A Critical Review of Mirror Neurons in Business Ethics

They Don't Reflect As Much As You Think

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Abstract

Mirror neuron activation (MNA) has been applied to number of business ethics contexts including marketing, charitable giving, organizational connectedness, and leadership. Unfortunately, the business literature has often ignored research in philosophy and psychology which can provide insight into the application of mirror neurons to business contexts and other disciplines. I will argue that the use of mirror neurons to support business decisions cannot be established solely on the existence of neural activation as it requires higher level cognitive functions that go beyond biological reductionism. But research into MNA does support their use in basic motor action understanding which is below the level of mental and psychological attributions. The corollary supports a dual-process model. On the one hand, mirror neurons are an automatic and unconscious process by which we understand human movement and, on the other hand, there is a cognitive system by which we understand action in terms of situational specifics and mental states.

Keywords: mirror neurons, empathy, neuroscience, action understanding

Over the past two decades, empathy has received considerable attention in the psychological and philosophical literature thanks, in part, to the debate between simulation-theory and theory-theory (Stueber 2006[1]). More recently, the concept of empathy has gained traction in business through numerous academic articles and books. Although defining empathy is difficult, the general idea is that by taking another's perspective or 'stepping into their shoes' it enables the identification of another's emotions and thoughts which leads to a greater understanding and explanation of behaviour. Most importantly, developments in neuroscience have contributed significantly to understanding the process by which empathy occurs. Originally found in monkeys (Rizzolatti et al. 1996) and then in humans (Mukamel et al. 2010), it was discovered there is a sharing or mirroring of neural pathways in the F5 region of the brain between the actor and the witness of the action. It is this mirroring, or so it is claimed, which allows us to understand the action intentions and emotions of others as part of a broader conception of social understanding. In other words, mirror neurons are a kind of embodied simulation or empathy that is "at the core of our experience of self and other, the root of intersubjectivity" (Gallese 2009, 526).

Mirror neuron research has been applied to number of business ethics contexts including marketing, charitable giving, organizational connectedness, and leadership. Unfortunately, the application of empathy to business has

1 The debate between theory-theory and simulation-theory each claims to solve the developmental riddle between the ages of three and five years when children begin to understand that other people's beliefs, desires, and thoughts can differ from their own. In short, it is claimed that children begin to develop what is known as a theory of mind, that is, an understanding that they themselves and other people have mental states—sometimes very different mental states— that govern actions. Before this age, children tend to assume everyone sees the world from their own point of view and have the same mental states as themselves. This milestone, say researchers, is crucial because seeing others as having different mental states from oneself is the first step to successfully explain and predict behavior. Theory-theory supporters argue that children construct theories to explain behavior, while simulation theorists extol the virtues of empathy—putting oneself in another person's shoes.

faced little analysis. I will cast a critical eye towards the idea of mirror neurons and empathy in order to address the void in the literature and, in particular, to highlight its limitations. To this end, I argue that the business research using mirror neurons to support empathy cannot be established solely on the existence of neural activation as it requires higher level cognitive functions that go beyond biological reductionism. Although research into mirror neuron activation (hereafter MNA) does support basic action imitation, it fails to provide an understanding of the intentions or goals behind the actions themselves. The corollary supports a dual-process model.

This paper is intended as a much needed critique of empathy. It does not outline, in any significant way, alternative models of ethical decision making, in part, because there is a vast and rich literature on the topic (O'Fallon and Butterfield 2005). My interdisciplinary approach to this topic is a valuable addition to the literature which, I believe, can provide greater insight into the application of mirror neuron. But let me start by defining empathy.

Defining Empathy

Defining empathy is difficult, in part, because its meaning has changed over time and there is little consistency in how it is used in contemporary literature. Sometimes empathy means feeling another's feelings; sympathizing with someone's suffering; being affected by the emotions of another person; imagining oneself in another's situation; imagining being the other person in his or her situation; imagining another's mental states; or some combination thereof (Coplan 2011). But, generally speaking, it is the concept of perspective taking or stepping into another's shoes which has become the hallmark of most contemporary discussions of empathy. Empathy has two important elements: affective and cognitive.

Affective empathy is the matching of a person's own emotions with the emotions of the target. Although people cannot directly experience the feelings of others, he or she can empathize with them by imagining themselves in like situations *as if* they were 'in their shoes.' Affective empathy is not the vicarious feeling of someone's emotions through unconscious awareness (emotional contagion[2]), nor is it being concerned for their well-being (sympathy); it is the putting of one's self into another person's situational specifics in order to make sense of those qualitative emotional states. In other words, affective empathy requires differentiating between oneself and another by consciously and imaginatively constructing "another person's subjective experience by simulating the experience of being in the other's situation" (Coplan 2011, 9).

