

## BOOK REVIEWS

Sandra Aamodt and Sam Wang, *Welcome to your brain: Why you lose your car keys but never forget how to drive and other puzzles of everyday life*. New York: Bloomsbury, 2008, xx + 220 pages. ISBN 13: 978-1-59691-283-0. ISBN 10: 1-59691-283-9

Reviewed by Liad Mudrik (Tel Aviv University)

How well do you know your brain? This is the main question that Aamodt and Wang pose to their readers, offering them a practical way to provide an answer: a multiple choice test that assesses your familiarity with your brain, or with brains in general: how much energy they use, when are they formed, what kind of food improves their performance, and when do they start to wear off. By the time you finish reading the book, you will surely manage to get a high score in their test. Unfortunately, the prospects of you getting to know your brain, as they put it, of achieving a true understanding of its mechanisms and processes, are much lower.

It seems that the brain, as depicted by latest neuroscientific texts, was never trendier; about two thousand popular-neuroscience books were published in the last five years alone. All of them try to summarize, at different levels of simplification, the continuously-growing neuroscientific knowledge accumulated thus far, making it as accessible as possible for the uneducated layman.

Indeed, one cannot underestimate the magnitude and significance of neuroscientific theories, their implications for our everyday lives, and for our self-conception. Phenomena like memory, perception, and even consciousness and free will that were once considered unscientific, illegitimate subjects for empirical investigation (Sutherland 1989), are now depicted in neural terms. Combined with some counter-intuitive findings of cognitive and social psychology studies, like the fact, for example, that we make better decisions if we don't have time to think thoroughly and deliberate about them (Dijksterhuis, Bos, Nordgren, and van Baaren 2006), neuroscience offers a handful of intriguing, thought-provoking experiments and insights about the way human beings and other creatures behave in the world.

*Welcome to your Brain* is an attempt to gather some of these findings and experiments in a reader friendly way, written for the purpose of both educating and entertaining. The authors, a former editor at *Nature Neuroscience*, one of the leading journals in the field, and an associate professor of neuroscience at Princeton University, promise to provide a guided tour to the brain, one that includes "all the best sights and most important spots" (p.xx). Accordingly, they move from

describing basic cellular functions, explaining what a neuron is and how it operates, to the sensual level of vision, audition, olfaction, gustation and somatic sensation, followed by discussions of emotions, rationality, and awareness. Alas, dedicating no more than eight pages to each chapter, the authors' guided tour might leave the curious visitor somewhat frustrated; as it often happens, the proclaimed aspiration to include all the important sites leaves no room for more profound accounts and theories. It allows no more than a glimpse on the most fascinating human phenomena and their neural substrates, a glimpse that doesn't allow comprehending their complexity and intricacy; as soon as you start to get an idea of what you are reading about, the chapter ends, leaving too many questions unaddressed.

True, *Welcome to your Brain* provides its readers with many anecdotes that will probably come handy in a cocktail party, together with some useful tips that might help you improve the way you perceive and act in the world; it offers ways to hear better on your cell phone in a loud room (cover the mouthpiece, since the phone feeds sounds from the speaker's surroundings through its circuitry and mixes them with the signal it gets from the other phone), to overcome a jet lag (expose yourself to a substantial dose of light at specific hours, according to your planned destination) or learn better for an exam (space your learning sessions — two learning sessions with time between them can result in twice as much learning as a single study session of the same length). It also examines ten popular myths about the brain, describing them as completely false or verifying their claims and explaining why they are true. For instance, contrary to what is commonly believed, the authors reveal that blind people don't have better hearing, although they do have better memory, especially for language. In the same way, we don't use only ten percents of our brain, babies who listen to Mozart don't get smarter and women are not moodier than men. But on the other hand, we do perceive time as slower during a traumatic event. No doubt, reading *Welcome to your Brain* is an enjoyable and enriching experience, thanks both to the vast amount of studies and findings described by the authors (unfortunately, without the exact references, making them harder to track down for further reading) and to their humorous, flowing, down to earth language.

However, what makes this book so delightful to read is also its Achilles' heel: the authors' style, illustrating complicated scientific theories and findings in everyday language, allegedly making them more accessible to the unprofessional reader, inevitably leads them to write in a dualistic-like way that preserves Cartesian logic and inserts conceptual confusions to the discussion.

I have written elsewhere about the "double subject fallacy" (Mudrik and Maoz, forthcoming). In the next few sections I will explain the fallacy,<sup>1</sup> and show how Aamodt and Wang commit it in their book. I will finally maintain that the double subject fallacy is not just a *façon de parler*, but rather a mistake that bears

significant implications both on the way we think about ourselves and on the way we understand neuroscientific theories.

