SERIES IN AFFECTIVE SCIENCE

Series Editors
Richard J. Davidson
Paul Ekman
Klaus R. Scherer

THE NATURE OF EMOTION
Fundamental Questions
edited by Paul Ekman and Richard J. Davidson

BOO!
Culture, Experience, and the Startle Reflex
by Ronald Simons

EMOTIONS IN PSYCHOPATHOLOGY
Theory and Research
edited by William F. Flack, Jr., and James D. Laird

WHAT THE FACE REVEALS
Basic and Applied Studies of Spontaneous Expression
Using the Facial Action Coding System (FACS)
edited by Paul Ekman and Erika Rosenberg

SHAME
Interpersonal Behavior, Psychopathology, and Culture
edited by Paul Gilbert and Bernice Andrews

AFFECTIVE NEUROSCIENCE
The Foundations of Human and Animal Emotions
by Jaak Panksepp

EXTREME FEAR, SHYNESS, AND SOCIAL PHOBIA
Origins, Biological Mechanisms, and Clinical Outcomes
edited by Louis A. Schmidt and Jay Schukin

COGNITIVE NEUROSCIENCE OF EMOTION
edited by Richard D. Lane and Lynn Nadel

ANXIETY, DEPRESSION, AND EMOTION
edited by Richard J. Davidson

PERSONS, SITUATIONS, AND EMOTIONS
An Ecological Approach
edited by Hermann Brandstätter and Andrzej Eliasz

THE NEUROPSYCHOLOGY OF EMOTION
edited by Joan C. Borod

THE
NEUROPSYCHOLOGY
OF
EMOTION

Edited by
Joan C. Borod

OXFORD
UNIVERSITY PRESS
2000
To my husband, parents, and sisters
The Epistemology of Reason and Affect

ROSS W. BUCK

The overwhelming question in neurobiology today is the relation between the mind and the brain.

(Crick & Koch, 1997, p. 19)

Emotions have traditionally been regarded as extras in psychology, not serious mental functions like perception, language, thinking, learning.

(Oatley & Jenkins, 1996, p. 122)

Contemporary investigators interested in the relationship between mind and brain and in the associated questions of knowledge, experience, and consciousness have for the most part centered on higher order cognitive functions—what Oatley and Jenkins (1996) in the above quotation termed serious mental functions—and have eschewed the detailed consideration of emotion. Historically, however, emotion more than other psychological phenomena has been intimately connected with the mysterious “mind stuff” of subjective experience. As B.F. Skinner (1953, p. 257) noted, such “private events” are outside the realm of objective observation: They are defined by their “limited accessibility (to the community) but not, so far as we know, by any special structure or nature.”

Some advances in the techniques of observing the neurochemical correlates of emotion are relevant to the understanding of subjective experience in general, perhaps making consciousness itself more accessible to objective scrutiny. With this accessibility, comes the opportunity to accommodate our theories to these new observations: to develop a more consensual, formal language with which to describe subjective experience, consciousness, and knowledge. To explore the implications of the new advances in the observation of subjective events, this chapter examines how the public/private distinction has been drawn and the nature of meanings attributed to private events, in modern conceptual
philosophy. The chapter outlines the history of philosophical conceptualizations of cognitive and emotional meaning, specifically those of pragmatism, positivism, and ordinary language philosophy, and discusses these with regard to recent advances in understanding the neurobiological bases of emotion.

**EPistemOLOGY AND NEUROBIOLOGY**

Epistemology is the theory of the origin, structure, and validity of knowledge and has generally been considered a branch of philosophy (Runes, 1962). In modern philosophy there is a fundamental distinction between knowledge and discourse that is open to public verification and knowledge and discourse that is not. The epistemological validity of the latter is in dispute: Some consider it to be "meaningless," while others acknowledge that, under some circumstances, what have been termed emotive knowledge and discourse have meaning and value. Historically, this debate has been influenced by the degree to which adherents of the different positions recognized the importance of biological processes in thinking and knowing. By and large, those conceptual philosophers who saw value in emotive knowledge were more influenced by biology, particularly Darwin's theory of evolution, and they tended to define the value of emotive knowledge in biological terms.

As conscious experience and thought were increasingly associated with the functioning of the brain, neurological epistemology arose from "a need to deal with epistemology on a neurological basis" (Kuhlenbeck, 1965, p. 147). MacLean (1990) coined the term "epistemics" for the study of the subjective brain. Clearly, the facts of neural organization set constraints for epistemology (LeDoux, 1994a, 1996). Moreover, advances in the capacity to observe emotional phenomena—both in the neurology of emotional responding in the brain and in the observation and analysis of the nuances of emotional expression—have opened aspects of private consciousness that were heretofore closed to public verification. Skinner in fact anticipated such advances in his analysis of private events. He wrote, "The line between public and private is not fixed. The boundary shifts with every discovery of a technique for making private events public" (Skinner, 1953, p. 282). These observations are fundamental to understanding the epistemological validity of emotional knowledge. This new understanding offers opportunities both to examine the adequacy of philosophical conceptualizations and to use those conceptualizations to identify important

---

1 Experiential philosophers, such as the existentialists, also have much to say about consciousness and emotion, but their views are not considered here due to space limitations. See, for example, Sartre (1948, 1957).

questions in the neurobiology of emotion that may have thus far gone unanswered, or unasked.

**PHILOSOPHICAL CONCEPTUALIZATIONS OF COGNITION AND EMOTION**

**Classical Roots: Monism and Dualism**

Since the time of classical Greece in the fifth century B.C., Western thought has distinguished between animalistic energies characteristic of the body and rational processes associated with "mind" or "soul" unique to human beings. In this dualistic position, mind and soul were seen as immaterial and beyond investigation except by rational means, that is, by metaphysical speculation. A contrasting idea of materialistic monism, that there is only matter, also appeared in early Greek thought but had less influence at the time. Examples of dualistic thinking are found in the writings of Plato and Aristotle, who presumed that nonhuman animals have rudimentary "souls" capable of dealing with basic bodily functions but not "rational souls," which were the foundation of human reason and logic. Aristotle distinguished three grades of soul: the vegetative, found in all living things; the sensitive, characteristic of animals and humans; and the rational, possessed only by humans. Following his example, Thomas Aquinas equipped humans with both a "sensitive soul," shared with animals, and a rational soul (Cofer & Appley, 1964).

