



Mental imagery and the illusion of conscious will

Paulius Rimkevičius¹

Received: 15 July 2020 / Accepted: 4 December 2020 / Published online: 3 January 2021
© The Author(s), under exclusive licence to Springer Nature B.V. part of Springer Nature 2021

Abstract

I discuss the suggestion that conscious will is an illusion. I take it to mean that there are no conscious decisions. I understand ‘conscious’ as accessible directly and ‘decision’ as the acquisition of an intention. I take the alternative of direct access to be access by interpreting behaviour. I start with a survey of the evidence in support of this suggestion. I argue that the evidence indicates that we are misled by external behaviour into making false positive and false negative judgements about our own decisions. Then I turn to a challenge to this suggestion. What could we interpret in cases when there is no external behaviour? I propose the response that we interpret internal behaviour. We can understand internal behaviour as mental simulation of external behaviour, which can proceed by way of conscious mental imagery. I argue that the proposal has the following advantages. It helps us explain more evidence than we could otherwise. It relies mostly on mechanisms that we already have reason to believe in. And it receives support from the available neurological evidence. I also suggest a way to test the proposal in future empirical research. I conclude by discussing the limitations of the proposal and its implications for the wider debates about the imagination and the will.

Keywords Imagination · Mental imagery · Conscious will · Illusion · Daniel Wegner · Peter Carruthers

1 Introduction

Is there such a thing as a conscious will? One can understand the question as being about the existence of conscious decisions. We can in turn understand a decision as a mental event that settles the question what to do. Let us say that when we settle the question what to do, we acquire an intention of doing it. And when we have the intention of doing it, then we go on and do it when the time comes, unless we fail to remember it, do not get the chance to do it, or are forced to reconsider. Likewise,

✉ Paulius Rimkevičius
paulius.rimkevicius@fsf.vu.lt

¹ Institute of Asian and Transcultural Studies, Vilnius University, Vilnius, Lithuania

we can understand being conscious as being directly accessible. Let us say that if a mental event is conscious, then it can be directly reported and used in planning actions.

We may intuitively think that our decisions are conscious (Nichols 2015, chapter 2; see also Nichols and Stich 2003). Or at least we may think that we have access to our decisions that is much more direct than our access to other people's decisions. In particular, we may think that we can access other people's decisions only by interpreting behaviour, and that we can access our own decisions without interpreting behaviour. For example, you may think that you can know your own decision to raise your arm without interpreting the cue that your arm is rising. Let us say that this is the sense in which one's own decisions are supposed to be accessible directly. That is, we are supposed to be able to report our decisions and use them in planning action without first going through the process of interpreting behaviour.

Although it may be intuitive to think that there are conscious decisions, some researchers suggest that this turns out to be an illusion. In particular, Wegner claims that we access our own decisions only by interpreting behaviour (2002; see also Carruthers 2007). He argues that this claim is supported by the empirical evidence indicating that we make certain mistakes. He says that people are often misled by external cues, such as observed behaviour, into misjudging their own decisions. He also says that we make false positive as well as false negative judgements about them. Sometimes we are misled into thinking that we have made a decision when we have not. And sometimes we are misled into thinking that we have not made a decision when we have. Wegner gives a great variety of examples, from mistaking that you moved a cursor on the screen, to spirit possession. But many of them are controversial, and below we will discuss some of the reasons why.

It will be of central interest to us in what follows that the claim that conscious will is an illusion faces its own challenges. Perhaps the most pressing challenge is the one that concerns such cases where there is no external behaviour (Haggard 2019; Bonicalzi and Haggard 2019). More specifically, it concerns those cases where people still report that they have made a decision. For example, someone can say that they have already made a decision to raise their arm but refrained from doing so in the last moments because they heard the signal to stop. The challenge that such cases pose for thinking that conscious will is an illusion can be reformulated in the following way. What could we be interpreting when there are no relevant external cues but we still think that we have made a decision?

Here I propose a response to this challenge. I draw on the idea that inner states play an important role in self-interpretation generally (Carruthers 2011). And the answer I propose is roughly this: When we cannot interpret external behaviour, we can interpret internal behaviour. As will be explained in more detail in the following sections, we can understand internal behaviour as mental simulation of external behaviour, which can proceed by way of conscious mental imagery. Here is an example. Suppose that you utter something to yourself in inner speech. That is an instance of internal behaviour. It is analogous in many respects to the instance of external behaviour when you utter the same thing out loud. Also, this instance of internal behaviour can proceed by way of conscious sensory mental imagery of the words being pronounced. I suggest that we interpret such conscious mental imagery

in order to access our own decisions. As I will argue in what follows, this proposal allows us to explain more evidence than we could explain otherwise. It also has the benefit of mostly relying on mechanisms that we already have reasons to believe in. And it receives support from the neurological evidence.

