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Intuition and Imagination in Clinical Decision- making process

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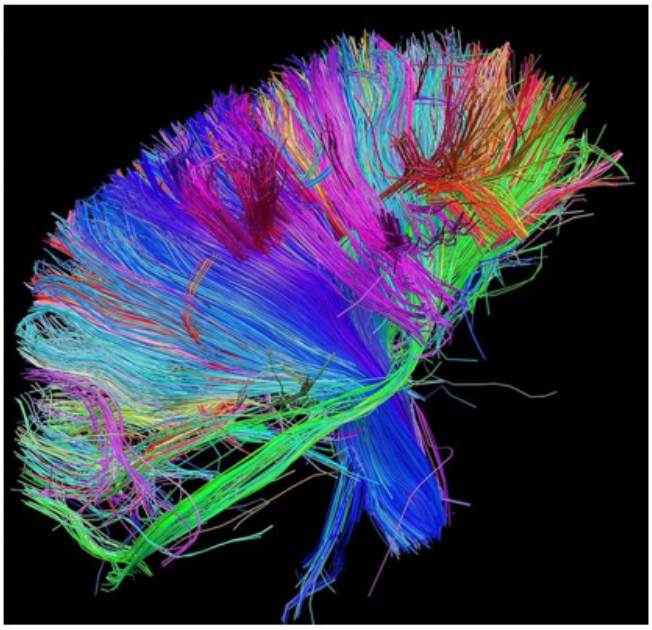
Introduction



A brain scan of white matter fibers, color-coded by direction. Laboratory of Neuro Imaging at UCLA and Martinos Center for Biomedical Imaging at MGH

In my prior essay "The Therapeutic Vision Non-Conventional Healing: A New Paradigm " I attempted to articulate a theoretical basis for human suffering and anguish based on the work of Sione Weil and James Hillman. Below I would like to move the fields of philosophy , depth psychology closer to theories of neural science and evidenced based empirical knowledge of the brain in an effrot to provide a holistic theory that includes both the hard wired neural circuits and knowledge of anatomicl and physiological processes with that of the humanistic depiction of psyche and soul.
In revisioning the therapeutic interface between doctor and patient we must deep dive into the psyche of the clinical decision making process and the ways bias influences as well as other barriers to the full surrender to the moment of interaction. One way is to examine theories of consciousness and affect from a neuro-biological perspective. Another is to look at recent scientifica advances in brain chemistry and neural networks using imaging techniques with AI.

[1]. "The Feeling of What Happens", Antonio Damasio's theory of consciousness proposed that consciousness arises from the interactions between the brain, the body, and the environment. According to this theory, consciousness is not a unitary experience, but rather emerges from the dynamic interplay between different brain regions and their corresponding bodily states.

Damasio argued that our conscious experiences are influenced by the emotional responses that are generated by our body's interactions with the environment, and that these emotional responses play a crucial role in shaping our conscious experience. This theory emphasizes the importance of the body and its physiological processes in the emergence of consciousness.

Damasio's three layered theory is based on a hierarchy of stages, with each stage building upon the last. The most basic representation of the organism is referred to as the Protoself, Core Consciousness, and Extended Consciousness.

Damasio's approach to explaining the development of consciousness relies on three notions: emotion, feeling, and feeling a feeling. Emotions are a collection of unconscious neural responses that give rise to feelings. Emotions are complex reactions to stimuli that cause observable external changes in the organism. A feeling arises when the organism becomes aware of the changes it is experiencing as a result of external or internal stimuli.

Theories of emotion currently fall into four main categories which follow one another in a historical series: evolutionary (ethological), physiological, neurological, and cognitive.

1. Evolutionary theories derive from Darwin's 'Emotions in man and the animals'.
2. Physiological theories suggest that responses within the body are responsible for emotions.
3. Neurological theories propose that activity within the brain leads to emotional responses.
4. Cognitive theories argue that thoughts and other mental activity play an essential role in forming emotions.

