

The Historical Emergence in Neuroscience of Crucial Categories for Ethical Decision Making

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Abstract

An underdeveloped appreciation of the neurohistorical foundations of ethical decision making suggests a critical need to revisit the interrelationships shared between cognitive neuroscience and moral decision making. This essay identifies three “crucial categories” in the history of cognitive neuroscience that have developed into, and continue to serve as, linchpins for human ethical development. Part 1 explores the category of episodic memory and identifies autobiographical memory judgments as a fundamental pillar of general moral judgments. Part 2 examines the category of emotional rationality and proffers that substantive ethical reflection is inextricably emotional and rational in nature. Finally, Part 3 analyzes the category of narrative identity and proposes that moral self-conception - understood as lens through which individuals are able to seek, identify, and act on the good - is the means by which moral development and moral self-actualization is made possible.

Keywords: *Neuroethics; Ethical Decision Making; History of Neuroscience; Episodic Memory; Emotional Rationality; Narrative Identity*

Introduction

An underdeveloped appreciation of the neurohistorical foundations of ethical decision making suggests a critical need to revisit the interrelationships shared between cognitive neuroscience and moral decision making. This essay identifies three “crucial categories” in the history of cognitive neuroscience that have developed into, and continue to serve as, linchpins for human ethical development. Part 1 explores the category of episodic memory and identifies autobiographical memory judgments as a fundamental pillar of general moral judgments. Part 2 examines the category of emotional rationality and proffers that substantive ethical reflection is inextricably emotional and rational in nature. Finally, Part 3 analyzes the category of narrative identity and proposes that moral self-conception - understood as lens through which individuals are able to seek, identify, and act on the good - is the means by which moral development and moral self-actualization is made possible.

Episodic memory and autobiographical moral judgment

The study of memory and cognitive learning arose from philosophical questions concerning the way individuals come to know themselves, others, things, and the world around them. Learning is the primary method by which one acquires knowledge and remembering

is the primary means by which one supports knowledge claims [1]. While the seventeenth to nineteenth centuries were marked by empiricist philosophers who speculated about the numerous factors that might affect the degree or strength of particular subjective associations, it was philosophers writing in the twentieth century who first introduced to psychologists the distinction between episodic and semantic memory. However, it was not until the “everyday movement” of the final two decades of the twentieth century when researchers first argued that attention should focus primarily on the ways in which individuals use autobiographical memory in their daily tasks [1].

A cursory history of memory research

A sweeping history of memory research must attend to (at least) four developmental themes in neuroscience: associationism, behaviorism, cognitive psychology, and themes of multiple and everyday memory systems. Philosophical speculations about learning were prominent among advocates of empiricism, the theory that sensory experiences are the exclusive and ultimate source of knowledge and truths about the world [1]. Ideas about the world are purported to derive from sense impressions, either as simple copies or as combinations of simple ideas. As the empiricist program required some means for ascertaining the constellations of sensory qualities, the notion of association by contiguity - the theory that complex ideas are formed in the mind by connecting together in memory simple ideas grounded in sensations that are experienced contiguously in time and space - was subsequently introduced. This basic idea accounts for the way individuals develop coordinated expectations about properties of objects (including causal sequences of events), predictions about future events, explanations of origin and effect, and plans of action designed to produce particular outcomes. Insight into these basic capacities of mind, which together comprise associationism (or association formation) and influence every learning theory in some way, have generated much experimental research on memory [1].

Behaviorism is a positivist philosophy contending that everything known about others is provided by close observations of overt actions and behaviors in specific situations [1]. Behaviorism developed out of a desire for scientific objectivity in observations and parsimony in explanations; it was especially condemning of the undisciplined introspective mentalism that was forwarded as an explanation of behavior at the turn of the twentieth century. On the behaviorist view, all that is needed to predict behavior is a catalogue of specific facts and generalizations about past responses to situations resembling the one presently faced. These generalizations about past situation-to-action regularities are supposedly carried in the nervous system as a set of stimulus-response (S-R) habits. While antecedents of behaviorism were many, few were more prominent than Charles Darwin’s theory of biological evolution, which suggested the continuity of all species, including *Homo sapiens*. For Darwin, learning was an adaptive mechanism that evolved over millions of years by small variations and minor accretions in the neural hardware charged with executing various learning tasks. Behaviorist approaches to learning were greatly encouraged by trailblazing studies on conditioned reflexes by Russian physiologist Ivan Pavlov and by early studies of trial-and-error (instrumental) learning by American educational psychologist Edward Thorndike. This behaviorist orientation was disseminated throughout the first half of the twentieth century, and strongly affected the way human learning was studied and explained [1].

While interest in cognitive (thought) processes enjoyed minor attention throughout the first half of the twentieth century, considerable momentum was imparted to cognitivism in the 1950s and 1960s [1]. One precursor was information (communication) theory, with its concepts of encoding and decoding messages, and the concept of limited capacity, which applied to any communication channel. The metaphor was that the human perceptual system analyzed the stimulus array, extracted information from it in the form of neural codes (in visual or auditory modalities), and that these codes entered into cognitive programs designed either to store them in memory, or to reason, make decisions, and guide actions. Donald Broadbent [2] adapted several ideas from this approach in his studies of selective attention, especially the use of dichotic tasks in which adults with earphones attempted to mimic speech heard in one ear while trying to ignore messages delivered to the other ear. Broadbent’s studies led him to advance the idea of selective sensory filters (along with a brief short-term memory) that could hold unattended speech sounds for several seconds before attention could “switch over” to deal with them. A second driving force of cognitive psychology was the work of Allen Newell and Hebert Simon [3], who constructed computer programs designed to stimulate details of thought processes that individuals endure as they solve various problems. Newell and Simon noted that S-R analyses of problem solving were ultimately unhelpful in deciding how to structure the knowledge base of programs in or-

der to perform efficient retrieval, or how to reason effectively to achieve particular goals. Galvanized by these developments, the analysis of perception, attention, immediate sensory memories, short-term memory, and the structure of long-term memory became prominent topics in the field [1].

With the rapid emergence of theories about different kinds of memories - short-term/long-term, visual/auditory sensory stores, pre-categorical/post-categorical stores, episodic/semantic, verbal/imagery, cognitive/motor, and several others - it was inevitable that attempts to coordinate these different types of memories to different parts of the brain would be made [1]. This research, initiated in the late 1980s, has proceeded on several fronts, including the examination of behavioral effects of specified brain lesions and damaged areas, indirect recording of brain activity, and use of fMRI measurements of cognitive and memory tasks. Successes in research on multiple memory systems have been remarkable and are hypothesized to accelerate in the future. However, in reaction to the dominant laboratory tradition, some researchers argued that attention should be shifted to the ways in which individuals use their memory in everyday tasks. This movement toward “ecological validity” in the late 1980s and early 1990s stemmed from concerns that principles derived from laboratory studies of memory may not elucidate many everyday memory phenomena. As a consequence, an abundance of research has been published on the extent and frequency of common types of memory errors and mental shortcomings in everyday life. One particularly fascinating element of the every-day memory movement is its investigation of autobiographical memory. By gathering and classifying phenomenological reports, psychologists have constructed theories of how salient “marking events” are used as signposts for ordering and reconstructing the temporal and logical sequence of events. More studies of this kind can be expected in the future as the field of memory research better connects with other branches of psychology [1].

The neuroanatomy of memory

Memory is equal parts basic and complex, and its range of function relates to the heterogeneity of underlying nervous systems in species from planaria to humans [4]. The broad scope of behavior subsumed under the auspices of memory has led researchers to search for appropriate categorizations of mnemonic subfunctions that span from elemental forms of classical conditioning to episodic memory. Human memory is especially embedded in various complex behavioral representations, such as thoughts, language, reasoning, and emotion. Identifying the specific location of memory processing is difficult insofar as cellular networks from the remote neural periphery to the integration cortices participate in such processing. Nevertheless, it is vital to disentangle the circuitry of memory processing. As with other forms of behavior, clues for memory development can be found in the survival value of memory functions. The acquisition, transfer, storage, and recollection of memories concerning people, places, or things represents the embedding of memory functions in an emotional-motivational context, an insight gained in the early days of brain research which indicated that regions involved in the processing of affective information are also involved in the processing of memory information [4].

Memory acquisition refers to the sensory uptake of information, its initial encoding, and its subsequent consolidation [4]. Of the aforementioned subdivisions, sensory uptake engages the appropriate sensory receptors, such as the unimodal sensory regions of the cortex. Based on the traditional model of distinct short- and long-term memory stores, it is presumed that information typically reaches the cortical level first and is stored there short term. In patients with selective short-term memory impairments, brain damage is frequently detected in the angular gyrus region of the parietal cortex, which indicates its central involvement in short-term memory processing and therefore in the initial level of information acquisition. Following acquisition, the most significant element of information processing is its transfer into long-term memory. Various regional combinations of the limbic system take part in memory transfer, the anatomical components of which can be likened to an orchestra that together produce a successful concert while each instrument maintains its distinguishable part. Insight, the tendency to fabricate experience (as compensation for memory loss), retrograde amnesia, conscious reflection, affective attachment, time perception, and susceptibility to inference are examples of features that vary quantitatively and qualitatively between cortical structures. Although the individual constituents of limbic-system structures serve diverse functions, each can be regarded as “bottleneck” formations through which information must pass for successful consolidation. Hence, bilateral damage to any of these structures consequently results in the disconnection syndrome known as (persistent) amnesia [4].