The double subject fallacy refers to personifying the brain while still preserving the existence of a self that, apparently, has a very complicated relationship with its personified brain. Aamodt and Wang, and many other neuroscientists in the last two decades, repeatedly write as if there are two intentional<sup>2</sup> subjects fighting for control — me and my brain. In other words, these writers both treat the brain as if it can have mental states such as beliefs, desires and wishes, and at the same time maintain that “we”, the persons who own the brain, can have a *different* set of such mental states. Let us first address the first part of the fallacy — describing the brain in terms that are commonly ascribed to human beings.

In *Welcome to your Brain*, one can find a handful of examples of such descriptions. Aamodt and Wang write about the brain intending to do certain things (p. 2), having to decide whether to take shortcuts or not (p. 3), wanting to sleep (p. 29), making generalizations about groups (p. 141), or even lying (pp. 46–47).

All these ascriptions of psychological predicates to the brain are examples of what Bennett and Hacker (2003) call “the mereological fallacy”. In their extensive and detailed work, these authors (Bennett, Dennett, Hacker, and Searle 2007; Bennett and Hacker 2003) examine “the conceptual foundations of neuroscience”, as they put it. Bennett, a neurophysiologist, and Hacker, a Wittgensteinian philosopher, claim in their interdisciplinary work that much like *Welcome to your Brain*, too many other neuroscientific texts commit the mereological fallacy by ascribing psychological predicates to the brain. “Mereology” refers to the relations between the whole and its parts. In our case, since the brain is a part of the whole human being, when Aamodt and Wang are saying “the brain intends” or “the brain decides”, they are in fact, according to Bennett and Hacker, assigning attributes of the whole (i.e., the human being) to one of its parts (i.e., the brain).<sup>3</sup>

Notably, Hacker and Bennett maintain that the mereological fallacy is not a matter of factual mistake; when Blakemore says that neurons have knowledge (Blakemore 1977: 91), when Crick claims that “what you see...is what your brain believes is there” (Crick 1994: 30), and when Damasio speaks about brains deciding well with “more than just pure reason” (Damasio 1994: 173), they are not stating false sentences — they are asserting non-sense statements. It is impossible to truly understand what they mean, claim Bennett and Hacker, since believing, deciding, estimating, presenting arguments, and having intelligence are things that can be said to be done by humans, not by parts of their bodies. It makes no more sense to ascribe believing to the brain than it does to ascribe it to the hand — both are parts of the human being, not the human being himself. Following Wittgenstein’s philosophy of ordinary language,<sup>4</sup> they maintain that the meaning of concepts lies in their ordinary uses. Since the criteria for assigning a psychological predicate

are behavioral, and brains cannot manifest the appropriate behavior for believing, wanting, etc., there is no sense to ascribing psychological predicates to brains.

I will not address the criticisms raised against the mereological fallacy and the replies of Bennett and Hacker (but see, among others, Bennett et al. 2007),<sup>5</sup> since they are not essential to my argument about the double subject fallacy. Suffice to say that even if we reject the mereological fallacy and accept the claim that it does make sense to say that the brain wants or intends, it is still completely unclear what is meant by sentences like “your brain doesn’t intend to lie *to you*” (Aamodt and Wang, p. 2, italics mine). Let’s assume that brains can indeed intend to lie. Who are they lying to? If the brain is the one capable of wanting, believing, deciding and intending, if it is not a conceptual mistake to ascribe psychological predicates to it, how can we speak of an additional subject, this “you” that the brain lies to?

Writing as if there are two subjects — me and my brain — is a key feature in Aamodt and Wang’s book; they repeatedly speak about the brain as something that tries to deceive and control its owner, acting against his or her explicit will. For example, when speaking about trying to lose weight, they write:

When you try to change your weight by eating less, your brain falls back on tricks to keep your weight at its preferred level... [for example,] to make you hungry, so that you’ll want to eat more... [or] try to fool you... When you find yourself acting as if cake doesn’t have as many calories if you eat it in tiny bites from someone else’s plate, you’re falling for your brain’s lies (pp. 32–33).

Now, it is one thing to ascribe mental predicates to the brain, as if it were some kind of an agent able to perform mental acts. It is somewhat different — some would even say absurd — to do all that while still referring to the whole person as another subject, living side by side with his brain. But that’s exactly what Aamodt and Wang do, when they ask if you can trust your brain, say that “your brain lets you watch a sunset... tell a joke, recognize a friend” (p. xix), that it “interprets many scenes without making you explicitly aware of what’s going on” (p. 40), or that it “rarely tells you the truth” (p. 8) and is “lying to you again” (p. 46). When they describe a patient that cannot trust his vision due to his clinical condition, they say that his brain “has not learned how to lie, or even tell the truth, fluently [to the patient]” (p. 47).