Note that no current theory of emotion falls strictly within a single cate-

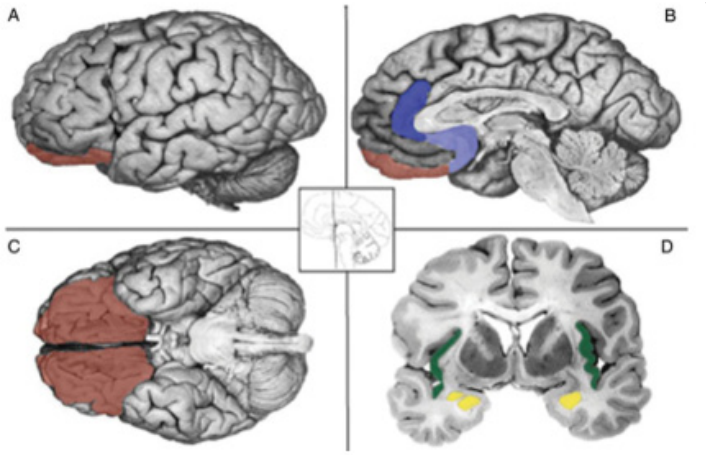
gory, rather each theory uses one approach to form its core premises from which it is then able to extend its main postulates.

Damasio's theory of consciousness has been met with criticism for its lack of explanation regarding the generation of conscious experiences by the brain. Researchers have posited that the brain's interaction with the body alone cannot account for the complexity of conscious experience, and that additional factors must be considered.

Furthermore, the theory has been criticized for its inadequate treatment of the concept of self-awareness and its lack of a clear method of measuring consciousness, which hinders empirical testing and evaluation.

Lisa Feldman Barrett a [2], Chicago based researcher, has also focused on affective science.

Emotions like anger, sadness, and fear have traditionally been thought of as innate, discrete entities, each with its own biological core: An event (seeing a snake) triggers a particular hardwired emotion (fear) and its corresponding behavioral and physiological responses (an adrenaline surge, screaming, running away).



***Locationist* Hypotheses of Brain–Emotion Correspondence. A: Lateral view. B: *Sagital* view at the midline. C: Ventral view. D: Coronal view**

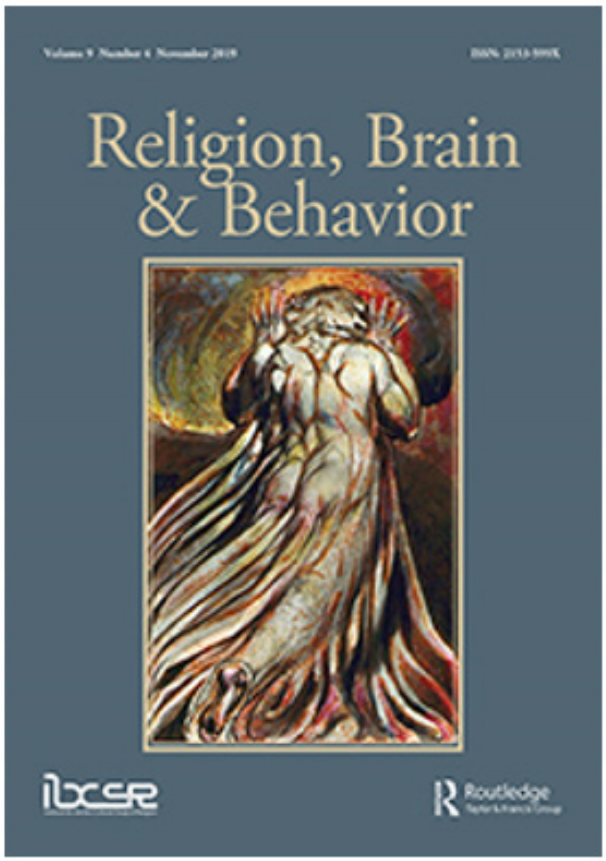
Brain regions hypothesized to be associated with emotion categories are depicted

Here we depict the most popular *locationist* hypotheses, although other *locationist* hypotheses of brain–emotion correspondence exist

Fear: amygdala (yellow); Disgust: insula (green); Anger: OFC (rust); Sadness: ACC (blue).

Her research has focused on the main issues in the science of emotions such as [3].

- What are the basic building blocks of emotional life?
- Why is it that people quickly and effortlessly perceive anger, sadness, fear in themselves and others, yet scientists have been unable to specify a set of clear criteria for empirically identifying these emotional events?
- What roles do language and conceptual knowledge play in emotion perception
- Are there really differences between the emotional lives of men and women.



More recent work by the British psychiatrist Ian McGilchrist [4], has proved a useful metaphor for exposing the way we function neurologically individually as well as societally. In a recent issue of Religion, Brain & Behavior dedicated to the work of McGilchrist, scholars reconsider his thinking about lateral asymmetries in brain function and apply his hypothesis more specifically to the theme of religious practices.