The second element of empathy is cognitive. Cognitive empathy entails using the imagination to get inside another's head to determine their mental states (beliefs, desires, etc.). The idea of cognitive empathy is consistent with contemporary philosophic definitions regarding empathy. John Deigh defines empathy as involving, "taking another's perspective and imaginatively participating in this other person's life" (1995, 759). And Peter Goldie argues, "Empathizing with another person involves imagining the enactment of a narrative from that other person's point of view" (1999, 397). Based on these definitions an individual doesn't project their own mental states onto another person but understands *what it's like* to be them in those particular circumstances. By cognitively simulating a person's circumstances and adjusting their own mental states accordingly, he or she becomes sensitive to and can construct an understanding of the target's mind. It is cognitive empathy that defines contemporary usage and underscores synonymous terms such as theory of mind, mind reading, and perspective-taking.

Of course the affective and cognitive elements of empathy can be combined to produce a more robust definition of empathy. Following Coplan (2011), I will define empathy as having three distinct features: 1) Affective matching between an observer and the target's emotional states. Affective matching requires a person to imagine the emotional field of another but is not vicarious; 2) Cognitive perspective-taking whereby, in taking another's perspective, he or she does not project themselves into the situation but imagines undergoing the other's experiences as a result of circumstantial and situational specifics; and 3) In coming to understand the target's experiences, the observer quarantines their own emotions and mental states to avoid contamination while at the same time representing the targets situation and thereby "preserving a separate sense of self" (Coplan 2011, 15).

To help clarify the notion of empathy, an example might be helpful. Imagine having coffee with a co-worker when she confides to you she is pregnant. Knowing she and her husband have been desperately trying to have a child for years and recognizing the frustration and disappointment of infertility, you are overjoyed at her good news leaping to your feet giving hugs and best wishes. This seemingly innocuous example manifests both the affective and cognitive dimensions

2 Emotional contagion can be loosely defined as feeling another's feelings (Hatfield, Cacioppo, and Rapson 1993). For example, when witnessing a person fall or receiving a punch from another, we may metaphorically gasp, wince, and feel their pain and suffering. It is a visceral or gut reaction to the emotions of others which is usually automatic and unconscious; a person 'catches,' so to speak, the emotions of others and experiences them personally.

of empathy. In stepping into your colleagues' shoes or simulating, so to speak, their situational specifics, you come to understand the emotional and mental elements behind their statements and actions. As Frederique de Vignemont explains:

> For instance, upon learning that… [my colleague]…is pregnant, I pretend that I am pregnant and that I want a child, which makes me feel happy…The causes and reasons of the emotional state are indeed the input of the simulation…Furthermore, the output of the simulative process is not exclusively emotional. It also includes the beliefs, desires and intentions that are triggered by the emotional situation. (de Vignemont 2009, 463)

For de Vignemont, empathy provides access to both the emotional states of other people and the finer-grained mental states associated with specific contexts. In short, empathetic mind reading allows you to simulate or imaginatively input the situational specifics of the co-worker (frustration, historical disappointment, and desire to have children) in order to achieve the necessary output; i.e. isomorphic understanding of mind both affective and cognitive.

Mirror Neurons Support Empathy

There is considerable neurological evidence to support our empathetic abilities. Discovered in monkeys (Gallese et al. 1996) and then in humans (Gallese 2001; Iacoboni and Lacoboni 2009; Mukamel et al. 2010), mirror neurons in the premotor cortex are stimulated when an action is observed and then resonate, mirror-like, in the observing person; there is a neural mirroring in the actor's brain and observer's brain. The unconscious sharing of the neural networks creates cognitive and affective connectedness with others and thus is a variety of naturalized epistemology. Neuroscience can shed light on our ability to empathize and, by extension, come to know another's actions, intentions, and emotions. Iacoboni states, "In functional terms, the large-scale network composed of mirror neuron areas, insula, and the limbic system likely provides a simulation-based form of empathy" (2009, 665). Mirror neurons also allow us to directly grasp an agent's mind including beliefs, desires, thoughts, and feelings through observation As Alvin Goldman states:

> There is little doubt about the existence of processes through which patterns of neural activation in one individual lead, via their observed manifestations (behavior or facial expressions), to matching patterns of activation in another individual. If the corresponding patterns of activation are not perfect duplicates, at least they resemble their corresponding states in the target in terms of the kinds or types of mental or brain activity involved…If the term 'mental' is used broadly….they are processes of 'mental mimicry'. (Goldman 2011, 33)

Mirror neurons only 'light up' when a goal-related action is performed in the target and when the goal-related action is observed by another person. This mirroring of neurons have also been found when observing the touch of another person (Keysers et al. 2004), expressions of pain (Singer et al. 2004), and facial gestures such as disgust (Wicker et al. 2003). This naturalized mirroring system is pre-packaged and automatic.