In Meditations (1641), Rene Descartes contributed the first systematic conceptualization of the interaction between mind, or soul, and body. The body is mechanical, public, tangible, visible, and extended in space; the mind/soul is private, intangible, and invisible. Descartes distinguished between nonhuman animal behavior, which could be accounted for by the reflex-like actions of mechanical "animal spirits," and human behavior, which was partly mechanical but partly influenced by a rational soul. In his conception, a rational soul makes contact with the body at the pineal gland. Conscious sensation occurs when the rational soul becomes aware of the animal spirits: body affecting mind. Conversely, the rational soul can alter the flow of animal spirits: mind affecting body (Wozniak, 1992). This interaction between spatial body and unextended mind cannot, for Descartes, be comprehended in either spatial or nonspatial terms: It is beyond our capacity to understand. This dilemma has been termed the Cartesian impasse (Vesey, 1965) and is reflected perhaps in the "explanatory gap" acknowledged in contemporary theories of consciousness (see Chalmers, 1995; Clark, 1995).

The philosophic tradition from Descartes flowed in two streams: the rationalism of Spinoza and Leibniz and the empiricism of Locke, Berkeley, and Hume.
Both rationalists and empiricists recognized both analytic statements of logic and mathematics and synthetic statements of fact and regarded this classification as mutually exclusive. To Hume, it was mutually exhaustive as well: Metaphysical speculation that was neither analytic nor synthetic could be nothing but "sophistry and illusion" (Levi, 1959, p. 333). This argument was to support and sustain a resurgence of materialistic monism in the form of positivism.

**Pragmatism**

American pragmatism derived its emphasis on science and "hard" facts from the tradition of British empiricism. This was combined, however, with the idea that truth is not absolute and that when we say "this is true" we mean that it is useful in some way (Hill, 1961). This doctrine of the functional nature of truth reflected a basic compatibility between pragmatism and evolutionary theory.

Pragmatism has ties to nineteenth century idealism in its doctrine that the known conditions the known: "reality is is and can be nothing more than reality as-known. . . . [O]bjective reality is nothing but the most inclusive and coherent system of ideas that the human mind can entertain" (Aiken, 1962a, p. 54). The mind is conceived of as an active agent, not a passive acceptor of sense data. What is "given" in experience is already invested with meaning and significance. A related similarity with idealism is the notion that ideas relate to their cultural and historical context. Furthermore, ideas are purposive: They are always goal-oriented and change with our needs and interests. These themes occur also in recent contextualism and hermeneutic analysis (Taylor, 1992). The pragmatists, however, differ from the idealists and recent theorists in their empirical and behavioral concept of mind and in their emphasis on sense perception and the guidance of the scientific method (when practical) as the best way to reach the objectives of thought. Also, the influence of Darwin's theory on pragmatism placed its spirit worlds apart from that of idealism. Pragmatists regarded thought to be a product of the natural order and conceived of it in essentially biological terms (Aiken, 1962a).

Early nineteenth century philosophy was dominated by what William James was to term "tender-minded" philosophies, such as Emersonian transcendentalism in the United States and neo-Hegelian idealism in England. Darwin's Origin of Species (1859) and other scientific advances threatened the adherents of these philosophies: They had to defend their concerns for inner self and spiritual values against the encroachments of positivist and materialistic scientism, which were supported by Darwin's findings and were actively advanced by Darwinists such as Spencer. The pragmatists did not accept either of the "two extremes of crude naturalism on the one hand and transcendental absolutism on the other" (James, 1907, p. 301). They looked consciously for a position that would reconcile these points of view (White, 1955).

---

C.S. Peirce

C.S. Peirce is regarded by many as the founder of pragmatism. In his pragmatic theory of meaning, Peirce (1877/1962) argued that meaningful propositions must be transformable into hypothetical, operational, experimental statements. Propositions must be translatable into the hypothetical form: "If operation \( X \) were to be performed on this, then \( E \) would be experienced." The "if" clause must mention an operation performed by the experimenter, and the "then" clause must mention something experienced or observed when the testing conditions are met. This procedure tells what a word denotes by "prescribing what you are to do in order to gain a perceptual acquaintance with the object of the word" (Peirce, quoted in White, 1955, p.157). If a proposition resisted translation into the proper form, it was considered scientifically meaningless, although it may evoke images or emotions (White, 1955).

Peirce suggested that the pragmatic theory of meaning rendered meaningless many statements in traditional metaphysics and theology and that, moreover, the theory would show many disputes in philosophy to be pseudoarguments over words or concepts that are pragmatically identical, that is, have the same operational translations. His theory of meaning contributed to the verifiability criterion of meaning of the positivists and to the operationism of P.W. Bridgman (1938), S.S. Stevens (1935) and others.

William James

Peirce's pragmatic theory of meaning was borrowed and modified by William James, who used it in his attempt to reconcile "tender-minded" and "tough-minded" doctrines in philosophy. James offered pragmatism as a "new name for some old ways of thinking" that can satisfy both the demands of the spirit and the demands of fact. He contrasted tender-minded rationalism with tough-minded empiricism, where rationalism "starts from wholes and universals, and makes much of the unity of things" and empiricism "starts from the parts, and makes of the whole a collection" (James, 1907, p. 11).

In The Principles of Psychology, James (1890) accepted the idea that good science was positivist: that everything scientifically knowable is public and that an objective psychology must eliminate subjective factors. In the mid-1890s, he began to revise this idea based on evidence from psychopathological conditions involving emotion and subconscious states. He critiqued scientific materialism with a metaphysics of radical empiricism, which was empirical in that it confined itself to the facts of experience but radical in that it demanded that science "not ignore any experience," including emotional experience (Taylor, 1992). James reinterpreted the foundations of science and religion in his pragmatic theory of truth. In the process, he broadened the meanings of Peirce's words "operation" and "experience" so that the operation to be performed was a belief in something
and the desired experience was a feeling of satisfaction. Thus the statement “S is true” is translated into “if you believe S, you will experience a feeling of satisfaction.” The “meaning” lies in those experiences to which the belief, if true, will lead. Verification consists of the occurrence of those experiences (White, 1955).