In the book, ***The Master and His Emissary*** McGilchrist ventures to create explanatory linkages between the characteristic features of the hemispheres of the human brain and the history of culture and civilization. Yet the neuroscience is complicated and the risks of oversimplification and overgeneralization are ever-present.

This is not the first time a book has attempted to employ lateral asymmetries in brain function as a lens through which to interpret culture in general and religious practices in particular. Perhaps most famously, more than four decades ago Julian Jayne used lateral asymmetries to articulate his bi-cameral mind hypothesis, which was used to explain the development of culture and religion.

James B. Ashbrook later published The Human Mind and the Mind of God (1984), which heavily relied on lateral asymmetry to explain culture, including everything from divergent forms of religious belief to variations in religious architecture.

Of course, the literature in neuroscience and religion is much larger at this point, and many of these other works address left-right brain asymmetry to some degree.

In his article, **McGilchrist** first summarizes his theory about different attentional styles being more closely associated with one or the other hemispheres of the human brain, and the brains of many other animals. Focus on detail is associated most strongly with the left hemisphere while

breadth of attention is associated most strongly with the right hemisphere. The classic evolutionary explanation (a "just-so" story in the positive sense of an imagined narrative that establishes prima facie plausibility) for hemispheric differences in attention is that feeding animals need to solve the life-and-death problem of focusing on eating and drinking while remaining vigilant about possible predators in the surrounding environment.

Alongside his divided brain hypothesis, McGilchrist also asserts, to his credit, that "both hemispheres are involved in all experience." Any neuroscientist immediately seeks a detailed account of how hemispheric specialization fits with the claim that both hemispheres are involved in all experience.

McGilchrist is far from silent on that issue, drawing especially on lesion studies. The claim is controversial, though, and he can never say enough to satisfy most neuroscientists, particularly those immersed in more recent neuroimaging studies.

Indeed Michael L. Spezio supports the contention that McGilchrist's central hypothesis lacks support from neuroscience studies, and ran a semantic meta-analysis of McGilchrist's The Master and His Emissary [7], against thousands of studies in the Neurosynth database.

The aim was to detect the extent of support for McGilchrist's specific claims about hemispheric dominance.

Reassuringly, the analysis showed that McGilchrist's reference to right and left hemispheres are associated in his own corpus with the phenomenological characteristics he attributes to them, which serves as a kind of validation of the method.

But, contrary to McGilchrist's claims, the neuroscientific evidence showed no association with the right hemisphere for empathy and only a tiny bias toward the right hemisphere for global attention.

In "Integrating The Hemispheres: The Divided Brain And Mental Health" Rod Tweedy summarized the evidence as follows [8].

The relationship between the two hemispheres of the brain is increasingly seen as central to our well-being and mental health, as a number of leading neuroscientists and psychotherapists have observed. Hemispheric imbalances and disconnections underlie many of our most prevalent forms of mental distress and disturbance, including schizophrenia, depression, autism, psychopathy, and alexithymia, as well as many relational and dissociative pathologies, including borderline, narcissistic, schizoid and paranoid personality disorders. A contemporary understanding of the nature of the divided brain is therefore of importance in engaging with and treating these conditions. As Cozolino strikingly observes: "psychotherapy can serve as a means to reintegrate the patient's disconnected hemispheres", noting that "the integration of dissociated processing systems is often a central focus of treatment":

A primary focus of neural integration in traditional talk psychotherapy is between networks of affect and cognition. Dissociation between the two occurs when high levels of stress inhibit or disrupt the brain's integrative abilities among the left and right cerebral hemispheres as well as among the cortex and limbic regions … Examples from psychiatry and neurology strongly suggest that psychological health is related to the proper balance of activation, inhibition, and integration of systems biased toward the left and right hemispheres. (Cozolino, 2010, p. 110, p. 111, p. 24).

As Cozolino suggests, psychotherapy facilitates neural integration between the cortex and limbic regions, as well as between conscious and unconscious processes, and the networks of affect and cognition, thereby restoring coordination among a number of vital systems where these have been disrupted or damaged. Hemispheric relationship lies at the heart of the therapeutic process itself, as I suggest in my book The Divided Therapist (Routledge, 2020), and a better understanding of the underlying mechanisms that enable integration between the left and right brain will, I believe, help to transform the practice of psychotherapy and psychoanalysis in the twenty-first century.