It is important to be clear what supporters of mirror neuron activation (MNA) claim. First, MNA is the foundation upon which empathy takes places; second, empathy provides us with action understanding isolated from the forces of culture and society. For Gallese, Eagle, and Migone, neural mirroring systems are a form of embodied simulation. MNA is as way of side- stepping the argument from analogy[3] by providing access to another's mind without self- projections; it is an implicit form of empathy. Mirror neurons enable us to understand the motor actions of others, why they performed those acts, and the intentions behind them (Gallese and Goldman 1998). As Gallese, Eagle, and Migone write, mirror neural systems allow "for 'reading' another's intentions, linguistic expressions, emotions, and somatic sensations….and, more generally, for understanding another's mind" (2007, 132). Other neuroscientists make similar conclusions regarding the importance of mirror neurons.

Mirror Neurons in the Business Ethics Literature

The application of mirror neuron to business ethics is broad and variant. An exhaustive literature review is beyond my present purposes and thus a brief summary will have to suffice.

Weber (2007) argues, from a marketing perspective, mirror neurons provide practitioners with an opportunity to develop promotional strategies that will allow customers to tap into mind of others. The assumption is that through various promotional strategies, such as

3 The argument from analogy for other minds is based on the idea that since people directly know the contents of their own mind, they can infer, by analogy, other people have minds based on similar behaviour.

advertising or personal selling, consumers will come to share the emotional and intentional states of other people and thereby come to understand the attentional and motivational aspects of the marketing message without actually being participants themselves. Creative marketing messages, such as showing a protagonist undergoing an experience (e.g. the pleasure or joy of buying a new car) or having them solve a common problem via physical action (e.g. using product X to remove a stubborn stain), are more effective than passive or non-experiential marketing techniques. As Weber states, such techniques are more effective because "the brain fully processes and replicates the activity observed" (2007, 59). In other words, MNA in both observer and actor will come to share similar experiences and, by extension, understand the messages manifest in the physical activities within the marketing strategy. The implication suggests that marketers can start with the ideas, concepts, and beliefs they want to communicate to customers and then find the physical movements which will then map into the isomorphic neural responses. Neuroscience, says Weber, will be able to tell marketing researchers if their message is effective.

The effectiveness of advertising messages can be measured, in part, by looking at how well ads are retained in memory. If one of the hallmarks of mirror neurons is to allow individuals to immediately recognize and understand another's action intentions, then seeing ads that stimulate them should be better recalled by people. Lacoste-Badie and Droulers (2014) assessed mirror neural activation in subjects after viewing ads in which people intentionally grasped objects and then compared it to control ads in which no grasping took place. The authors found that ads featuring people handling products were better learnt and memorized by subjects than similar products that weren't handled. In other words, the 'grasping and acting' condition, opposed to the 'no interaction' condition, produced higher product recall and recognition. The implications suggest that advertisers should make TV commercials showing characters handling products, thus activing mirror neurons, in order to influence consumers recall and recognition of products. MNA allows subjects to distinguish the various intentions within action-based ads and, therefore, are better able to recall the ads themselves. However, the authors correctly point out their study does not actually link mirror neurons to consumption behaviour and, therefore, more research is needed.

The implications from both of these marketing studies suggests that activation of mirror neurons, in conjunction with affectively charged moral attitudes, could manipulate consumer motivation and behaviour, especially in children, and thereby undermine the self-regulatory processes of conscious decision making (Nairn and Fine 2008). This creates a paradox in advertising. If one of the goals of advertising is to inform people to make more rational decisions, then a neuroscientific account seems to undermine its very purpose and create a unethical landscape whereby the consumer's conscious mind is bypassed (Ambler and Ford 2005). In other words, advertisers can 'power up' our mirror neurons to change or alter beliefs and desires about what we want or need. From an ethics point of view, surely MNA would be deemed unethical if it violates free will.