Here is how we will proceed. We will start by looking at the evidence that suggests that we make mistakes about our own decisions (Sect. 2). Then we will turn to the challenging cases, where we think that we decided, even though there is no external behaviour to support this interpretation (Sect. 3). After that, we will look at the proposed reply in more detail. We will consider the support that it receives and some of the ways to test it in future empirical research (Sect. 4). We will conclude by discussing the limitations of the proposal and its implications for the wider debates about imagination and volition (Sect. 5).

2 Misjudging your own decisions

In this section, we will look at four kinds of mistakes that people make about their own decisions. The first kind of mistake concerns the existence of the decision, or *whether* we decided. The second kind concerns the timing of the decision, or *when* we decided. The third concerns the content of the decision, or *what* we decided. And the last one concerns the cause of the decision, or *why* we decided. The first kind of mistake is the most relevant for our purposes. This is because you cannot be wrong about the existence of the decision and right about its timing, content, or cause. But you can be wrong about one of these other things and right about its existence. Therefore, evidence of mistakes about the existence of our own decisions can provide the most support for the claim that conscious will is an illusion. However, the other three kinds of mistake can also be taken to support the same conclusion. If we get misled about our decisions in so many ways, it would seem that there must be a long and winding road towards them. Consequently, we will look in turn at all four kinds of mistake.

2.1 Misjudging whether you decided

Let us start with mistakes about the existence of our own decisions. We can take as our first example one of the most famous experiments by Wegner himself. Consider the I Spy experiment that he conducted together with Wheatley (1999). In this experiment, they asked the participants to sit together with another person. They told them that this other person is also a participant, but this other person was actually a confederate of the experimenters. They showed them a screen with about fifty objects, such as a swan, from the children's game I Spy (hence the name of the experiment). Both people were given headphones and told that each of them will hear different words as a minor distraction. The experimenters then instructed them to move a cursor on the screen, together, for the first 30 s. They also told them that after that they will hear 10 s of music. The experimenters said that during this time the participants had to individually stop the cursor on an

object of their choice. After each trial, the experimenters asked them to rate the intentionality of the stop. They used a line with the endpoints marked ‘I allowed the stop to happen’ and ‘I intended to make the stop’. On some trials, the confederate was given full control of the cursor and told through the headphones to stop it on a certain object. On other trials, the confederate was told to allow the participant to make the stop.

Wegner and Wheatley found that, on the free trials, the participants had a slight tendency to report that they intended to make the stop. The same tendency was found on the forced trials when the participants heard the name of the object 1 s before the cursor stopped on it. They also found the opposite tendency on forced trials when the participant heard the name 30 s before or 1 s after the stop. Wegner and Wheatley interpret these findings as suggesting that the participants inferred their own decisions from the cues provided by the experimenters. The participants were supposed to reason as follows: If I thought about the object and then immediately the cursor stopped on it, then I must have intended to make that stop. Why else would the participants be unsure if they made the stop when they had full control of the cursor? And why else would they say that they intended the stop when they had no control over it?

Unfortunately, critics have pointed out quite a few problems with the proposed interpretation. Consider the worries that Walter expresses in his recent paper (2014). First, he notes that the participants did not exactly say that they intended the stop, when they heard the name of the object 1 s before. Rather, they marked the line near the middle. Second, he says that they likewise exhibited only a slight tendency to say the same on the free trials. The suggestion is that together it indicates that they might have been unsure about both of their answers. Third, he emphasises that the ratings were averaged over significantly fewer trials in the free condition compared to the forced condition. The suggestion here is that the already small differences could disappear if there were more trials to average from in the free condition. Fourth, he draws our attention to Wegner’s own experiments on facilitated communication, which could throw doubt on his interpretation of the present experiment. Wegner pointed out that so-called facilitators do not notice when they decide for the other person instead of simply communicating that person’s decision. Walter suggests that the case of the confederate might have been similar in that the confederate could have failed to let the participants make the stop. After all, the confederate had to keep moving the cursor to some extent even during the free trials. Otherwise, they would not have been able to keep up the impression that they are trying to stop the cursor on an object of their choice.