One area where a lack of integration between the left and right hemispheres can be particularly devastating is in early relational development. It is the right hemisphere of the brain which is dominant for the first eighteen months of life (Mucci, 2020, Cozolino 2010), and early developmental processes are therefore largely dependent on and rooted in right hemisphere networks of attachment, affect regulation, and implicit sense of self. Damage or impairment to these networks can lead to significant patterns of subsequent disruption and imbalances between the hemispheres, which are often the focus of later psychotherapeutic treatment.

As Schore, one of the pioneers in investigating these systems and their impact on our relational well-being, notes, "there is now consensus that deficits in right brain relational processes and resulting affect dysregulation underlie all psychological and psychiatric disorders" (2020, p. 74). "Impaired integration", observes Siegel, another major figure in our understanding of the role of hemispheric re-integration in the clinical practice of therapy, "is the root of mental dysfunction".

As Russell Meares remarks, "disintegration is perhaps the central pathology induced by relational trauma. It manifests a failure to develop a co-ordination among the elements of the brain/mind system necessary to the emergence of self". Because of these powerful and compelling associations between impaired integration, hemispheric disconnection, and mental distress, there is increasing awareness that we need to rethink and reframe our understanding of what we actually mean by "mental disorder". What we currently term "disorders" might in fact be more accurately thought of as "dis-integrations", since so many forms of distress that we encounter are rooted in forms of hemispheric disorganisation and disruption. According to the most recent neuroscientific and psychoanalytic research, disorder is not so much a breakdown in order as a breakdown in integration.

Integration and Balance

Integration does not simply mean finding a "balance" between the hemispheres, as if each were two identical and equal players: "The relationship between the hemispheres," McGilchrist observes, "is not symmetrical. Each needs the other; each has an important role to play. But those roles are not equal – one depends more on the other, and needs to be aware of that fact":

One hemisphere, the right hemisphere, has precedence, in that it underwrites the knowledge of that the other comes to have, and is alone able to synthesise what both know into a usable whole. (McGilchrist, 2009, p. 176) The right hemisphere, he notes, has precedence not only in terms of "primacy of experience", but also in terms of "primacy of wholeness", "the primacy of the implicit", "primacy of broad vigilant attention", "primacy of affect", and "primacy of the unconscious will".

It is the hemisphere that grounds us and sustains us when we start breathing, the hemisphere that underwrites the first eighteen months of our life and our earliest developmental formations, it is the hemisphere that supports and delivers every relationship, attachment, and embodied experience we have (as "the seat of our unconscious, our embodiment and emotional regulation", as Dowds notes), and it is the hemisphere that empathises with our final breath. The right hemisphere underwrites and "delivers" our direct experience of the world, which the left brain then "unpacks" and processes, before returning it to the right hemisphere, to be re-integrated into the wider picture. As Dowds notes in her compelling

discussion of this process:

McGilchrist argues—by analogy to the Hegelian triad of thesis, antithesis, and synthesis—that complete and rich processing of experience requires a sequence of transfers between the hemispheres in the following order: right, left, and then right again. This entails: holistic experiencing by the right brain; logical examination and categorisation by the left; and then a return to the right for a final synthesis of the original gestalt with the abstract analysis, so as to generate an integrated and transformed whole that is more than the sum of its parts.

This is the process that therefore underlies and underwrites integration: right-left-right ('R-L-R'). It also underwrites the integrative form of group therapy developed by Gantt and Badenoch, known as 'Systems-Centered Therapy' (SCT), which also draws on McGilchrist's groundbreaking work in this field: "SCT's theory uses a left brain map to access greater right brain knowing and integration, again a flow of R-L-R", thereby facilitating and nurturing "a group mind that supports right brain function and right-left-right hemispheric integration".

They call this movement "the ongoing collaboration of right-left-right, which is our brain's natural pattern of development and transformation", and again link it to McGilchrist's work in understanding the relationship between the 'master' hemisphere and the 'emissary'. In other words, first psycho-analysis, and then psycho-synthesis.

"The work of the left hemisphere needs to be integrated with that of the right hemisphere", notes McGilchrist. He eloquently argues "that the rationality of the left hemisphere must be resubmitted to, and subject to, the broader contextualising influence of the right hemisphere, with all its emotional complexity" and "that the rational workings of the left hemisphere … should be subject to the intuitive wisdom of the right hemisphere".