James’ reformulation enabled him to formulate an original theory of meaning, truth, and verification that threw light on many speculative statements bypassed by Peirce. The choice between belief and disbelief in God is meaningful because the adoption of one alternative would lead to different life experiences than the choice of the other (Hill, 1961). Thus, subjective human experience was taken as the ultimate test of truth. This implication led James to be hailed as a savior by some and to be brutally caricatured by others. Peirce dissociated himself from James’ formulation by renaming his own view “pragmatism,” a term he described as “ugly enough to be safe from kidnappers” (quoted in White, 1955, p. 158).

White (1955, p. 159) summarized James’ position succinctly: “The true is what we ought to believe. That which we ought to believe is what is best for us to believe. Therefore, the true is that which is best for us to believe.” This view, however, reflected an ambiguity in utilitarian ethics: What is best for whom? James often answered “the individual,” but, as Peirce stated in a letter to James, “What is utility, if it is confined to a single person? Truth is public” (quoted by White, 1955, p. 159). This is the particular theme of pragmatism emphasized by John Dewey.

John Dewey

To Dewey, James’ account of truth was too individual and capricious. Dewey used Peirce’s pragmatic theory of meaning as the foundation for a theory of social and public morality. Where James used pragmatic theory to explain the “true,” Dewey used it to explain the “good” and, with George Santayana, the “beautiful” as well (White, 1955). Dewey offered an ethical theory that, like James’, attempted to steer a moderate course between ideas of “transcendent eternal values” and the “empirical” view that value is defined by mere personal liking, desire, enjoyment, or interest.

Peirce’s question of “what is best for whom?” can be viewed in terms of Darwin’s theory: What is best is that which promotes successful adaptation. The idea of adaptation is consonant with pragmatism, and indeed Dewey approached the idea of public good from a Darwinian point of view. He wrote that Darwinism “led straight to the perception of the importance of distinctive social categories especially communication and participation.” He continued, arguing that “a great deal of our philosophizing needs to be done over again from this point of view, and that there will ultimately result an integrated synthesis in philosophy congruous with modern science and related to actual needs in education, morals, and religion” (Dewey, 1931, p. 3). One of his contributions was the idea of a “problematic situation,” which was at once biologically rooted and socially enveloped.

The Epistemology of Reason and Affect

Conclusions

In pragmatism, one finds the idea of knowledge as a product of the natural order, suggesting that emotional knowledge may be evaluated according to biological criteria. Also, the essence of scientific methodology is distilled in Peirce’s operationalism: that to be scientifically meaningful, a proposition must be translatable into an operation that must reliably produce an observation or experience. James extended this so that emotional experiences—for example, of satisfaction—could be used as criteria of meaning and truth. Dewey and others suggested that common values, not individual satisfaction, be used as the criterion not of “truth” but of “good” and “beauty.” While James’ and Dewey’s conceptions tended to moderate and expand the venue of Peirce’s operationalism into the realm of emotional meaning, the logical positivists applied it much more strictly and rigorously.

Positivism

Positivism is the doctrine that the highest form of knowledge is a simple description of sensory phenomena (Carnap, 1937; Runes, 1962). In contrast with the pragmatists, the positivists of the early twentieth century based their conceptualizations on mathematics and logic: They tended to be uncompromisingly “tough-minded” and were not greatly influenced by biological thinking. In logical positivism was found most directly the faith that human beings come to knowledge through erecting abstract concepts that are based ultimately on publicly verifiable operations. The positivists considered that difficulties arise when concepts are not clearly grounded in observations. They considered the function of philosophy to be analysis and clarification, and a major goal of the early positivists was to construct a perfectly simple, clear, and logical artificial language for science that could clarify scientific statements, free of the entanglements of ordinary language. Judgments of value and beauty and statements expressing feeling were seen to be devoid of cognitive content and were largely ignored.

English neorealism

Bertrand Russell and Alfred North Whitehead formulated the basis for the analysis and construction of ideal, artificial systems of language, logic, and mathematics in three volumes of Principia Mathematica (1910–1913). Their objective was to demonstrate that mathematics is derivable from logic, and they introduced technical innovations that both contributed to modern symbolic logic and gave positivism a methodology and the model for an artificial but unambiguous symbolic language (Levi, 1959).

Another major contribution of Russell to positivism was his logical atomism in which he attempted a logical reconstruction of physics. This described the
The Epistemology of Reason and Affect

physical universe as if it could be described in terms similar in form to those in *Principia Mathematica*. "Logical atoms" were independent, primitive notions used to describe the rest of the universe. It was reasoned that, if the truths of mathematics, science, and common sense can be dealt with in a logically perfect language, it would allow us to know precisely what we are saying and whether it is logically true. The presupposition is that the world of logical discourse is similar in structure to the world of fact and that the elimination of internal inconsistency in the one will provide a clue to the structure of the other. It is in terms of logical atoms that a perfectly logical scientific language would describe the world (Aiken, 1962b; Levi, 1959).

Between 1911 and 1913, the Austrian Ludwig Wittgenstein was at Cambridge and came under the influence of the new logic. In 1922 he published *Tractatus Logico-Philosophicus*, which was a radical restatement of Russell’s logical atomism. Wittgenstein argued that statements that describe or mirror atomic facts are the basis of science. A perfect scientific language would provide a mirror for the structure of reality. Ordinary language cannot provide this mirror because it contains impossible problems of meaning and implication. It is for this reason that philosophical analysis exists. Given a logically perfect language, as approximated in *Principia Mathematica*, statements could be mechanically reduced to their basic atomic facts. This language would resemble a calculus, with clear and simple basic terms (Aiken, 1962b). Wittgenstein distinguished between factual, or synthetic, and logical and mathematical, or analytic, propositions. The latter are always tautologies and tell us nothing about the world. They merely tell us what we can infer from true and false statements (Barrett, 1962).

