Cognitive Neuroscience and Business Ethics: How Can Each Field Contribute to the Other?

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Cognitive neuroscience is both a relatively new and rapidly growing field, signifying that this is an opportune time to delineate its influence on the field of business ethics, as well as to advocate in reverse for the influence of business ethicists to shape future neuroscience research. Of relevance for business ethics, neuroscience research on moral cognition has increased dramatically over the last two decades (see, for example, Greene & Cohen 2004, Shenhav & Green 2014, Young & Koenigs, 2007). Cognitive neuroscience already has made significant contributions to the study of moral cognition, contributions which relate to the field of ethics.[1] However, this research does not connect to business and does not incorporate a business ethics perspective. Further research that integrates business ethics and neuroscience is needed (Robertson, Voegtlin, & Maak 2016, Salvador & Folger 2009).

The aspiration to integrate two fields is not necessarily new. Over at least the past two decades, scholars in the field of business ethics have observed the challenge of bridging the gap between the work of normative philosophers and empirical social scientists (Donaldson 1994, Robertson 1993, Treviño & Weaver 1994, Weaver & Treviño 1994). Treviño and Weaver (1994) acknowledge the academic contributions of both sides, provide a comprehensive assessment of the features of both empirical and normative research, and call for further constructive dialogue between the two sides. In a follow-up article Weaver and Treviño (1994) espouse a "symbiotic"

[1] Note that in this paper I use the terms "moral" and "ethical" interchangeably.

relationship in which empirical and normative researchers work together, recognizing their compatibility and the mutual benefit to be derived, but also admitting the difficulties.

At the time that Treviño and Weaver and Donaldson were writing in the 1990s, there was little to no awareness of neuroscience as a field that might have an impact on business ethics. The question today then becomes whether any symbiosis among neuroscientists, philosophers, and socials scientists studying business ethics can be achieved. This paper addresses the following three research questions:

1) What are the most promising ways to enhance our field of business ethics through scholarly communication and collaborative work among philosophers, social scientists, and neuroscientists?
2) What contributions have already been made and how can we build on those contributions? The thinking to date among business ethics researchers has been to explore ways in which cognitive neuroscience can contribute to business ethics, but this paper also examines the opposite point of view. Specifically, how can we in the field of business ethics, both normative and empirical scholars, shape future neuroscience research in topics germane to our field and research interests?
3) What is it that neuroscience can and cannot do? We also need to recognize the potential limitations of neuroscience to philosophical and social science research in business ethics. This paper offers some preliminary suggestions.

The challenges of working across scholarly disciplines are many. One problem of integrating the work of normative and empirical researchers is communication. Treviño and Weaver (1994) illustrate this problem with a (presumably) hypothetical conversation between a philosopher and a business school faculty member at an academic conference. In this conversation each scholar denigrates the research approach of the other. To follow Treviño and Weaver's (1994), lead, one can only imagine what a hypothetical conversation would look like

among neuroscientists, philosophers, and social scientists in business ethics. It could go something like this:

Neuroscientist: My research has found that a decision-making scenario about ethical issues elicits emotion.

Social scientist business ethicist:

We already know that. We don't need brain science to tell us what we already know And just because there is neural activity in the part of the brain housing emotion, how can you be sure that emotion is tied directly to ethics? Maybe something else in the scenario is triggering emotion.

Besides, I read your paper and I could not make heads or tails out of your statistical analysis. It is as if you are speaking a different language.

Philosopher business ethicist:

How does it help me to know that emotion is involved in decision making about an ethical issue? That doesn't tell me anything about whether the decision is a good one.

If we analyze how normative and empirical perspectives have integrated or failed to integrate, perhaps that will help determine the points at which neuroscience research can expect to integrate with both, and how this hypothetical conversation can be improved.

It is perhaps easier to argue that normative business ethics has a great deal to communicate and contribute to empirical business ethics than it is to make the opposite claim about the contribution of empirical business ethics to normative business ethics. There is a sense that empirical work must always acknowledge normative work, whereas normative work need not always acknowledge empirical influence (Robertson 1993). Let's take, for example, the hypothesis that corporate codes of ethics will lead to less unethical behavior on the part of employees. This hypothesis makes no sense without normative underpinnings as to what constitutes employee unethical behavior. Recently, using the concept of corporate governance, Donaldson (2012) argued convincingly for the importance of making the normative basis of

corporate practice explicit. For example, he contends that much of agency theory, a self-described positive theory of economic behavior, rests on normative assumptions, including that agents are justified to act in the best interests of their principals, in other words, that this is a good thing. As Donaldson demonstrates, the normative basis of positive economic theories of the firm is often ignored.