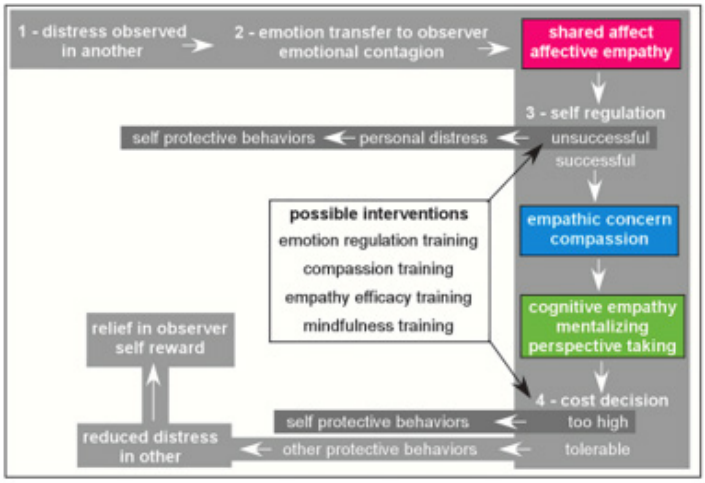
What the left hemisphere offers, brilliantly, and uniquely, is "a valuable, but intermediate process, one of 'unpacking' what is there and handing it back to the right hemisphere, where it can once more be integrated into the experiential whole" (McGilchrist). What the left hemisphere delivers, then, is dissection, analysis, separation. What the right brain delivers is wholeness, and in this again it has a peculiar resonance and relationship with therapy. For the whole purpose of therapy is wholeness – the very word "health" (as in "mental health") means wholeness (O.E. hælan, "to make whole, sound and well"). And wholeness is the result of integration: "healing emerges from integration", note Siegel and Solomon, again pointing to the intimate connections between healing, health, and wholeness (Siegel & Solomon, 2013, p. 7). The result of all this all this knowing thyself, all these examined and unexamined lives, all this distress and division and dysfunction – is integration.

It is this integration that emerges within us and between us that frees the mind from its suffering in isolation, its repeated states of chaos and rigidity that emerge from an unintegrated life.

How do you know if you're integrated? "The outcome of integration", notes Siegel, "is kindness and compassion". Kindness is a state which is not judgmental, competitive, or instrumental. These are signs and symptoms of an inner disconnection, an obstacle, a dis-organisation or dis-harmony. "From this perspective mental illness results from a disconnection from others and a retreat into selfishness", notes Cozolino (2006, p. 414). And if, as Cozolino strikingly suggests, mental illness is the result of separation from others, from disconnection and lack of integration, then mental health is the emergence into interconnection, into interdependency, into wholeness. Into kindness.

My question is how to apply these theories to organic somatic medical models.

Might these approaches to synthesis affect outcomes in say chronic illness? What is the neurobiological substrate of empathy?



Translating empathy to pro-social behavior.

Francis Stevens Katherine Taber have recently reviewed advances in neuro-science research into affect [9].

Research in the scientific literature increasingly demonstrates that empathy consists of multiple dimensions, and that defining empathy as a single encompassing term may be imprecise. Recent calls have been made for increasing empathy as means to increase pro-social behavior (see fig above).

However, contradictory evidence exists that empathy may reduce pro-social behavior. This debate has sparked confusion around what is empathy, along with the value of empathy in promoting pro-social behavior.

Individuals' responses to affective empathy, seeing the suffering of others can result in personal distress or empathic concern, which may then subsequently affect motivation for pro-social behavior. Current research in affective neuroscience suggests that combining compassion interventions in conjunction with both affective and cognitive empathy offers the most optimal likelihood that individuals will engage in pro-social behavior.

Empathic concern and personal distress are also considered to be facets of affective empathy. Empathic concern is considered to be different from emotional contagion. With emotional contagion, there is no self/other distinction, whereas in empathic concern the individual recognizes their emotional response is coming from outside themselves.

Personal distress is self-focused. Personal distress involves having a negative emotional reaction to another's suffering. Some researchers link personal distress with emotional contagion. Empathic concern is also considered to be related to pro-social behavior.

Singer and Klimecki, suggest that the individual's ability to generate compassion determines whether they respond to another's troubles with empathic concern or personal distress.

Compassion may act as a secondary step in self-regulating emotions to reduce the uncomfortable feelings evoked by seeing another in distress (personal distress). This will be discussed further when we look at the role of compassion in empathy.

