannot comprehend. There are truths which, though they depend on experience, are yet independent of its *amount*. Even the validity of a *classification* in formal logic does not depend on the exhaustive enumeration of the cases it subsumes.

Mankind is forever pioneering in the universe of thought, and the successful pioneer at once trusts and distrusts his own conceptions. Over our thinking hangs an ominous fortuity, and nowhere is the struggle for existence waged so relentlessly as in the world of thought. As Plato discerned, the conflict of ideas is the motif of all history, human and animal. There is indeed a dialectic of thought, but its necessity is imposed by the world in which we dwell. How does this necessity appear in the technique of verbal dialectic?

38. In verbal discourse we employ "terms" as emblems of meaning; and "terms" when their meanings are analyzed, turn out to be but the place-names of their temporary rest. Here the desire for eternal rest which besets our flagging energies, emerges in the attempt to make one term preëempt the meaning of its opposite. Thus, La Mettrie would fain have the term *machine* include all organism; and Hegelianism would make the machine an idea, and Watson would regard the idea as a vocalization. The test of success in these attempts is to ask whether our terms are not fraught with double meaning. For example, we should ask what profits

it to speak of a machine which 'thinks,' of an 'idea' which tips the balances, and of a chemical process in the vocal organs which 'comprehends its own formula.' In all of such cases we obviously try to make an identity of meanings which are radically different.

On similar grounds, we argue that *fact* and *value* are terms pointing to utterly different meanings. We cannot, therefore, apply to them the same term. We must be simple in our terminology but only so simple as we dare to be. The grim difference between the world that *is* and the world that *ought to be*, is as yet such that it is beyond comprehension to identify them. Logic has a method of testing the validity of inferences, but none for the intelligibility of words. We define words by reference to others; always we are made to understand by something which is not defined. This is because underneath the inert symbolism of words there is a perpetual evolution of meaning, which words only approximate, as a zoötrope affords but an approximate image of the movements of a dancer. Definition is, accordingly, an art, half guided by rule, half guided by intuition. Pascal advised us to define neither too much nor too little. This all comes to saying that the dialectic of terms is but the surface expression of the deft yet unforeseeable dialectic of the imagination. The concepts employed in logic are meanings just structural enough to be fixed by a word;<sup>9</sup> but an idea is more than a structure: it is an individual subject to growth or to decay.

42. Let us consider in more detail what is *given* and what is *made* in this world in which imagination moves. The Aristotelian principle of contradiction is that a thing remains what it is. Red is red: its principle of action upon and our action upon it remain constant. Yet, if we had this and no more, we should be living in a non-moral world. That is, if seeing gray forever precluded the seeing of red and green, and if this were the same for everything else, then fact and value would be identical, and thought would have no excuse

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<sup>9</sup> John Dewey, *How We Think*, 1910, p. 125.

for existing, because there would be no invention which it could achieve. But Aristotle's principle indicates only one side of the thinking process. Even while we say that a thing will not change, we endeavor to change it. That is, we apprehend the 'thing' by a sort of effort, which it constantly tries to evade. The "fixity" of a thing includes our effort to hold it "fixed." Moreover, even while we say that the thing is fixed we prepare to change it, and our success in doing so is a story which we call evolution. To amplify, common-sense implicitly takes sense-data as present in the objects to which they refer. Neo-realism, seeking to make this into explicit theory, must undertake the difficult task of showing that incompatible sense-data can characterize the same object at the same time. Says Mr. Percy Nunn,<sup>10</sup> "A hot body owns at the same time all the hotness that can be experienced around it." "The buttercup actually owns—'as co-ordinate substantive features'—all of the colors that may be present under different conditions." Holt declares that the whole world is full of such contradictions.<sup>11</sup> Granting that the iron will 'own' heat at all (which is already at the opposite pole from neo-realism) it could own no more than one temperature since it has but one position with respect to itself. The buttercup might well 'own' (in its own memory, let us say, if it have one) "all the colours which may be present under different conditions"; the different 'conditions' referred to will be real because time is real. That is, even the buttercup must distinguish between the color it *does have* and the many other ones which it might have. In vain do we try to erect a monism of being or a monism of understanding. Neo-realism cannot (and they do not attempt it) demonstrate that the monism of being which they defend is either physical or mental.

<sup>10</sup> Percy Nunn, *Proc. Aristotelian Soc.*, (N. S.) Vol. X, pp. 197, 203. See also S. Alexander, *Ibid.*, Vol. X, p. xi.

<sup>11</sup> Edwin B. Holt, *The New Realism*, pp. 364, 370. See also his *The Concept of Consciousness*, Chap. XIII.

Bertrand Russell essays an escape from the difficulty arising from the fact that different individuals find different sense-data in the same object.<sup>12</sup> He maintains that there are an infinite number of worlds, each of which has a space of its own. There are as many of these spaces as there are private percipients; therefore the qualities which pertain to any one space cannot clash with the qualities found in the other spaces. But if the perspective, that is, the space, of each percipient is completely removed from all other spaces, then no problem arises which needs to be solved by Russell's subtlety. He first assumes that only one perspective enters into one awareness, but then assumes this to be somehow disturbed by the necessity of reconciling what it finds with the sense-data that belong in other spaces. Difficulty only arises when we have two subjects, entertaining the same perspective, who yet find a difference of sense quality in the same thing. How is this difficulty to be solved? We think that it can never be solved so long as we suppose that the sense qualities belong to the object and to the subject alone. The way out is to make use of the fact that these sense-data are in a sense *given* to the object by the subject—they represent a certain efficiency which we have acquired in encountering objects. If the normal eye sees red where the color-blind eye sees gray, there is here no problem of logic, no problem as to how incompatible sense-data can adhere in the same object. We are here only concerned with a problem of *defect*. The eye which sees gray suffers from an *insufficiency* of vision. The dictum "red remains red" only means, therefore, "red remains red until we are able to make it yield some other sensation." Thus, even perception follows the principle of conceivability; and it is this which keeps vision, for example, forever different from photography. It is imagination which lends its characteristic properties to all living activities, making of the whole phenomena of growth a unique process which can never be fully explained in chemical terms

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<sup>12</sup> Bertrand Russell, *Scientific Method in Philosophy*, Chicago, 1914.

so long as chemistry is a science of fixed entities. If we mount from the sphere of perception to the sphere of memory, we shall find that imagination exercises its influence in such a way that it makes memory far more than the 'wax-tablet' theory can describe.