There is limited evidence available regarding the storage of memory in the human brain [4]. Animal research demonstrates that successful information acquisition first requires bioelectrical changes, such as long-term potentiation and long-term depression, followed by induced changes in neuronal morphology, including dendritic spine growth, synaptic enlargement, and neuropil expansion. Moreover, evidence that even complete bilateral damage of any of the limbic bottleneck structures does not necessarily prevent successful retrieval of old information suggests that none of these structures (e.g., medial thalamus and hippocampal region) is a long-term memory storage site. Rather, frequently proposed loci for long-term storage of information are the cerebral cortical areas, especially the association or polymodal regions. Evidence for the involvement of these regions in memory storage is derived from imaging studies that indicate that widespread cortical sites are activated during memorization tasks in normal subjects, and from the pronounced correlation between prevalent cortical damage in patients with significant memory impairments. Further, a strong correlation has been observed between a significant decrease in regional cerebral glucose metabolism across anterior and posterior cortical areas and the inability to remember or acquire new episodic and semantic memories. Nevertheless, the question of whether cortical regions alone are able to represent an event or whether they require assistance from emotion-coding regions (such as the amygdala or septum) remains unsolved [4].

Memory recall is a broad notion and includes various forms of evidence for the availability of stored information [4]. As evidenced by the false memory literature, environmental conditions influence the retrieval of information to a considerable degree. Consequently, Endel Tulving [5] reintroduced the term “ecphory” to describe the process by which retrieval cues interact with stored information to produce an image or conscious representation of the information in question. Insofar as every form of retrieval simultaneously entails encoding, dynamic imaging studies have not been able to answer the question of whether information retrieval occurs independently of the encoding regions. Several findings demonstrate that the nervous system stores enormous amounts of data, of which only minor parts are steadfastly available without appropriate retrieval cues. The notion that regions independent of those involved in long-term transfer may also be active in recall tasks emerged only in the last two decades. The idea arose from single case reports of patients with focal brain damage outside of the classical limbic regions who lost access to old memories but still possessed a preserved capacity to form new ones. Autobiographical memories, which have more emotional content and date from distant past, have been observed to engage temporopolar regions to an even higher extent than prefrontal areas. A combination of infero-lateral prefrontal and temporo-polar regions was consequently assumed to trigger the retrieval of stored historical memories [4].

The ontology of autobiographical memory

Autobiographical, or “episodic,” memories enable individuals to create and maintain personal identity. By sharing past experiences and attending to the memories of others, individuals build and strengthen social relationships [6]. Paired with semantic self-knowledge, episodic memory is the primary database informing the self. Cognitive and neuropsychological research suggests episodic memories and semantic self-knowledge structures are stored in separate areas of the brain and serve diverse functional roles. Whereas semantic self-knowledge is typically applied at the personal level, autobiographical memories are used to inform behavior in particular circumstances. In this way, autobiographical memories possess an ancillary predictive utility for understanding meaningful life outcomes that transcend personal calculations referring to semantic self-knowledge, such as traditional questionnaire measures of personality [7]. Both positive and negative life experiences have an immediate impact on personal well-being, and memories of those experiences serve to guide choices, attitudes, and actions in life. Significant life experiences are encoded as autobiographical memories and remain associated with the cognitive-affective component experienced during the initial event. Autobiographical memories remain attached to representations of how the initial event was experienced, often determined by the individual’s goals during encoding. Although personal goals differ across situations, self-determination theory proposes that human beings possess an overarching desire for growth, which is expressed through the daily pursuit of three psychological needs: autonomy (the need to feel volitional and authentic in one’s actions), competence (the need to feel effective and efficacious), and relatedness (the need to feel connected, and to care for and be cared for by others) [8].

Activation analyses of episodic memory encoding have pointed to a common element of left frontal and hippocampal regions, as well as specific regions in the temporal cortex and anterior cingulate [9]. Seed-correlation analysis between blood flow in the right hippo-

campus and all other brain areas during face encoding revealed that the right hippocampal region was strongly linked with a region in the anterior cingulate. Regarding retrieval, the activation analyses indicate that certain regions generally show decreased activity during episodic memory retrieval. This outcome has been suggested to reflect task-related inhibition from other brain regions. This inhibition of activity potentially reflects prevention of task-irrelevant processing and, if accurate, constitutes a significant aspect of episodic retrieval. Regarding regions that are specifically activated when retrieval is successful, a cryptic issue has concerned whether prefrontal brain regions are generally activated (reflecting “retrieval mode”) or whether they are activated to a higher extent when retrieval is successful. Analyses of functional connectivity within the last two decades have gleaned that activity in the right prefrontal regions can reflect either retrieval mode or retrieval success, depending on the other regions to which it is functionally linked. This result is consistent with the notion that brain regions do not possess intrinsically singular functions, but that their functional role can vary across cognitive operations as a function of neural context. Finally, network analysis has been used to directly compare the neural interactions underlying episodic encoding and retrieval. Structural equation modeling of data from young subjects exhibited a shift from positive interactions involving the left prefrontal cortex during encoding to positive interactions involving the right prefrontal cortex during recall [9].

Psychological writing on the subject of autobiographical memory began (at least) as early as William James [10]. Rather than considering memory as encompassing such acts as motor learning, habit formation, S-R strengthening, and the acquisition and use of knowledge, James viewed the nature of recollection as identical to what is now called episodic memory. The conscious recollection that accompanied memory retrieval was the defining characteristic of memory. As James writes: “Memory requires more than the mere dating of a fact in the past. It must be dated in *my* past. ... I must think that I directly experienced its occurrence” [10, p. 612]. Today, episodic memory is also defined by the nature of conscious awareness that accompanies retrieval, now known as auto-noetic (self-knowing) awareness. The retrieval of episodic memory is not merely an objective account of what happened or was seen or heard. Rather, its contents are infused with the idiosyncratic perspectives, emotions, and thoughts of the individual doing the remembering. Hence, it necessarily involves the feeling that the present recollection is a reexperience of something that has happened before. Insofar as episodic recollection requisitely entails a conscious reexperience of a personal past, it is possible to conclude two theoretical propositions about autobiographical memory. First, autobiographical memory is critically different from all other varieties of memory and can be disassociated with them. There now exist at least three populations of subjects who show selective losses of episodic memory along with shared performance on other memory measures. Second, autobiographical memory is closely related to other higher order mental achievements that are not traditionally considered acts of memory. This includes the auto-noetic capacities to introspect upon present experiences and to anticipate future experiences through the imagination [11].

In the exercise of episodic memory, individuals retrieve not only what events occurred (item memory), but also when they happened (temporal-order memory) [12]. Temporal-order memory is thus a critical form of source memory and an integral and defining characteristic of autobiographical memory. In many circumstances, episodic memories are useful only to the extent that temporal-order information is simultaneously available - for instance, remembering where one left one’s car keys today versus yesterday. Lesion and functional neuroimaging studies have shown that the PFC is a critical region for temporal-order memory, as is the MTL. Nevertheless, the neural correlates of temporal-order memory, particularly as they relate to autobiographical events, are not well understood. Temporal-order memory involves both reconstruction and distance processes. Reconstruction processes are effortful operations that include receiving contextual details and using them to deduce the order of events. For example, when trying to determine whether, during a one-day trip to Catalonia, the visit to Montserrat occurred before or after lunch, one might remember the pleasant feelings of resting tired legs in a comfortable restaurant and conclude that the visit to the Benedictine monastery occurred before lunch. In contrast, distance processes are less effortful operations that rely on feelings associated with the strength of the memory trace. For example, one does not need to employ reconstruction processes to conclude that a clearly remembered trip to Paris occurred more recently than a vaguely remembered trip to Dublin. Although reconstruction and distance processes can be used to discern the temporal order of a common set of events, reconstruction processes are generally more effective for events that are close in time. Closeness in time benefits autobiographical reconstruction insofar as makes causal links more obvious [12].

Autobiographical memory as pillar of moral judgment

Remembering and knowing are two subjective states of awareness associated with autobiographical memory judgment [13]. Remembering refers to the intimate experience of past events in personal history in which previous events and experiences are recreated with the awareness of reliving these events and experiences mentally. In this way, remembering entails cognitive time travel that engages one's innermost sense of self. Knowing refers to other experiences of the past in which one is impersonally aware of the knowledge possessed. Knowing indicates the general sense of familiarity individuals have with abstract knowledge, including the awareness of subjectively experienced events as objective facts. The notion that remembering and knowing could be studied in the laboratory was first suggested by Endel Tulving [14], who proposed that two states of awareness reflect auto-noetic and noetic consciousness - two forms of consciousness that respectively characterize episodic and semantic memory systems. He reported experiments in which subjects were instructed to communicate their awareness states at the moment they recalled or recognized words previously encountered in a study list. Though Tulving used free-recall, cued-recall, and recognition tests, it was recognition memory that became the most commonly used remember/know paradigm, not least because recognition memory is most likely to be associated with experiences of knowing (and remembering), particularly when recognition is accompanied solely by feelings of familiarity. Moreover, the two states of awareness captured by remember/know responses were viewed, at the time, as additionally relevant to dual-component theories of recognition memory, which posited that recognition would be accomplished by one of two independent processes: recollection and familiarity [13].