Finally, Walter points out that the participants likely decided to stop on the same object as the confederate, at least on some trials. He says that this is likely because of the following two circumstances. First, there were few objects that the confederate could reach without making the movement of the cursor suspicious (such as by hastening it). This is partly because the instruction was to stop the cursor during the relatively short time interval of 10 s, while the music played. This is also because people tend to stop midway through that time interval. Second, the participants often reported wanting to stop on the object that was named through the headphones. That was often the same object that the confederate was instructed to stop on. All of these

points challenge the interpretation that the participants were not conscious of their own decisions.¹

Many other experiments that were initially thought to provide support for the claim that conscious will is an illusion have now been similarly questioned by critics (see also Nahmias 2002, Bayne 2006, Mele 2009a, Shepherd 2013, Peters 2014, Carruthers 2015a). But for our purposes, we can assume that the critics are right about the earlier experiments. Instead of arguing about the best interpretation of the earlier experiments, we will look at some more recent empirical work. I will argue that it looks more promising for someone who wants to support the same conclusion.

The first experiment to consider was conducted by Schlegel et al. (2015). In this experiment, participants were asked to sit with their hands on their lap under an occluder, palms up, each loosely holding a stress ball. They were linked to machines measuring electrical activity in the brain and the muscles of the arms. The experimenters asked them to watch short nature videos. They also asked them to press either the left, or the right ball, depending on where an arrow pointed that appeared on the screen. After this, the participants were hypnotised and instructed to respond similarly to semicircles that appeared on the screen. Then the experimenters woke them up from hypnosis and told them a cover story suggesting that now the machines will be calibrated once every video. They also told them that this might make the muscles in their forearm contract. The participants then pressed the balls when the semicircles appeared on the screen. Finally, they were hypnotised to remove the last instruction and again completed the task, now with the explicit command to respond to the semicircles.

Schlegel and colleagues discovered, in a thorough interview after the experiment, that most participants believed the cover story and did not experience feelings of conscious will when they pressed the stress balls during ‘calibration’. They found that these participants thought that the machine made them press the stress balls during that stage. They emphasise that the machines did nothing to influence the movements. They also note that there was no significant difference in the brain activity of the participants when they performed the second and the third tasks. It means that the brain activity during the ‘calibration’ phase showed all signs of voluntary action. This was so despite the fact that the participants denied that they intended the movements. According to the experimenters, these findings suggest that conscious willing is not necessary for voluntary action. They understand voluntary action as an action that is caused endogenously and is neither a mere reaction to an external stimulus, nor a mere reflex. If the participants had direct access to their own decisions,

¹ An anonymous reviewer says that it is still worth asking why the answers should cluster around the midline. The reviewer also suggests that this might be because an assumption of shared control is made at the outset and left unchallenged by what happens later in the experiment. If we have direct access, why does it not present a challenge to that assumption? I think this goes some way towards defending the initial interpretation regarding the free condition. As for the forced condition, I think that the initial interpretation remains problematic, because it is still hard to rule out that the participants’ decisions often coincided with the confederate’s decisions (Walter’s fifth point).

why would they say that the machine made them press the ball, when it did no such thing?²

The second experiment to consider was conducted by Olson et al. (2016). In this experiment, the participants were asked to lie in an fMRI scanner. In one condition, the experimenters told them that the machine can read their thoughts. In another condition, they told them that the machine can influence their thoughts. As a matter of fact, they used a machine that was out of order. It only served to provide the sights and sounds (e.g., the humming) that are typical of such machines. While in the scanner, the participants were asked to choose a number from zero to one hundred. After they got out of the scanner, they were questioned by the experimenters about their experience while they chose the number. In one condition, the participants were given a questionnaire that included questions about the sense of agency. In another condition, they participated in an elicitation interview. In this interview, the experimenters emphasised *what* was experienced and not *why* it was experienced. They also led the participants with questions that were themselves almost devoid of content, serving merely as prompts to continue talking.