43. The problem of memory is to understand how its images can at once denote an object and connote a meaning. Many psychologists have made attempts to show that some images are copies of objects and others embodiments of meaning. Some among them have insisted that thought and the meanings which it involves must be imageless. The debate concerning *imageless thought* is one of the most extended and significant debates in which modern psychology has been involved. To this problem our discussion has led, and in dealing with it we will make use of a valuable summary by Francis Aveling.<sup>13</sup>

Galton<sup>14</sup> was the author of the notion that images were often like composite portraits, and this ingenious notion attracted the attention of Huxley, Hume, and Binet. Galton studied the mental content when one thinks of particular and general terms. He found some observers who testified that they found nothing in consciousness except the word itself<sup>15</sup> Ribot, however, was the first to offer any considerable study of imagery.<sup>16</sup> He sought to discover what is in the mind when we get a general term through some sense mode. Such terms were presented to observers, who were asked to give their introspections. Their replies were classified. Thus, he arrived at a confirmation of the notion of 'types of imagery.'

<sup>13</sup> Francis Aveling, *On the Consciousness of the Universal and the Particular*, 1912. This volume also contains a history of the concepts of the universal and the particular in philosophy, and contains a report of an experimental study made by the author, the chief result of which is to demonstrate that meaning is not dependent upon imagery.

<sup>14</sup> Sir F. Galton, *Inquiries into Human Faculty*, 1883.

<sup>15</sup> Sir Francis Galton, *Op. Cit.*, Appendix E.

<sup>16</sup> Th. Ribot, "Enquête sur les Idées Générales," *Revue Philosophique*, 1891, Vol. 32. See also his *L'Evolution des Idées Générales*, 1897.



But some of his observers found nothing else in consciousness except the word. Ribot argued that there must be something else in the mind besides the word, else the word would be meaningless. He concluded that a 'general idea' is a word plus possible imagery plus an obscure unconscious element which he does not define. This, it may be observed, is a rather speculative vein for one so given to 'positivism' as was Ribot. But we appreciate the difficulty he was under. The truth is, we are here engaged with a difficulty which is as much logical as it is experimental. There is the same distinction between an *image* and its *meaning* that there is between anything and its meaning. The attempt to identify imagery and meaning is doomed to failure at the very start.

Marbe's work is important.<sup>17</sup> His study of judgment ended with the conclusion that judgment is a fact that we are aware of in its own character, not at all as a sensation, not as an image, nor as a feeling. It possesses imageless content (*Bewusstseinslagen*) involving attitudes of consciousness that are different from perceptions and images. Ach<sup>18</sup> carried out experiments in the study of will and thought and finds that his observers report content or knowledge for which there is no qualitative basis. But he holds that the tendency to arouse these when an idea is in the mind accounts for the experience of meaning. This notion is similar to James' theory of the 'fringe of consciousness.' Watt<sup>19</sup> confirmed the observations of Külpe that the task set for the observer chiefly affects the nature of his apperceptions; and he concludes also that there are indefinite images that may function as 'universals,' though he points out that this does not preclude the existence of non-imaginal or general ideas.

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<sup>17</sup> Francis Aveling, *Op. Cit.*, p. 61. Cf. K. Marbe, *Experimentell-psychologische Untersuchungen über das Urteil*, Leipzig, 1901.

<sup>18</sup> *Loc. Cit.*, p. 61, Cf. N. Ach, *Über die Willenstätigkeit des Denken*, Göttingen, 1905.

<sup>19</sup> *Loc. Cit.*, p. 65. Cf. Watt, H. J., "Experimentelle Beiträge zu einer Theorie des Denkens," *Arch. f. die ges. Psychologie*, Vol. IV, 1905, p. 289.

Messer,<sup>20</sup> basing his researches upon those of Watt, finds a 'general image.' It is so ill defined that it can stand for a whole class. But he does not by any means consider either a particular or a general image as the necessary condition of understanding. He finds that when a key is given to a subject, the meaning frequently appears in consciousness before the word. The work of Bühler<sup>21</sup> on the thought-processes as a whole ends with the conclusion that thought is mediated by concepts, not by images. His defense of imageless thought is clear and uncompromising. Bovet repeated the experiments of Marbe, Messer, and Bühler in Geneva in 1908,<sup>22</sup> and defends the general method of research used, and corroborate their conclusions.

But these Wurzburg psychologists are severely criticised by Wundt<sup>23</sup> and by Titchener.<sup>24</sup> Von Aster joins them in their general condemnation of the doctrine of imageless thought; which is that such thought is beyond 'observation,' and amounts to an indescribable experience.

Newer studies, however, reaffirm their findings. Moore<sup>25</sup> made a study of abstraction, and among other results, confirms the existence of imageless mental contents. Perception, he concludes, is made possible by the existence of mental categories to which sense experiences are assimilated. So we

<sup>20</sup> *Loc. Cit.*, p. 67. Cf. A. Messer, "Experimentell-psychologische Untersuchungen über des Denken," *Archiv. f. die ges. Psychologie*, Vol. VIII, 1906, p. 1.

<sup>21</sup> *Loc. Cit.*, pp. 68-69. Cf. Bühler, "Tatsachen und Probleme zu einer psychologie der denkvorgänge," *Archiv. f. die ges. Psychologie*, Vol. VIII, 1907, p. 297; also Vol. XII, 1908, p. 1.

<sup>22</sup> *Loc. Cit.*, pp. 68-69. Cf. P. Bovet, "L'Etude experimentale du Jugement et de la Pensee," *Archives de Psychologie*, Vol. VIII, 1908, p. 9.

<sup>23</sup> *Loc. Cit.*, p. 69. Cf. Wundt, *Psychologische Studien*, Vol. III, 1907, p. 301.

<sup>24</sup> Titchener, E. B., *Lectures on the Experimental Psychology of the Thought Processes*, N. Y., 1909.

<sup>25</sup> Moore, "The Process of Abstraction," *Univ. of California Publications*, Berkeley, Cal., 1910.

find this problem of meaning and imagery entering into the present concerns of psychology but without being solved.<sup>26</sup>

44. We have learned that this problem of imageless meaning is ill suited to investigation. Images are prone to appear when we seek them, and we are left in doubt as to whether they are ever absent when we think. Let us see whether this problem is not more than an experimental one. Let us suppose for the sake of argument that we never think without the presence of images. Would this fact in any way account for the notion of *generality* and of *meaning*? We think not. The difficulty is that the image is supposed to be the copy of a particular object at the very start.

Now, it is possible to derive meaning or generality from these particular images in one of two ways. First, the image becomes the *symbol* or *bearer* of generality. In this case, the image itself is not the *meaning*. What then is the unknown which we call meaning, and why does it choose a particular image to bear it? The whole problem of the relation between mind and things is transferred to the mental realm where it becomes the problem of the relation between meaning and imagery.