The Vienna Circle

Wittgenstein’s logical atomism and distinction between analytic and synthetic propositions impressed a group of philosophers in Vienna. The “Vienna Circle” was founded in 1923 in a seminar organized by Moritz Schlick. Its most important period began in 1926, when Rudolf Carnap joined the university faculty. The Circle published a manifesto in 1929 and a periodical, *Erkenntnis*, beginning in 1930. In 1938, the group broke up with the fall of Austria to the Nazis (Levi, 1959).

The classic viewpoint of the positivists of the Vienna Circle was summarized by Levi (1959, pp. 344–345). It included the proposition that “all cognitively significant (meaningful) discourse is divisible without remainder into analytic or synthetic propositions.” This asserts the crucial distinction between the tautological statements of logic and mathematics and the factual statements of the sciences, which are considered probably true or probably false. Also, “any proposition that purports to be factual or empirical has meaning only if it is possible in principle to describe a method for its verification.” This is the verifiability criterion, closely related to Peirce’s criterion of meaning. Furthermore, “all meta-

physical assertions, being neither analytic nor synthetic, are meaningless” and “all normative assertions . . . are scientifically unverifiable, and are therefore to be classified as forms of non-cognitive discourse.” Noncognitive discourse was termed emotive discourse. Emotive statements are not meaningless, for they express how we feel, but they are not “cognitive” (Levi, 1959).

When the Vienna Circle was formed, the positivists thought that they were absolutely right and were spoiling for a fight with other positions. At this time, their principal weapons were simplicity and clarity (Bochenski, 1961). Beginning in the mid-1930s, however, the positivists came to realize that things were not as clear and simple as they had seemed. Their methods were found to be quite limited, and they were forced to become more flexible, moving in the process toward “a rapprochement with pragmatism” (Barrett, 1962, p. 13). One of the changes in the positivist outlook reflected the fact that their definition of cognitive discourse was so restrictive that large areas of experience remained untouched. The neat analytic–synthetic dualism did not deal with the meaning of “emotive discourse,” including value statements like “the painting is beautiful” as opposed to the cognitive statement “the painting is red.” Also, statements of feeling, while seen as “noncognitive” were not held to be meaningless.

The Analysis of Ordinary Language

Ludwig Wittgenstein

Wittgenstein eventually abandoned the attempt to develop an ideal artificial language and became skeptical of the very foundation of *Principia Mathematica*. Possibly this was in part a result of Goedel’s 1933 theorem proving the incompleteness of mathematics: that any mathematical system must contain true but unprovable statements (Levi, 1959). This discovery revealed mathematics in a light different from what Wittgenstein had seen in *Tractatus*: The tautological character of mathematics was no longer so clear (Barrett, 1962). Instead, Wittgenstein came to agree with G.E. Moore that the common sense statements of ordinary language are the proper objects of analysis (Aiken, 1962b).

Rather than pursue unattainable ideals of simplicity and clarity by analyzing unreducible “logical atoms” and a fixed syntactic calculus, Wittgenstein came to see language as inevitably complex and organic (1963). The forms of words do not represent the structures of things; instead, they represent forms of life (Aiken, 1962b). Wittgenstein compared language to “an ancient city: a maze of little streets and squares, of old and new houses . . . surrounded by a multitude of new boroughs with straight regular streets and new houses” (Levi, 1959, p. 436). Instead of reforming language, Wittgenstein now sought to understand it.

Central to his new conceptualization was the idea of “language games.” Wittgenstein suggested that it is pointless to search for a common element in all
that we call “language.” The elements of language are related to one another in myriad ways, and one common relationship cannot be found. “Language” is the name of these related elements, just as “games” is not an expression of some common trait that can be found in all of the activities that we call “games.” That series of relationships and similarities, overlapping and crisscrossing like the twisted fibers, makes up the thread called “language” or “games.” This thread of similarities is termed a “family,” exhibiting “family resemblances,” rather than a unitary “essence” that characterizes all examples of the phenomenon of “language” or “games” (Wittgenstein, 1953).

This concept of language gave Wittgenstein a new viewpoint on philosophical puzzles and their resolution. He became interested in the things that drive philosophers into bizarre and maddening enigmas, suggesting that the origin of such riddles stems from the improper use of language and that such riddles can be eliminated only by the meticulous analysis of language as it is actually used (White, 1955). “Philosophy,” he said, “is a battle against the bewitchment of our intelligence by means of language” (Levi, 1959, p. 441).

Gilbert Ryle: The ghost in the machine

One such enigma is the Cartesian impasse: the incomprehensible idea of a purely spiritual mind joined somehow to a purely material body. Gilbert Ryle (1949, pp. 15–16) ridiculed this as the “dogma of the ghost in the machine.” Ryle argued that the “Cartesian myth” is an illusion arising from an improper use of language. Specifically, he argued that speaking of mind as if it were a substance in the same logical category as the body is a category error analogous to speaking of “the university” as if it were a substance of the same logical category as classrooms, laboratories, libraries, and the like. Actually, mind is an organizing principle of a different logical type than the body, just as the university is an organizing principle encompassing its constituent elements. He noted that the theoretically interesting category mistakes are those where people are perfectly competent in applying a concept in ordinary life but have difficulty when thinking abstractly about the concept, relating it inappropriately with other abstract concepts.

Ryle (1949, p. 83) singled out the realm of emotion as one where Cartesian thinking is particularly intractable: Most philosophers and psychologists, he noted, view emotions as “internal or private experiences. . . . They are occurrences that take place not in the public, physical world but your or my secret, mental world.” Ryle suggested that the word “emotion” is used to designate four different kinds of things, including inclinations (or motives), agitations (similar to conflicts), moods, and feelings. He argued that inclinations, agitations, and moods are “not occurrences and do not therefore take place either publicly or privately. They are propensities, not acts or states” (Ryle, 1949, p. 83). Thus brittleness is a propensity of glass to break when struck. Although we may say “the glass broke because it is brittle” or “the glass broke because it was struck,” only the latter statement denotes an occurrence. Ryle (1949, p. 83) continued: “feelings, on the other hand, are occurrences, but the place that mention of them should take in descriptions of human behaviour is very different from that which the standard theories accord to it.” He noted that James defined feelings in terms of bodily sensations, but wrote “for our purposes it is enough to show that we talk of feelings very much as we talk of bodily sensations, though it is possible that there is a tinge of metaphor in our talk of the former which is absent from our talk of the latter” (Ryle, 1949, p. 84).