This is indeed the challenge. Researchers trained in a specific discipline tend to ignore the potential contribution of their counterparts in other disciplines. Normative work may depend on context, and empirical work may rest on normative foundations, but these influences, where they exist, have tended to be implicit. This implicit nature is especially apparent in neuroscience research. Various neuroscience studies of moral cognition, for example, have used multiple conceptions of what is meant by moral cognition without making explicit exactly what comprises moral cognition, the circumstances in which it occurs, and how it leads to ethical or unethical behavior. Nor have neuroscientists explored the normative basis of moral cognition.

Thus, for over two decades we have had scholarly discussions about ways to bring empirical and normative business ethics research together—with perhaps only modest success. Conceivably the overall conclusion is that each stream of research can clearly stand on its own, but that the field of business ethics is enriched when Weaver and Trevino's (1994) symbiosis occurs. Now we are faced with an even more demanding and intriguing challenge, that is, to understand the role of cognitive neuroscience in both normative and social science empirical research domains. Salvador and Folger (2009) believe that it is not just a question of integrating cognitive neuroscience and business ethics, but that neuroscience holds promise for bridging the "normative-empirical divide" (p.19) in that it necessitates greater conceptual clarity on the part of business ethics scholars.

The paper will proceed as follows. Section I addresses the ways in which neuroscience plays a role in empirical business ethics research and how empirical business ethicists can direct future neuroscience research. This section is the main focus of the paper. Section II briefly focuses on the contributions of neuroscience to normative business ethics, as well as suggestions for how normative business ethicists can contribute to future neuroscience research. Section III addresses challenges and limitations associated with neuroscience. Section IV concludes with thoughts about our role as business ethicists in collaborating with neuroscientists.

I. Neuroscience and Empirical Business Ethics

The purpose of this section is twofold: first, to call attention to the neuroscience findings that are most applicable to the field of business ethics, and second, to suggest ways in which neuroscience research could benefit from a business ethics perspective. Perhaps the four most important areas in which neuroscience research can and does contribute to business ethics are 1) descriptions of the brain structure and function underlying ethical decision making, 2) the dual process model of decision making, 3) the role of emotion in ethical decision making, and 4) conceptualizations of moral cognition.

Brain structure and function.

An intriguing issue is the ways in which moral decision making may differ from other forms of decision making. Of course, all cognitive decision making has certain elements in common, but moral decision making can involve different forms of neural activity. Perhaps this is best illustrated by the famous case of Phineas Gage, who sustained a brain injury, but for the most part maintained his cognitive reasoning ability. His behavior, however, suggests that he lacked the ability to make appropriate moral decisions. Subsequent research on neurologically

impaired subjects has corroborated that subjects may retain their normal cognitive abilities, but at the same time exhibit unethical behavior (Greene 2005).

Since the time of the Phineas Gage case, neuroscience research has begun to map moral judgment in the brain. Over time, moral cognition has been relatively consistently associated with several brain regions (anterior pre-frontal cortex, orbitofrontal cortex, posterior superior temporal sulcus, anterior temporal lobes, insula, precuneus, anterior cingulate cortex, and the limbic system) (Moll et al., 2005). Although early studies such as the Phineas Gage case found areas specifically associated with moral cognition, more recent work acknowledges the challenges of doing so. The current conclusion is more complex, acknowledging that the connectivity of brain regions means that moral judgment and cognition are found throughout the brain. Note also that the regions that have been associated with moral cognition are also associated with other reasoning and decision making processes, making it more difficult to isolate brain regions specific to moral cognition. Moreover, activation of brain regions differs according to the situational cues of a particular study design and is dependent on the nature of the moral problem, the difficulty of the decision, and contextual stimuli.

One recent study attempts to corroborate brain structure features underlying Kohlberg's (1958) classic theory of moral reasoning. Kohlberg's cognitive-developmental approach dominated moral psychology for decades. Kohlberg posited that individuals pass through specific stages of moral reasoning in an invariant sequence. Once a particular stage is reached, it is not possible to go back to the previous stage. This theory has provided the foundation for significant research delineating the thought processes of individuals at the various stages. However, there is nothing in the theory that provides any physiological evidence that these stages exist. Prehn et al. (2015) found that the brains of subjects at the post-conventional level of

moral reasoning were characterized by increased gray matter volume in the ventromedial prefrontal cortex and subgenual anterior cingulate cortex, compared with subjects at a lower level of moral reasoning. This line of research holds promise for investigating the brain structure of individuals in relation to their ethical decision making. In other words, do the brains of individuals who make an ethical decision differ from the brains of individuals who make unethical decisions, and, if so, how? Of course, knowing this will not answer the overarching question of cause and effect.