45. The second solution affirms that certain images *as such* are general meanings. Their generality is like that of composite portraiture of which Galton speaks. The difficulty is that the portrait and the 'faded image' taken alone do not reveal their generality. The portrait might be the very likeness of some person, none need guess that it is a photograph of society at large. How then shall we know which images are the general ones? Is it when we use them as generalities? If so, then the image does not give generality to us, but we give generality to it. Another device is to say that general images are somewhat faded ones, in which particular fea-

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<sup>26</sup> Our review of the literature is only a sketch of the chief results. To be even a survey, we could not ignore the work of Egger, Bain, Strickler, Stumpf, Paulhan, Baldwin, Bastian, Collins, Lehmann, Secor, and others.

tures have dropped out. But in this case, instead of regarding the image as a lordly generality, why do we not consider it as even less than an individual, perhaps as a ghost or an illusion?

We seem to be struggling here, not with an experimental difficulty, but with a logical one. We have already accepted an image as denoting a particular thing and nothing more. Is it not then rather vain to try to extort from it *meaning* and *generality* which we have already by definition excluded? We must reconsider our first presumptions regarding the image. If we begin by declaring that the image is no more than an 'imitation' of an object, we are still wrong in inferring that therefore an image is no more than a *denotation*. In any case, if we accept it as purely denotative, it is futile to try to extract connotation (meaning) from it. Images are 'imitations' of objects in some sense, but we must remind ourselves that objects have a double significance: they are at once facts and values. The object is the meeting place of the general and the particular, for fact and value. To state this same view ontologically, the 'thing' is the meeting place for *being* and for *becoming*. And if it is the work of perception to portray 'things' in all their truth, then we will expect that images, derived from sense, will do the same. The image too is the meeting place for fact and value, for particularity and generality; and the problem here is no more obscure than it is with the object itself. It is perception which mediates between 'things' and the images of them. Let us consider the phenomena of perception in more detail in order to untangle the devices by means of which it apprehends at once the generality and particularity of things.

The resemblance of the eye to a camera (made evident by the classic work of Helmholtz) has led to the stubborn and persistent notion that vision is a sort of photography. But in our opinion, vision, and every other sense process, exhibit characteristics which go far beyond what chemical process is able to explain. In perception there is a vital labor

which has not a few analogies to thinking. Perception is a process in which the discovery of resemblances and differences go hand in hand. If we suppose that perception grasps only the particulars, we find ourselves involved in both logical and experimental difficulties. If perception grasps only elementary sensations we make it unable to testify as to the reality of what it perceives. Titchener demonstrated this—though not by intention. He attempted to apply to perception his usual method of analysis, of reducing all phenomena to their elementary ‘components’ or elements. He analyzed the sensations into attributes of quality, intensity, duration, clearness, etc. How, then, do these various properties yet belong to one and the same sensation? Because *quality* serves the office of an essence, giving modality to all sensations and serving as a sort of matrix in which the other properties can adhere. Thus, a sensation becomes an element, and its attributes are ‘aspects’ or ‘sides’ of it.<sup>27</sup> Titchener arbitrarily takes *quality* as something more than an ‘aspect’ of the sensation. To have taken intensity in its place would have been just as tenable logically.<sup>28</sup> But Titchener argued that quality serves his purpose best since it keeps down the number of sensations and their kind. The substance of a sensation thus turns out to be only an arbitrary determination, selected because of its systematizing value. In fact, the ‘elementary sensation’ itself turns out to be an entirely subjective concept. It was by similar argument that Berkeley and Hume arrived at scepticism regarding the extra-mental existence of things. This criticism has been urged by Rahn and others. Rahn pointed out that intensity,

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<sup>27</sup> E. B. Titchener, “Sensation and Its Attributes,” Lecture 1 of his *The Psychology of Feeling and Attention*, 1908.

<sup>28</sup> C. Rahn, “The Relation of Sensation to Other Categories of Contemporary Psychology: A Study in the Psychology of Thinking,” *Psychol. Rev. Mono. Suppl.*, Vol. XVI, 1913, No. 67. Other critics are Miss Calkins, *Psy. Rev.*, Vol. VI, 1899, No. 5. Ladd and Woodworth, *Elements of Physiological Psychology*, 1911, p. 302.

duration, and clearness are relative and therefore necessarily subjective. They depend on comparison. Titchener refuses to make a thorough reply to Rahn<sup>29</sup> because Rahn refers to no works of his later than 1910. Titchener further explains that he distinguishes between the 'sensation of classification' and the 'sensation of observation.' The 'sensation of classification' is the type in which he interests himself as an experimentalist. The various attributes of the experienced sensation that are found together in experience are 'bracketed' together by the experimenter. But how do we know that they belong to one and the same thing externally? Titchener admits that we are able to bracket together only what we find together in the excitation, and he thus gives excitation the logical preference over 'determination.' We accept this result, but point out that it amounts to an admission on the part of Titchener that our faith in the existential status of a sensation is verified by immediate experience only. We have failed to establish the reality of a sensation by an abstract association of 'components.'

Perception is then this mutual discovery of unity and multiplicity. Says Bergson,<sup>30</sup> "Generalization can only be effected by extracting common qualities; but that qualities should appear common, they must have already been subjected to a process of generalization." Perception is just such a simultaneous process of association and dissociation. Perception seems passive, but it is really an active process—it involves *work*... We 'carve' the things we see out of a confused world. Otherwise, how could the repetition of a perception make it clearer? Is it because a second occurrence deepens the impress on the brain? Then, how is memory able to separate the two impressions made in the same place, since it is able to recall each occurrence separately? It appears that these various impressions are at once added and kept

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<sup>29</sup> E. B. Titchener, "Sensation and System," *Am. J. of Psychol.*, Vol. XXVI, 1915, No. 2, pp. 258-267.

<sup>30</sup> Henri Bergson, *Matter and Memory*, 1911, p. 205.

separate; and this fact serves to demonstrate that memory is such that the notion of a wax-tablet explains only one-half of what memory does; and the same holds true of perception. Perception and memory are both instruments of the imagination, and it is this fact which renders chemical explanations of them forever inadequate. Chemical and physical explanations cannot touch the world of becoming in which imagination (and with it, memory and perception) moves. Perception and memory, like imagination, are a kind of thought, as their rôle in thinking makes apparent.