Olson and colleagues found that the participants reported a significantly lower sense of agency when they were told that the machine can influence their thoughts. They also discovered that, when told that it can influence their thoughts, the participants reported rather outlandish experiences. For example, the experimenters got reports of such experiences as the experience of the number being inserted into one's thoughts. Or the experience that one is unable to change the number when trying to do so. Or the experience that one is being led by someone else to choose a certain number. In contrast, they gathered no similar reports from the participants when they were told that the machine can read their thoughts. The experimenters interpret these findings as suggesting that people are easily misled into misjudging whether they themselves made a decision.³

These two experiments suggest that people disown their decisions when they are given a convincing story about an external cause. But it should be noted that the I Spy experiment aimed at showing more. It also aimed at showing that people can be misled into trying to own somebody else's decision. The two recent experiments that we just discussed provide no direct evidence on whether people can be misled in

² An anonymous reviewer suggests that hypnosis could block direct access. I think this is possible. But this is an additional hypothesis, and I am not aware of any evidence in support of it. Moreover, the fact that the brain signals were alike in the two conditions seems to challenge it. Therefore, I think that the other interpretation is more plausible. In a similar vein, the authors of the study themselves note that we do not know how hypnosis changes brain functioning. And they stress that showing direct access is not present in this case does not yet show that it is not present in typical cases. I agree. But I think that the results do put some pressure on the direct access interpretation. This is because they are an anomaly in its light (but not in light of its rival) and so press it to make such additional assumptions.

³ An anonymous reviewer notes that one might worry that thinking of a specific number is not really an action (see also Mele 2009b). But here the task was not simply to think of a specific number, but to choose a number. The participants had to report not simply what came to their mind, but which of the things that came to their mind they eventually chose. It is easier to argue that the former is not an action than to argue that the latter is not an action. In this respect, the task in this experiment is also different from the task of thinking of seven animal names that start with a 'g' (Mele's example).

that way. However, as noted above, we may be able to provide some indirect support for that conclusion. This could be done by showing that people try to own decisions made at a different time, having a different content, or originating from a different cause. The suggestion would be that this comes close to attributing somebody else's decision to oneself. At the same time, these experiments provide further support for the claim that people are not directly aware of their decisions.

2.2 Misjudging when you decided

The most famous experiment about the timing of conscious decisions was conducted by Libet et al. (1983). In this experiment, they seated people in front of a clock with a rapidly rotating light beam. They gave them the task to skip the first rotation and to move their index finger at any time during the second rotation. The participants were told not to plan in advance when they will move. They also had to report the position of the light beam at the time when they first became aware of the urge or intention to move. The experimenters additionally measured electrical activity in the participants' brains and the muscles of their arms. (The hypnosis experiment that was discussed above, like many others, follows this experiment and was in fact named after it: 'Hypnotising Libet'.)

Libet and colleagues found that the reported onset of awareness was later than the onset of a brain signal that predicted the finger movement. The experimenters interpret this as suggesting that the participants were not aware of the decision to move at the time when it happened. They conclude that the event that settled the question when to move was unconscious. We should note that this does not directly show that the participants were wrong about the timing. The participants were asked to report when they became aware of the decision, not when the decision happened. So it remains a theoretical possibility that they knew that the decision happened slightly earlier. However, this interpretation might seem like a stretch even to those who are critical of the experiment.

In any case, Libet's interpretation of his own results, like Wegner's interpretation of his results, has been variously questioned by critics (for a variety of views, see Sinnott-Armstrong and Nadel 2011). Today, critics have called into question almost every aspect of Libet's original picture. They have questioned the interpretation of the timing and nature of the brain signals as well as the participants' reports. For example, they note that the experimenters mix urges and intentions together, when only the latter are directly relevant to the existence of conscious decisions. They also note that the brain signal in question might reflect background neuronal noise rather than the initiation of movement (Schurger et al. 2012). We will assume that the critics are right about this early study as well. We will also leave aside, for the moment, the now vast literature discussing the neurological evidence on the timing of our intentions. Instead we will look at a somewhat more recent experiment that provides behavioural evidence to support the same conclusion.

The experiment was conducted by Banks and Isham (2009). In this experiment, the participants were once again linked to machines measuring electrical activity in the brain and in the muscles of their arms. They were also seated in front of a

screen with a clock. And they were asked to report the time when they first became aware of their intention to move. This time, they were instructed to press a button at the time of their choosing. The experimenters ensured that when the button was depressed a few millimetres, closure took place, but no tactile feedback was given. They also made sure that the feedback that they did give them would be delayed on some trials. In one condition, they gave the participants auditory feedback. In the other condition, they gave them visual feedback in the form of a video showing the finger pressing the button.