The cardinal premise underlying the use of remember/know responses is that the subjective states of awareness thereby measured cannot be dependably inferred from more conventional calculations of performance [13]. Since subjective mental experience cannot be deduced by purely objective measures of performance, subjective reports must be taken into account. Remember/know processes are not intended as introspective measures of underlying hypothetical constructs; their use also differs from classical introspection in that it only requires subjects to distinguish between kinds of mental experiences rather than report the details thereof. Both remembering and knowing define general states of awareness that may be broken down into varieties of experiences. Just as remembering can be divided into more specific source monitoring judgments, so too may know responses be divided into additional response categories. The development of subsequent "guess" responses partly reflects particular concern about the interpretation of know responses - an issue that has plagued the remember/know paradigm. In Tulving's model, the default response of knowing remains open to abuse by subjects, who may use know responses to reflect various judgmental strategies that do not involve any awareness that items were selected from a study list. As a result, later studies have largely controlled for this by strongly discouraging guessing. However, allowing subjects to report guesses seems a better solution to this problem. Evidence suggests that it is guess responses, not know responses, which reflect various other judgmental strategies. These strategies appear to indicate awareness of the prevailing circumstances during the memory task, such as the general characteristics of the item or the frequency of previous responses [13].

Most autobiographical memory judgments involve - or can be turned into - a choice between two elemental responses. This makes memory judgments ideally suited for studying retrieval and decision dynamics. Traditionally, such questions have been addressed using reaction time, but speed accuracy tradeoff, and an unwillingness of subjects to respond based on a bare minimum of information, limits the usefulness of the response time measure [15]. Insofar as making judgments requires inferring a continuous criterion from numerous attributes of the object in question, rule- and exemplar-based strategies may prove a clearer lens through which to view autobiographical memory as a pillar on which moral judgment rests. Rule-based strategies assume that individuals form hypotheses about the relationship between the cues and criterion and apply this knowledge to make judgments. Rule-based judgments have been chiefly captured with linear, additive models or cue abstraction models. Linear models describe individuals' judgments in a variety of tasks ranging from personal selection to medical diagnoses and have been found to match explicit judgment rules. Based on the lens model, linear models assume that individuals explicitly abstract a weight for each cue and then combine the weighted cue values additively. For instance, when judging the moral permissibility of palliative sedation for a particular patient, the clinicians involved would first determine the value of proportionate pain reduction and task demands that correspond with (minimally) adequate patient care. Thereafter, those clinicians would weigh

the patient's diagnosis, prognosis, and pain intractability alongside the task demands of palliative sedation practice and combine this knowledge by adding the weighted cue values [16].

By contrast, exemplar-based strategies rely on the retrieval of past experiences from long-term episodic memory [16]. Exemplar-based strategies assume that previously encountered objects are stored in memory along with their criterion values. To judge the new object (probe), all previous encountered objects (exemplars) and the associated criterion values are retrieved from memory. For instance, when judging the moral permissibility of palliative sedation for a particular patient, the clinicians involved would reflect on all the past instances in which palliative sedation was (and was not) appropriate. The more similar a retrieved exemplar is to the probe, the more it influences the final judgment. Accordingly, previous circumstances in which palliative sedation was morally permissible influence the attractiveness rating more than unrelated clinical experiences. Hence, exemplar-based strategies imply that individuals store concrete instances without abstracting any knowledge and engage in an associative similarity-based process during memory retrieval. Research suggests that individuals use both rule- and exemplar-based strategies, with strategy selection depending on task characteristics and individual differences. When individuals perform judgment tasks and receive feedback about the correct criterion, they tend to rely more on cue abstraction strategies if the criterion is a linear additive function of the cues (in linear tasks). However, individuals shift to exemplar-based strategies when (in multiplicative tasks) the judgment criterion is a non-linear function of the cues. In general, autobiographical memory judgments influence two aspects of strategy: execution and selection. Regarding the former, better episodic memory can enhance exemplar retrieval and thus lead to more accurate exemplar-based moral judgment. Regarding the latter, episodic memory abilities can fortify either the ability to choose the more accurate moral strategy or the preference for one moral strategy in particular [16].

Emotional rationality and moral choice

The relationship between emotion and reason has been a major topic in Western philosophy since its genesis [17]. However, the relationship between emotional choice and rational choice is a more recent concern. Both reason and rationality are primarily normative inasmuch as they inform agents of the options that ideally should be pursued in the effort to secure sought-after ends. Their explanatory use arises when the agent takes the normative suggestion and tests it by confronting the prescribed behavior with its observed counterpart. In economics, for instance, rational-choice explanations, based on the assumption that agents will maximize utility, was the standard understanding of behavior until 1980, when it became subject to criticism from a number of scholars who subsequently developed new models of behavior. Broadly speaking, these alternative, neurocognitively-gearred models constitute what has loosely become known as the field of behavioral economics [18].

Emotion and reason in plato and aristotle

The ancient Greeks had no word equivalent to the Latinate "emotion." The term commonly used in its place, *pathos*, generally indicates "that which happens to a person or thing." The writings of Plato and Aristotle develop conceptions of relevant cognitions and exemplify the need to be reflective about the fundamental nature and role of cognition within emotion. Insofar as the experiences of pleasures and opinions depend on a living body (animated by the soul), Plato draws a corollary when he divides not soul from body, but a rational soul - competent to determine what is best for the entire soul - from a non-rational soul, which he further divides into appetite and spirit. Appetite concerns a certain class of desires (*epithumiai*). Objects are considered desirous (*epithumētikon*) by virtue of the intensity of desire accompanying them. Though not emotions themselves, intense desires are accompanied by emotion: in respect of its appetite, the soul hungers, thirsts, loves, and feels the excitement (*epitoētai*) of other desires. Appetite is cognitive inasmuch as it is a companion to certain repletions and pleasures. To desire something is, for Plato, to desire it as pleasant, and such desiring involves thinking it to be pleasant. Through the example of Socrates' anger, Plato later chronicles the spirit as a distinct part of the soul. When anger is directed at oneself, it gives rise to the emotion of shame. Provoked by wrongs to be resisted, it speaks in terms of "oughts," and becomes by nature the ally of reason: it receives the values of others and translates them into its own terms. On this basis, it is tempting to conceive of Plato's spirit as the emotive part of the soul. In Plato, then, what emotions lack in rationality, they make up for in a phenomenology born of imaginative recall that combines pleasure and pain [17].

Aristotle connects the passivity of emotions with their physicality [17]. For Aristotle, all emotions of the soul involve the body - anger, good temper, fear, pity, confidence, joy, love, and hatred - and upon the experience of emotion the body is affected in a certain way. Aristotelian deliberation is a process of calculation and reflection that leads the agent from contingent goals (suggested by one's character in the perceived circumstances) to a means that acceptably achieves it. The ultimate end is acting well, which demands a receptivity to the emergence of pros and cons. The practical wisdom (*phronēsis*) exercised within deliberation tests the goal (in the circumstances) by discovering whether to permit it to be achieved acceptably. Yet the initial selection of a goal emerges out of an agent's perception of the situation. Hence, it is not simply a matter of identifying the neutral facts of the case, but of being attracted and repelled by the possibilities that painful or pleasant perceptions present. Put simply, the practical eye is the eye of the heart, not merely of the head. For Aristotle, *phronēsis* is rooted in educated affective responses. Education takes place through experience which conditions the agent in choosing and acting well through correct training in response to pleasure and pain. Achieving the mean in relation to an affection is a matter of being disposed to it, not indiscriminately, but as is best from one situation to another. Hence, ethical education in Aristotle is emotional education. Discarding too simple a Socratic focus on the contents of thought, Plato and Aristotle embrace the interconnections within the emotions of body and soul, perception and imagination, and feeling and thinking [17]. In the end, emotions are not simply things felt; they are also the very framework of thinking.

For Plato, rational knowledge is the highest good [19]. As highest good, it serves as the measure of worth for everything else. Thus, until one possesses rational knowledge, the acquisition thereof must be the singular goal that trumps all others, for all things are made good solely thereby. Inquiry - which arises from the awareness that one does not know something in particular - serves as the provisional good until one possesses the highest good: rational knowledge. The ability to reason about and secure definitive knowledge of something, Plato suggests, is directly connected to the capacity to overcome the distinction between subject and object. In brief, to know an object is for that object to be present for the subject in the same way that the object is present in itself. Yet the possibility of reason's self-awareness depends on the separation between subject and object. The thinker cannot fully take on the object while simultaneously maintaining the hypothetical character of the investigation. Plato contends, therefore, that reason is the grasp of an object as a collection of parts, and that in order for this type of work to take place, there must be a higher faculty at work as well - one responsible for the "oneness" of the subject's grasp. This higher faculty, *nous*, is responsible for grasping the oneness of an object, and must overcome the separation of subject and object to do so. For Plato, the moment of insight, which marks the overcoming of differences between the distinct parts being considered, is the operation of *nous*, and in that act both the opposition between the parts of the object and the subject and object is overcome [19].

The nucleus of Aristotle's concept of rationality lies in his theory of first principles, which in turn comprises his theory of *epistēmē* [20]. The Greek word *epistēmē* has a broad range of meanings, ranging from (rational) "knowledge" at the weakest to "science" or "understanding" at the strongest. For Aristotle, *epistēmē* is an organized body of knowledge arranged in a hierarchical and explanatory structure, with lower-level items being explained by higher-level ones, and those in turn being explained by still higher-level ones, until at the apex first principles (*nous*) are reached, which are themselves indemonstrable. However, first principles are not cognitive starting points; rather, individuals must start from appearances (*phainomena*) that are not themselves (at least initially) objects of *epistēmē*, and from them work up dialectically to a grasp of first principles. The *phainomena* from which individuals begin include not only the empirical data of sense-perception, but also *endoxa*: "reputable beliefs." Of immediate import to the present context is Aristotle's concept of practical rationality (*phronēsis*): the intellectual virtue or excellence that enables individuals to plan or deliberate well about what is good or useful for living well and therefore being happy. Confined to identifying the proportionate means to ends, practical rationality is concerned with right means, whereas moral virtue is concerned with right ends. Aristotle compares the process of rational deliberation to the process of scientific discovery. Just as problem-solving terminates in the recognition of something ultimate, which forms the first step in the construction of a figure, so practical deliberation terminates in the recognition of something ultimate, which marks the "first cause" in action. Through detailed and rigorous discussions of the relationship between the actions taken by moral agents and the practical reasoning leading up to it, Aristotle concludes that the employment of practical rationality in the planning process can only be completed at the time of action, and that it includes, as its terminus, a practical syllogism [21].