46. So far, our description of 'how' the imagination has divided itself into two distinct functions goes somewhat in a circle. We say that the imagination has two tasks because we live in two worlds which oppose each other, the world of ideals and the world of facts. Our account further holds that the imagination, and the action which realizes it, causes these two worlds to telescope enabling us to go from the one to the other. This assumption of the duality of our experience is no *gratis dictum* of ours. That we dwell in a world of being as distinguished from a world of becoming is a truth forced upon us by experience. So much is this the case that we regard a person who makes no distinction between fact and value, either in thought or in act, as defective. But there is another matter which is more open to debate, and this is the question as to how such a double reality can appear to the same subject. We have tried to make this clear in our definition of the imagination and its description; and we have also tried to show how imagination specializes its processes without sacrificing its generality of power. We have still a further difficulty. Just how does imagination gain something and yet lose nothing by its characteristic fission into formal and moral modes of thought? How is thought able to solve problems more efficiently than action?

If in thinking we merely play the drama of life subjectively with only 'copies' of the particulars with which we deal in active conduct, it is difficult to see how any advantage

is possible. This theory of reasoning goes back to associationism and was defended not only by the associonist logicians, but by such psychologists as Bain, Hartley, and Binet. Will it be argued that by dealing with images instead of real objects, we are able to avoid the fatal 'trial and error' which is met with in conduct? But it is quite certain that these images are less exact than their originals; and in this case it would seem that the 'trial and error' difficulties were only aggravated when we choose to think rather than to act. To be sure, such errors will be confined to thought; but thought must issue in action sooner or later, and then the accuracy of action will be no greater than the accuracy of thought which preformed it. Indeed, if thought proceeds only by the association of images, it has less chance of succeeding than have the sensori-motor arcs which we assume to govern action, since the latter are supposed to 'deal' with the real and unmistakable original objects, with few risks of the errors which creep into the images of them.

Is thought less subject to error because it can repeat its trials *ad libitum* before venturing to act upon them? This could only be provided the trials were varied for the purpose of determining the more successful ones. But, it is impossible to say which is successful until all are tested in experience. What is more, if each virtual trial occurs with all the particular details that the reality will involve, there must be included the same loss of time and the same effort as in real experience, since time and effort too are details of a lived event. In truth, such thinking would have nothing to distinguish it from action itself. Thought can hardly be said to involve either less or more effort than action, because they are to a great extent efforts of a different kind. At any rate, there is no measure of effort except the testimony of men and it appears that most men prefer action to reflection.

In what, then, does the peculiar advantage of thinking consist? Is the efficacy of thought due to its utilization of memory? But action too has its 'memory,' if we mean



memory of the wax-tablet variety. Tropisms, reflexes, habits, and instincts are all organic 'memories,' and seem to be both general and particular, just as the conscious memory seems to store both general and particular ideas. For example, the heart reflex is particular; it suffices for one particular task alone. The biceps reflex has a generality which suits it to countless functions. But we do not regard such functions as thought. Actually, the biceps reflex is as particular as that of the heart, it is only to the mind which sees its multiform uses that its action is generalized. We have rejected the notion that thinking consists in the association of particulars. Neither does the unique power of thought consist in its sole use of general ideas. For one thing, generalities are notably incapable of informing us adequately concerning our problems, which are always particular ones. The law of gravity does not tell us when a given apple will fall: there is an element of fortuity in every event, which is fortuitous for the very reason that it has not (perhaps cannot) be generalized.

If thought is to be successful, it must be both general and particular at once. To achieve this is the typical work of the imagination. It makes possible the development of special structures and functions without sacrificing the generality of possible development. Imagination has developed formal and moral reasoning as special processes, but it has done so without permitting either one entirely to lose the power of the other. Imagination, while it divides things into numbered parts, retains the general value which binds them into a common class. This mutual exercise of generalization and particularization is characteristic even of the lowest forms of thought.

47. No doubt imagery plays a large part in the thinking of savages and in the thinking of children.<sup>31</sup> But the use of particular images does not prove that untutored minds are

<sup>31</sup> Lévy-Bruhl, *Les Fonctions Mentales dans les Sociétés Inférieures*, 1910.

capable only of particular ideas. On the contrary, there is good reason to think that such a mind employs particular images partly as symbols for abstractions. The thought of the scientist differs from this only in degree. He displays a tendency to greater and greater abstraction, but at the same time to greater and greater particularity. It is just to the extent that we can bring some past generality of experience to bear upon a particular object or event that we are set free from the fortuity of time. Accordingly, the more abstract thinking of the scientist gradually loses the dramatic and timeful quality of the thinking of the child. Experience comes more and more to be represented by timeless concepts; but to the extent that thought is inventive, this timefulness is not eliminated but only obscured. Thinking, like life in general, is under two necessities: the necessity of being efficient, and the necessity of being plastic and inventive. Evolution and imagination are both under the necessity of discharging these two functions. Evolution so resembles imagination in this respect that we suspect that evolution is the characteristic product of imaginative thought. The Spencerian notion of evolution as a progression from the general to the special is utterly untenable. If generality were exhausted, evolution would of necessity come to an end. When an animal's entire powers are represented by specialized structures, it has attained, to be sure, 'perfect' adaptation to a given situation; but at the same time its powers to adapt itself to a new situation (which is what evolution means) reaches zero. The problem of evolving is the problem of finding the golden mean, the best balance between particularity of adaptation and generality of power. To maintain both of these functions is the characteristic function of the imagination. It is our aim to show that in all stages of thought, whether it be the thought of the savage, of the scientist, or of the poet, induction and deduction, association and dissociation, judgments of fact and judgments of value mutually support each other.

Primitive imagination is mainly *reasoning by analogy*. In it there seems to be nothing of the elaborate induction and deduction of the scholar. "A child sees in the moon and stars a mother surrounded by her daughters. The aborigines of Australia called a book a 'mussel,' merely because it opens and closes like the valves of a shell-fish."<sup>32</sup> But do these cases involve reasoning by resemblance alone? We think not, for there must be present also an active *dissociation* which leads to the overlooking of the discrepancies. On the other hand, there are instances of primitive thinking in which resemblances are suppressed, as when a savage recognizes an individual tribesman by suppressing the resemblances he bears to all men in general. Elements dissociated have been meddled with by the imagination as surely as elements associated. Perception and conduct owe unique character to this same double process of association and dissociation, which it is our present task to show, holds also for the thinking process proper.