Here is what Banks and Isham found. The participants reported that they first became aware of an intention later, when the feedback was delayed. Much like in the experiment by Wegner and Wheatley, the tendency to take external cues into account disappeared on some trials. This was so when a greater amount of time separated the cues from the actual movement. The experimenters interpret these findings as suggesting that the participants inferred rather than perceived when they decided to move. In the terms that we adopted at the outset, we can say that the participants accessed the time of their decision not directly but by interpreting behaviour. It is probably safe to assume in this case as well that the participants did not know that the decision happened before they became aware of it. And that would mean that they were wrong about the timing of their decisions. There seems to be no reason why the timing of their decisions should align with the auditory or visual feedback that was manipulated by the experimenters.

Could it be that the participants were directly aware of their decisions when they happened but later misjudged their timing? It remains a theoretical possibility that the mistake was made somewhere further downstream. Perhaps at first the participants made a conscious decision, as well as the right judgement about its timing, but later they revised the judgement. Perhaps they revised it because of the perceptual feedback, which suggested a different time of decision. However, this explanation does not seem very plausible. This is because then we would have to say that people use indirect access instead of direct access, when given the opportunity. And there seems to be no good reason to think that they would do that. Why judge your decisions from unreliable external cues if there are reliable internal cues?

2.3 Misjudging what you decided

Let us now turn to an experiment that provides evidence on whether people misjudge the content of their decisions. The experiment was conducted by Johansson et al. (2005; see also Hall et al. 2010, 2012, 2013). In this experiment, the participants were shown two pictures of female faces and asked to point to the one that they found more attractive. Unknown to the participants, there was a second picture, with the opposite face, behind each visible picture. After the participants made their choice, the experimenters flipped the chosen picture down and slid the hidden picture over to the participants. They performed the switch with a sleight of hand, covering the chosen picture with their sleeve as they pushed the other one to the participants. Then they immediately asked the participants to explain why they chose the picture that they now held in their hands. The experimenters followed up this

experiment with a variety of similar experiments. In these other experiments, they switched jam samples, tea samples, answers about moral questions, and answers about political attitudes and voting intentions.

Johansson and colleagues report that the majority of participants failed to detect the switch. Moreover, they found that the explanations given by the participants were indistinguishable from the explanations provided for actually chosen items. The experimenters call the effect ‘choice blindness’. They interpret the findings as suggesting that there is a discrepancy between choice and introspection. In our terms, this means that there is a discrepancy between the actual content of the decision and the content that the participants accessed directly. The experiment is often discussed in relation to mistakes about our own judgements (Keeling 2018; Andreotta 2019). This is understandable, as the participants were clearly wrong when they gave reasons why they judged one face more beautiful than the other. But more relevant to our purposes, the participants were also wrong about the content of their decisions. For they decided to point to one of the pictures but then continued as if they had decided to point to the other. This suggests that people can be misled into thinking that they just made a different decision.

2.4 Misjudging why you decided

We finally turn to mistakes about the causes of our own decisions. We will now look at an experiment that was one of the most important in starting the research tradition on what is now known as ‘the introspection illusion’. The experiment was conducted by Nisbett and Wilson (1977; see also Wilson 2002). In this experiment, the participants were given the impression that they are participating in a consumer survey. The experimenters gave them to choose between four articles of clothing: four nightgowns or four stockings. They asked the participants to pick the article that they found to be of the highest quality. Afterwards, they invited them to explain their choice. Unknown to the participants, the four articles of clothing were all identical.

Nisbett and Wilson found that the participants were significantly more likely to choose an article that was placed further to the right. When asked to explain their choice, the participants gave all kinds of explanations, but no participant seemed to be aware of the left-to-right effect. Moreover, the experimenters found that when the effect was mentioned to the participants, they firmly denied something like that could have influenced their choice. The experimenters interpret these (and similar) findings as suggesting that people are sometimes unaware why they chose as they did. In our terms, they were not conscious of the causes of their decisions.

As noted above, there is now an entire tradition of research on the so-called introspection illusion. The term refers primarily to misjudgements about the causes of our own mental states. Arguably, research on priming effects can also be considered a part of this tradition (for an argument that this is so and a discussion of other relevant experiments, see Scaife 2014 and Doris 2015). Therefore, the claim that we do make this kind of mistake is perhaps the least controversial of those that we are considering. At the same time, this kind of evidence is probably the least relevant for our purposes. After all, the cause of a decision is not even an internal property

of it. However, the fact that we make such mistakes does lend some plausibility to the claim that we are not conscious of the decision itself. A mistake about the cause of the decision might indicate a mistake about the timing or content of the decision. And these in turn might indicate that we did not have direct access to the decision itself.