The neuroanatomy of emotion

Pioneering work on the effects of lesions on behavior in animals led to the gradual discovery of emotion-related brain networks [22]. This work was stimulated in part by Darwin, who was among the first to situate emotion in a biological context, arguing that emotional states in both humans and animals correspond with neurological phenomena related to movement. The temporal lobe was the first brain region to be associated with emotional processing, and extraction of the temporal lobe generated marked changes in behavior. In the late 1930s, James Papez integrated earlier work to propose that a unit of linked structures - including the hypothalamus, cingulate gyrus, hippocampus, and anterior thalamus - comprise the anatomical basis of emotions. Subsequent work established the amygdala in particular as a pivotal element in what became known as the Papez-MacLean limbic model. Employing a variety of experimental methods, studies in humans and animals have provided further evidence of the vital role of the amygdala in emotion. As suggested above, the amygdala is necessary for Pavlovian fear conditioning, facilitating the acquisition and expression of fear responses. However, the amygdala is no longer seen as functioning exclusively in service of negative emotions; it also appears to play a role in appetitive conditioning tasks, consistent with findings from functional imaging suggesting a role in positive emotions [22].

The amygdala is the recipient of converging projections from much of the cortical mantle, hypothalamus, hippocampus, brain stem, and neuromodulatory systems. This connectivity suggests that the amygdala contributes substantively to the categorization of the overall state of the organism by integrating information from the body and the external environment. Such categorical representation subsequently affects sensory, motor, executive, and memory-related processes through the diverging outputs of the amygdala [22]. Information from the amygdala can be followed to the posterior OFC, which is associated with the value-processing of stimuli, and therefrom to the lateral prefrontal cortices associated with cognitive processes. The pattern of information processing follows linear sequences of connections predicted by the structural model for cortico-cortical connections. The relational rules of the structural model allow prediction of the possible information flow from the posterior OFC, which receives data concerning the affective status of the environment, to lateral prefrontal cortices, which are associated with cognitive processes. The amygdala innervates all layers of the posterior OFC, including middle layers, which receive feedforward signals. The posterior OFC projects to the lateral prefrontal cortices through sequential steps involving areas with (increasingly) better defined laminar structure, through anterior orbitofrontal areas and lateral prefrontal areas, culminating in posterior lateral prefrontal areas 46 and 8, respectively. The foregoing associations suggest an efficient flow of information along consecutive feedback pathways from areas with a principal role in emotions to areas associated with cognition, decision, and action [22].

The conventional wisdom that one can see the glass as “half full” or “half empty” captures the essence of cognitive emotional regulation [23]. Emotional reactions are largely determined by the appraisal and interpretation of circumstances and events. While some individuals have a general tendency to view the world in positive or negative light, the capacity to shift emotion through adapting one’s interpretation of an event - known as reappraisal - can also be taught and consciously applied. In standard reappraisal tasks, participants are asked to think about the stimulus differently to reduce its negative emotional consequences. Several studies have investigated the neural systems that mediate the cognitive regulation of negative emotions as analyzed through subjective reports or physiological responses. Frequently reported are increased DLPFC blood-oxygenation-level-dependent (BOLD) responses during regulation versus attend conditions paired with decreased amygdala activation. The DLPFC is suggested to implement the executive control necessary to actively reinterpret the stimulus during reappraisal, whereas the amygdala is involved in the expression of the emotional response. Insofar as there is sparse direct connectivity between the DLPFC and the amygdala, it is unlikely that the DLPFC directly influences amygdala function but rather does so through more ventral PFC regions. The VMPFC has reciprocal connections with the amygdala that inhibit emotional reactions following extinction involving Pavlovian fear-conditioning tasks, and it is proposed to mediate the influence of the DLPFC on the amygdala. This DLPFC-VMPFC-amygdala circuitry is hypothesized to underlie the cognitive control of diminishing negative emotional reactions, but it may also play a role in increasing negative affect depending on the particular reappraisal strategy. Implicating similar circuitry to the cognitive control of cravings, emotion regulation strategies engage overlapping regions of the DLPFC and VMPFC and produce decreased BOLD reward responses in the striatum [23].

While the flexibility of cognitive emotion regulation techniques can be an advantage, their strategies are less successful in stressful situations, owing (in part) to their dependence on the DLPFC [23]. Additionally, when emotional reactions consistently result in maladaptive choices, it may be helpful to have a technique that leads to a more permanent change. Affective neuroscience has identified a few such strategies - most notably extinction training - but their impact on emotional reactions connected to decision making has not been extensively investigated. To effect a more lasting change in learned associations underlying emotional responses and instrumental actions, researchers have recently investigated techniques that change the original associative, affective memory by altering its re-storage after retrieval or reconsolidation. Although the understanding of reconsolidation mechanisms and how to target these processes in humans remains in its infancy, this technique may lead to substantive advances in reducing the impact of maladaptive emotional reactions on choices. Interestingly, investigations examining the relationship between emotion and decision making have indicated that choices themselves can alter emotions. This research suggests that the opportunity for choice enhances subjective affective ratings of choice options and concurrently increases BOLD reward responses in the striatum. To the extent that affect and emotion influence choices, editing affective responses will eventually alter decisions. Moreover, choices themselves can change affect, which (in theory) should modify subsequent choices. If future research can discover and characterize further effective means to alter emotion, human beings would be able to harness these techniques to help optimize decisions [23].

The neuroanatomy of rationality

Since the early 1970s, psychologists have devoted significant attention to human reasoning, decision making, and the psychological processes that underlie them [24]. While some of this consideration was inspired by the importance of these processes, much of it was prompted by a series of experimental findings that seemed to have bleak implications for human rationality. In 1966, Peter Wason [25] published a highly influential study involving a cluster of reasoning problems that became known as the selection task. By 1993, the selection task had become the most intensely researched individual problem in the history of the psychology of reasoning [24]. What Wason (and numerous researchers since) found is that humans tend to reason rather poorly, failing at simple logical tasks, committing glaring mistakes in probabilistic reasoning, and being subject to various irrational biases in decision making. This work led to a reconsideration of the mechanisms for reasoning, but not of its assumed function of enhancing cognitive flourishing and decision making [26]. Another notable cluster of studies have examined the way in which individuals use base-rate information to make probabilistic judgments. According to the familiar statistical methodology developed by Thomas Bayes, the probability of a hypothesis on a given body of evidence depends, in part, on the prior probability of the hypothesis. However, a series of experiments conducted by Daniel Kahneman and Amos Tversky [27] showed that subjects often significantly undervalue the import of prior probabilities. By the beginning of the twenty-first century, the landmark work of Kahneman and his contemporaries would include the development and emergence of dual process models to distinguish between intuitions and reasoning (system 1 and system 2 reasoning, respectively) [26].

The neural constituents of reasoning have traditionally been expressed in terms of brain spatial coordinates [28]. Early neuropsychological work viewed reasoning as emerging from global brain processing, consistent with data indicating that it is adversely affected by diffuse brain damage. Neuroimaging studies have situated the correlates of reasoning in terms of (local) functionally specialized brain activity, either by viewing reasoning normatively or by dividing it into subcomponent processes. The results often lack specificity to reasoning and, at best, provide a static characterization thereof. To date, the neuroimaging literature has focused on short-term and normative forms of reasoning. While this limits variability in reasoning episode length and allows reasoning episodes to be segmented into separable chunks, it does so at the price of limitations in the phenomenology and ecologic value of its stimuli. Moreover, despite optimal temporal resolution, even electrophysiological studies have adopted an event-related perspective, pinpointing activity occurring seconds prior to insight emergence, which merely documents the outcome of reasoning processes, not the processes themselves. Other studies concerning event-related neural activity associated with the solution of riddles with insight were found to be related to properties of preceding resting activities. This research has the exceptional merit of using spontaneous brain activity to characterize reasoning, but essentially provides a description of comparative statistics. While some behavioral studies have treated reasoning as a dynamical process, a substantive, comparable neurophysiological characterization is still incomplete [28].

The generalized form of reasoning comes in episodes offering scant behaviorally salient events with no characteristic temporal length [28]. Each episode is an irreproducible event insofar as reasoning tasks can be executed in a variety of ways. Brain activity associated with reasoning is not event-related, and several neurophysiological processes interact in a wide range of spatial and temporal scales. These phenomena can all be traced back to a basic fact: the brain did not develop a specific device for reasoning. Hardwired partially segregated modules ensure that perceptuo-motor functions are executed at great speed, with conventional duration and time-varying profile, and identifiable stages, largely determined by input statistical properties. Reasoning, by contrast, is associated with internally-driven dynamics: processing times and stages, as well as functional brain geometry, is primarily unconstrained. When observed over time, brain fluctuations appear to be characterized by structured patterns. The temporal sequence with which these patterns are re-edited across the cortical space similarly appears to have non-random structure. The structure with which these fluctuations appear can be communicated in the same way one would describe object, including a characterization of its component parts, the relationships between them, and the way it can be examined. David Papo [28] views brain fluctuations as analogous to the steps of a random walker. By these means, Papo suggests, one can best understand the neurological “phase space” - the space of all states attainable by the system’s dynamics - including the traveled distances, times to reach a given target, and memory of previous steps. However, to fully grasp the phase space, it is critical to remember that the brain consists of a great number of local random walkers, each of whom interact to form transient patterns of connectivity. Overall, the space in which the random walker turns out to live - a space that reflects the brain’s dynamical repository - can be finally described as a sophisticated spatio-temporal structure.