Let us suppose the case of a child who yesterday suffered pain as a consequence of putting its finger into the flame of a candle. Today it sees another flame—and halts a wayward hand just in time, thanks to yesterday's association between *flame* and *pain*. But we have also to thank a *dissociation by contiguity in time*. Today's situation dissociated from yesterday's, and this alone enables the child to use yesterday's experience as a *value*. Can we generalize from this and say that the logic of morals ever seeks differences and that formal logic ever seeks resemblances? First appearances render the view plausible. Resolving the unknown to the known on the basis of resemblance is the avowed task of formal reasoning as expressed in science. The moral reason, on the other hand, is as stubbornly bent on finding in reality a virtue or good which the appearances deny. But the relation of imagination to formal and moral logic is generic, and

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<sup>32</sup> Th. Ribot, *Essays on the Creative Imagination*, 1906, p. 26.

in our usage this implies that however specialized formal and moral logic become, they must still make an implicit use of what they have sacrificed in order that they may become what they are. We accordingly expect to find in both formal and moral reasoning a mutual process of generalization and particularization. By way of example let us take a simple case of formal thinking, where questions of value will seem to be entirely excluded.

48. Imagine, then, a child exercising the elementary power in arithmetic which we term counting. Here the principle of Aristotle, that things remain what they are, seems to find a rigid and exclusive usage. But is there no other principle of thought operating? We cannot ask, does the child employ the Aristotelian principle explicitly, and another principle implicitly, for he succeeds without any theory about the matter at all. It is we who reduce his operations to principles: and we answer the above question by saying, "Yes, there enters into this process a principle which goes far beyond numbers themselves, and far beyond the principle of Aristotle. We refer to the unconscious assumption of the child that he can *continue* to count. The child counts by successive acts of attention, but the number of these acts will always be finite. From whence, then, comes his conviction that he can count or could count indefinitely? "We have," said Poincaré,<sup>33</sup> "the faculty of conceiving that a unit can be added to a collection of units; thanks to experience, we have occasion to exercise this faculty and we become conscious of it; but from this moment we feel that our power has not limit and that we can count indefinitely, though we have never had to count more than a finite number of objects." Poincaré suggests the origin of this infinity of number: it is due to that part of our nature which is able to conceive of the infinite repetitions of an act. Counting therefore involves a paradox. We count to exhaust the class of things we are

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<sup>33</sup> Poincaré, Henri, *Dernières Pensées*, 1913, p. 21.

counting, and yet we conceive that our arithmetic extends to infinity. But this is a paradox only so long as we think that the Aristotelian principle is the only one involved in reasoning. Experience belies it, for in experience no matter how much we count, always something remains over. What this 'something' is, is more than arithmetic can tell: that art only knows what it has counted already. As Renouvier observed,<sup>34</sup> the number series, 1, 2, 3, 4, etc., does not reach an infinite number. Consequently, anything numbered must always exist in finite amount. Only the *possibility of counting* is infinite. But is this unending possibility due to a certain potency of human nature alone? No, for thought is moulded on things, and our minds could not think the possibility of counting as being infinite if there were not in nature a certain inexhaustible richness which permits it. But those who wish to make arithmetic into metaphysics, i.e., those who have the Pythagorean notion that the universe is a universe of numbers only, must require that the parts of the universe that have so far escaped the mathematical inventory of science is still given in finite amount. James very justly points out<sup>35</sup> that all science may legitimately require of the universe is that *nothing should be lacking*. It is not even true to say that the counted things are limited: the things we count are limited only in the sense that we conventionally accept them as such. A tree is 'one' object only when we are counting trees; but the moment we change our point of view, we may regard the tree as a fraction of a larger unit or as a constellation of innumerable atoms. In truth, it is only our counting itself that is 'limited,' not the things counted. Every object we count is a unit because we are at the time satisfied with it as such. But our imagination, ever restless, does not even permit an atom to remain 'one,' strenuously as we may assume this while we are quantifying nature.

Every number, in fact, is at once a unity and multiplicity.

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<sup>34</sup> William James, *Some Problems of Philosophy*, 1911, p. 162.

<sup>35</sup> *Idem.*, p. 162.

Arithmetic can show us how to count, but *not when to cease counting*. This latter knowledge is given us by our purposes, by the goals toward which we strive. Thus, even the child of our illustration exercises two faculties in his arithmetic. He reasons in terms of the 'imitation' of similars, but the similars he counts, and how many of them is determined by his moral sense. Just as a buyer in the market place counts the money he intends to pay in exchange for the goods he receives. He not only counts, but counts a specific amount, and this amount is a *value* subject to judgments to which the counting itself is not subject. The price of the goods may be 'fair' or unjust, but with this the mere *number* of the coins paid has nothing to do. It is indifferent whether we say that the goods is paid for with several dollars or several hundreds of cents. Here formal and moral thinking co-operate without quarreling. It is only when we become conscious of our mental processes, when we think about thinking, that difficulties arise. To the child, the principle of contradiction and the principle of progress operate unawares in his thought. It is only when we become aware of the operation of principles of thought that the difficulties of metaphysics arise. Is not imagination here seeking to know what it can and what it cannot do? This is an issue which has momentous consequences: the issue as to whether or not formal reasoning is adequate to all problems is a crucial issue in this age of exact science; and in fact in the history of ideas which underlies all history, this issue has been many times fought.

It is not wholly true that in normal imaginative thinking formal logic takes care of particularity, and that moral ideas provide unity in terms of the unity of goals. Generality and particularity appear together in both facts and values. The unity of number is the unity of some value which gives a common character to its members. But is value once and always unitary? No, for in moral reasoning they become explicitly plural. That is, in moral thinking we do not count

similarities of things, but their differences, because each difference represents a virtue which we dare not neglect. The intellect posits a universe of *being*, and deals democratically with all things in terms of quantity and number. But moral reason does not ask, "How many books exist and what is their total quantity in weight?" It seeks rather to learn the multiform good and evil effects of particular books, and holds that this is the matter which should determine their number. But to achieve this, counting is still necessary—necessary in order to determine the labor it will take to destroy the bad and create the good. That is, for action, quantity and number are values.

49. Let us consider further the special case of a class of enumerated objects. Their classification rests upon one or more traits which they have in common. This principle of unity will be a *value* of some kind, other than quantity. To be sure, in mathematics we have classes of numbers: the class of rational as contrasted with the irrational numbers, or the integers as contrasted with the fractions. Here it will seem that we have objects forming a class with no other properties whatever except that of quantity. Can quantity as such be a principle of the unity of a class? Mathematics is drawn from experience and is a powerful instrument in guiding it. What is the psychology of its success if it does not employ a value of some kind as the basis for its classifications? We think that the mathematician does introduce values as the basis of his classification as follows: If his units are really enumerated, if he writes,  $1/10$ ,  $2/10$ ,  $3/10$ , etc., here are vital realities, each one representing an act of attention and a movement. It is by such finite increments that he hopes to arrive at the number *one* which is more than a quantity—it is a goal and therefore a value, at which he arrives just as we arrive at home by so many discrete steps. Now, the classes of numbers are just such 'homes' or beacons, or havens of rest, to which the mathematician directs his

endeavors. These quantities are values because they are the milestones of human effort.