Dual process theory. According to dual system or dual process theory, individuals make decisions using both intuition and reasoning (Cushman 2013; Greene 2014). The first process is one that is automatic and favors what is happening now, whereas the second process is what Greene terms "manual" and involves a more reasoned approach favoring what will be happening later. Greene demonstrates through his own research and that of others that distinct areas of the brain are involved in each of these two processes. Haidt (2001) has been particularly convincing about the significance of the automatic process, emphasizing the role of intuition in ethical or moral decision making. Building on this dual process model, Scott Reynolds (2006) proposes a "neurocognitive model of ethical decision making." His model specifies how individuals think as they make decisions about ethical issues using both reflexive unconscious reactions and a higher-order or reasoning process of thinking. Reynolds believes that much reaction to ethical issues occurs below the level of consciousness and is responsive to an individual's own ethics template that is both descriptive and normative. In other words, an individual decision-maker faced with the decision whether to cheat on her expense account will have an unconscious sense of what is meant by cheating on an expense account, as well as why it is wrong to do so.

Neuroscience technology seems particularly appropriate for the investigation of the role of automatic processes in ethical decision making. An attractive feature of neuroscience technology is that it eliminates the problem of social desirability bias so common in the study of business ethics. For the most part individuals believe themselves to be more ethical than other people (Messick & Bazerman 2001) and they also want to give the appearance of being more ethical (Randall & Fernandes 1991). If a survey question asks individuals if they have cheated on their expense accounts, for example, it may be assumed that the most unethical people are also the most likely to lie in order to present themselves in the most favorable possible light. The conjecture is that the most unethical people are the most likely to tell you that they are ethical. But individuals cannot control neural activity in their brain, and the assumption is that fMRI data will represent accurately the attitudes of an individual, regardless of their social desirability. The thinking here is similar to the rationale for the administration of a lie detector test, or polygraph. The usefulness of the polygraph lies in its ability to tap into physiological indices of truth telling and lying that are not under the control of the individual. Similarly, fMRI studies have explored neural responses as individuals deceive others (see, for example, Abe et al. 2007; Farah et al. 2014).

With the emergence of the relatively new field of behavioral ethics and its emphasis on intuition and decisions that occur below the level of consciousness, neuroscience has a great deal to contribute. Broadly defined, behavioral ethics is "concerned with explaining individual behavior that occurs in the context of larger social prescriptions" (Trevino, Weaver, & Reynolds 2006, p. 952). In particular, behavioral ethics seeks to explain the curious and frequently observed phenomenon that good people do bad things. Individuals seem able to engage in a range of ways to deny that their actions are unethical, many of them occurring below the level of

consciousness, including simply not recognizing the ethical dimension of a decision and rationalizations as to why the action is ethical. Moral neglect occurs when individuals fail to see or overlook the ethical dimension of their actions (Moore & Gino 2013, Tenbrunsel & Messick 2004). Through repetition individuals may become numb to the ethical nature of their actions and they may use language that focuses attention away from ethics. A lie becomes hyperbole, for example, and discrimination becomes choice or selection. Moral justification or rationalization is the way in which individuals are able shift blame for their behavior away from themselves. Common rationalizations include, "That's the way the game is played"; "Everyone is doing it"; "I am just following orders." Unconscious biases or blind spots also account for unethical behavior, and cognitive neuroscience is well positioned to study them (Bazerman & Tenbrunsel 2011).

Choice architects can structure a context in a certain way so that choices presented to individuals will lead them to make specific decisions, which may occur below the level of consciousness (Bowie 2009), in other words, a "nudge" to encourage the decision maker to make a certain decision. Thaler and Sunstein (2009) acknowledge that there can be "evil nudges" and "bad nudges." This means that nudges can be put in place in organizations to benefit the employer at the expense of the employee. However, in the case of nudges that lead to employee ethical behavior, the assumption is that both employer and employee benefit. Take a simple example such as the position of codes of ethics in organizations. If codes are prominently displayed and the message is communicated to employees that their peers are following the codes, the belief is that individuals will be more likely to conform to the codes of ethics. Desai and Kouchaki (2017) demonstrate that exposure to "moral symbols" presented by subordinates in

an organization can dissuade their superiors from engaging in unethical behavior as well as lower the likelihood that the subordinates will be asked to engage in unethical behavior.

It would be interesting to design neuroscience studies that track brain activity as individuals react to specific types of nudges. Using the codes of ethics example, subjects could be exposed to hypothetical codes and then asked to make a decision involving an ethical issue. The design of the study would involve investigating the impact of the codes on the decisions made, but would go further in exploring brain activity both as individuals are exposed to the codes and as they make their decisions.

