This section provides reactions to current and emerging issues in bioethics.

Hot Baths and Cold Minds

Neuroscience, Mind Reading, and Mind Misreading

JOHN HARRIS and DAVID R. LAWRENCE

Abstract: The idea—the possibility—of reading the mind, from the outside or indeed even from the inside, has exercised humanity from the earliest times. If we could read other minds both prospectively, to discern intentions and plans, and retrospectively, to discover what had been "on" those minds when various events had occurred, the implications for morality and for law and social policy would be immense. Recent advances in neuroscience have offered some, probably remote, prospects of improved access to the mind, but a different branch of technology seems to offer the most promising and the most daunting prospect for both mind reading and mind misreading. You can't have the possibility of the one without the possibility of the other. This article tells some of this story.

Keywords: neuroscience; fMRI; brain imaging; mind reading; thought identification; brain fingerprinting

Preamble

Our story of mind reading begins with poetry. The science of the brain—neuroscience—is, at least in part, in the mind-reading business. Neuroscience attempts, inter alia, to replace the eyes as windows to the soul. We start with poetry because, historically, poets have been the neuroscientists who have best understood the ways in which the mind works. And we are concerned with hot baths because one of the greatest of all poets, Homer, used this image as a metaphor for the human condition, a condition that not only appreciates hot baths but also notices their absence and understands the wider meaning of both these states.

In a wonderful essay on Homer's Iliad, Simone Weil analyzes Homer's portrayal of the moral realities and ironies of human life in a memorable passage. She starts with these famous lines from *The Iliad*, in which Andromache, Hector's wife, awaits Hector's return from battle:

> She ordered her bright-haired maids in the palace
> To place on the fire a large tripod, preparing

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> A hot bath for Hector, returning from battle.
> Foolish woman! Already he lay, far from hot baths,
> Slain by grey-eyed Athena, who guided Achilles' arm.[1]

Weil comments: "Far from hot baths he was indeed, poor man. And not he alone. Nearly all the *Iliad* takes place far from hot baths. Nearly all of human life, then and now, takes place far from hot baths."[2] She might have said, for it is surely consonant with the wistful regret of both Homer and her own commentary, that nearly all of human life takes place far from comfort or understanding.[3] But this passion for understanding the hearts and minds of others, even far from hot baths, reminds us of both its attraction and importance.

Hector's last words as he lies dying at the hand of Achilles and as far as it is possible to be from hot baths, takes up our theme: "Hector of the flashing helmet spoke to him once more at the point of death. 'How well I know you and can read your mind' he said."[4]

Introduction

Soul-searching is not identical to mind reading, nor is mind reading identical to a complete description of brain activity (even if it were possible to achieve such a thing). An analogue here may be the relationship between genetics and epigenetics. Many neuroscientists and philosophers of neuroscience seem stuck in an era equivalent to genetic essentialism and oblivious to the era of epigenetics and its cerebral equivalent. Our suggestion is that desires, motives, intentions, and attitudes, and both external and first-person access to these, relate to a map of the brain or a description of brain activity as understanding the behavior or functioning of a creature relates to the map of its genome. We know from contemporary epigenetics that the behavior of genes—gene expression—is influenced by the coding of the genes but also by environmental factors as well as, for example, being modulated by patterns of inhibitors and promoters other than DNA that are set up within the cell and are self- perpetuating.

Wittgenstein famously remarked in connection with establishing a reference—the object referred to—in speech: "If God had looked into our minds he would not have been able to see there of whom we were speaking."[5] Why wouldn't he?

Consider the questions: Is this murder? Or is this rape? The answers to questions such as these are not to be found in states of the brain, not least because, in the case of rape, the consent or otherwise of the other party is not to be found in the brain state of the putative rapist and because, in the case of murder, whether or not the act of killing might constitute self-defense is likewise not to be found in brain states.

Relatedly, we have the illusion that memories are traces of experienced events, thoughts and feelings brought to mind sometime after the experiences themselves. But although memory is pretty certainly due to brain states, two further "things" are not. First, one hypothesis casts doubt on whether what we 'remember' actually happened and therefore whether or not it is in fact a memory. The second hypothesis is that our memory is a recalled trace of earlier experiences, including thoughts and feelings occasioned by something in the world. We simply do not reliably know whether apparent memories are simply memories of a previous memory, which itself involved many hypotheses about events both in the mind and elsewhere in the world. We return to these issues in a moment.