The 'tristram Shandy paradox' may serve as an illustration to make clear what we mean. Tristram Shandy took two years to write the biography of the first two days of his life. Can we conclude that at this rate the biography will ever be completed? Bertrand Russell<sup>36</sup> thinks that it can (supposing the author to be immortal). Since the days and years have no last term, he argues, any assigned day will be written about, and no part of the life remain unwritten. But, as James points out, the first price of an infinite attainment is that of never becoming weary of an impossible task. Russell is right in hypothesis, if we neglect the reality of time and fatigue. But even counting takes place in time, and this leaves a chasm between Tristram Shandy's life and his autobiography which obliges us to say that there will always be years of his life which are not written.

What advantage is gained by erecting quantities into artificial goals of endeavor in the science of mathematics? There is gained a generality of power. The real spaces in which we move and with which we are familiar, under the survey of practiced eyes and the motor mechanisms which they control, will fall into various cut-and-dried paths of movement, each of which forewarns us of the number and kinds of tensions which will be required to traverse it. Now, the virtue of mathematics is that it frees imagination from the thralldom to habit. The realm of numbers are a veritable field of 'anyness,' as Carus called it, in which the energy of our acts may be infinitely small and delicate and may traverse the strange spaces of hyper-Euclidean geometry. Imagination is ever engaged in achieving means of progress which a custom-ridden habit declares 'irrational.' 'Number' is the most democratic evaluation that we can give to things. When we merely count things, we give each of them an equal

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<sup>36</sup> Wm. James, *Some Problems of Philosophy*, 1911, p. 183.



status of reality: this again frees us from that bias of moral reason which has credited each thing with a particular virtue. But number alone is too democratic: so democratic that arithmetic alone does not tell us how far to subdivide the world when we count. If simplicity is the only virtue, then why count beyond the five continents and the five seas? But here the moral sense intervenes, and would carry things to the opposite extreme: forbidding that the ston be indivisible and demanding that number be infinite. The ordinary integers serve nearly all exigencies of our daily life, but the mathematicians have been driven to imagine minute fractions between them, and between these threads of irrational numbers. What does this mean other than that in the moral sphere no quantity can be so small that it is not forth counting. So also mathematical space eternally falls spart into new points. Is this in obedience to any other demand than the restless importunity of a spirit which, like Maxwell's demons, would leave no other position of the universe unaffected by its will? In action, we find a compromise, and the 'objects' with which we deal represent our compromise between unity of quantitative being and the infinite uses to which we would put it if we could. The number 'one' with which we christen the object, itself wavers between absolute unity and infinite divisibility. We must think of the imagination functioning by a succession of tensions (and we surmise that this has its counterpart in the mechanism of the mind's control over the body). What is gained in this process? A working balance between special efficiency of function and generality of adaptation. The intellect posits a universe of mere being accountable in terms of quantity and number. Here is at once generality and particularity, as much of each as we please. Here is generality of power, for when all things are reduced to the generality of being, we gain by the sacrifice of all form, a maximum of potentiality. Upon this as a flexible medium, the imagination can exercise itself, free from all conventions of habit and custom. We too often think of

the notions of space and matter as poverty-stricken and drab images. On the contrary, the points of space and the atoms of matter permit a constructive ingenuity to which there is no ideal limit. It is here that we build up in fancy that ideal good which we hope some day to build in concrete form. Thus, the highly differentiated function of formal and moral logic reflects the infinite growth of our moral ideals.

So in moralizing, each good is final and absolute for the individual acts which realize it. Ideals are goals for our endeavor: this is their general function. Most general of all is the good, which as a goal is not concerned with particulars. It represents a "purposing which goes on forever."<sup>37</sup> Yet, each goal is attained by a series of numbered steps: these are the purposes "which come and go."

50. In our consideration of the imagination up to this point we have given a too exclusive consideration to mathematics, at the expense of formal logic. We take the two as the type examples of formal reasoning, and would emphasize the point made by Russell that logic is but the youth of mathematics. Its attempt to attain maturity is well evidenced by Russell's own symbolic logic. The similarity of formal logic to mathematics is a point that will not go undisputed, and we will consider it first. Then, we will examine anew our general principle that special forms of thinking have developed from imagination. If formal logic is the product of such a growth, the proof will be in its inability to get along without the capacities it has abandoned. That is, we shall find in formal logic that fact and value are inseparable, though value be suppressed for the sake of the syllogism, just as in mathematics it is suppressed for the sake of counting. We shall expect to find judgment, like number, at once analytic and synthetic.

As regards the formal status of logic, we would qualify Russell's statement by saying that logic is destined to remain

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<sup>37</sup> A. W. Moore, *Pragmatism and Its Critics*, 1910, pp. 156-8.

the "youth of mathematics," unless it is to give up a very crucial difference which separates them. This point of separation appears clearly between a logical and a mathematical class. The mathematical class, as we saw, has as its uniting principle the notion of *quantity*, though value is implicit in it. On the other hand, the members of a logical class are explicitly united by some definite qualities or properties. The mathematician escapes a difficulty which particularly harasses logic, that is the problem of nominalism. In mathematics we seemingly find it easy to take a number as at once singular and plural: but we showed that this is not actually the case. Given the digit 'one' for example, it can be a plurality only on the condition of its divisibility, but this involves expectation and savors of *value*. If we have the fractional parts of the number *one* given, we attain to oneness by a similar process of introducing the notion of value, this time the number *one* will be a goal. May it be said that there are other types of mathematical classes whose membership is differently constituted than by this part and whole idea? But since all numbers are quantities, the only device by means of which we can divide them into sub-classes is to take advantage of the fact that some have certain qualitative traits which distinguish them. Finite numbers are thus distinguished from transfinite numbers, and the rational from the irrational numbers which are beyond all finite limits, greater than all finite numbers. We can see that the distinction here depends on the introduction of the notion of *time*—transfinite numbers are actually infinite; for them, the possibility of continuing to count still further does not exist. Similarly, irrational numbers were invented to solve a certain 'timeful' difficulty that arises in the case of ordinary fractions. Between two rational fractions, for example,  $1/10$ th and  $1/11$ th there is a gap, but a gap which can never be filled by inventing other rational fractions between them. So, the mathematician conceives that there are other 'irrational' fractions with the peculiar power which enables them to bridge these gaps with-

out the infinite vista of time which is required for rational numbers to bridge these gaps. Thus, the distinction between finite numbers and transfinite numbers is not a distinction of *quantity*, but a distinction of quality, the difference between finite and infinite goals. The same can be said of the distinction between rational and irrational numbers.