In light of the foregoing, perhaps the most profound capacity of human reasoning is cognitive inference, which concerns the production of new mental representations on the basis of those that already exist [26]. Examples of inferences are the production of new beliefs on the basis of previous beliefs, the production of expectations on the basis of perception, and the production of plans on the basis of preferences or beliefs. Thus understood, inference need not be deliberate or conscious; it is at work not only in conceptual thinking, but also in perception and motor control. As such, it is a fundamental ingredient of any cognitive system. Reasoning refers to a particular form of inference at the conceptual level, where new mental representations (conclusions) are not only consciously produced, but the previously held representations (premises) that warrant it are also consciously entertained. The premises serve to provide reasons to accept the conclusion. If a conclusion is accepted due to the intuitive strength of the argument in its favor, this acceptance is an epistemic decision taken at a personal level. If a complex argument is constructed by linking argumentative steps, each of which having sufficient intuitive strength, this is a personal-level mental action. If the argument is verbally produced so that others will witness its intuitive force and accept its conclusion, this is a consciously undertaken public action. The mental action of working out a convincing argument, the public action of producing the argument so that others may be convinced by it, and the mental action of evaluating and accepting the conclusion of an argument produced by others correspond to what is commonly and traditionally indicated by reasoning [26].

The emotional and rational tenets of choice

In the past decade, multiple studies have suggested that activity in a small number of brain areas encode reward quantities during tasks related to choice [29]. Areas such as the parietal cortex appear to encode how many millimeters of water an action will yield to a thirsty person, and areas such as the ventral striatum and the medial PFC appear to encode the amount of money an option will yield. Indeed, there is now broad consensus in the neuroscience of choice community that reward magnitude is clearly represented in a small number of well-identified areas. In their 2012 study, Dino Levy and Paul Glimcher [29] conduct a meta-analysis using data from recent fMRI studies that suggest that one of these reward encoding areas - the VMPFC/OFC - can be understood as representative of the value of almost all reward types on a common scale that predicts behaviorally-observed comparison and choice. The idea of common currency representation at a strictly theoretical level is not new. In his 1947 economic study, Paul Samuelson [30] proved that decision makers who are internally consistent in their choices behave precisely as if they were applying a single common scale for the representation of value. To be sure, the assumption that the chooser is rational is not a necessary condition for a common currency representation. Since Samuelson’s proof, almost all theories of choice - from expected utility theory through prospect theory, including modern reinforcement learning algorithms - have shared the belief that in order to choose, the different elements of each option must eventually be converged,

however uniquely and insufficiently, into a single value for the actual process of comparison. Nevertheless, there is no evidence to suggest that neural currency of values arises solely in the subregion of the VMPFC/OFC. Any common currency observed in the brain must reflect the activation of multiple cognitive processes [29].

A long tradition of research on judgment and decision making (JDM), originating from choice or preference theory in microeconomics and decision theory in philosophy, supposes that uncertain decisions are rooted in cognitive processes involving means-end reasoning, logical inference, mental effort, and precision computation according to cost-benefit calculi [31]. In the 1990s, however, JDM models increasingly integrated emotional processes, influenced by a reconsideration of emotion in neuroscience. As these models evolved, a steadfast emphasis on emotional contributions to JDM was an approximate, heuristic process that delivered rapid evaluations without mental effort. Additionally, JDM researchers increasingly identified conflict in decision making as the product of divergence between rational and emotional evaluations, and pathological decision making as the result of affect heuristics. Notwithstanding the popularity and straightforward appeal of distinguishing between rational and emotional contributions to JDM, several fundamental issues remain unresolved. Contemporary theories can be characterized in terms of the representations they posit, and it remains unclear in what ways rational and emotional contributions to JDM differ along these dimensions. Perhaps the most surprising discovery to date is that core emotional structures, including the midbrain dopamine system and insula, decompose under certain choice contexts along the statistical dimensions that comprise the cornerstone of financial decision theory. Previous accounts of emotion as value-stimulus associations tended to focus on the OFC as the cardinal structure involved in representing award expectation and viewed midbrain dopamine areas as involved in reward-related learning rather than in the representation of reward expectation as such. Nevertheless, recent findings suggest that value encoding in the midbrain dopamine areas potentially underlie an early implicit encoding that is communicated to the OFC, where it guides both emotional and rational choice [31].

Emotional choice arises from belief insofar as emotions have cognitive causal antecedents [18]. Although this is the typical and most important case in human affairs, it is not the only one. As neurological studies of fear and panic attest, mere perception without any propositional content can also trigger emotion. A sign on the wall indicating the dangers of smoking, for instance, causes greater emotional arousal when accompanied by a color photo of a cancerous lung. Insofar as beliefs can serve as either the effect or cause of emotion, the relation between beliefs and the emotions they generate are remarkably fine grained. In most cases, emotional choice will be minimally rational: the action performed will be the best means to realize the agent's desire, given the belief with which it corresponds. However, on Human premises, the fact that desire is induced by emotion need not undermine the full rationality of the action. In many psychological studies of emotion, valence - or position on the pleasure-pain dimension - is used as the independent variable. In this model, positive emotions tend to make individuals more risk-averse, whereas negative emotions tend to cause risk-seeking behavior. Simultaneously, positive and negative emotions respectively generate optimistic and pessimistic cognitive biases. Hence, when subjects are not explicitly told the odds of winning and losing, but have to assess them from the evidence provided, cognitive bias and risk attitudes work in opposite directions. Compared with the fine-grained classifications of emotions based on cognitive antecedents or action tendencies, valence is a coarse-grained category. In studies employing cognitive antecedents as the independent variable, the impact of emotion on risk attitudes appears in a different light. Whereas fearful individuals typically expressed pessimistic attitudes and risk-averse choices, angry individuals expressed optimistic risk calculi and risk-seeking choices. In this case, emotional-induced risk dispositions and emotion-induced cognitive bias work in the same direction [18].

The standard model of rational choice is defined in terms of the relation obtaining among action, beliefs, desires, and information [18]. The beliefs and desires of rational agents cause them to choose a course of action that can be rationalized in light of the information at hand. Rational agents choose the action that best realizes their desires, given their beliefs about what their options are and about the consequences of pursuing them. The beliefs are themselves inferred from the available data by the procedures that are most likely to yield true beliefs. Prior to belief formation, rational agents gather more evidence in an amount that is optimal in light of their desire and the expected costs and benefits of gathering new information. Thus understood, rationality is a matter of process and outcome. Whereas

a direct influence on beliefs is inconsistent with rational belief formation, an indirect influence mediated by information gathering is not necessarily irrational. An individual who cares little about the environment, for instance, is rationally unmotivated to invest resources to find the best ways to recycle waste. It will prove useful, here, to distinguish between two kinds of preferences: substantive and formal. Substantive preferences relate to specific pairs of options, such as one political candidate over another. Instances of formal preferences involve the rate at which the future is discounted, including considerations of risk aversion, loss aversion, and the like. Although formal preferences are somewhat domain-specific - e.g., an individual may use different discount rates for future health and future income - they have a wider scope than substantive preferences. Rational choice, then, is typically defined by the interaction between substantive and formal preferences. This suggests that rational agents do as well as they can in light of the cognitive resources and propensities with which they find themselves endowed [18].

Narrative identity as moral self-conception and commitment

The formal concept of narrative identity was first postulated in the twentieth century: Sigmund Freud wrote about dream narratives, Carl Jung explored universal life myths, Alfred Adler examined narrative accounts of earliest memory, and Henry Murray identified recurrent autobiographical themes in the Thematic Apperception Test [32,33]. Still, none of the traditional theories of personality in the first half of the twentieth century imagined human being as storytellers and human experience as a story to be told. The inaugural theories of narrative personality were developed in the late 1970s and early 1980s. Silvan Tompkins proposed a “script theory” of personality that conceived of the individual as a metaphorical playwright who organizes the emotional experiences of life in terms of salient “scenes” and recurrent “scripts.” In a somewhat similar line of thought, Dan McAdams formulated a “life-story” model of identity, suggesting that people living in modern society begin, in late adolescence and young adulthood, to understand their lives as ever-evolving stories that integrate the reconstructed past and the projected future in order to imbue life with degrees of unity and purpose [32,33].