Role of emotion. Neuroscience research in moral cognition has demonstrated the importance of the role of emotion in ethical decision making (see, for example, Moll et al. 2002; Young & Koenigs 2007). Research has shown that the pre-frontal cortex, but also the regions of the brain involved in emotional reactions, are important for a person's moral development (Greene, 2015). Combined with the importance of unconscious processes, this emphasis on emotion validates that decision making about ethical issues is not solely a conscious decision by rational actors. A rational decision maker faced with the question of whether or not to behave unethically would be expected to consider the likelihood of detection and punishment, the burden imposed by that punishment, as well as the importance of the potential reward associated with acting unethically. Instead neuroscience establishes that such calculation is at best only one part of how an individual thinks as she engages in decision making about an ethical issue (Cushman 2013).

Greene (2003) tested two scenarios and found that judgments in response to "personal" dilemmas (the man by the side of the road compared to "impersonal" ones (donating money to the poor in another part of the world) involved greater activity in brain areas that are associated

with emotion and social cognition. He concludes that because of the way our brains are wired "needy people who are up close and personal" push emotional buttons. But this still does not address the normative question of whether it is better to help the man by the side of the road than it is to donate money to the poor on the other side of the world. Instead it only tells us how people perceive these two scenarios differently and that different emotional responses are evoked. This example illustrates the importance of linking a normative perspective to neuroscience findings, a topic to which this paper returns in Section II.

What do cognitive neuroscientists mean by moral cognition?

How is moral cognition understood and studied in neuroscience research? What does it mean to discover where in the brain moral cognition resides? Which areas of moral cognition are most and least studied by neuroscientists? The assumption is that neuroscientists have an explicit conceptualization of what constitutes moral cognition. As we will see, however, very different conceptualizations of moral cognition are found in neuroscience research. It would be useful to analyze exactly what comprises moral cognition as studied by neuroscientists. Furthermore, research on moral cognition investigates topics related to ethics, but rarely related to the specific study of business ethics.

A fundamental question is whether moral cognition means moral reasoning or sensitivity to moral issues or both. James Rest (1984) proposed a four-component approach to moral behavior: moral sensitivity, moral judgment (or moral reasoning), moral motivation, and moral character. Neuroscience studies of moral cognition for the most part focus on the first two, moral sensitivity and moral judgment, but rarely make a distinction between the two. Indeed, the two are inextricably linked and both are a part of moral cognition. The study of the emotion triggered

by ethical issues has become prominent in neuroscience, which suggests that moral sensitivity and awareness are being studied.

In an important first step in differentiating aspects of moral cognition, Casebeer and Churchland (2003) describe three interrelated categories of neuroscience research on moral cognition: moral emotions, moral social cognition, and abstract moral reasoning. They also distinguish between ecologically valid and experimentally simplified conceptions of moral cognition. We have seen that moral emotions and abstract moral reasoning both figure prominently in many studies of moral cognition. Casebeer and Churchland describe moral social cognition as moral judgments that are made in a social context, a context difficult to replicate in any lab setting, but especially in an fMRI scan. Casebeer and Churchland readily concede that moral judgment and social judgment are tightly intertwined.

It is helpful to turn to the field of moral psychology for conceptions of morality. Graham et al. (2011) propose five universal elements of morality: Harm/care, Fairness/reciprocity, In-group/loyalty, Authority/respect, and Purity/sanctity. Of course, this categorization is not the only one developed by moral psychologists, but it is useful to apply it to neuroscience studies of moral cognition. The authors develop a Moral Foundations scale based on these five categories. The scale asks, "When you decide if something is right or wrong, to what extent are the following considerations relevant to your thinking?"

- Harm/Care: Whether or not someone suffered emotionally, example: "Compassion for those who are suffering is the most crucial virtue."
- Fairness/Reciprocity: Whether or not some people were treated differently than others, example: "Justice is the most important requirement for a society."
- In-group/Loyalty: Whether or not someone's actions showed love for his or her country, example:

"People should be loyal to their family members, even when they have done something wrong."

- Authority/Respect: Whether or not someone showed a lack of respect for authority, example:

  "Respect for authority is something all children need to learn."

- Purity/Sanctity: Whether or not someone violated standards of purity and decency, example:

  "People should not do things that are disgusting, even if no one is harmed."

What is interesting about this list is that that most fMRI studies seem to fall under the broad categories of Harm/care to the exclusion of the other four categories. No doubt the most famous and most dramatic neuroscience study of moral cognition is that of Greene (2001) and the trolley dilemma. The trolley dilemma involves the decision to throw a switch to divert a runaway trolley from a track on which five people will be killed to a track on which one person is killed instead. Greene also tested the variant of the trolley dilemma in which an individual must push a large stranger off a bridge who will then be killed by the trolley to keep the trolley from killing the five people on the track. Greene studied brain activity of subjects as they encountered these two versions of the dilemma, concluding that the pushing of the large stranger evoked a great deal more emotion than did flipping the switch. But what is interesting for present purposes is how this dilemma relates to moral cognition, particularly the classification scheme of Graham et al. (2011). Clearly it involves harm as individuals will be killed and the dilemma arguably ignores the other categories (fairness, loyalty, etc.) identified. Similarly, Hauser et al. (2007), Young et al. (2010), and Young and Saxe (2008) focus on scenarios involving harm; in fact most of Hauser's scenarios are variations of the trolley dilemma.