Moreover, they suggest that reading their book will enable “you” to overcome your brain’s manipulation, to “predict when your brain is a source of reliable information and when it’s likely to mislead you” (p. 2). In other words, it’s not only that the brain can play tricks on its owner; the owner can, and should, fight back. And that is what *Welcome to your Brain* is for — providing us with means to free ourselves from our brain. Or, as they put it:

Your brain lies to you a lot ... [it] has to take shortcuts and make lots of assumptions. Your brain's lies are in your best interest — most of the time — but they also lead to predictable mistakes. One of our goals is to help you understand the types of shortcuts and hidden assumptions your brain uses to get you through life. We hope this knowledge will make it easier for you to predict when your brain is a source of reliable information and when it's likely to mislead you (p. 2).

The problems of this kind of writing are twofold. First, it makes the brain a new version of the soul, endowing the former with all the properties commonly ascribed to the latter. Second — and more importantly — it gives the brain a will and a set of beliefs of its own, while still preserving the will and beliefs of its owner. It doesn't get more dualistic than that — two subjects, sharing the same body, manipulating one another.

According to Aamodt and Wang and many other current neuroscientific texts (e.g., Damasio 1994; Frith 2007; Gazzaniga 2000; Ornstein 1992), the brain sometimes wants me to do things I would rather not to. I can lie to my brain and it can cheat me back, and we can even have two different mental states — there are things that my brain knows and I don't. Or, in Aamodt and Wang's words: "your brain rarely tells you the truth, but most of the time it tells you what you need to know anyway" (p. 8).

It seems that we conduct a highly complicated relationship with our brain, a relationship that resembles Freud's id, ego, and super-ego (Freud 1942), or Descartes' battle between the soul and the evil demon (Descartes 1960). By no means can this relationship fit a materialistic view of the world, which is adhered to by the great majority of neuroscientists. Being a materialist, one simply cannot speak about the brain and its owner as if they were two separate entities (neither can a dualist, in fact; he would replace the brain with the incorporeal soul, and there would not be any room left for an additional "me"). But even scientists that explicitly declare themselves as enthusiastic materialists tend to write as if they are not.<sup>6</sup>

One might claim that these are all examples of figurative speech, a rhetorical tool aimed at simplifying the theories at hand. I have thoroughly addressed these claims elsewhere (Mudrik and Maoz, forthcoming), claiming first that there is no new, figurative meaning to sentences that include the double subject fallacy: in contrast to what usually happens when using a metaphor, here we do not assign new meaning to the terms being used or borrow the attributes of one term to explain the other. Second, I believe that these alleged metaphors introduce more confusion to scientific texts than any potential cognitive gain they might carry. When one tries to get to the bottom of things, to fully comprehend what they mean, insoluble questions inevitably emerge, making things more complicated, surely not easier to understand: can I and my brain have different mental states?

If so, given that there is no mental change without a neural one (Kim 1982; Smart 1959), does it mean that I and my brain have two different neural states? That, surely, cannot be the case. Moreover, what is the meaning of speaking about me *overcoming* my brain? Who is in control here?

This kind of questions seem senseless not only to philosophers; it was John Z. Young, considered as one of the most influential neuroscientists of the 20th century, who wrote: “If the person is inseparable from his brain it is senseless to ask which of them controls the other” (Young 1987: 215).

Metaphors, analogies, metonymies, and similes can be extremely useful in scientific writings, reflecting the authors’ attempts to enhance both the coherence and understandability of their texts and ideas (Brown 2003; Ziman 2000). But when Aamodt and Wang describe eating bites from someone else’s cake as an example of the brain playing tricks on us, is it really more coherent and understandable than saying that we fool ourselves by doing so? Does it explain something, anything, about the mechanisms of self deception? Does it explain something about the neural mechanisms underlying hunger or cravings for sweets that overcome our motivation to lose weight? Does it make the described phenomenon more or less understandable?

Far from being simply a criticism about Aamodt and Wang’s writing style, pointing at instances of the double subject fallacy exposes scientific confusions and reveals a closet dualism that muddles the water of the neuroscientific discourse on free will, consciousness, and the like.<sup>7</sup> All the fascinating findings and theories described in *Welcome to your Brain* can be explained without the need to differentiate between me and my brain, or to supply the readers with motivation to unveil the deceptive curtain their brains lay before their eyes.<sup>8</sup> The brain is interesting enough for us to learn about its processes; there is really no need to attract readers by making it our enemy. Writing without committing the double subject fallacy might make the book a bit less amusing, but it will surely spare its readers from having to figure out how can brains manipulate human beings, and how can humans possibly fight back. Instead, they could spend more time in understanding one of the most intriguing and thrilling subjects of our times — the processes and mechanisms of the human brain, and their relations to human behavior.