Ryle suggested that feelings are signs of agitations and offered an analogy with a stomach ache as a sign of indigestion. He asserted that there are no necessary or sufficient criteria for either: “[Feelings] are signs of agitations in the same sort of way as stomach-aches are signs of indigestion. Roughly, we do not, as the prevalent theory holds, act purposively because we experience feelings; we experience feelings, as we wince and shudder, because we are inhibited from acting purposively” (Ryle, 1949, p. 106). He goes on, “we can induce in ourselves genuine and acute feelings by merely imagining ourselves in agitating circumstances. Novel-readers and theatergoers feel real pangs and real liftings of the heart, just as they may shed real tears and scowl unfeigned scowls. But their distresses and indignations are feigned. They do not affect their owners’ appetites for chocolates, or change the tones of voice of their conversations. Sentimentalists are people who indulge in induced feelings without acknowledging the fictitiousness of their agitations” (Ryle, 1949, p. 107).

Discussion

Ryle hoped that the proper use of language would resolve the Cartesian impasse, but that particular quandary remains: In the words of Crick and Koch (1997, p. 19), “the overwhelming question in neurobiology today is the relation between the mind and the brain.” The new ability to observe brain functioning may, however, allow us to reformulate the issues in useful ways. In this regard, Barrett (1962, p. 62) pointed out that there are “large areas of experience where our language is not yet ripe for any significant attempt at formalization.” As areas amenable to public observation expand with improved techniques for “making private events public,” in Skinner’s words (1953, p. 282), formalization of language will naturally follow. Arguably this is occurring today in the realm of emotion theory.

In this regard, Barrett (1962, p. 17) also suggested that the positivistic understanding of “cognitive” is constructed on an overly narrow model. He described and critiqued the positivists’ position on feeling and emotion, noting that in their writings feelings are “some kind of subcutaneous twinges, throb, or tremors that in some odd way lie on the opposite side of mind from intellect and reason, which
are the truly cognitive faculties.” But, he pointed out, “Ordinary language contains plenty of uses where we speak of knowledge in connection with the presence of feeling and ignorance in connection with its absence.” He concluded, “Feeling is not a blind stab or spasm of some psychic substance underlying mind, but a form of consciousness that, like every other mode of consciousness, has its own intentionality and revelation.”

Barrett’s critique (1962) of the positivist view of cognition and emotion is compatible with recent analyses of emotion as constituting a type of cognition. Arguably emotional knowledge is functional—it has survival value in an evolutionary sense—and is “meaningful” from the pragmatic perspective. The next section considers the nature of emotional and cognitive knowledge from a neurobiological viewpoint.

EMOTIONAL AND COGNITIVE KNOWLEDGE

We have seen that many modern philosophers have considered “emotion” and “cognition” to be mutually exclusive, with cognition being associated with public knowledge and discourse and emotion consigned to a “noncognitive” private knowledge of doubtful epistemological status. Recent research in the neurosciences has afforded a greater objective understanding of how the brain processes underlying what have traditionally been termed emotional and cognitive knowledge differ, and this understanding offers insights into the functions of this knowledge. More specifically, there is evidence that “emotion” and “cognition” differ in level and speed of brain processing.

Level of Brain Processing

In 1927, Bertrand Russell anticipated a major contemporary theory of emotion in an account of a visit to a dentist. Russell (1927, p. 226) discussed the “radical transformation” in the theory of emotion wrought by Cannon (1915), suggesting that certain endocrine secretions are the “essential physiological conditions of the emotions.” The dentist had injected adrenaline in the course of administering a local anesthetic. Russell (1927, pp. 226–227) wrote: “I turned pale and trembled, and my heart beat violently; the bodily symptoms of fear were present, as the books said they should be, but it was quite obvious to me that I was not actually feeling fear. . . . What was different was the cognitive part: I did not feel fear because I knew that there was nothing to be afraid of.”

The idea that emotion involves an interaction between “cognitive” and “physiological” factors was the basis of the well-known Schacter and Singer (1962) study and self-attribution theory of emotion. This theory suggested that cognitive elements are responsible for the qualitative aspects, and physiological factors the quantitative aspects, of emotion. Russell recognized, however, that “physiological” factors could be responsible for qualitative aspects of emotion as well. He suggested that some emotions such as melancholia, “presumably, can be caused in their entirety by administering the proper secretions” (Russell, 1927, p. 227).

We now know that the physiological bases of emotion involve far more than the autonomic and endocrine systems: There are basic emotion circuits that reflect primal survival demands, prompting rapid and coherent responses. These interact with higher level brain systems that contribute increased flexibility that can reflect strategic considerations (Panksepp, 1994a).

Speed of Brain Processing

The Zajonc-Lazarus debate

The question of the speed of emotional processing was central to one of the classic debates in recent emotion theory, concerning whether “emotion” precedes or follows “cognition.” The Zajonc-Lazarus debate is instructive both because it illustrates how differences in the use of language and the definition of terms can produce apparent theoretical quandaries with devout adherents on both sides and because it was resolved by the results of neurobiological research.

The debate began with evidence that subjects could respond preferentially to stimuli without “knowing” what they were: Familiar nonsense syllables and ideograms were rated more positively even though subjects could not recognize them as familiar. On this and other evidence, Robert Zajonc (1980, 1984) argued that affect occurs before, and independently of, cognition. His argument drew a strong response from Richard Lazarus (1982, 1984), who argued, based on his own research, that emotion could not occur without prior “cognitive appraisal.”

Examination of the arguments of Zajonc and Lazarus reveals that their disagreement rests on how each defined “cognition.” Both had developed verifiable operational definitions of the construct “cognition,” but what was not immediately apparent was that these operations were quite different. Zajonc (1984) defined cognition as involving some kind of “mental work”: some transformation of sensory input or information processing. For Lazarus, cognition could involve a “primitive evaluative perception” (1984, p. 124) that was “global or spherical” (1982, p. 1020). In effect, both Zajonc and Lazarus agreed that some sort of sensory information is necessary for emotion, but they disagreed on what would constitute “cognition.”