The evolution of narrative in history

It has been suggested that in the process of replacing supernatural with natural theories of disease causation, Hippocrates laid the groundwork for a practice of medicine in which clinicians rarely speak to patients [34]. There is certainly a strong history in Western medicine that regards medical practice as, first and foremost, the palpitation of the abdomen and the analysis of laboratory results, so that conversation of any sort is viewed peripherally. However, this tradition fails to account for what becomes readily evident on a perfunctory reading of Hippocrates and subsequent classics of medicine: notwithstanding the status of conversation with patients, conversation among clinicians is central to medical practice, and this conversation frequently takes the form of telling stories. From Hippocrates until fairly recent times, narrative case history has dominated medical thinking and has been the nucleus of much medical literature. As Kathryn Montgomery Hunter [35] notes, there is an essential narrative core to the practice of medicine. Hunter discerned a parallelism between the ethical method of casuistry and the reasoning of clinicians, which explains in part why casuistry is aptly suited to serve as the methodology par excellence for clinical bioethics. Casuistry applies to both general maxims and large sets of cases that illustrate the application of moral rules with more or less precision. Moral wisdom lies not in the recollection of maxims, but arises from witnessing the complex interplay between maxims and cases. In similar fashion, medical practice lies not in the understanding of medical science, but involves the application of medical science to particular, individual cases. Without a repository of case exemplars to draw on, medicine could neither be taught nor practiced. For Hunter, then, learning to become a clinician requires, first, learning to tell the story of a patient’s illness in standardized format, and then learning the skill of comparing and contrasting that case presentation to a collection of parallel cases within the appropriate scientific category to discern the correct diagnosis and treatment. The “right” answer in clinical reasoning requires both a thorough understanding of the basic science and also an appreciation of the unique features of the case at hand that might - and likely will - require that the standard treatment be modified [34].

As mentioned above, prior to the mid 1980s, there was scant evidence in the medical literature to suggest any interest in narrative and story. Unsurprisingly, the first area of medicine to express a systematic interest in narrative was psychiatry, particularly psychoanalysis. James Hillman [36], for instance, was comfortable denying that psychoanalysis is empirical or scientific in any sense, asserting instead

that it was a special form of “poesis,” or “making by imagination into words.” To do psychoanalysis in the 1970s was to create certain kinds of stories that have powerful impacts on the people about and to whom the stories are told. For Hillman, the stories appear superficially to be empirical and scientific because it is this appearance that gives them their power. Further, the stories are particularly powerful from the viewpoint of patients insofar as these individuals have, by virtue of their thoughts or behavior, frightened away others who might have offered help in understanding or remained silent out of fear of driving others away. In stark contrast, Eugene Brody and Judith Tormey [37] were unwilling to dismiss the empirical basis of psychoanalysis so readily. They maintained that “reality” constructed by psychoanalysis in the 1980s was intersubjective and dependent on both psychoanalytic theory and the continued reciprocity of the analyst-patient relationship. In this way, the analyst’s interpretations and interventions serve to make behavior intelligible. Narrative ineligibility is a function of deep-seated constructs shared by both analyst and patient alike. Thus understood, psychoanalytic theory is properly interpreted as a theoretical construction that serves as a principle of selection and organization in the formulation of a patient’s life narrative. Brody and Tormey would later observe that insofar as psychoanalysis is fundamentally therapeutic (and not investigative), the way in which a patient’s suffering responds to the newly created narrative forms an unavoidable criterion for the success of the endeavor.

As research advances of the 1980s and early 1990s reestablished character traits as the dominant constructs in field of personality psychology, narrative approaches began to assume new roles in the medical literature [32,33]. Like character traits, life narratives speak to the organization and structure of life, but unlike character traits, narrative approaches to personality explicitly address issues of context. Strongly influenced by social constructivist perspectives on the self, leading theorists and researchers such as Hubert Hermans, Gary Gregg, Ruthellen Josselson, Michael Pratt, Bertram Cohler and Avril Thorne developed narrative approaches to personality that placed the construction of life-stories more explicitly in the context of cultural discourse, emphasized the ways in which personal narratives make for numerous contextualized selves even as they serve to integrate lives in time, and highlighted the roles of gender, class, race, and social status in the construction and performance of life stories. The nearly simultaneous publication of the first edition (1987) of Howard Brody’s *Stories of Sickness* [34] and Arthur Klienman’s (1988) *The Illness Narratives* [38] was an early signal of a more general turn of interest toward narrative in medicine [34]. This “narrative turn” in healthcare mirrored a broadly based interest in narrative emerging concurrently in the fields of religion, psychology, anthropology, political science, linguistics, education, philosophy, and literature. This novel interest in narrative was a call to attend to stories in medicine and to think about medicine in an interdisciplinary manner. A flurry of scholarly studies on narrative appeared throughout the 1990s, including Hunter’s 1991 *Doctors’ Stories* [39], Anne Hudson Jones’ (1996) series of articles on literature and medicine in *The Lancet* [66], Hilde Lindemann Nelson’s (1997) edited volume *Stories and Their Limits* [67], the (1998) British anthology *Narrative Based Medicine* [40], and Anne Hunsaker Hawkins’ (1999) “pathography” accounts [68].

If narrative theories in the 1980s aimed to reveal the inner coherence of lives in response to the situationist critique, by the turn of the twenty-first century they had managed to appropriate and improve upon some of the main themes of the old situationist position - namely, the emphasis on local meanings, contingent performance, and the role of historical and cultural contexts in the exercise and evolution of personality [32,33]. The ways in which narrative theories and methods have helped to recontextualize personality psychology in recent years are evident in a variety of diverse studies and research programs. Researchers have demonstrated how character traits and personal needs are expressed through particular kinds of life stories, and how character traits pair with narratives to predict psychological well-being and other important life outcomes. Moving beyond character traits, researchers have also examined how particular values and moral orientations are reflected in and shaped by life narratives, family stories, and broader community and societal myths. Narrative approaches have been similarly employed in the study of difficult life events and major life decisions, revealing how individuals make sense of adversity and change and the ways in which sense-making influences the maturation of personality. Moreover, while narrative approaches have enriched nomothetic research in personality psychology, the turn toward narrative has also revived a commitment to ideographic research. With its emphasis on exploring qualitative data about individual lives, narrative methods have provided researchers with new tools for examining the particularities of a single case. If personality psychology is to make significant headway in the future, it must rely on narrative approaches to reconcile its historical divide between nomothetic and ideographical ways of understanding human beings [32,33].

The neuroscience of narrative

Human experience, both interpersonal and intrapersonal, is supremely influenced by the act of comprehending stories, producing stories, and executing the subprocesses that enable such understanding and production [41]. As narrative consumers, human beings seem insatiable, finding the personal stories of others compelling and spending significant time engaged with novels, plays, films, and television shows. This affection for narrative emerges early in childhood, when individuals develop deep-seated and long-lasting emotional attachments to the storybooks and movies that surround them. Far from a frivolous undertaking, interactions with fictional narratives have the capacity to transform beliefs about the real world. Indeed, researchers have repeatedly demonstrated that reader attitudes shift to become more consistent with ideas expressed in a narrative after exposure to fiction. As communicators, human beings are also prolific story producers, primarily employing a distinct narrative structure to communicate with others. This structured narration of experience appears necessary for maximal health. Contemporary data suggests that the more coherent and organized an account that one creates for a past trauma, the greater the probability of beneficial effects as a result of such a narration. Along similar lines, an enormous corpus of clinical literature confirms that creating coherent stories of traumatic events and incorporating them into victims' self-representation is elemental to the successful treatment of PTSD. Moreover, the benefits of narration generalize beyond the realm of personal trauma, as evidenced by the accumulation of similar advantages when the content of personal narrations are future-oriented and distinctly non-traumatic. Hence, storytelling is not merely a native element of human social interaction; it is also indispensable to one's overall health and well-being [41].

Studies of narrative discourse have historically examined goal-based stories more often than any other genre [41]. While many similar models exist, they differ from one another at a level of detail not immediately useful for comparison with brain areas and their known functions. Although early theories of narrative comprehension focus on the reader's representation of the text itself, most contemporary models harmonize on the significance of understanding how the readers represent what a particular text describes. The primary contribution of these "mental" or "situational" models is that words automatically activate experiences of their referents. Based on this premise, Raymond Mar [41] identifies three effects that underlie narrative: (i) words activate broad functional webs that are similarly activated upon the experience of the referent; (ii) present webs are articulated by former webs (and vice versa), and by constraining (initially) broad activations to currently relevant information; and (iii) integration into the current memory representation occurs by way of transition construction between articulated webs in ways comparable to the modulation of attention. Ascribing possible brain areas to support this model is daunting. Nevertheless, the task is made possible by examining those brain areas specifically associated with story-processing. Studies of discourse-level language chiefly use other lower-level language tasks as a comparison or control. In this way, brain areas engaged during narrative tasks, such as semantic processing or the encoding of stimuli into long-term memory, are taken into account. It is probable that a large number of brain regions contribute to narrative comprehension, especially those networks supporting language, memory, and perception. With this in mind, it appears that cognitive models of comprehension describe narrative processes that fall under three (broad) categories: (i) memory encoding and retrieval, (ii) integration, and (iii) elaboration and stimulation [41].

While the minimalist hypothesis contends that few memory processes are unique to narrative, memory-based researchers agree that strategic processing occurs under certain conditions [41]. Maintenance of information over extended periods of time is sustained by the persistent firing of neurons following the removal of eliciting stimuli, and the brain region that best performs this function is the frontal lobe. Neurons in the DLPFC - specifically in Brodmann's Areas (BA) 6, 8, and 9/46 - have been associated with the cross-temporal and cross-modal processing (likely) necessary for language processing. Other regions in the frontal lobe also appear similarly important, especially upon consideration of the functional areas identified by Morris Moscovitch and Gordon Winocur's [42] Working with Memory model. Processes of strategic memory revival immediately relevant to story comprehension from this model include (i) the monitoring and manipulation of contents of working memory (mid DLPFC, frontal cortex, BAs 9 and 46), (ii) the specification and maintenance of cues for long-term memory retrieval and encoding (VLPFC and BA 47), and (iii) processes of rejecting (VLPFC, BAs 11, 13, and 25) or accepting (anterior PFC and BA 10) the products of memory retrieval. It is worthy of note that several other theorists have recognized the significance of working memory for narrative comprehension, particularly the role played by inhibitory selection processes in the

execution of this ability. The multi-component model of working memory proposed by Alan Baddeley [42], for instance, includes a transient store, known as the episodic buffer, which integrates, manipulates, and maintains complex multimodal information. This buffer is also thought to permit the modeling of hypothetical situations and theoretically forms a foundation for narrative processes. Based on neuropsychological data, the functions performed by this component of working memory are thought to be localized in the right frontal lobe [41].