Mirror neurons have also been linked to motivating charitable giving in children. Gallo (2007) argues that if children see their parents making financial contributions to charities, then they will equally be motivated do the same. The motivation to engage in charitable giving stems from the fact that doing so leads to a greater sense of wellbeing and happiness compared to those that only spent money on themselves (Aknin et al. 2013). It is claimed by Gallo that MNA will provide children with direct access to these reasons behind parental actions and thus ethically be motivated to do the same. As Gallo states, "the implications of mirror neuron theory… suggests that when children see their parents behaving in specific intentional manner time and after time, their brains actually experience that activity" (Gallo 2007, 4). In watching their parents, the activation of MNA in children will also provide them with a greater sense of happiness and wellbeing and, therefore, foster ethical kids.

The application of mirror neurons has also found fertile ground within organizational contexts. Pavlovich and Krahnke (2012) explore the role empathy plays in creating organizational connectedness. Neural mirroring, as Pavlovich and Krahnke articulate, is a way of unconsciously sharing one's neuropathology and thereby create cognitive and affective connectedness. More specifically, the cognitive process of stepping into another's situation and taking their perspective is a necessary condition for feeling compassion and helping behaviour. In this sense, organizational connectedness, supported by mirror neurons, can only occur if intentional actions are harmonized between individuals at the biological level. In recognizing our affective connectedness with others through compassion, organizations can transcend atomistic self-interest to create interdependent communities focused on human flourishing. Practically, empathy translates into motivating individuals to share, cooperate, and help and make better ethical decisions.

Daniel Goleman and Richard Boyatzis (2008) also support the neurological basis of effective and ethical leadership. Based on Goleman's (1995) earlier work on emotional intelligence, great leaders tend to exhibit empathy and are attuned to the moods and emotions of others. More generally, the discovery of

mirror neurons, says Goleman and Boyatzis, create a metaphorical neural Wi-Fi network which allows us to unconsciously and consciously detect and connect to another's emotional state to produce a shared experience. For senior managers, being empathetic will increase leadership efficiency by cultivating the ability to foster positive feelings in one's employees, who in turn will be more likely to follow their leader's emotions and actions because they too have mirror neurons firing and, as a result, collectively creates emotional attunement with others. To illustrate the point, the authors use the example of how the CEO of Southwest Airlines walked throughout the Dallas airport meeting and greeting his colleagues and customers. They state, "We could practically see him activate the mirror neurons… in each person he encountered. He offered beaming smiles, shook hands with customers as he told them how much he appreciated their business, hugged employees as he thanked them for their good work. And he got back exactly what he gave" (2008, 78). Although not everyone will be as empathetic and attuned as the CEO of Southwest Airlines, mirror neurons could also be harnessed through training so managers can become more socially intelligent by virtue of recognising the intentions and emotions of employees. That is, mirror neurons could provide us with an automatic mechanism for understanding the mind of others effortlessly.

A follow up study by Boyatzis et al. (2012), also concludes an association between mirror neurons and ethical leadership. More specifically, researchers found individuals who had experiences with resonant leaders (characterised by mutually positive emotions, increased sense of belonging/hope, greater feelings well-being and compassion for others) had enhanced mirror neuronal activity compared to those who had experiences with dissonant leaders which lacked such qualities. In other words, resonant leaders seemed to create a sense of attunement with others as a way of building emotional connectedness and thus laying the foundation for cognitive understanding. The implications suggest the activation of mirror neurons between leaders and employees leads to a deeper understanding of each other's actions and intentions and, therefore, leads to a greater sense of wellbeing and emotional connection.

MNA and the Problem of Intentional Understanding

Unfortunately, the business ethics literature noted above rests on a questionable philosophical assumption; namely, mirror neurons allow people to grasp the intentions of others. It is important to reiterate the claims made by supporters of mirror neurons in regards to empathy. Mirror neurons will be replicated within the observer and target and allow the observer to understand

the target's behaviour. Neurological mirroring can then, somehow, be put into one's empathetic machinery through the imaginative process allowing him or her to recognize the target's mind (emotions/mental states) and, therefore, explain their intentional behaviour. As Lamm and Majdandžic nicely explain, "mirror neurons are the very reason why we can empathize with others—being the little work horses that pull the carriage of our empathic abilities" (2015, 15). In other words, it is because of our mirror neurons, bottom-up so to speak, that we can empathize with others and come to have an understanding of mind.