## Notes

1. The use of the word “fallacy” requires an explanation. Strictly speaking, a fallacy is a form of argument which can lead from true premises to a false conclusion (Kenny 1991). The fallacies I am about to introduce, namely the mereological and the double subject fallacies, involve inappropriate use of predicates, not an inadequate form of arguments. Thus, they are not fallacies

in the strict sense of the word. However, as I will show, following Kenny (1991) and Bennett and Hacker (2003), this inappropriate or miss-use of predicates leads to a fallacious form of arguments, that are held to entail the conclusion that more has been explained by a psychological theory than has in fact been explained. I will claim that this appearance of understanding in fact holds back scientific progress, when unsolved problems are mistakenly considered as answered and accounted for.

2. The word “intentional” is used here in the sense of “having intentions” rather than “having intentionality”. The former means that the subject is able to commit volitional act. The latter refers to Brentano’s (Brentano 1973) famous use of the word intentionality as a defining characteristic of mental states, “aboutness” or “being about something”, as opposed to physical states. My use of the word is also not intended to refer to Dennett’s intentional stance (Dennett 1991).

3. It should be noted that Bennett and Hacker are not the first to criticize such ascriptions; see Kenny’s (1991) discussion on the homunculus fallacy that shares similar grounds and philosophical stance as Bennett and Hacker. Also relevant is Dennett’s distinction between the personal and the subpersonal levels, and the tendency to confuse them (Dennett 1969), which is further discussed by many others (Bermudez 1995; Hornsby 2000; Hurley 1989, 2001; Millikan 1991, 1993).

4. As Wittgenstein put it: “Only of a human being and what resembles (behaves like) a human being can one say: it has sensations; it sees, is blind; hears, is deaf; is conscious or unconscious” (Wittgenstein 1963: § 281).

5. Also relevant are Blakemore and Churchland’s criticisms (Blakemore 1990; Churchland 2005).

6. See, for example, Frith’s discussion on the matter: “I am a materialist. But I admit that I sometimes sound like a dualist. I talk of the brain “not telling me everything it knows” or “deceiving me”. I use such phrases because this is what the experience is like. Most of what my brain does never reaches my consciousness. This is the stuff that my brain knows about, but I don’t. On the other hand I am firmly convinced that I am a product of my brain, as is the awareness that accompanies me” (Frith 2007: 23).

7. Aside from the implications on scientific progress, there are of course philosophical and social implications to dualistic thought. Many scientists and philosophers tend to complain about the dualistic intuitions that still prevail among many, if not most, people around the world (e.g., Bloom 2005; Crick 1994; Damasio 1994; Dawkins 2006; Dennett 2006). Condemned first for being simply wrong, and second for being socially dangerous (e.g., Bloom 2005; Crick 1994; Damasio 1994; Dawkins 2006; Dennett 2006), many consider dualism as one of the most influential errors in human history. From that point of view, it seems even more implausible that scientists would write in the dualistic-like way that is reflected in the double subject fallacy.

8. The fact that the book is a popular one, meant mainly for unprofessional readers doesn’t make it immune to the above criticism. As Kenny (Kenny 1991) put it, referring to his remarks about R.L. Gregory’s book “The Eye and the Brain”: “The reader may feel that this is completely unfair criticism. The words I have criticized are taken from the first page of a popular book. What is the harm in personifying parts of the body in order to dramatize scientific information which can be stated in completely neutral metaphor-free language? Whether dramatization is good pedagogy depends on whether the important events happen on or off stage” (p. 128). In other words,

when the pedagogy renders the sense of what is being said, when it starts to penetrate the theory and not only serve as means to explain it, it should be criticized. This is the danger of conceptual confusions of the kind described here, and it is of no comfort that the text is a popular one; these confusions are probably read by more people when it comes to popular science, and their dualistic implications might be absorbed less critically by the common reader, who probably finds reassurance in the fact that they are compatible with his basic dualistic intuitions.

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### *Authors' address*

Liad Mudrik  
 Department of Philosophy  
 Tel Aviv University  
 69978 Tel Aviv  
 Israel  
 liadmu@gmail.com

### *About the author*

**Liad Mudrik**, a graduate of Tel Aviv University inter-disciplinary program for outstanding students, is a PhD student in Philosophy and Neuroscience. Her M.A. thesis was about the neural correlates of visual awareness. In philosophy, her research is about the relations between neuroscience and materialism. In Neuroscience, her research is about semantic context violations and the ability to process them in the absence of attention and awareness. Her paper *Me and my brain — the double-subject fallacy*, co-authored with Uri Maoz, is forthcoming in 2009.