The LeDoux resolution

The Zajonc-Lazarus debate was resolved by the findings of LeDoux and his colleagues that fear involves an interaction between fast processing associated
with the amygdala and slower but more elaborate representation associated with the neocortex. Specifically, stimuli reach the amygdala directly via the thalamus: a short and fast route. Because it bypasses the cortex, the amygdala receives directly only a “crude, almost archetypical” representation of the stimulus, which is shortly followed by a more accurate representation involving cortical processing (LeDoux, 1996, p. 166). This neural organization indicates that we "begin to respond to the emotional significance of a stimulus before we fully represent that stimulus" (LeDoux, 1994a, p. 221).

LeDoux (1996, p. 202) also found that the memories of fearful experiences involve at least two sorts of neural organization: an implicit emotional memory system associated with the amygdala and a declarative or explicit memory system associated with the hippocampus that is associated with conscious recollection. These normally operate simultaneously and in parallel, but their functioning can be dissociated in experimental animals and in rare case studies in human beings (LeDoux, 1994b).

LeDoux’s data suggest that both Zajonc and Lazarus are correct, but the former limits the definition of “cognition” to the slower, representational process and the latter regards the initial fast response as “cognitive.” In any event, the labeling becomes trivial once the neural organization is understood. However, we choose to label what goes on (relatively) early and in the response to events, there is a fast initial response that biases slower representational processing and a more elaborate processing that feeds back and alters the fast response.

MOTIVATION, EMOTION, COGNITION, AND KNOWLEDGE

The LeDoux resolution of the Zajonc-Lazarus debate suggests how language can become trivial once we understand the neural organization underlying what we call emotion and cognition, and objective neurobiological investigation has the potential to inform other semantic puzzles as well. At that level of understanding, what Barrett (1962) termed the formalization of language becomes possible, and we move away from everyday language toward a more specific variety more like the sort championed by the positivists. The formalization of language in a given area of inquiry follows naturally upon public verifiability of fundamental phenomena in that area. If phenomena are not publicly observable, it does not necessarily mean that discourse concerning them is meaningless but rather that consensus and accurate communication using such discourse is difficult to achieve because of the slippery nature of language. Verifiability lays the groundwork for formalizing language, but at the same time the language per se in a sense becomes less important. If a theoretical statement is testable it is also trivial, in the sense that it is the testing that is really important. This was demon-

strated by the definition of cognition being rendered secondary to the operations employed in LeDoux’s research.

Before we do fully understand a psychological phenomenon objectively at the level of public verification, however, language is anything but trivial. It is all we have to communicate and attempt to come to an understanding about that phenomenon, including how to come eventually to measure it. The criteria for meaning in such discourse remain the classic criteria of rhetoric: the internal consistency of the argument; its cogency, cohesiveness, clarity, simplicity, fruitfulness, eloquence. Some aspects of human experience may forever remain in the realm of the poet or experiential philosopher, whose only tools are language: perhaps the more “emotive” the better.2

The remainder of this chapter considers the language used to describe the origin, structure, and validity of knowledge, taking into account recent observations involving emotion in the behavioral and neural sciences. It is suggested that “emotion” and “cognition” are not in fact distinct phenomena: that emotion always involves cognition and, more controversially perhaps, cognition always involves emotion. Furthermore, both emotion and cognition always involve “motivation” and vice versa. In the following, conceptual definitions for, and interactions between, “motivation,” “emotion,” and “cognition” are laid out.

Defining Motivation, Emotion, and Cognition

Developmental–interactionist theory attempts a unified conceptualization of motivation, emotion, and cognition based on the assumption that one cannot coherently describe or define “motivation,” “emotion,” or “cognition” without considering both of the other terms. Each is involved in both of the others: Motivation intrinsically involves emotion and cognition, cognition involves motivation and emotion, and emotion involves motivation and cognition (Buck, 1985).

Motivation and emotion

**Motivation** is defined as the potential for behavior that is built into a system of behavior control and **emotion** as the manifestation or **readout** of motivational potential when activated by a challenging stimulus (Buck, 1985, 1988, 1994a; Buck et al., 1997). The relationship between emotion and motivation is seen to be analogous to that between matter and energy in physics. Energy is a potential that is not seen in itself but rather is manifested in matter: in heat, light, force, and so forth. The energy per se is never shown. Similarly, motivation is conceptualized as a potential that is not seen in itself but rather is manifested in emo-

---

2Emotion can be communicated *spontaneously* via biologically based sending and receiving mechanisms. This topic is beyond the scope of this chapter, but see Buck and Ginsburg (1997) for a discussion of the evolutionary epistemology of empathy.
tion. Motivation and emotion are thus seen as two sides of the same coin or as aspects of a common core phenomenon: the motivational-emotional system. Phylogenetically structured primary motivational-emotional systems (primes) are considered to be “special-purpose processing systems” that over the course of development interact with “general purpose processing systems” that reflect the capacity of the species for learning via classical conditioning, instrumental learning, higher order cognitive processing, and, in human beings, language.

Cognition

Cognition is defined as knowledge that is based on “raw” awareness or knowledge-by-acquaintance. This basic knowledge, driven and guided by motivational–emotional systems, is spontaneously restructured into representational knowledge-by-description over the course of development (Piaget, 1971). Knowledge-by-acquaintance was described by Bertrand Russell (1912/1959, p. 46) as the presentational immediacy of experience that is completely self-evident. William James (1890/1952, p. 144, italics in the original) noted: “I know the color blue when I see it, and the flavor of a pear when I taste it. . . . but about the inner nature of these facts or what makes them what they are, I can say nothing at all. I cannot impart acquaintance with them to any one who has not made it himself.” Thus knowledge-by-acquaintance is always “true,” or veridical, in a sense. In contrast, knowledge-by-description is not self-evident and can be false.