However, there are problems with the bottom-up intentional understanding view. First, it is highly unlikely that MNA play a causal role in giving rise to intentional understanding because there is no one-to-one mapping of perceived movements and their associated goals at the neurological level (Lamm and Majdandžic 2015). In order for mirror neurons to play a role in our understanding of others, they would have to be individuated to specific behaviour as reasons for it. But there is no scientific evidence to suggest neural mirroring is that fine-grained. The same mirror neural regions of the brain are activated for a multitude of actions and it's unlikely they code specific action intentions by direct visual input. As Churchland (2011) points out, a cubic millimeter of cortical tissue has about 100,000 neurons and over a billion synapses. To suggest that specific action intention can be identified with specific MNA via functional magnetic resonance imaging scans is highly improbable and almost impossible to correlate without improved scientific techniques.

Second, even if observing someone reaching for an apple might create isomorphic mirroring of neurons and, indeed, one could simulate such action, it's questionable whether neuronal mirrors can reveal, in any meaningful way, the goal of reaching for the apple. Was the goal of reaching for the apple to eat it, throw it, draw it, or bake it? The individuated goal related to the intentions of others, which are imbued with mental states and emotions, cannot be reduced to MNA. Rebecca Saxe poignantly writes:

> Mirror neurones may contain representations of action sequences that make fine-grained predictions about an unfolding action, but only in terms of the physical movement, not the internal states (or, *a fortiori*, the propositional attitudes)… Mirror neurons thus fall short of evidence for ST [simulation theory or empathy] because there is no evidence that they serve as the basis for attributing any internal state to the target. Instead, they may represent only the external sequence of actions. (Saxe 2009, 450).

The problem is that any kind of neural coding of action intention would have to be content-laden. Unfortunately, mirror neurons lack mental content and therefore are unsuitable for action understanding. In other words, neural resonance, if it plays any role in our understanding of others, is founded on the false premise of being content-rich. It might be possible for mirror neurons to allow individuals to detect another's action but cannot itself give us intentional action understanding. Intentions arise from an individual's network of beliefs, desires, and emotions with conceptual content that cause the intention in question (Jacob 2008). It is highly unlikely neurons will cause intentional understanding in bottom-up fashion.

Third, it is unclear why mirror neurons are necessary for knowing the intentions of others through empathetic imagination. For example, witnessing someone crying at work might illicit isomorphic neural mirroring but the reasons for crying are still unaccounted for. Crying could be result of having been fired, promoted, had a loved one die, or been diagnosed with cancer. Action understanding and their associated reasons are often relative to specific contexts and individual histories. So, even if MNA happens at the neural level, understanding why someone is crying is usually based on refined knowledge of the social, cultural, and psychological context in which it occurs. In short, empathy is superfluous because we already know, generally speaking, under what conditions people usually cry.

Implications for Business Ethics

If my previous analysis is correct, the relationship between MNA and action understanding is weak. Using MNA to support ethical decision making seems deeply problematic. Given the complexity of reasons why people engage in specific ethical/unethical behaviour, opposed to simpler tasks such as reaching for fruit, it is unclear how such intentional actions can be captured at the neurobiological level. For example, according to traditional marketing theory, consumers are motivated to pay attention to ads and thus remember them, not by emotional and cognitive resonance, but because of specific features and benefits, brand recognition, and the desire for consumers to make rational informed decisions about how such products or services will help or hinder their life (Schmitt 1999). Making the connection between neurobiological states and marketing is superfluous because MNA are below the level of conscious decision making and, therefore, their use in understanding marketing messages is suspect.

Consider the reasons why people give to charity. Activating one's mirror neurons by seeing others give to charity does not help us understand individual motivation because people give for a host of reasons. Lasby's (2004) survey of approximately 14,000 Canadians revealed that feeling compassion for others, perhaps through mirror neuron activation, is only one of many reasons why people are motivated to give the charity. People give to charity because they have beliefs about the good specific non-profit organizations do for society, personally know someone who is affected by the cause (e.g. cancer), feel duties towards the community, act on religious beliefs, or want to reduce the amount of income tax paid. Reasons for charitable giving cannot be reduced to neuroscience.