To summarise, the experiments discussed in the second section suggest that people sometimes misjudge whether, when, what, and why they decided. Moreover, they indicate that people are misled by external cues, such as observed behaviour. The evidence therefore provides some support for the claim that we always access our decisions by interpreting behaviour. If we had direct access to them, then it would not be clear why we make these mistakes. And even if we could explain how such mistakes are possible given direct access, that would still not be enough. For we would then need to explain why we make mistakes in that particular pattern, a pattern that suggests interpretation of behaviour. We make them in circumstances that closely parallel those in which others are misled about our decisions (see Bem 1967 and Cassam 2017). It would also not be enough to simply say that people's judgements are influenced in unexpected ways. Because there is an alternative explanation that makes these mistakes expected.

3 Judging decisions without external cues

In this section, we will look at some of the evidence that seems to challenge the claim that conscious will is an illusion. In particular, we will focus on the cases where there is no external behaviour. More precisely, we will look at the cases where people still report that they made a decision. We will then also look at a challenge that is closely related. This other challenge concerns cases where we have external behaviour and the relevant kind of preceding thoughts but people still deny that the behaviour was intended. In this kind of case, there seems to be enough evidence to support the interpretation that a decision was made. Yet people do not subscribe to that interpretation. These two kinds of challenging cases suggest that external cues are neither necessary, nor (together with the relevant preceding thoughts) sufficient for thinking that we decided. Judgements on decisions seem to be made irrespective of these cues.

3.1 Are external cues necessary?

Let us start with an experiment by Matsuhashi and Hallett (2008). The experimenters call it 'Libet interrupted'. In this experiment, the participants were once again linked to machines measuring electrical activity in the brain and in the muscles of their arms. The experimenters asked the participants to extend their index finger as briskly as possible once every 5 to 10 s. They told the participants that they should not plan in advance when they will move. They also mentioned to them that every once in while they will hear a signal sounding. If the participants heard this signal after they had already decided to move, then they had to

refrain from implementing that decision. If they heard the signal after they had already started to move, then they had to refrain from finishing the movement. In both cases, the participants were instructed to then wait for another 5 to 10 s, until the next trial. The participants were asked to otherwise keep the muscles of the arms relaxed.

Matsuhashi and Hallett found that the participants often refrained from movement. They also report that, judging from when the participants were likely to move, this was at least sometimes at a time when they had actually already decided. The experimenters interpret this finding as suggesting that external cues are not necessary to induce the thought that a decision has been made. We could make a more general point here. It seems intuitively true that we often refrain from doing what we decide to do, or at least postpone implementing the decision. In fact, we primarily need the concept of intention for explaining such cases (see also Bratman 1987). We need it to explain cases where action does not immediately follow settling the question what to do. If the theory saying there is no conscious will cannot accommodate such cases, then it seems to be in serious trouble.

Let us now turn to another experiment that points in the same direction. It was conducted by Desmurget et al. (2009; see also Fried et al. 1991). In this experiment, the participants were patients suffering from intractable seizures. These patients were undergoing evaluation for brain surgery. The evaluation included stimulating the brain of the patients via electrodes placed directly onto their cerebral cortex. The patients were conscious during the procedure and were able to give reports about their experience. The experimenters asked the patients to report what they felt when each of the different areas, where the electrodes were placed, were stimulated.

Here is what Desmurget and colleagues found. Under weaker stimulation of the parietal region, the patients reported a desire or intention to move, which concerned the contralateral hand, arm, or foot. Under stronger stimulation of the same region, the participants reported thinking that they had actually executed those movements. As a matter of fact, there was no observable movement and no discernible difference in the electrical activity of the muscles. Under stimulation of the premotor region, the participants executed movements with their mouth and the contralateral limbs. This fact notwithstanding, they denied intending those movements. The experimenters interpret these findings as suggesting that the participants were conscious of their intention to move, before they moved. They also interpret the results as suggesting that the parietal region is where these intentions arise.

These two experiments indicate that people sometimes think that they decided to move, before they move. People sometimes judge that a decision was made, even when there is no external behaviour to support such an interpretation. This means that external cues are not necessary for judging that there was a decision. It also throws some doubt on whether external behaviour plays such a role in the typical case. And therefore it lends some support to the alternative interpretation of the evidence that we looked at in the second section. That is, this provides some support for the claim that there was something that prevented the participants from using their direct access to their own decisions. Before answering this challenge, let us briefly look at another challenge that is closely related to the one just described.