Cognitive empathy has also been referred to as mentalizing, theory of mind, or perspective taking, Cognitive empathy is distinct from affective

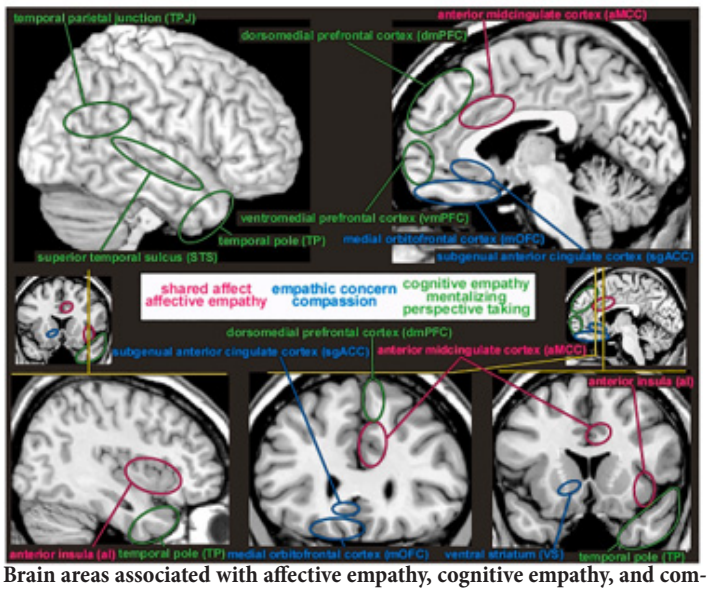
empathy on a neural network level (Stietz et al., 2019). Cognitive empathy involves the individual's ability to understand another's experience by taking another's perspective. Cognitive empathy may help one person put in context the feelings of another. Cognitive empathy in the absence of affective empathy enables understanding of what another is feeling without necessarily vicariously experiencing the same emotion. This is commonly included in the description of psychopathy, in which an individual has intact cognitive empathy, and can understand and manipulate another's feelings; but lacks affective empathy and therefore has no concern for the emotional state of the other.

It has been suggested that conditions like autism spectrum disorders (ASD) may show the opposite pattern of intact affective empathy and impaired cognitive empathy. However, differences in affective empathy have also been found within ASD. Some authors found no difference in affective empathy between healthy controls and the ASD participants (Hadjikhani et al., 2014), others suggest normal affective empathy for positive emotions and impaired affective empathy for negative emotions (Mazza et al., 2014), while another group of studies finds an exaggerated affective empathy response, supporting the empathy imbalance theory of autism.

It has been conventional wisdom that affective empathy (feeling another's pain) directly relates to the care for another human being (pro social action).

A recent study explored the complex relationship between dimensions of empathy (perspective taking, empathic concern, personal distress) and dimensions of justice sensitivity (reaction to another experiencing unfair events, reaction to being treated unfairly, reaction to personally benefiting from unfair events).

Sensitivity to justice for others was predicted by both perspective taking (cognitive empathy) and empathic concern (compassion), but not by personal distress (emotional contagion). The authors noted, the possibility that high levels of personal distress may be more likely to motivate self-protective (antisocial, withdrawal) rather than other-protective (pro-social, helping) behaviors. The authors also suggested that educational interventions to promote fairness be directed toward more cognitive aspects of empathy rather than emotional sharing.



Brain areas associated with affective empathy, cognitive empathy, and compassion. Correlating with Current Imaging Models.

The neuroscience of empathy

With the recent growth of affective neuroscience research, a more nuanced view of the different facets of empathy is being developed, allowing researchers to tease apart the components of empathy, compassion, and pro-social behavior based on the brain responses.

The multidimensional nature of empathy is not germane to a single neurobiological process. Functional neuroimaging research indicates that different components of empathy are associated with several related yet distinct brain processes marked by co-activation amongst brain regions.

The majority of studies have focused on empathy evoked by some type of pain, and this research supports the affective and cognitive empathy distinction. Affective empathy for vicarious pain (seeing someone else in pain) is associated with the activation of areas that are also activated by experiencing pain, particularly the anterior/mid cingulate cortex (aMCC) and anterior insula (aI) (see fig below).