The trolley dilemma is representative of a category of moral issues that Young and Koenigs (2007) broadly classify as addressing the question, "when, if ever, is it morally

permissible to harm one to save many?" (p.70). Indeed there are multiple variations of this theme that neuroscientists have investigated. For example,

> "*Transplant*: You are a doctor. You have five patients, each of whom is about to die due to a failing organ of some kind. You have another patient who is healthy.
>
> The only way that you can save the lives of the first five patients is to transplant five of his young man's organs (against his will) into the bodies of the other five patients. If you do this, the young man will die, but the other five patients will live."
>
> "*Crying Baby:* Enemy soldiers have taken over your village. They have orders to kill all remaining civilians. You and some of your townspeople have sought refuge in the cellar of a large house. Outside you hear the voices of soldiers who have come to search the house for valuables.
>
> Your baby begins to cry loudly. You cover his mouth to block the sound. If you remove your hand from his mouth his crying will summon the attention of the soldiers who will kill you, your child, and the others hiding in the cellar. To save yourself and the others you must smother your child to death" (Greene et al. 2008).

As discussed, a significant finding from neuroscience research is that emotion plays an important role in ethical decision making. In reviewing neuroscience research on emotion, it is apparent that multiple conceptualizations of morality are employed. Vignettes or statements with a moral dimension are used to study the emotion they evoke. Beginning with Moll et al. (2002), their study of moral emotions used a conception of morality broadly conceptualized as either the welfare of society or that of other individuals. Stimuli were comprised of moral violations including physical assaults, poor children abandoned in the streets, and war scenes. Moll et al. (2001) studied moral cognition by presenting "moral" and contrasting "factual" statements to subjects. Subjects were asked to evaluate the statements as "right" or "wrong." The moral statements included:

> "Old people are useless
> They hung an innocent
> Every human being has the right to live
> The boy stole his mother's savings
> The wounded were left behind"

If we use the five components identified by Graham et al. (2011), we might conclude that the statements containing "old people," "an innocent," "every human being," and "the wounded" relate to a concept of fairness/reciprocity and that stealing falls directly in the harm/care category. But the four statements that contain elements of fairness also contain elements of harm. Leaving the wounded behind will certainly result in harm. But perhaps a loyalty dimension is present as well in the idea that old people are useless or that the wounded were left behind. Do we not owe a duty of loyalty to old people and to the wounded? These five statements illustrate the difficulty of drawing fine distinctions in categories of morality. Still the categories are useful to illustrate the areas of morality that have been most studied and those most neglected in neuroscience research.

In addition to the emphasis on harm found in neuroscience studies of moral cognition, it is important to note that to date there are few neuroscience studies that relate to business or workplace ethical issues. For example, Mendez (2006) presents subjects with a series of statements ranging from "Take the last seat on a crowded bus" to "Drive after having one drink" to "Drive out the homeless from your community." This list of statements does include two that relate directly to workplace ethics, "Take credit for others' work" and "Get more time off than your co-workers." Mendez asks subjects to rate these statements on a four-point scale from "not wrong" to "severely wrong." Going back to Graham et al.'s classification scheme one sees the difficulties in categorizing these items, although the two related to the workplace have to do with fairness.

Greene (2001) divides his vignettes into three categories: non-moral dilemmas, moral impersonal dilemmas, and moral personal dilemmas. Again it is difficult to find scenarios that have to do with a business setting although the following may come closest.

> "You are a young architect visiting one of your construction sites with your boss. Your boss is a despicable individual who makes everyone around him miserable including you. It occurs to you that if you were to push him off of the building you are inspecting he would fall to his death and everyone would think it was an accident.
>
> Is it appropriate for you to push your boss off the building in order to get him out of your life?"

So yes, broadly construed this is a workplace issue, but murder is a legal issue and this scenario does not fit any standard framework of business ethics issues.

Similarly the following are workplace issues, but again the vignettes involve illegal actions, rather than business ethics issues.