Likewise, creating ethical organizations by recognizing employee interdependence and connectedness or social intelligence is premised on understanding the motives and intentions of one's colleagues. And understanding intentions/motives requires sufficient knowledge of background mental states (beliefs, desires, values, etc.) and conscious decision-making processes to determine what those intentions are. The implications suggest, contrary to Pavlovich and Krahnke (2012), mirror neurons offer poor explanations of connectedness within organizations but can be better understood by looking at various beliefs and desires which create ethical culture. Van Marrewijk (2004), for example, found organizations that promoted genuine communication between managers and employees (credibility), encouraged caring and collaboration between employees (respect), practiced equality and justice in how people were treated (fairness), and emphasized friendliness and a welcoming community culture, fostered greater connectedness and increase organizational performance. Similarly, contrary to Goleman and Boyatzis, employees smiling back and shaking hands with their boss, for example, might elicit mirror neuron firing but it is unclear how this reductionist strategy aids our understanding of their reasons for acting that way. A better explanation suggests employees shake hands, smile, and hug their boss because social norms about power dynamics in organizations and social conditions dictate such behaviour is ethically acceptable, even if it is not genuine.

There are, however, deeper concerns about MNA. MNA and empathy are premised on the notion of pretense (Gallagher 2009). In order for empathy to work: 1) A person must simulate or pretend to step into another's shoes and mentally assume their belief, desires, and emotions within situational contexts; 2) By stepping into another's shoes, one can manipulate or control the mental input process in order to understand what we don't have access to; i.e. another's mind. Unfortunately, neither of these aspects can be met by mirror neurons. First, neural resonance falls outside our ability to control the mental inputs necessary for empathy to take place. As Gallagher explains, "We, at a personal level, do not manipulate or control the activated brain areas—in fact, we have no instrumental access to neuronal activation,

and we cannot use it as a model" (2009, 361). Mirror neurons are not activated by us but through the viewing of another's actions. Second, this means, at the neural level, there is no pretense and, therefore, no empathy. As Gallagher explains, "it is not possible for them [mirror neurons] to register my intentions as pretending to be your intentions; there is no 'as if' of the sort required by ST [simulation theory or empathy] because there is no 'I' or 'you' represented" (2009, 362). Mirror neurons are activated automatically by witnessing another's intentional actions or engaging in intentional actions ourselves, but there is no first or third-person aspect captured at this level. Neurons merely 'fire' on or off, so to speak, and, therefore, whether we pretend to be in another's circumstances is irrelevant to their function.

In summary, mirror neurons are merely a kind of perceptual elicitation but cannot be used to definitively support empathy in the business literature. So, although at the neural level mirror neurons might be significant in triggering parallel neurological responses, understanding intentional ethical action requires propositional knowledge beyond unconscious neural processes. It is, therefore, unclear how mirror neurons could be used to support marketing, philanthropy, organizational connectedness, or social intelligence without having rich background knowledge and understanding of contextual cues which are beyond neurology. Moreover, action understanding usually requires having knowledge about ethical standards, social norms, personality and emotions of those observed, and how the individual has acted in past situations. Within this context, simulating others via mirror neurons seems superfluous and unnecessary, because motor actions themselves cannot provide a sufficient or necessary basis upon which understanding takes place[4].

Implicit Concepts and Mirror Neurons

Recall, for supporters of MNA, witnessing the actions of others should impart intentional knowledge of why the subject acted through the empathetic process. The implicit assumption of MNA is that intentional understanding is encoded within the motor action itself. In witnessing the action of others, say Gallese, Fadiga, Fogassi, and Rizzolatti, intentional knowledge should be passed onto others. They state:

> Mirror neurons could be the means by which this type of knowledge can be extended to actions performed by others. When the observation of an action performed by another individual evokes a neural activity that corresponds to that which, when internally generated, represents a certain action, the meaning of it should be recognized, because of the similarity between the two representations. (1996, 606)

The link between action execution and action understanding implies that mirror neurons can code or capture conceptual knowledge. For example, if Weber's (2007) link between MNA and marketing is correct, then neural mirroring will ensure both observer and actor will experience the same internal sensations and thereby glean valuable information about marketing messages. The identical physiological effects suggests the marketing message will be transferred from actor to observer in the form of coded concepts such as 'quality', 'value', 'save time' or 'feel good.' The claim that MNA provide children with reasons as to why adults give to charity would, likewise, have to be in the actions themselves and then simulated to provide such conceptual knowledge as 'giving', 'needy', 'altruism', 'happiness', amongst others.