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Mind Reading: First Folio

Windows of my mind[6]

Mind reading and the relationship between the face, particularly the eyes, and the contents of the mind or indeed of the soul have been and remain a fascination for humankind. This preoccupation reflects a fact about human beings. We want to read minds, including our own; we want this so that we understand what kind of person the bearer[7] of the mind is—who we have to deal with, how they are likely to behave, what they want, what they are likely to do, and what they have done. And we need to know these things about ourselves quite as much as about others. What manner of man am I? What sort of woman are you?

Mind reading, if and in so far as it can be done, would be a powerful cognitive enhancer and, like all knowledge, a significant source of power.

The image of the eyes or the face as windows into mind or the soul often plays a seminal role in the imagery we use to discuss the project of mind reading. Perhaps the earliest references to the eyes as windows to the soul come from Cicero, who is here expanding on the nature of oratory—formal speechmaking: "The countenance itself is entirely dominated by the eyes. . . . For delivery [oratory] is wholly the concern of the feelings, and these are mirrored by the face and expressed by the eyes."[8] Leo Tolstóy, in *War and Peace*, talks of the "moral physiognomy" that reveals the mind in the face. In Book VI, he notes a change in Natàsha after the departure of Prince Andrew:

> But a fortnight after his departure, to the surprise of those around her she recovered from her mental sickness just as suddenly and became her old self again, but with a change in her moral physiognomy, as a child gets up after a long illness with a changed expression of face.[9]

Let's continue in perhaps the most promising place, with a few reflections by one of the greatest of all neuroscientists, William Shakespeare.

Introspection

We should not forget that one important dimension of mind reading involves reading the mind from the inside, that is, introspection. But this is not more reliable than any other of the forms of mind reading, not least because of the tendency we humans have for self-justification and self-deception.

Hamlet, confronting his mother, Queen Gertrude, with the infamy of the murder of his father, and of what Hamlet regards as her "incest" with her new husband, his father's brother, elicits this response:

> O Hamlet, speak no more
> Thou turn'st my eyes into my very soul,
> And there I see such black and grained spots
> As will not leave their tinct.[10]

In *Macbeth* we find Duncan lamenting his inability to detect treason in the Thane of Cawdor,[11] whom he has just executed for that treason.

> There's no art
> To find the mind's construction in the face:
> He was a gentleman on whom I built
> An absolute trust—[12]

In *A Midsummer Night's Dream*, Helena insists:

> Love looks not with the eyes, but with the mind,
> And therefore is wing'd cupid blind;

Helena is saying that love is not interested in superficialities like beauty, which is only skin deep, but in what lies behind. Love springs from imagined

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understanding, often leavened with a strong yeast of hope or optimism about the nature of what lies beneath the surface, beyond the physical gaze. But she also insists that only the mind can deliver the required understanding of what others are like, and this it constructs from many sources, as we shall see.

But it is in *Richard III* that Shakespeare comes nearest to our present preoccupations. Richard, newly crowned but insecure, wants Buckingham's approval of the murder of the "Princes in the Tower" (Edward V of England and Richard of Shrewsbury, Duke of York—Edward being the "legitimate"[13] heir to the crown worn by Richard of Gloucester, of England, the third of that name). Richard III is initially reluctant to spell out his murderous plans and so expects the Duke of Buckingham to anticipate his wishes, the function of all good courtiers from time immemorial:

> Ah, Buckingham, now do I play the touch,
> To try if thou be current gold indeed.
> Young Edward lives—think now what I would speak.[14]

That is to say, "read my mind." Later he makes this thought clearer to the "dull" Buckingham:

> Shall I be plain? I wish the bastards dead,
> and would have it suddenly perform'd.[15]

Thought-Identification Technologies: Second Folio

It is probably correct to assume that we are a long way from a neuroscientific breakthrough in mind reading. However, recent developments in neuroscience,[16] and in particular in brain imaging, have created expectations that, for example, criminal intent might be detectable in brain states. If this is really possible, which we personally doubt, then this information might be used as evidence justifying restraint or detention prior to any offence being committed. John Harris served on a working party of the Royal Society in 2010–2011 that examined these issues, and although that working party emphatically concluded[17] that the case was not proven for the use of brain-state evidence in criminal trials, this situation may well be subject to future revision.[18]

"Thought-identification" technologies, as they might be properly termed, are advancing implacably; though in an arena as complex as the human brain, great leaps in technology may not equate to commensurate leaps forward toward our goal of reliably and clearly reading thoughts.

Much of the focus has been on fMRI (functional magnetic resonance imaging) techniques and the information recorded by these types of scans, which build on traditional MRI by virtue of their ability to indicate neuronal activity within three-dimensional spaces, or voxels, ranging from 4 to 1 mm^3.[19] This sensitivity is reliant on the blood oxygen level dependent (BOLD) signal[20]—the para- and diamagnetic properties of oxygenated and deoxygenated blood, respectively, in the vicinity of a neuronal cluster, as caused by the particular hemodynamics necessitated by the operation of those neurons.