> "You are a management consultant working on a case for a large corporate client. You have access to confidential information that would be very useful to investors. You have a friend who plays the stock market. You owe this friend a sizable sum of money.
>
> By providing her with certain confidential information you could help her make a lot of money, considerably more than you owe her, If you did this, she would insist on canceling your debt. Releasing information in this way is strictly forbidden by federal law.
>
> Is it appropriate for you to release this information to your friend so that she will cancel your debt?"
>
> Or
>
> "You are the owner of a small business trying to make ends meet. It occurs to you that you could lower your taxes by pretending that some of your personal expenses are business expenses.
>
> For example, you could pretend that the stereo in your bedroom is being used in the lounge at the office, or that your dinners out with your wife are dinners with clients.
>
> Is it appropriate for you to pretend that certain personal expenses are business expenses in order to lower your taxes?"

Two conclusions can be reached from this brief discussion of moral cognition in neuroscience research. The first is that it is difficult to find neuroscience studies of moral cognition that relate to business ethics, that is, both that have a business context and that contain ethical rather than legal issues. The paucity of business ethics scenarios in neuroscience studies of moral cognition suggests an opportunity for business ethicists to develop and test scenarios

that relate to moral decisions having to do with business and the workplace. Secondly, the emphasis on harm in vignettes or scenarios in neuroscience research on moral cognition is striking. It would be instructive to develop a business ethics conception of moral cognition, which presumably would go beyond the notion of harm. Thus, those of us in the field of business ethics are presented with an opportunity to shape the nature of the study of moral cognition in future neuroscience studies. Perhaps we can reference Graham et al. (2011) and other conceptualizations of morality that go beyond issues of harm and care. We can begin a discussion of how to design neuroscience projects to investigate the research questions and agendas most fundamental to business ethicists.

II. Neuroscience and Normative Business Ethics

We have a great deal of evidence and a convincing argument from Joshua Greene (2014) that neuroscience does matter for our understanding of normative ethics. Furthermore, and this is of interest to normative business ethics research, Greene establishes that deontological thinking is automatic, whereas utilitarian thinking is manual. He goes on to claim that the neurological basis of ethical thinking will lead us to revise our normative ethics theories. Greene also argues "that a deeper understanding of moral psychology favors certain forms of consequentialism over other classes of normative moral theory" (695). Here is his argument:

> Science can advance ethics by revealing the hidden inner workings of our moral judgments, especially the ones we make intuitively. Once those inner workings are revealed we may have less confidence in some of our judgments and the ethical theories that are (explicitly or implicitly) based on them (695-696).

Thus, Greene's contention is that the impact of cognitive neuroscience on normative ethics rests on an understanding of empirical neuroscience research on decision making processes and moral judgments.

Bowie (2009) studied the specific topic of the impact of brain research, as well as psychological research, on philosophical ethics, concluding that there are conditions under which human freedom and responsibility for choice may be diminished by brain impairment. However, as Bowie (2009) rightfully points out, knowing which part of the brain houses moral cognition or how individuals engage in moral reasoning does not tell us how to resolve a moral problem, nor does it help us to know the essence of the meaning of moral cognition or whether an action is justified ethically. Bowie also argues that in some cases knowledge about brain activity may seem to restrict our freedom of choice, but in other instances such knowledge will enhance understanding of freedom and responsibility if we know how to act on the information provided by neuroscience. Although Bowie does not elaborate exactly how this can be accomplished, one can imagine, for example, that awareness of and knowledge about our unconscious biases could lead us to modify our behavior to overcome those biases.

Even if, as Churchland (2013) contends, cognitive neuroscience cannot by itself provide explanations for attitudes or behavior, it can document their source in a manner that may be fruitful for normative research. In addition to the concepts of consciousness and moral identity mentioned previously, normative business ethics is concerned with issues of free will, autonomy, agency, intent, and responsibility. Cognitive neuroscience can tell us how brain damage or impairment affects each of these phenomena. Recent work at the intersection of law and neuroscience has even found detectable differences in the brain between individuals who are knowing, versus those that are reckless, as they contemplate a crime (Vilares et al. 2017). These categories are central to criminal convictions and sentencing, but often prove elusive. Similarly, the notion of intent is focal to studies of business ethics. If neuroscience can reveal an

individual's intent, deliberate or accidental, for example, this could change our attributions of an individual's moral responsibility.

All this points to the fact that a great deal of thought and research looks at the question of what cognitive neuroscience may contribute to the field of normative business ethics. But what if we turn this around and ask a different question, that is, what does normative business ethics have to contribute to cognitive neuroscience? My answer would be that there is a great deal to learn and a great deal of further research needed to understand the normative underpinnings of cognitive neuroscience and its study of moral cognition. Some basic questions remain. Are cognitive neuroscience studies using the right conceptualizations of the moral brain? Could normative business ethicists propose ethical issues to be studied beyond obvious examples, such as lying? What are the normative areas that have been neglected by cognitive neuroscience and how can these gaps be filled? As in the previous discussion of empirical business ethics research, perhaps it would be useful for normative business ethicists to formulate and present their own conceptualization of moral cognition for research by cognitive neuroscientists.