The integration and articulation of representations described in constructionist models are anticipated to engage the selection, monitoring, and manipulation processes in the frontal brain areas mentioned above [41]. Of these, the mid DLPFC is significant insofar as it supports temporal ordering, processing of sequential information, and temporal integration. Moreover, specific frontal areas modulate attention in ways potentially useful for achieving integration through selective and organized recruitment of other cortical areas. Orbito-frontal regions likely play an important role as a function of their link to inhibition processes. Similarly, the anterior cingulate is thought to be involved due to its association with motivation. A neuroanatomically-based model of narrative comprehension has been posited by Mark Beeman [43], who emphasizes the significance of right hemisphere brain networks. Beeman proposes that the right hemisphere appears suited for coarse, distal coding of loose associations whereas the left hemisphere is optimized for more precise coding of immediate and obvious connections. While the right hemisphere aids in activating certain inferences, the left hemisphere is thought to ultimately select and integrate these inferences into structured discourse. Construction and identification of global narrative coherence is thus believed to be aided by right hemisphere networks, although the left hemisphere is also predicted by this model. Finally, both the Event-Indexing Model and Immersed Experiencer Framework predict that an even broader network of activations may occur during narrative comprehension in conjunction with previously mentioned memory and integration areas, including the medial PFC (particularly the paracingulate cortex) and temporal-parietal junction, extending possibly to the temporal poles and amygdala [41]. Furthermore, the monitoring of spatial relations predicted by these models may lead to activation in the hippocampal regions, parietal and medial occipital areas, and posterior cingulate. Congruent with this thinking, Jordan Grafman [44] has proposed a theory of PFC function in which the PFC represents structured, sequential events that are goal-oriented and, hence, narratively schematic.

The ontology of narrative identity

As the study of narrative has swept across a wide range of academic disciplines, a variety of implicit and explicit views have developed about what narratives are and why they are important for human self-understanding [45]. There seems to be relative consensus that narrative does not merely delineate what happens, but draws out or creates meaningful connections between events and experiences, thereby rendering them intelligible. Nevertheless, there is no consensus on the precise nature of this organizing activity. In an effort to elucidate the varying approaches to this question, theorists have been divided into those who conceive of narrative as a cognitive instrument for imposing meaningful order onto human reality or experience, and those who consider it to be primarily an ontological category that characterizes the human way of being in the world - that is, something constitutive of human existence. These can be referred to, respectively, as the epistemological and ontological position on the significance of narrative for human existence. However, the attempt to draw a sharp distinction between ontological and epistemological approaches to the narrative dimensions of human existence is particularly problematic from a phenomenological-hermeneutic perspective. In this vein of thought, the basic structure of interpretation - the hermeneutic "understanding-something-as-something" - is seen to characterize all experience, even the most rudimentary sense perception. Hence, the process of interpreting experiences is not an additional procedure of knowing but constitutes the original structure of being in the world. Charles Taylor [46] summarizes this view by positing the claim that human beings are "self-interpreting animals" - beings constituted by their ways of interpreting themselves and the world. Drawing on the thought of Martin Heidegger, Hans-Georg Gadamer, and Hannah Arendt, Paul Ricoeur's *Time and Narrative* [47] and *Oneself as Another* [48] develop a hermeneutic theory of narrative subjectivity (identity) that emphasizes not only the culturally and historically grounded character of (self-) interpretation, but also the way in which cultural webs of narratives take part in shaping the horizon of interpretation, mediating the relationship of individuals to both the world and themselves. If cultural narratives affect the ways in which individuals experience things, there can be no pure, raw, immediately-given experiences, the narrative interpretation of which would necessarily be a matter of retrospective distortion. Instead,

human beings are always entangled in stories, wearing personal narratives in a dialogical relation to cultural narratives, both of which are objects of unremitting reinterpretation [45]. Hence, as Ricoeur (1981) asserts, “our existence cannot be separated from the stories that we tell of ourselves” [49, p. 156].

From the viewpoint of narrative hermeneutics, the debate concerning whether human beings live or tell narratives is based on a questionable opposition: it is not true that life “in itself” would naturally follow the structure of narrative, but neither is it true that individuals first live and then sew lived experiences into a story [45]. Rather, living and telling are interwoven with one another in a complex movement of reciprocal determination. On this view, the narrative interpretation of experience is not a process of fabricating something true and real, but is instead constitutive of being; as Jerome Bruner puts it: “life is not ‘how it was’ but how it was interpreted and reinterpreted, told and retold” [50, p. 31]. While narration constitutes something - that is, creates meaning rather than merely reflecting or imitating something that exists independently of it - this does not mean that narrative interpretations falsify experience or are somehow external or secondary to it. Human beings are the subjects of life stories that are constantly being told and retold in the process of being lived. This understanding emphasizes that human experience (in se) involves a process of repeated interpretation and sense making. The relationship between subjective experience and narrative identity can be clarified in relation to the fundamental phenomenological-hermeneutic notion of interpretation. If experience (always) has the structure of interpretation, then narratives can be viewed as having the structure of a “double hermeneutic” insofar as they are interpretations of experiences that are already interpretations: they knit experiences together by demonstrating how they are related and by creating meaningful connections between them [45]. Ricoeur uses the notion of “mimesis II” to characterize the way in which literary and historical narratives configure everyday interpretations of action (“mimesis I”). His notion of refiguration, or “mimesis III,” refers to the process by which individuals interpret these literary and historical narratives from the horizon of their concrete life situations and thereby reinterpret their experience in light of these cultural narratives. This process can be characterized in terms of a “triple hermeneutic.” In this way, Ricoeur notes, narrative “carries us beyond the oppressive order of our existence to a more liberating and refined order” [51, p. 468].

Following the central claim of Edmund Husserl’s [52] notion of the life-world, it can be argued that meaningful thought arises from contact with objects in a shared world so that one’s neural network is shaped and realizes the learned skills of perception, cognition, and action. Kant takes this thought over from Aristotle’s discussion of second nature - i.e., socialized nature - shaped in human children so that they react to the world in ways that reflect cultural attunement. The human nervous system is thereby organized to track events and objects around the subject and differentially weight the data patterns received so as to assimilate the modes of adaptation to the human life-world employed by human beings in a common social milieu. To read the narrative data patterns in that shared form of life, one relates them to what others say so that reproducible regularities of brain function are intricately interwoven with conversations or speech. The conscious narrative manifesting from one’s discursively engaged life trajectory (emanating from and continually reshaping its neural substrate) is a selection producing a lived subjective identity. Cognitive neuroscience attests that consciousness is not determined solely by bottom-up but also top-down influences of meaning and narrative coherence. This top-down effect parallels the contextual effects on letter and word perception of whole language reading activities. The imaged brain is, therefore, as responsive to the whole context and identity of the individual being imaged as it is to stimuli perceived by the relevant receptor organs. While human beings demonstrate commonality in the way information is processed and cognitive tasks are approached, the task of constructing an individual life and subjectivity is done idiosyncratically and forges a neuroimaging profile of narrative that is as unique as a fingerprint. This furnishes an approach to neuroethics that takes account of philosophical and ethical aspects of narrative identity that can be overlooked in neuroscientific thinking [53].

The subjective brain embodies the significance attached to things and the way it shapes itself in light of experience and inheritance [53]. An older individual, for instance, faced with the inability to cope at home, may see this in various ways: the loss of a distinctive place in the world, alienation from the familiar scaffolding environment that has been previous depended upon, release from cares and responsibilities that have become straining, or something else entirely. From this view, the world reflects a dance in which the significations sur-

rounding a person interact with the events that obtrude and together give shape to a narrative conception of self. Such a life story makes individuals who they are and their brains take on the shape necessary to translate that story in actuality in the world in which they live, move, and have their being. These stories are shaped by sensibilities and standards of reason so that, as Taylor remarks, "making sense of my present action ... requires a narrative understanding of my life, a sense of what I have become which can only be given in a story" [54, p. 48]. That story concerns the issues of one's place relative to the good - a negotiation within a sociocultural context (with the brain serving as the vehicle for this activity) reflecting an inclusive and ongoing editorial transformation of life episodes so that its integrity is crucial to one's function as a person. When it becomes disorganized and unstable, the narrative identity of the individual begins to unravel. For an Aristotelian, being somebody-somewhere is the result of a brain shaped to realize a certain psyche partly as a process of self-creation. Human beings are creatures who present themselves to others in ways that reflect choices constrained by their neurobiological nature and historical contingencies. In all individuals there is a struggle between diverse narrative dimensions that is evident as they endeavor to become somebody-somewhere by structuring their neurocognitive architecture in a way that conduces to living a good life with good relationships [53]. This is what drives Ronald Carson [55] to suggest that in order to make sense of themselves, human beings tell tales - tales of truth, tall tales, tales of wisdom and woe - and listen to the tales told by others. Stories, with their beginnings, middles, and ends, redeem life from contingency and make it something other than a meaningless succession of events.