We make use of similar notions when we distinguish the real quantities of space which we number. Consider weight and volume as types of quantity. If they were quantities of the same kind then we should get the true quantity of a body by adding weight to volume. But instead we divide weight by volume. Nothing could have taught us to do this except that unique balance, the *muscular system* which measures quantity by its intensity, by its resistance to effort. This intensity of effort is determined by the lapse of time in which it occurs: so that a body of great volume will not have the same intensity as a smaller one of the same weight, since the space it covers requires us to apply effort at more points or else to distribute them more in time. Far from dealing with pure quantity as such, we are here already in the midst of a drama, replete with values and choices.

51. The entities which ordinary logic classifies have other properties besides their sheer substance. One or more of these characteristics may serve as the basis for a classification, but each one of them nevertheless retains the characteristics of substance not considered in making the classification. Hence arises the problem of realism versus nominalism. Is the class real, or is it only a name? How does it grasp the realism of its members without destroying them? How can a universe which means no particular thing, mean anything at all? The debate, realism versus nominalism, arises because we create an antithesis between knowledge and things. We take knowledge to be the unchanging, that is, the general or the universal properties of things. The particular we segregate in the material world. Matter and knowledge thus appear utterly different, and we decide for the reality of the

one or the other according to our temperament and training. We believe either in the reality of general ideas or in the reality of particulars. Our view is that the truth is somewhere between these extremes. We do not think that the world of things monopolizes particularity, nor that concepts monopolize generality. We think that there is a general first-truth about the universe which the first glow of thought must have discerned: namely, that existence is *indeterminate*. Ours is at once a world of being and becoming: a world which is, and yet a world which may be augmented or which may perish. It is the function of the imagination to portray so certain and yet so uncertain a universe. It has specialized its task, evolving the intellect to take account of the world that is, and the moral reason for dealing with the problem of transforming it. But these two manners of reasoning must not lose sight of each other, and we think that the notions of generality and of individuality in logic, rightly understood, will throw much light on their cooperation.

There is a certain generality and particularity about things already, and the same can be said of concepts. Things have in common the property of *reality*. Their indubitable claim to this is their power to affect us. This it is which has led philosophers to ascribe to them substances, and this is the meaning of *matter* in science. But they affect us in particular ways and at different loci in space. This constitutes their particularity. So far, we have described an object as a fact, as a datum of experience; and we find that its factual status is at once general and particular. Between this generality of substance and the particular properties which it yields, there is a genetic relation. The *matter*, the *substance*, is the source of of unique properties which we may find in it in the future. Thus the visual impression which we call 'gray' may in time divide into two properties, yellow and blue, and yellow in time yields red and green. What is the value status of an object? Its present phenomenal properties are specific values *now*. But it has also a general

value, constituted by its 'substance' which may in time give rise to new phenomena. But the instant we take the point of view of an evolved future, the substance of a thing is the specific thing about it, while its accidents or 'phenomenal properties' seem to exhibit potentiality. This latter point of view is that of rationalism, while empiricism looks at phenomena from the point of view of the present. The difference between the two philosophies resolved to a difference of point of view, and it is a difference which is determined by the concept of time. The rationalist considers nature as if all time had already flown, and to him *substance* will seem to preempt the realm of being and 'accidents' or appearances the realm of becoming. From the point of view of the present, however, it is the appearances which are real, and substance which is the source of becoming. The truth is somewhere between these views. We shall find these views reconciled in imaginative thought, which takes account of the two points of view at once. Imagination, like conduct, moves in a medium of time in which past, present, and future maintain an organic unity. It reasons in terms of both fact and value, and carries on the work of generalization and particularization at the same time. In it, the principle of similarity and the principle of causality are in harmonious cooperation, just as they are in the realm of deeds, where we note resemblances even while we prepare to destroy them.

## 4

## EMBODIMENT OF TIME IN THE IMAGINATIVE LIFE

52. William Jams somewhere observes that the philosopher is one who is astonished at the commonplace. In truth, it is the commonplace which is enveloped in the greatest mystery. The pull of gravity which we never escape is the eternal puzzle of physics; while that very mainstay of life which we call matter is still a stranger to chemistry. We seem to find anchorage on a stable foundation of matter, yet it is against this very influence that we constantly struggle. Most baf-

fling of all is the mystery of knowledge which represents itself as knowing nothing of this struggle, but which is nevertheless able to guide us aright when we engage in it.

Immediate experience too is engaged in a perpetual problem, but its problem is not a purely formal one. In it we exercise a double form of comprehension: we think at once in terms of *forms* and of *ideals*, and this constitutes imaginative thought. Imagination is immediate experience became articulate, and so near experience is it, that the borders of the two constantly overlap. Imagination brings us nearest to that contact between spirit and matter which is of prime concern at once of the active and the reflective life. Immediate experience leads us to see that our world is compounded of two ingredients, seemingly aline to each other but both familiar to us. These ingredients we have called fact and value. All that we call the sweat and toil of life, its fortunes and its mischances, constitute the conditions upon which we may mediate between the world of fact and the world of value. Time and labor are the prices which we pay for this transformation.

But formal concepts and motives play each an indispensable part in this process. Our motives discern goals, but formal concepts designate for us the means of their attainment. It is the business of conceptual thought to place at our disposal a mass of knowledge gleaned from the past, and this knowledge is timeless to the degree that it frees us from the fortuity of time. Formal concepts present to us that which we may most inevitably expect from nature. It is the function of formal reason to keep informed about the world of being. Moore <sup>38</sup> well compares the canons of reasoning to intellectual habits, slowly developed because of our contacts with a relatively static material world. The postulate of the uniformity of nature is but an inveterate expectation with which we approach the world. One selects his own hat from a number

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<sup>38</sup> A. W. Moore, *Pragmatism and Its Critics*, 1910. This matter is discussed in detail in Chapter XI.

of them. Here the law, "All things remain what they are," is wholly tacit. The Aristotelian principle is but this same habit becomes articulate. Habit is notorious for its inability to achieve a new act which is not already in its repertoire. Where there is a unique problem, habit can only tell us *the way in which we cannot solve it*. Suppose we reach for an object only to find that it is an image reflected in a mirror. In this case the habit of reaching only leaves us with the realization that we have failed. So also the syllogisms of formal logic tell us only when we reason wrongly. We make use of an inveterate mental habit for going from one premise to another, just as we reach for an object always with the same rectilinear movement.