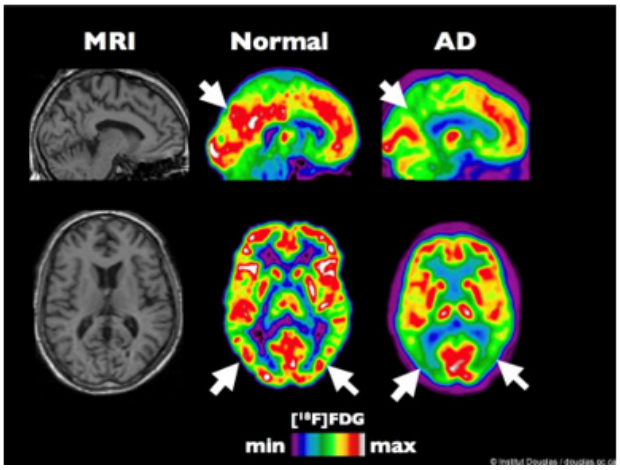
The posterior insula (pI) involves an interoceptive awareness of body states, while the aI involves a more evaluative component to the perception of pain or emotion suggest that within the left insula the posterior area is more related to personal experience of pain while more anterior regions would be associated with other's pain. Some evidence demonstrates that personal distress is associated with pI activity.

Additionally, authors have suggested increased connectivity between the left pI and dmPFC seen in personal distress is representative of individuals mistaking other's feelings as their own. Furthermore, comparing studies with pain empathy cues vs. other negative states, the aI responded to both conditions, while the mid-insula showed greater activation for pain only cues.

Cognitive empathy is associated with activations in areas associated with mentalizing and theory of mind, including the dorsomedial prefrontal cortex (dmPFC), ventromedial PFC (vmPFC), temporoparietal junction (TPJ), superior temporal sulcus (STS), and temporal pole (TP) ; Schnell (see Fig. 2). The TPJ which plays an important role in distinguishing between the self and the other may be particularly significant in identifying between self-pain versus other pain. The inferior frontal gyrus (IFG) also appears to be important in the recognition of emotional expression that is involved in empathy.

Mirror neurons in premotor and inferior parietal areas respond in a similar manner when an individual executes a goal-directed action and when they observe the same action being executed by another (Hunter et al., 2013), and neuroimaging studies do demonstrate a functional overlap in brain areas when individuals are observing and experiencing the same emotions, but this does not mean that the same neurons are activated by both conditions

Mirror neurons in premotor and inferior parietal areas respond in a similar manner when an individual executes a goal-directed action and when they observe the same action being executed by another (Hunter et al., 2013), and neuroimaging studies do demonstrate a functional overlap in brain areas when individuals are observing and experiencing the same emotions, but this does not mean that the same neurons are activated by both conditions.



The data from neuroimaging research supports these differences too. The aMCC and aI have been shown to play a fundamental role in the expression of affective empathy towards another person's pain, can also be influenced by situational factors, and functional imaging studies support this. When nurses viewed pictures of injured parts of the body both their subjective ratings (pain valence, pain arousal) and areas of the brain activated varied by whether the location was primed as being in a hospital or at home. In the hospital context compared to the home context, pain stimuli elicited lower negative ratings and greater activation in TPJ.

The brain's empathy response also varies based upon the individual who is being empathized with. This can vary by trustworthiness, closeness, social status, and group membership of the other. Singer et al. (2006) found when playing an economic game, fair players elicited more empathy than unfair players. This trustworthy effect has been further observed in faces, with trustworthy faces receiving more empathy. Observing the social exclusion of a friend was associated with activations in aI and aMCC, whereas observing the social exclusion of a stranger was associated with activations in dmPFC, precuneus, and TP. Similar, observing low social status individuals in comparison high-status individuals increasingly activated the aI and aMCC, areas associated with affective empathy.

Multiple studies have shown stronger empathy responses to one's own ethnic or racial group when compared with out-groups (Eres and Molenberghs, 2013). For example, observing injury being inflicted on a same-race hand was associated with greater activation of aI and stronger arousal (pupil dilation) than observing injury to an other-race or a violet hand, although activations in somatic and motor areas were similar).

In another study higher activations were found in aMCC/supplementary motor area when subjects viewed in-group member's pain as opposed to out-group member's pain. This work suggests that individuals may not feel the same level of distress or empathy when seeing an out-group member suffer as compared to an in-group member.

The findings above are bringing closer the biology and the humanistic aspects of pain suffering and empathy which we will look at closer in our next essay

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