III. Challenges and Limitations

Cognitive neuroscience requires unique positioning in relation to business ethics research. This differentiation hinges on at least three critical elements:

1) Cognitive neuroscience is a field of study concerned with the biological processes and physical aspects of the brain underlying cognition, including mental processes, experiences, sensations, intuitions, and understandings. The power of this methodology lies in its ability to investigate in real time what is happening in the brain as individuals make decisions. Cognitive neuroscience is able to tell us what part of the brain is activated in response to a particular stimulus, but research demonstrating why that part of the brain is activated is still in a relatively exploratory

phase. Unlike other social science research in business ethics, cognitive neuroscience, at least at its present stage of development, is more descriptive than explanatory.

2) There is a greater translation and accessibility challenge with neuroscience findings than with other empirical findings in business ethics. Neuroscience requires specialized knowledge and uses specific methodologies not found in other social sciences. Its influence on business ethics depends largely on an ability to understand these methodologies and their accompanying specialized language and algorithms.
3) Business ethicists, especially philosophers, may be resistant to neuroscience. Certainly, neuroscience is not unique in its potential for resistance, but it does seem that it could engender greater resistance than other fields of study, largely because it seems to challenge fundamental philosophical concepts such as autonomy, free will, and what constitutes personhood. In the sections below we will discuss each of these points of differentiation in turn.

Neuroscience as Descriptive

Cognitive neuroscience consists of a range of methodologies, including Electroencephalography (EEG) (method that places electrodes on the scalp to measure electromagnetic activity of the brain), Transcranial magnetic stimulation (TMS) and transcranial direct current stimulation (tDCS) (methods that temporarily inhibit or stimulate specific brain areas or functions). The methodology most widely used in the study of moral cognition is that of functional Magnetic Resonance Imaging (fMRI) technology, also known as brain scan technology. Participants are placed in an fMRI scanner and react to stimuli or perform tasks while their brain activity is measured. The most prominent measure is the blood-oxygen-level-dependency effect (BOLD). BOLD fMRI captures changes in the oxygen concentration of the blood flow in the brain. Neural activity increases blood oxygenation.

The resulting changes in the magnetic field measured by fMRI are used as a proxy for brain areas that are active during a task or as a response to a stimulus (Dimoka 2012; Huettel et

al. 2014). For example, the mesolimbic reward system is activated when individuals make donations to charitable organizations in the same way as when individuals receive monetary rewards (Moll et al. 2006). Thus, fMRI findings provide correlations with a psychological state that is associated with some level of heightened neuron activity. However, Churchland (2013) argued that these correlations do not necessarily comprise explanations of attitudes or behavior. Indeed, criticism of neuroscience findings contends that there is a tendency toward over-interpretation of results. The assertion is that explanations of states of mind are extrapolated from descriptions of neural activity and that correlation may be confused with causation (Rachul and Zarzeczny 2012). Despite Churchland's contention that fMRI findings do not provide explanations, Kable (2011) maintains that causal inferences can be made in the sense that changes in the environment or in psychological states cause changes in brain activity. This set of arguments suggests that we should continue to seek ways in which neuroscience can be helpful in explaining ethical decision making and behavior, but at the same time we should exercise caution in attributing explanatory powers to neuroscience findings.

Accessibility of Neuroscience Findings

Neuroscience methodologies are often dissimilar enough from other business ethics methodologies that neuroscience research results may remain opaque to those not trained in the methodologies. Perhaps it is incumbent on neuroscientists to communicate their research questions and findings in a manner that is comprehensible to business ethics scholars not schooled in neuroscience technology. Despite this need for specialized training, neuroscience findings have found their way into the popular press, and these findings appear to have an appeal to a general audience. For example, Weisberg (2008) found that people are unduly impressed by neuroscience findings perhaps because they are accompanied by visually appealing brain

pictures. Thus, the media can translate neuroscience findings for the lay public, but in a superficial way. There is a further need for more rigorous translation into terms that are relevant, actionable, and understood by scholars in other disciplines.