Parallel comments can be made regarding the link between MNA and empathetic organizational connectedness. If Pavlovich and Krahnke are correct, MNA leads to empathetic concern for one's colleagues fostering mutual independence and leading to increased employee commitment and satisfaction. But, independent of social influences, MNA should provide the observing colleague with an understanding of concepts such as 'fairness', 'respect', and 'friendliness,' which as I outlined earlier, are important elements to creating a culture of interdependence. Likewise, great leaders can leverage the brain's social circuitry to create effective leaders. If Goleman and Boyatzis are correct, a leader's actions and emotions will be mirrored by employees and thus it is imperative for leader's to project positive emotional signs such as smiles and laughter to them. These positive signals will then be picked up, via MNA, by employees to create positive feelings and lead to increased performance. This implies concepts such as 'effort', 'support', 'succeed', 'results', 'exceptional', and the like, would be simulated by the observer and could be understood. In short, it seems mirror neurons are a form of biological telepathy.

But the connection between MNA and conceptual understanding is unlikely. Neurological evidence suggests that conceptual knowledge is not rooted in MNA but in the temporal lobes. To illustrate this claim, let me turn to neurological finding from individuals suffering from semantic dementia (Hodges and Patterson

4 The claim that MNA are necessary for empathy must also be questioned in light of situations where empathy occurs without witnessing another's movements. For example, reading a novel or newspaper might elicit empathetic reactions without visual cues about what others are doing (Lamm and Majdandžic 2015).

2007). Semantic dementia is a progressive neurological disorder characterised by an inability to understand concepts, objects, and people. Interestingly, in the first stages of impairment, memory of day-to-day events is normal and conversation is usually unaffected because conceptual deficits only affect less common words. However, as the disease progresses specific words, such as 'Montreal', 'cup', and 'pigeon', are replaced by general words such as 'city', 'object', and 'bird'. And, as the disease increases, patients end up being 'word deaf'; able to comprehend only a few speech words. The naming of drawings and pictures also becomes increasingly impaired over time. For example, when researchers asked a patient to name a picture of a zebra, the women claimed it was a horse. Semantic dementia also impacts knowledge of how to use objects, although in early stages, a person can use an object, say a kettle, but not know what it is. Neurologically, at the beginning of impairment, there is bilateral atrophy of the temporal lobes but eventually degeneration extends to the posterior and inferior frontal lobes. In short, conceptual understanding is found in the temporal lobes not mirror neurons and therefore any association is misplaced.

Moreover, appealing to MNA is unhelpful in relations to conceptual understanding. An understanding of the intention of actions are not found in the movements themselves but in the context of use and higher level cognitive thinking. As Hickok explains, "The movements themselves, as they are coded in motor cortex, are semantically ambiguous and therefore meaningless…The meanings simply aren't in the movements, and the closer you get to motor codes for specific movements…the farther removed from meaning you get" (2014, 135–36). But we don't need experiments to prove that conceptual meaning is separate from motor activity. There are many concepts we can understand without having the physical ability to perform them (fly, slither, etc.) and there are many things we can perform that aren't part of our motor system (age, digest, etc.). There are equally numerous ethical concepts we can understand which have no relation to our motor system at all such as good, bad, virtue, and so forth.

The implication for business ethics suggests that MNA does not support a conceptual understanding of marketing, philanthropic, organizational connectedness, or leadership effectiveness without appealing to how such coded concepts could be integrated within specific social contexts. And this means we must look beyond motor movements to higher cognitive systems.

Mirror Neurons and Imitation

Recall, supporters of mirror neurons and empathy argue neural correlates explain our mind reading capabilities. If my previous criticism is correct, this is a mistake. MNA does not enable knowledge of other minds in any meaningful sense. However, mirror neurons should not be dismissed outright as having no role in action understanding. An alternative explanation requires looking at what role they play within the contextual and situational specifics in which they are activated. As Hutto argues, "mirror neuron activity constitutes a distinctive kind of action understanding that comes before and below capacities for mentalistic attribution and the emergence of folk psychological competence proper" (2013, 1145). In this sense, mirror neurons are limited to and represent a kind of embodied simulation that is automatic and reflex-like. Hutto suggests we must recognize how mirror neurons enable people to do all sorts of things without falling victim to talk of 'understanding neurons.' Letting go of such reductionist ideologies produces a more realistic picture of intentional motor action. Mirror neurons don't fire in isolation of situational or contextual information available to both observer and agent. In other words, wider links must be forged between neuronal activity and the situation in which an agent's motor intention takes place while at the same time resisting temptations to associate mirror neurons with explicit conceptual understanding and mental state talk.

Looking at the developmental literature is helpful in understanding the core role mirror neurons play in action understanding. Meltzoff and Moore (1977) found that infants, some as young as 42 minutes old, were able to imitate the facial expressions of others. In order to imitate facial expressions, the infant must link their body movement with that of others via proprioception (Meltzoff and Moore 1977). And it is this link which has its basis in mirror neurons. Mirror neurons are important for engaging in imitative behaviour and thus connecting perception and then reproducing the witnessed action.