Knowledge-by-acquaintance constitutes the raw data of perception based on perceptual systems evolved to detect information in the form of stimulus energy: in light, vibration, and volatile chemical substances physically present in the environment (Gibson, 1966, 1979). James J. Gibson’s theory of ecological realism provides a coherent and detailed account of the evolution of knowledge from the earliest organisms to human perception. Gibson (1979, p. 255) termed raw perception awareness: “To perceive is to be aware of the surfaces of the environment and of oneself in it.” Awareness is direct, self-evident, and nonrepresentational: “percepts qua percepts are the ultimate actualities and are not experienced as representing something else. . . .” (Kuhlenbeck, 1965, p. 144. Italics in the original).

According to Gibson, species evolved to be sensitive to those aspects of the environment that afford possibilities or opportunities for behavior: affordances. There are three sorts of “raw” awareness. First, there is awareness of affordances in the terrestrial environment, such as those provided by physical objects as support, obstacles to motion, and so forth. Second, there is awareness of social affordances provided by other animals: “other animals afford, above all, a rich and complex set of interactions, sexual, predatory, nurturing, playing, cooperating, and communicating” (Gibson, 1979, p. 128). Emotional displays can be considered to be social affordances (Buck, 1984; Buck & Ginsburg, 1997; McArthur & Baron, 1983). Third, Gibson (1966, p. 31) recognized awareness via interoceptors of vague sensations of internal origin—feelings and emotions—the “pangs and pressures of the internal environment.” These may be conceptualized as bodily affordances, and in the present view subjectively experienced affects—feelings and desires—constitute awareness of bodily affordances.

In contrast to raw awareness or knowledge-by-acquaintance, knowledge-by-description is representational, constructed from the restructing or processing of raw perceptual data. Thus we have direct perceptual acquaintance with events in the terrestrial environment, social environment, and internal bodily environment and representational knowledge about these events based on information processing and inference. Agnosias, where elementary perception is intact but “stripped of meaning” (Bauer, 1984, p. 457), might constitute an inability to transfer specific sorts of knowledge by acquaintance into knowledge-by-description (Buck, 1990).

Affect

The subjective experience of emotion involves a direct interoceptive knowledge-by-acquaintance of bodily processes serving functions of self-regulation. “Bodily processes” in this context do not refer to feedback from autonomic responses or expressive behaviors; rather, they are specific neurochemical systems of internal perception that have evolved to inform the organism of functionally important events in the bodily milieu. The experiential aspects or qualia associated with these interoceptive perceptual systems are feelings and desires (Buck, 1993). The events of which they inform include needs for food (hunger), for water (thirst), for warmth or cold, for sex, and so forth; these are drives involving specific bodily needs. We are also informed of more general need states involving primary affects, such as happiness, sadness, fear, and anger.

Affect is defined formally as the direct knowledge-by-acquaintance of feelings and desires based on readouts of specifiable neurochemical systems evolved by natural selection as phylogenetic adaptations functioning to inform the organism of bodily events important in self-regulation (Buck, 1985, 1994a). Affects are special-purpose, gene-based, neurochemical readouts. The subjective phenomenal reality of affect is self-evident and is experienced directly and immediately. Also, affects are always present. A constant readout of feelings and desires is available at all times. We can always turn our attention to “pick up” how hungry, or thirsty, or warm we are and also how happy, sad, or angry. We tend spontaneously to notice this information only when it is strong or sudden, but, like the feel of our shoes on our feet, it is always with us. Relatively strong affects associated with specific elicits are typically termed emotions as compared with moods, which last longer and are not so associated with specific elicits (Ekman & Davidson, 1994).

Affective and rational cognition

Tucker’s distinction (1981) between syncretic and analytic cognition is related
to, but not identical with, the knowledge-by-acquaintance versus knowledge-by-description distinction. Knowledge-by-acquaintance is syncretic cognition: hot, holistic, direct, immediate, and self-evident raw acquaintance. In contrast, much but not all knowledge-by-description is analytic cognition: cold, sequential, and linear information processing (an exception involves spatial knowledge-by-description). Combining Tucker's conceptualization (1981) with the present one, we may say that affective cognition is syncretic and based on special-purpose systems, while rational cognition is analytic and based on general-purpose systems (Buck, 1985; Buck & Chaudhuri, 1994; Chaudhuri & Buck, 1995).

The Interaction of Affective and Rational Cognition

Biologically based primes are considered to be special-purpose systems arranged in a hierarchy in which the interaction with general-purpose systems becomes more important as one goes up the hierarchy (Buck, 1985). The simplest primes are reflexes where the response is wholly "hard wired" and innate, with virtually no flexibility. At the next position on the hierarchy are fixed action patterns, or instincts, which are quite inflexible when examined closely: One cannot teach salmon to change their migratory behavior. The next level of the primes does, however, involve flexibility. Drives involve specific bodily needs that are signaled to the organism by affects: desires like hunger and thirst that function to activate and direct behavior so that the organism explores its surroundings to search out and learn to find relevant resources. The next level of the hierarchy does not involve specific needs: The primary affects signal a bodily state but do not influence behavior directly. The individual knows that he or she is happy or angry and may or may not know why; but no specific behaviors are activated. Instead, the affects function to facilitate flexibility and choice among alternative behaviors: The individual has a choice about what to do, and if, for example, anger is felt toward a large person or a small person, the behavior will be different.

As one proceeds up the hierarchy from reflexes to instincts, to drives, to affects, the interaction between special-purpose and general-purpose systems increasingly favors the latter. The dimension presented in the upper section of Figure 2.1 arguably more accurately reflects the relationship between affect and reason than does the more usual categorical distinction between "emotion" and "cognition." Also, other phenomena may be usefully placed on this dimension. For example, the dimension mirrors the phylogenetic scale, with simple creatures' behavior (ants, bees) being mostly a matter of reflexes and creatures with significant analytic-cognitive capacities being at the other extreme. The progressive evolution of learning abilities that confer increased behavioral plasticity has been termed anagenesis (Gottlieb, 1984). The developmental scale may also be represented, with the more hard-wired infant at the left and the adult at

---

Figure 2.1. (Upper) The interaction of affective and rational cognition. "Ryle's "ghost in the machine" (1949). (Lower) The hierarchy of knowledge. See text for description.
the right. Finally, the dimension can represent the evolution of the nervous system, with functions served by more “primitive” structures to the left and to the right increasingly complex functions based on brain stem, midbrain, paleocortical, and neocortical processing.