One approach is provided by Kable (2011) who offers a toolkit of the methods of cognitive neuroscience meant for an audience that has "very little, if any, knowledge of cognitive science techniques" (p. 63). Kable outlines three types of tests common to fMRI methodology: tests of association, tests of necessity, and tests of sufficiency. Tests of association "involve observing or experimentally manipulating psychological states of behavior, simultaneously measuring neural activity, and examining the correlation between the two" (p.65). For example, studies of cooperation show consistent activation in brain areas that have been associated with reward processing (see for example, Rilling at al. 2002). Tests of necessity "involve disrupting neural activity and showing that this manipulation impairs a specific behavioral or psychological function" (p.66). Finally, tests of sufficiency "involve enhancing neural activity and showing that this manipulation results in a specific behavioral or psychological state" (p. 66). Kable's tests of association tend to be the most relevant for business ethics researchers, as well as perhaps the most easily understood by non-neuroscience scholars. Nevertheless, the presentation of neuroscience results is not always accessible to those not trained in neuroscience.

Potential Resistance to Neuroscience

Churchland (2013) discusses the phenomenon of resistance to neuroscience and the reasons for such resistance. Resistance includes the fundamental contention that we cannot derive normative implications from neuroscientific results (Berker 2009), nor can neuroscientific findings radically change our conception of ourselves (Morse 2004). One concept that may prove

especially resistant to neuroscience findings is that of moral identity. If neuroscience is telling us that moral identity is comprised solely of a set of neurons and their connections, this seems to challenge conventional philosophical thinking about what constitutes the moral self. Furthermore, if for some individuals, moral identity has a religious basis, neuroscience seems particularly ominous, as there may appear to be no place for the soul in a discussion of the mind and the brain. In addition to moral identity, concepts of free will, autonomy, intent, and responsibility for moral actions may be influenced by cognitive neuroscience research. For example, stimulating or inhibiting certain brain functions can result in reduced autonomy, which some would interpret to mean reduced responsibility for one's actions.

Resistance to neuroscience is not confined to academicians. In Tom Stoppard's play, *The Hard Problem*, a sentiment of anti-science pervades. The play's message is that science will never be able to explain the conscious experience, indeed, that some things are beyond scientific explanation. Perhaps we could be equally pessimistic about the ability of science to explain morality, or we could be more sanguine and believe that science can contribute to our understanding of morality. For example, James Q. Wilson in his book *The Moral Sense* (1993) relies on science and the scientific method to provide support for the existence of morality. Wilson's aim is "… to uncover the evolutionary, developmental, and cultural origins of our moral habits and our moral sense" (p. 26). And although scholars interested in the intersection of ethics and neuroscience, including Roskies (2002), admit that neuroscience findings raise more questions than they can answer about the nature of determinism and free will, Roskies believes that neuroscience research will shape our views about the essential nature of ethics. Of course, this notion of reduced responsibility for our actions is controversial, but deserving of the attention of normative business ethicists.

IV. Conclusion

The aim of this paper has been to begin a conversation about how those of us in the field of business ethics can learn from neuroscience, as well as how we can contribute to neuroscience research. As discussed, the challenges are many, but the opportunities are pronounced. As this paper has noted, normative and empirical work in business ethics benefit when each stream acknowledges the considerable role of the other. Similarly, it would be a missed opportunity if business ethicists treat neuroscience as a completely separate field of study. Neuroscience is still in a relatively nascent stage, which affords the prospect of influencing future work to further understand how the brain processes ethical issues in business.

This paper has contended that neuroscience is different from other empirical social sciences and thus perhaps more challenging to integrate with our field of business ethics; nevertheless, we would be remiss in ignoring its potential ability to contribute to understanding of ethical decision making and behavior. Noteworthy findings in moral cognition already hold promise for shaping future business ethics research. As this paper has discussed, we can identify neural activity underlying ethical decision making and, to a certain extent, can differentiate it from neural activity associated with other types of decision making. We know that emotion and intuition play a sizable role in ethical decision making. We also know that impairment in certain areas of the brain can alter ethical decision making, as well as ethical behavior. Clearly there is much that we still don't know and that as business ethicists we would like to know. We have questions that neuroscientists can help to answer.

What does this look like in practice? Business ethicists can work with neuroscientists to design interdisciplinary research to address foremost questions in the field, whether it be how to influence unconscious biases, how to structure organizational rewards that encourage employee

ethical behavior, or how choice architecture can work to elicit ethical behavior. What goes on in the brain as individuals face questions about how to prioritize stakeholder interests? Do trust and distrust look different in the brain? What about cooperation versus competition? Additionally, and perhaps more importantly, as business ethicists we can advance our own conceptualization of moral cognition, one that goes beyond scenarios depicting harm. We would like to know more about the brain's neural activity underling concepts of justice, duty, and rights, to name only a few seminal theories in business ethics.

Barring interdisciplinary work, it is incumbent upon us at least to familiarize ourselves with the methodology of neuroscience research, its analysis and interpretation. We need to be able to read articles with some level of knowledge and sophistication and to have a sense of which research questions in our field are compatible with neuroscience technology. The field of business ethics has much to learn from neuroscience research, as well as much to teach it.

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