Thought-identification research that has utilized fMRI data depends on the BOLD signal to figuratively illuminate regions of the brain that are known to be associated with a particular neurological activity. For instance, one widely discussed study by Nishimoto and Gallant[21] recorded visual cortex response activity while subjects viewed a wide range of imagery. By collecting several thousand hours of data, it was possible to map particular voxels to particular

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stimuli. Subsequently, the researchers were able to develop a modeling algorithm that could identify and (crudely) reconstruct the images and video from the neural activity data itself; thereby "reading" what the brain saw. In a similar fashion, other researchers[22] have mapped activity resulting from merely thinking about a number of simple known images—a screwdriver or celery—and can accurately predict which of these a subject is considering. Similarly, it has been demonstrated that this technique can be utilized for auditory information-reconstructing speech as digital sound from the mapped neural activity.[23]

This technique can only use "live" activity—that is, when the subject is actively inside the hardware and actively viewing the images—but, last year, a study from Cornell had some success in reconstructing imagination using a similar fMRI process. Instead of viewing images, subjects were asked to visualize people with particular sets of personality traits. They were then asked to imagine how these "personality models" might react or behave in a number of circumstances. The analysis that followed

> examined how protagonist identity and trait information interact, or how the brain associates specific personality traits with a given protagonist . . . suggest[ing] that personality information is integrated in the [medial prefrontal cortex], producing a model for behaviour predictions.[24]

In other words, the study was able to "read," in simple fashion, the thoughts of the subject regarding these imaginary constructs without the need for active input.

The detection of intention is also in its infancy and is limited to simpler motor functions rather than such complex, abstract plans of action as may be required for criminal enterprise. Chun Siong Soon, Marcel Brass, Hans-Jochen Heinze, and John-Dylan Haynes[25] published research in which they were able to predict the use of the right or the left hand in a button-pushing exercise by identifying BOLD "readiness potentials"—up to 1,000 ms before the action took place. Of course, 10 seconds is perhaps less than desirable for *Minority Report*[26]–style pre-crime prosecution.

Nonetheless, there has been much research into using fMRI and the BOLD effect for the detection of falsehood.[27] Utilizing processes of baseline determination not dissimilar to those detailed previously, these studies generally concluded that, in the words of one study, "attempted deception is associated with activation of executive brain regions"[28]—in other words, that certain regions are more active when formulating a lie than when formulating the truth. However, the studies are inconsistent as to the specific regions they indicate; their various suggestions include the "right anterior frontal cortices,"[29] "the anterior cingulate cortex, the superior frontal gyrus, . . . the left premotor, motor, and anterior parietal cort[ices],"[30] and the "temporal and sub-cortical [regions],"[31] effectively indicating that large swathes of the brain are activated by falsehood. There are also important questions about the specificity of such studies—for example, it is not clear whether fMRI techniques can differentiate between deliberate deception and more innocent falsehood.[32]

Another technology has been used specifically to attempt to read minds for the purposes of lie detection: electroencephalography (EEG), or "brain fingerprinting." This technique differs from fMRI in that it does not image the brain itself but rather records the patterns of electrical activity within it through electrodes placed on the scalp, in this case with particular focus on the

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wavelength and frequency of P300, an event-related potential that "signal[s] an individual's recognition of a unique or meaningful item."[33] P300 is unconscious and uncontrollable, unlike conventional galvanic or heart-rate-based polygraphs. Thus, EEG could theoretically be used to determine whether a situation or a piece of evidence was familiar to the subject, regardless of his or her claims.[34] It also has an advantage over fMRI in that it is not a control-question test, wherein detection can only be effective with certain formulations of questions. Still, once again, the results for the technique are somewhat mixed[35] and were obtained only in highly controlled situations unlikely to be replicable in the courtroom.