But this habit of reaching cannot assure us that the object for which we reach is indubitably real, and that it is not a virtual image; and neither does the syllogism tell us whether the judgments it employs are true. Of course, we commonly deal only with real objects and ordinarily make inferences only from true judgments; but here is just the difficulty: this is true only commonly. Uniformity is but part of nature; and therefore there are aspects of experience with which habits and syllogisms cannot cope. As Poincaré declared, "To wish to comprise nature in science would be to want to put the whole into the part."<sup>39</sup> The very realism of life depends on this unstable and unshifting aspect of the universe. If the world were indeed guaranteed an uncorrupted and eternal existence then habit would be adequate to all problems of action. But if a habit is a mechanical mode of adjustment, as it is currently defined, then 'adaptation' would appear to go on without consciousness. Of course, in this case, 'adaptation' would cease to have any meaning. In such a world all logical problems (if we grant that they could even arise) might be solved by those logical machines which savants have invented for their amusement. But habits are never entirely mechanical as is proved by the fact that

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<sup>39</sup> Henri Poincaré, *The Value of Science*, 1907, p. 4.



they are subject to the process of learning. Habits too deal with a world of becoming. The intellectualist has sought to make immediate experience articulate, and he has supposed that to achieve this finalism is required. But his mechanical syllogisms are not *thought* for the same reason that a mechanical habit is not *conduct*. Mechanical action and mechanical thought are by definition *effortless* and unconscious, and by these tokens timeless. Real thought and real conduct are quite different: they are laborious and dramatic in character. Habits and the figures of the syllogism *are useless unless we are able to apply the right habit or the right syllogism at the right time*. Habit and thought are under a similar *want*, the want of converting a real into an ideal world. We cannot say that they are under a *necessity* of reconciling fact and value, unless we understand this necessity in a unique sense. It must be not a logical necessity but a *felt* necessity, a necessity which attracts us. That is, our free choice to pursue truth is prior to the 'logical necessity' of getting truth according to the rules. Allegiance to the pursuit of truth, the spirit of science, like every true allegiance is of the volunteered variety: our allegiance to ideals is a bond which we ourselves establish. But there is another bond which is 'necessary' in an ontological sense: this necessity, forced upon us after we have forced values upon ourselves, requires us to pay for every value attained and by a price of labor and waiting. All consciousness of time is conditioned by this factor: the sense of time exists only where there are goals upon which our hopes and efforts can converge. And the realism of time and of labor inhere in the fact that our labor and our waiting may be in vain. These matters are commonplace to immediate experience and to imagination. The expenditures of effort and the risks of chance are brute necessities which conduct and thought never escape, provided they have already accepted the challenge of ideals. This all comes to saying that if we choose to live, we can live only under this minimum condition, namely: that

we accept a certain discontent with the conditions of life. The infinitely diverse deeds and thoughts of a lifetime have yet one quest in common, to discover that which is the most *constant* and also to discover how the *constant* may be *transformed*. Even the turnip must have a slumbering discontent with its state; only this saves it from being mere clay. To be sure, the choice of life itself is reversible, but the suicide chooses also to sever his allegiance to ideal causes which his life might further. What is unescapable and ontologically necessary is the labor and chance of living, once we have accepted life as worth while.

53. But imagination has a unique way of dealing with this necessity. Like a good general, it accepts the conditions of combat; that is, it begins by conceiving the real and the ideal world in their fullest opposition. Formal and moral reasoning constitute acts of acceptance of the duality of the world in which we live. But in this sharp separation of the world which is real from the world which is ideal, time and labor, which just now united these worlds in action, seem to vanish. Perfect ideality is only infinitely possible, and the infinite cannot be attained by steps which occupy finite moments of time. The finite and the infinite become different in kind; and we cannot mount to the infinite by multiplying the finite. Time and effort seem incapable of mediating these worlds.

It is just this initial act of the imagination which we believe has been misunderstood, and it is this which has given rise to most of the puzzles of epistemology. This opposition of the conserved material reality to pure possibility may be interpreted in two ways. Either it is an acceptance of the challenge of life in the severest form in which it can be conceived, or else they constitute judgments on the nature of reality. In the first case, the opposition of pure fact to pure value is but the first movement of thought. But we are tempted to take this first movement of thought for its last. Reason begins by positing the universe as given once for all, but it has already made preparation for changing the universe

in this very assumption; for it insists that the givenness is in infinitely small particles, and it is this which enables the 'given' universe to be so plastic. The world is given 'once for all' says the intellect, but it says this with the proviso that the *size* of its particles and the *positions* which they may occupy are *not given once for all*. Hence, that perfectly rigidity and perfect plasticity of the world with which science deals. The concepts of the exact sciences are crowded with dramatic elements in spite of their explicit avowal of their timelessness. This is evident in the classic paradox of science, the calculus of probabilities. The phrase is itself a paradox, for a true calculus should admit of no probabilities: it should only give certainties.

The events of experience will not yield a perfect calculus no matter how carefully we observe their frequencies. That is, real events never quite 'fit' the curve of mathematical chance which alone represent a perfect calculus. The chance occurrences of our experiences only approximate uniformity of frequencies. If we toss coins, the requirement of a perfect calculus would be that the chance of 'head' or 'tail' be equal. But we only approximate this equality in experience. Even if we are fortunate enough to find one hundred tosses resulting equally divided between the two possibilities, we are beset with the doubt lest even this may be an accident, which more tosses may confirm or deny. Suppose we forsake experience and try to attain a perfect calculus in theory. But we still find that the difficulty pursues us, for we will be confronted by a barrier in our own logic. The difficulty with experience was, that it did not tell us *where* and *when* the particular events would occur which we are seeking to reduce to a calculus. And to renounce experience is but to transfer this same difficulty to the rational plane: for the law of chance fails to tell us just where the particulars will occur that substantiate the law. Certainly a probability of one-half does not free us from the fortuity of time. It should only do so perfectly when, for example, tossing the coin we should find

that it yielded half heads and half tails each throw, which is an absurdity. Even if we possessed a coin which never failed to turn up heads and tails in perfect alternation, it would violate the law of chance one-half of the time. In this case, the notion of a perfect calculus is satisfied only when we know we are going to toss the coin again, but this is a matter which the calculus itself cannot fortell. In short, the one thing which always resists the power of the calculus is a certain fortuity of time which is expressed not only in nature at large, but especially in the activities of the human will.