Levels of Knowledge

A hierarchy of knowledge

The relationship between affect and reason can also be presented in terms of three levels of knowledge, which is illustrated in the lower section of Figure 2.1. The most fundamental sort of knowledge is Gibson’s awareness (1966) constituting knowledge-by-acquaintance: Thus we have an immediate acquaintance with the external physical environment (terrestrial awareness), of other organisms (social awareness), and of oneself (self/bodily awareness). The latter includes the affects. All living creatures, even the simplest, manifest this basic awareness: In this sense it is similar to Aristotle’s “vegetative soul.” Knowledge-by-description is termed cognizance, and Figure 2.1 shows three levels of cognizance: associative classical conditioning, goal-directed instrumental learning, and higher order cognitive processing. These progressively complex sorts of learning came into existence successively over the course of evolution, and they conferred progressively greater behavioral flexibility. Knowledge about the environment is terrestrial cognizance, knowledge about others is social cognizance, and knowledge about the self, including the affects, is self/bodily cognizance. Such representational knowledge is characteristic both of human beings and other animals and is perhaps analogous to Aristotle’s “sensitive soul.” The level of knowledge that differentiates human beings and nonhuman animals involves language (Buck, 1994b): Arguably linguistic competence is also what distinguishes Aristotle’s “rational soul.” Linguistic knowledge might be termed understanding, yielding terrestrial understanding, social understanding, and self and body understanding. Self-understanding involves a system of rules that is structured by learning, cognition, and language over the life of the individual, including rules about the experience and expression of affects.

The role of language

These formal rules constitute a system of behavior control that allows human behavior to come under the influence of factors outside the experience of the individual organism. All other creatures are constrained by their own individual experience during development. They can never escape their own experience no matter how powerful their higher order cognitive processes. Human beings, in contrast, can be informed via language by the experiences of those long gone and can imagine events that never have been and indeed never could be experi-enced, such as counting the number of angels standing on the head of a pin or falling into a black hole. This perhaps is the origin of an essential dualism in the human species apart from the mind–body issue. Language imparts to human behavior a formal, logical structure that does not exist in nonhuman animals. Whereas the forces of natural selection have shaped animal behavior, human behavior is influenced as well by formal, linguistically structured, and socially constructed social rules. This formal linguistic influence is perhaps in fact analogous in some ways to Ryle’s “ghost in the machine” (Buck, 1994b). Specifically, language competence involves principles for organizing behavior that are absent in nonhuman animals.

Consciousness

Consciousness is represented in Figure 2.1 as ranging from the raw knowledge-by-acquaintance of simple creatures, through the addition of representational knowledge-by-description, to human linguistic understanding. An assumption here is that consciousness is an emergent function of raw Gibsonian awareness; another is that earlier forms of nonconscious awareness gradually evolved into consciousness but that the earlier forms persist in complex creatures. For example, Panksepp (1994a) has cited evidence that the dream state associated with REM sleep may reflect the functioning of an ancient arousal mechanism associated with emotion.

LeDoux and Panksepp have expressed different but perhaps compatible views regarding emotion and consciousness. LeDoux (1994b) suggested that there is one mechanism of consciousness that is usually filled with the ordinary concerns of daily life, with the capacity to be directed toward objects of interest. When a threatening object is encountered, the emotion network associated with fear takes over, directing consciousness to relevant objects. Panksepp, in comparison, associated different sorts of emotional consciousness with different neural systems. He noted that “there seem to be as many distinct internally experienced affective states as there are basic motivational and emotional systems of the brain” (Panksepp, 1994b, p. 396) and suggested that “all mammals probably experience essentially similar types of basic motivational and emotional feeling states” (p. 399).

It is illuminating to apply these ideas to the example of an emotional situation suggested by Scherer (personal communication, 1996): losing one’s luggage at the airport. Typically, at the airport one is filled with ordinary concerns, but if one’s baggage is lost attention is directed to coping processes that can involve a variety of affects. One might consider ordinary functioning to be on the right side of the affect–reason model in Figure 2.1 and that losing one’s luggage would tend to move functioning to the left, with an increase in the relative ratio of affective to rational functioning. To take the example further, if one loses one’s child at the airport, the ratio of affective functioning might increase rather more
and perhaps particularly involve basic physiological systems associated with panic (Panskepp, 1982). Furthermore, if one loses one’s engines at the airport, the resulting response might be even more “irrational” and physiologically based. Finally, if the child is found or the emergency landing is made successfully, the relief and joy experienced may similarly overwhelm rational considerations.

**SUMMARY**

A guiding thesis of the chapter is that a greater scientific understanding of that most “subjective” of phenomena, emotion, can contribute to understanding more general problems of conscious experience: that a well-grounded and valid conceptualization of emotional knowledge is crucial to understanding the relation between the mind and the brain. The chapter has discussed the history of philosophical discussions of the epistemological status of public and private events and suggested that one of the dilemmas with private events is that it is difficult to construct consensual language to define and describe them. As emotional events become more public due to technical advances, conceptual advances in the formalization of language naturally follow. An example is the formalization of the concept of “cognition” from LeDoux’s research. In this regard, a conceptualization of how motivation, emotion, and cognition are related is presented. A major proposition is that emotion in fact involves a kind of cognition, a kind of knowledge. Analytic “rational” versus syncretic “affective” knowledge are distinguished and related to three levels corresponding roughly with Aristotle’s three grades of soul: direct, “raw” acquaintance, or awareness; representational knowledge about knowledge, or cognition; and formal linguistic knowledge, or understanding. These levels can be observed in knowledge of the external world as well as in emotional knowledge and can be associated with levels of neural functioning in the brain, from subcortical systems associated with fast but crude processing to the more accurate, precise, and detailed processing associated with cortical systems.

As for the Cartesian impasse? Perhaps eventually human language and understanding will bridge the gap, but it may involve a reconceptualization of the basic nature of physical reality (see Hameroff & Penrose, 1996).

**REFERENCES**


The Epistemology of Reason and Affect