3.2 Are external cues sufficient?

The other challenge to the claim that conscious will is an illusion comes from cases where behavioural cues seem insufficient. Consider again the last experiment that was discussed above. The participants moved their mouth or limbs but firmly denied that the movements were intentional. If we judge decisions from behavioural cues, then what was missing? It should be stressed that, on Wegner's view, we access decisions by interpreting behaviour in light of the circumstances. He says that, in addition to there being behavioural cues, three other conditions have to be satisfied for us to think that we intended the behaviour. We should have a conscious thought before we observe the behaviour. The thought should be consistent with the behaviour. And we should not be aware of any other plausible candidates for being the cause of the behaviour, other than the conscious thought. According to him, when these conditions are satisfied, we infer that the conscious thought was what settled the question what to do. It might well be that, in the case discussed above, one of these other conditions remained unsatisfied. For example, it seems plausible that the participants could have failed to think about the movements in advance.

There are other cases where this reply will not do. Consider patients with tics (see Ganos et al. 2018). They perform repetitive behaviours that can range from rather simple to rather complex. That could be a simple twitch, but it could also be jumping, cursing, or even making rude remarks that are sensitive to the context. Since these behaviours are repetitive, the patients are quite likely to think about them before they engage in them. Moreover, these behaviours seem to exhibit at least some of the signs of voluntary action. For instance, take a patient that has a tic of shaking their left arm. If they started moving their right arm rhythmically, then their left arm would stop shaking and start following the same rhythm. In this respect, the patients are just like other people, who find it hard to voluntarily shake one arm and move the other rhythmically. So the movement seems much like other intentional movements, and the patients think in advance that they will engage in it. Nevertheless, they deny that the movements are intentional.

However, it seems that this kind of case can also be explained by referring to some of the other conditions mentioned by Wegner. Remember that the thought should be consistent with the behaviour. In the case of the patient with a tic, the thought is likely to be inconsistent. They might well think that they should refrain from behaving that way or that they do not want to engage in that behaviour. Of course, it could be that sometimes they simply think that they will move. Still, it seems that they would have other reasons to interpret their behaviour as involuntary. They will probably think about these behaviours as pathological. They might be told so by someone else, or they might simply observe that they cannot refrain from them, even when these behaviours have obviously negative effects. These other considerations might well override the tendency to judge that the behaviour is intentional. Therefore, it is not clear that tics constitute a counterexample to Wegner's theory.

To summarise, the evidence that we discussed in the third section indicates that people sometimes access their decisions without having any relevant external cues. It suggests that external behaviour is not necessary and perhaps not sufficient (even

with prior consistent conscious thought and no alternative causes). It means that we rely on something internal to access our decisions. One option now is to go back to the suggestion that we access decisions themselves as conscious events. But as argued above, we would then face the challenge of explaining why we rely on external cues in the way that we do. Roughly the same could be said about the option of saying that there are some internal cues that are tightly linked with the decisions, or that there are internal cues that lead us to our decisions in some way that is more direct than interpreting behaviour. But yet another option is to say that there are internal cues that lead us to our decisions roughly in the same way as external cues do. This is the one we will explore next.

4 Judging decisions from mental imagery

In this section, I reply to the main challenge to the claim that conscious will is an illusion. Once again, the challenge is to explain what we are interpreting when there is no external behaviour to indicate that we made a decision. We will start with a more detailed description of the proposal itself. Then we will look at the considerations in support of it. This will include a discussion of the explanatory advantages that we gain and the background theories that make our assumptions more plausible. It will also include a look at the relevant neurological evidence. Finally, we will discuss some ways in which the proposal could be tested in future empirical work.

4.1 The imagery hypothesis

Here is the proposal, in short. The defended claim is that we access decisions only by interpreting behaviour. The challenge is to explain what we interpret when there is no external behaviour. The response is that we interpret internal behaviour. We can understand internal behaviour as mental simulation of external behaviour. This proceeds by way of mental imagery. The mental images can be conscious. They are sometimes images of the behaviour itself. Other times, they are images of the consequences of the simulated behaviour. But in neither of these cases can having these conscious mental images by itself constitute a decision. For that does not directly settle the question what we will do. However, the imagery may influence decisions. In fact, the main purpose of entertaining it might well be to help us figure out the best course of action. The point is that, although the imagery is clearly relevant to the decisions, it only gives us indirect access to them. At least that is the proposal.