However fraught with current technological or neurobiological difficulties the techniques of thought identification or mind reading might be, they introduce a serious possibility that thought may, in the face of significant confirmatory neurological evidence, be at some point taken to be the equivalent of action or evidence for certain purposes. Indeed, the first attempts to do so have already taken place. In *United States v. Semrau*, the defendant sought to utilize fMRI evidence that he was being truthful in a fraud case, but the request was disallowed on a range of points, including the error rate of the technology, the control standards, the variance of his circumstances from any situation previously studied, and the fact that the technology was not widely accepted as reliable by experts, thus failing Federal Rule of Evidence 702.[36] Similarly, EEG has been presented in courtrooms, and although it was rejected outright as evidence in *Slaughter v. State*,[37] it has been used to convict in two separate murder cases in the Indian state of Maharashtra.[38]

Mind Reading via Thoughts and Deeds: Third Folio

Shakespeare, who was perennially preoccupied with mind reading, was somewhat enigmatic himself, perhaps because of the universality of his themes. In a famous sonnet, William Wordsworth[39] suggests that Shakespeare's sonnets are the key to understanding Shakespeare the man:

> Scorn not the Sonnet; Critic, you have frowned,
> Mindless of its just honours; with this key
> Shakespeare unlocked his heart;

Here we have reached the nub of our argument and, you will be relieved to hear, the end of poetry. It is in our writings and our interest in the writings or otherwise recorded thoughts and actions of others that our minds can be read and, sometimes, perhaps often, misread.

Thinking and Feeling in the Cloud

Life in the cloud is immortal and omnipresent and, almost, as replete with feelings as our own dear lives.[40] We must now accept that our words and, to an extent, our actions and thoughts are permanently in the cloud and accessible to anyone and everyone. Of course, thoughts and actions are as open to interpretation as words and always as ambiguous. As William Empson famously remarked, "In a sufficiently extended sense any prose statement could be called ambiguous."[41]

As John Harris previously suggested concerning the existence of the cloud,

> This is a game-changing [innovation], and indeed constitutes a very dangerous turn of events. Not only is it a possible restriction, not just on free speech but on the possibility of sober, or even informed or nuanced discussion, it also

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> constitutes perhaps the final erosion of the distinction between speaking and acting, and indeed between thought and action, and may have already expanded the scope of the "reckless" part of the coupling of "reckless" with "endangerment" to the point of no return.
>
> This is because, not only do we have no knowledge or control over who will have access to our words and in what circumstances, we do not even have any control over how they will be edited, sensationalised, decontextualised, bowdlerised or otherwise distorted. We must be always aware of the potentially limitless scope, and indeed duration, of what we say.[42]

An example of the radical expansion of access to our words is provided by a comment made on a news story recently, which spread in an amazing way. "'Companies like Novartis should not be in the position to block moves to more cost-effective treatments in order to maximize their profits,' said John Harris of the Institute for Science Ethics and Innovation at the University of Manchester." This comment was made in a press release; Reuters put it on "the wires," and the report subsequently received 31,088,501 page views and 4,572,149 unique visitors.[43] More than 4.5 million different individuals accessed this comment online, and, in addition to the large number of web hits and visitors to the site, this remark was reported in 278 separate national and local news outlets, both broadcast and print.

As the chairman of Google, Eric Schmidt, has remarked, "The fact that there is no delete button on the internet forces public policy choices we had never imagined."[44] Recently, a landmark European Court ruling[45] on the right to be forgotten may indeed lead to the removal of items of personal data from particular sites or local search engines, but this will not mean that the relevant data has been entirely expunged from the cloud, nor from databases or computers, or rendered inaccessible.

In the cloud, words and indeed images and sounds exist, as far as we know, forever, in all places and all times. This is the immortality that some have dreamed of.[46] It also further erodes the traditional distinction between words and action and possibly also between thoughts and words, because speculations may be taken to be proposals and an exposure of the weakness of an argument *against* something may be taken to be an argument *for* it. This gives scope for radical misunderstanding and misrepresentation. But perhaps even more important than the fact that our words, actions, and thoughts are forever in the cloud is the fact that, insofar as they are digitized, they can in principle be accessed by anyone with the requisite skills. As Bruce Schneier made clear in an oral presentation to the Royal Society,[47] anything submitted or recorded online would be permanently in the cloud, accessible to anyone (like himself) knowledgeable enough to access them. Moreover, as Schneier noted, "all the research is being done on computers . . . and any computer can be hacked, not most, any!"[48]

In the cloud we have a permanent, accessible, and in principle freely available archive of everything we have ever recorded digitally. *What has so far been generally overlooked is that this constitutes the most comprehensive gateway to the soul (or way of constructing an alternative soul ab initio) ever discovered, one that is, in principle, available to all and permanently accessible.* In short, we already have a massive capacity for "mind reading" and hence mind misreading, against which there is no effective defense, and to which most of us are exposed. Here, we speak of those aspects of our minds and your mind that have been digitized, that is, put into computer memory or

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onto the Internet—into the cloud. There is no defense; anything that has ever been on a computer, let alone been e-mailed or stored in the cloud, can be read and downloaded, and that access cannot be prevented.