Narrative identity and moral development

The use of narrative categories to understand the construal of lives through time is a productive heuristic in personality, self, and identity, and its appeal for understanding moral development is long standing [56]. Indeed, narrative is increasingly employed to account for moral personality, prosocial moral identity, and the characteristics of various moral exemplars. In the present context, the use of narrative is valuable for (at least) two reasons. First, narrative is deployed to account for a novel region of the moral life - harm-doing - and, second, for understanding a new construct - moral agency - that comes with it. It does so with rich possibilities of integration with other developmental achievements, systems, and literatures. Hardly an orphan construct, narrative moral agency is deeply informed by achievements in non-moral developmental processes. This much is significant for those who worry that moral psychology has become isolated from theoretical and empirical advances in other domains of psychology. Monisha Pasupathi and Cecelia Wainryb [57] position morality within the landscape of research programs in moral development, and agency within research on closely allied constructs, such as efficacy control and self-determination. For Pasupathi and Wainryb, moral agency is defined in terms of morally relevant actions that have implications for justice and care. The emphasis on justice and care is a traditional way to bind narrative identity with moral development. Causing harm intentionally puts one at odds with such moral principles, and the resulting tension invites narrative construction of moral agency. Failing in prosocial behavior does not require construction of moral agency insofar as prosocial acts are not obligatory (under the conception of morality forwarded by the cognitive developmental tradition, including domain theory). However, the work of moral agency is not a simple matter of making domain distinctions. While moral agency is singular, its sources are plural. Hence, morally charged situations are as complex as the individuals caught up with them. While moral identity is concerned with individual differences in moral value centrality, research has not yet identified a convincing developmental pathway, and existing investigations are limited by their reference to prosocial but discretionary behavior. As Pasupathi and Wainryb observe, when confronted with moral failure, human beings tend to construct narratives that help them make sense of moral agency. Narrative moral agency is, therefore, positioned in a way that stakes out new territory in the study of moral development [56].

Insofar as moral agency without an agent is as inconceivable as an agent without personality and selfhood, the language of moral self-identity and moral personality is not easily dispensed with. Narratives of moral agency are constructed by persons of a certain kind - moral persons with steadfast commitments that serve as cardinal components of their self-understanding. Put simply, what defines moral agency is not the actions performed - actions do not speak for themselves - but the agents of the actions [56]. The key turn of significance for moral development is how early social-cognitive units are transformed from episodic into autobiographical memory. At some point, specific episodic memories must be integrated into narrative form that references a self whose story it is. Parents, for instance, assist children in organizing events into personally relevant biographical memories in accord with the frequency and sort of questions they ask

about daily routines or recent experiences. Parental interrogatives - concerning, perhaps, what happened when one child pushed another, and what that child should do next - serve as a scaffold that helps children structure events in narrative fashion. In turn, this provides (as part of a self-narrative) action-guiding scripts - apologizing for causing disproportionate harm, for example - which becomes frequently practiced, overlearned, routine, habitual, and automatic. Parental interrogatives might also include reference to norms, standards, and values so that the development of the moral self becomes part of the child's autobiographical narrative. The narrative self that emerges from early dialogic interactions with caregivers is, then, also a moral self. The source of narrative moral development lies in the shared, positive, affective relationship with one's caregivers. It manifests as an effect of what Grazyna Kochanska [58] calls the "mutually responsive orientation" that characterizes the interpersonal foundation of conscience. This orientation is marked by shared, positive affect, mutually coordinated (enjoyable) routines, and a cooperative interpersonal set that delineates the shared willingness of the parent and child to initiate and reciprocate relational overtures. It is from within mutually responsive orientations, paired with their corresponding secure attachments, that children are eager to comply with parental expectations and standards. The committed adherence of children to the norms of values of caregivers consequently motivate internalized moral development and the work of conscience [56].

In its broadest applications, narrative identity is a label attributed to the attempt to differentiate and integrate a sense of self along diverse social and personal dimensions. Consequently, identities can be differentiated and claimed according to various socio-cultural categories: gender, age, race, occupation, socio-economic status, ethnicity, religion, and the like. Any claim of narrative identity faces (at least) three dilemmas: (i) sameness of a sense of self across time in the face of constant change; (ii) uniqueness of the person vis-à-vis others (i.e., not being the same as everyone else); and (iii) the construction of agency as constituted by self (with a self-to-world direction) and world (with a world-to-self direction). For Michael Bamberg [59], narrative identity takes off from the "continuity/change dilemma," and from there ventures into issues of uniqueness (self-other differentiation) and agency. In contrast, notions of self and sense of self develop from the self/other and agency differentiation, and from there filter into the "diachronicity of continuity and change." The engagement in activities that make claims regarding self-understanding require acts of self-identification by implementing and choosing from particular repertoires that identify and contextualize the narrative author along varying socio-cultural categories. It is helpful to consider these repertoires not as mental or linguistic schemata located in the mind, but rather as preconscious, unfixed, and open to change, depending on context and function. Narrating one's life, as an activity that makes claims about the sort of person one is, requires the ordering of characters in space and time. At the same time, self-narration unites two different ways of making sense: a scientific approach according to which events follow each other in a casual, non-teleological sense; and a hermeneutic, plot-governed approach from which events gain meaning retrospectively owing to the overarching contour by which they are configured. Additionally, personal narratives, whether fictional or factual, draw toward aspects of human life that mark something more than what is reportable or tellable, but, as Taylor [54] remarks, life- and live-worthy. Hence, self-narrating enables individuals to disassociate the speaking/writing self, thereby allowing them to take a reflective position vis-à-vis the self as character in past time-space, make those past events relevant for the act of telling (an activity in the present), and become orientated to a transcendent human good. Against this horizon, self-narration establishes itself as a privileged site for moral self-development and analysis [59].

The ability to conceive of life as an integrated narrative forms the epicenter of what Erik Erikson [60] calls "ego identity" (on the basis of which later moral identity may develop and run its course). Erikson's underlying assumption is that at some point in socio- and ontogenesis, life begins to solidify into building blocks that, when placed in correct order, cohere: important moments tie into important events, events tie into episodes, and episodes tie into a life story. It is this analogy between life and story - or, better, the metaphoric process of seeing life as storied - which fueled the narrative turn of the 1970s. However, the strength of how scholars make use of this analogy varies. On the one hand, there is a relatively loose connection according to which human beings tell stories of their lives (and the lives of others) by using particular narrative formats. Lives can be told as following an epic format or as consisting of unconnected patches. On the other hand, lives are most often told by laying out characters and their (moral) development. Character requires an internal and external form of organization. The former is typically organized through a complex interiority, usually in the form of traits, which arranges actions and unfolding events as outcomes from motives that spring from this interiority. The latter, external offset of character develop-

ment takes plot as the overarching principle that orders human action and answers the threat of discontinuous and meaningless life by a set of possible continuities. The interplay of human interiority and culturally available models of continuity (plot) gives narratives a powerful role in viewing life as a story. With narration thus defined, life transcends the animalistic and unruly body and gains the power to organize unorganized material into human temporality - the answer to non-human, a-temporal, discontinuous chaos. Another helpful application of the narrative metaphor for life emerges as the product of a narrative mode of thinking. In separate but similar ways, both Jerome Bruner [61] and Donald Polkinghorne [62] contend that there is a particular cognitive mode of making sense of the social world that is organized narratively. Theodore Sarbin [63] affiliates the cognitive claim with a more strongly formulated ontological position and argues that human beings live in a story-shaped world and are guided by narratory principles. Finally, Elliot Mishler [64] propagates the use of autobiographic narrative interview data in a contextual approach that does not limit itself to the capture of human experience or look behind the author, but rather fosters inquiry into the realm of interaction and relationships.

The foregoing conceptualizations reflect a particular cultural perspective. In contemporary American society, narratives about defying convention in order to follow intrinsic longings or suffering through life's harshest tribulations only to emerge enhanced and integrated in the end, enjoy considerable cachet and admiration [65]. Among the most popular of these narratives are stories of upward mobility, liberation, recovery, atonement, and self-actualization. In each of these forms, an intrinsically motivated individual overcomes intense suffering to experience an enhanced status or state - moving from rags to riches, slavery to freedom, sickness (or addiction) to health, sin to salvation, or immaturity to the full expression of the morally-developed self. In many of these stories, the agent experiences a negative perception of the heretofore narrative self and, as a result, works hard to redeem life and develop virtue in some way. In many others, however, the problem concerns suffering that comes to the agent through no individual fault - through unexpected illness, loss, poverty, or the like. Such redemptive narratives chart the individual's movement and identity over time from suffering to an improved disposition. In contemporary American society, then, redemptive life narratives seem to suggest that if the terrain of moral development is not steep, the narrative identity thereby produced cannot maximize its potential [65].

Conclusion

This essay identified three "crucial categories" in the history of cognitive neuroscience that have developed into, and continue to serve as, linchpins for human ethical development. Part 1 explored the category of episodic memory and included a specific analysis of the history of memory research, the neuroanatomy of memory, and the ontology of autobiographical memory. It concluded by identifying autobiographical memory judgments as a fundamental pillar of general moral judgments. Part 2 examined the category of emotional rationality and included a specific analysis of emotion and reason in Plato and Aristotle, the neuroanatomy of emotion, and the neuroanatomy of rationality. It concluded by proffering that substantive ethical reflection is inextricably emotional and rational in nature. Finally, Part 3 evaluated the category of narrative identity and included a specific analysis of the evolution of narrative in history, the neuroscience of narrative, and the ontology of narrative identity. It concluded by proposing that moral self-conception - understood as lens through which individuals are able to seek, identify, and act on the good - is the means by which moral development and moral self-actualization is made possible.

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