Next, consider the well-known fact that around 12 months of age children begin to follow the eye-gaze of other persons (Butterworth and Jarrett 1991). For some researchers, shared visual attention about the environment is clear evidence infants have some, albeit limited, appreciation of other minds. That is, infants are able to focus their attention on what another's gaze is about (directed at) and this gives them important clues about the attentional focus of mom, dad, brother, sister, gramma or grandpa and, in doing so, come to understand something about their minds and the action intentions associated with it. Mirror neurons, as has been pointed out, fire when we witness others engage in goal directed behaviour, such as joint attention. However, the joint attention process must not be viewed as imbuing "an explicit process in which the child conceptualizes some mental content ... and then attributes it to another person in a specific situation"(Tomasello 1999, 75). Mirror

neurons can provide humans with a pre-conceptual understanding of action.

Infants also seem to recognize the goals and intentions of others and use them as the bases for self-actions. In one experiment, investigators showed infants an adult who unsuccessfully attempted to perform an action (e.g. putting a block in a container). Although the intended goal of the adult was unachieved, infants then attempted to perform the fail action as way of fulfilling the goal. The research suggests that infants can infer the underlying goals of actions from the perceived actions of others. But we should not conclude that explicit mentalizing is taking place. A child's ability to imitate others is the foundation upon which a theory of mind is constructed. As children map their actions on others, they construct important links between their own actions and mental states learned through the socialization process.

The corollary suggests mirror neurons represent a form of joint attention at the neural level but, at the function level, there is no explicit mental state attribution. In other words, imitation and joint attention are just a few examples of how mirror neurons could provide a basic understanding of goal directed motor action without appealing to higher mind reading abilities. That is, A comes to know the goal-state of B as part of the perceptual process to do this or that; no reduction to neural processes are needed but it is a non-conceptual understanding of intentional action all the same. Joint attention and imitation are the precursor to more explicit belief/desire folk psychological attributions.

Our ability to understand the actions of our fellow humans should not be surprising if the research on mirror neurons is correct. Generally speaking, people are not mysterious alien creatures in need of conscious, explicit, and continuous explanations all the time. Basic motor and emotional connectedness between people, by virtue of mirror neural resonance, are the foundation upon which higher levels of cognitive and ethical reasoning can be facilitated. In short, psychological research indicates it would be a mistake to interpret MNA as having no role in regards to understanding basic human actions or emotions; it's a way of non-conceptually grasping what others do or intend to do and thus come to have some kind of rudimentary understanding.

In the psychological literature, there is growing support for a dual-process model; on the one hand, mirror neurons are an automatic and unconscious process by which we understand basic actions/emotions and, on the other hand, a conscious processing system by which actions are understood in terms of conceptual and situational specifics (Reynolds 2006; Fogassi 2011; Spunt and Lieberman 2013). The research not only points to a dual process of action understanding but reinforces the earlier claim that mirror neurons are insufficient at representing the intentions behind various kinds of ethical actions.

Conclusion

There is little support for mirror neurons as they apply to empathy in business ethics. Appealing to mirror neurons as way of explaining marketing, charitable giving, or organizational connectedness does little to explain the intentions behind such behaviour. Although MNA seems to play a role in basic motor understanding, using them to defend empathy in business leads to the fundamental problem of how to explain intentional action. Without appealing to higher cognitive mental states, neuroscience has little explanatory force. Perhaps, over time, as new research unfolds, science will be able to explain action intention at the neurological level, but the very nature of such explanations must be acknowledged as being different and unnecessary when it comes to explaining the mind.

However, critics might argue that my objections against mirror neurons do not eliminate empathy from business. For example, by empathizing with actors in ads, customers could be able to simulate the beliefs, desires, and emotions relevant to the product and thereby come to learn the relevant intended messages. Likewise, by empathizing with parents giving to charity, children could develop the motivating intentions necessary to engage in helpful (prosocial) behavior. Furthermore, simulating another's affective and cognitive states could lead to a better understanding between colleagues and, as a consequence, strengthen cooperation and helpfulness in the organization.

Collectively, my criticisms against MNA do not undermine empathy's role in business. My intention is not to critique affective or cognitive empathy but the neuroscience that supports the empathetic process. And the picture that emerges is troubling. Empathy, from a mirror neuron perspective, does not get us into the mind of others without higher cognitive abilities which are essential for mind reading and central to making ethical business decisions.

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