If we think about what "data" most of us have consigned to the cloud, the list can be alarming. Most of us now write on some kind of digitizing equipment: a computer, tablet, or smartphone; most of us also write and receive emails, tweets, and so on; many have a web presence—a Facebook or Twitter account or a website; and many also keep their diaries and appointments in electronic media. Moreover, the cloud contains a record of the websites we have visited and of the things we have ordered online. Many of us fill in our tax returns online, pay fines online, and visit online medical services like NHS Direct; we look up medical conditions online, order drugs and services—many of which may be unavailable or even illegal in our own countries—and so on . . . the list is as large as our imagination and as inventive as Google's algorithms.

It should be clear that much of this will contain the substance of what we believe on many matters; what we are minded to do or to consider doing; what we have done, including elements of our desires, fantasies, and interests; what we know and don't know; our preoccupations, activities, patterns of behavior, purchasing habits, and the amount of money we spend; and what the objects of our gaze are—and more or less reliable inferences can be drawn about what sort of gaze it is.

Some aspects of this are starting to arouse interest. People using the Internet are becoming increasingly aware of the dangers of images they post and things they say on Facebook or other websites; this realization is perhaps aided, ironically, by the proliferation of news feeds and novel forms of communication provided by the cloud. The rise of highly visible cyberstalking applications such as *Creepy*,[49] which aggregates the geolocation data attached to various tweets, updates, photos, and the like from any chosen poster and generates a map of the subject's whereabouts, and the extensive media coverage focused on cyberbullying,[50] with hundreds of tragic and often upsetting stories doing the rounds, have attracted attention. Charities and the victims and/or the families of the victims of these dangers have started campaigns to publicize them[51] and to offer advice and assistance.

Research suggests that, among users in what is generally regarded as the most vulnerable group, preteens and early teenagers, there is a "[belief] in the value of online privacy," and that "educational opportunities regarding internet privacy and computer security as well as concerns from other reference groups (e.g., peer, teacher, and parents) play an important role in positively affecting the Internet users' protective behavior regarding online privacy."[52] The rising awareness of the public and the willingness to respond to the potential dangers of the cloud are perhaps well illustrated by a recent petition against a newly announced Facebook feature, which would "let it listen to our conversations and surroundings through our own phones' microphone. Talk about a Big Brother move."[53] At the time of writing, this petition has more than 587,960 signatories.

Mind Misreading: One Recent Example

A recent news story is particularly telling. On March 21, 2014, the BBC reported that "[a] woman who threw acid in the face of a friend while wearing a veil as a disguise has been jailed for 12 years." The conviction of Mary Konye for this assault on Naomi Oni was widely reported.[54] The police had not believed

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the victim; they had examined her laptop hard drive and found that, before the attack, she had "looked at plastic surgery websites" and at news features concerning Katie Piper. Katie Piper was a young woman who, in 2008, as *The Guardian* reported, "was raped by a man she'd met online. He then arranged for someone to throw acid in her face."[55] Armed with what they thought was evidence concerning Naomi Oni's state of mind, the police thought, or through lack of thought assumed, that this was evidence that she had harmed herself, rather than, as proved to be true, that she was the victim of a malicious and vicious attack.[56] As the UK newspaper *The Daily Mirror* reported at the time of the assault on Ms. Oni (February 25, 2013), "Officers seized the 20-year-old's laptop after discovering she had viewed websites about acid burn victims before she was hurt."[57]

The police in this case were guilty of an error of inference, one of the most common errors to which humankind is subject. Moreover, the cloud simply contains data, often without context and almost always without other relevant information. For example, the cloud is irony blind; it usually contains no data on tone of voice. Often there is also no context. Remarks that may be nuanced in print, or, for example, in a public statement or speech, often appear on the Internet in truncated form, without nuance. One of the present authors has watched while members of the audience at a public lecture he was giving have tweeted extracts of the speech, which then appeared without the nuance or qualification that the lecture contained.

It is true that those of us who publish, broadcast, speak publicly, and so on, place our minds to an extent in the public domain, where they may freely be "read" by all and sundry. But most of us do so or do so potentially without realizing that that is what we have done or without realizing that—set in a new context, without nuance, qualification, or other caveats—the meaning will inevitably be not only distorted but sometimes corrupted beyond recognition.

More significant by far, all people who use devices that record or transmit digitally are, almost certainly, placing themselves, if not on public record, at least in a universally and permanently accessible public domain. This is a domain in which inferences will increasingly be drawn (conservatively or recklessly or anything in between) about what we think, feel, believe, wish for or intend, desire, or dread. Some of the inferences drawn about us will be reasonable and accurate enough, and for the foreseeable future these will constitute the best available windows to the soul.

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