Here is an example of how this might work. Suppose that you have to answer a question by telling me yes or no. Before you say anything out loud, you may say it in inner speech. Suppose that in inner speech you say yes. This utterance by itself would suggest that you decided to answer positively. If you said it with a strong emphasis, then you would have even more reason to think that it expresses your decision to give a positive answer. However, you could also say that in inner speech and still decide to tell me no. This could be because you subsequently imagine that saying yes would have some negative consequences. Or it could be because you then

utter the other answer in inner speech as well. In the latter case, the mental imagery itself does not point to either decision unequivocally. It could even be that you had already decided to give me a negative answer. But then you said yes in inner speech just to simulate the consequences and to make sure that you need not change your mind. This shows that simulation can clearly be relevant to a decision and yet only give access to it through interpretation.⁴

Now consider how this applies to the experiments that we said challenge the claim that conscious will is an illusion. Take the interruption experiment. It is plausible that, before moving, the participants mentally simulated the brisk finger movement. The simulation could have proceeded by way of conscious mental images. These could have been motor images of the movement itself or visual images of the effects. To be sure, the participants were told not to plan in advance when they will move. But on the one hand, telling them not to think of the movement might have had the opposite effect. It might have worked like telling someone not to think of a white bear (Wegner 1989). On the other hand, the instruction not to plan in advance can be interpreted as merely asking not to settle on a decision. Mentally simulating possible actions does not amount to settling on a decision. However, when the participants are interrupted, they are explicitly asked to consider if they have already formed an intention to move. Suppose that they hear the signal at a time when they are entertaining an image of the movement or its consequences. In the context of the explicit question, it would be natural for them to interpret the image as a sign that they already have formed an intention. So perhaps they responded as if they had the intention to move, because they interpreted their own mental imagery that way.

Let us now take another look at the experiment where a desire or intention to move was reported after the person's brain was directly stimulated. To see how the proposal applies in this case, we have to explicate the notion of simulation just a little further. As I understand mental simulation here, it works roughly as follows. We start the mental process that would normally lead to external behaviour, but then we stop it at the very last stage. If that is the case, then we should expect that mental imagery will arise when we will stimulate brain areas that are associated with earlier stages of the process. Note that the participants reported intentions when just such areas were stimulated. We could explain this by suggesting that the stimulation gave rise to mental imagery, that was then interpreted as a sign of having an

⁴ It should be noted that there is an ongoing discussion on whether such conscious imagining, perhaps together with other closely related events, conscious or unconscious, can itself sometimes constitute a decision, perhaps in a revised sense (Mele 2009a; Carruthers 2011; Shepherd 2013; Vierkant 2015; Frankish 2016). I am afraid that I cannot do justice to this complex debate here. But roughly, I think that saying this event sometimes plays the role of a decision needs to be supported by an account of when it should do so; otherwise, the suggestion seems ad hoc. And saying it plays this role together with other events needs to be supported by an account of how we become aware of them, showing that they can be conscious. Finally, saying we need to revise the concept of decision (or of settling a question) requires support from an account that shows the new concept to be capable of playing the roles required of it. I believe that, on all three counts, much work remains to be done. And in absence of these developments, the account proposed above clearly remains a possibility. Moreover, given the similarities between imagining and overt action, it presently seems to me that this account is the more plausible one. (Thanks to an anonymous reviewer for pressing me on this.)

intention. Note also that the participants moved but thought that the movement is unintentional when the experimenters stimulated areas associated with later stages of the process. We could explain this by saying that the stimulation of these areas did not give rise to mental imagery. They in turn could not have been interpreted as signs of an intention.⁵

To sum up, both experiments that posed a challenge can now be explained. What helps us explain them is the hypothesis that imagery is involved in judging one's own decisions. Call this 'the imagery hypothesis'.

4.2 Support for the hypothesis

We will now look at the support for the imagery hypothesis that is already there. Most importantly, as can be seen from the above discussion, an advantage of the imagery hypothesis is that it helps us explain more evidence than we could otherwise. If we say that we only use external cues, then we have trouble with the evidence discussed in the third section. And if we say that we have direct access (or very reliable internal cues), then we have trouble explaining the evidence discussed in the second section. But if we say that mental imagery is involved, then we can explain all the evidence that we discussed. This is the most important advantage of the hypothesis. But it has other sources of support as well.

The imagery hypothesis also has the advantage of allowing us to explain more evidence at a relatively low cost. This is because we already have reasons to believe in mental mechanisms similar to those that it postulates. So we do not have to make too many additional assumptions in order to introduce it. These mental mechanisms are postulated by the simulation theory of mental imagery and by the interpretive-sensory access theory of self-knowledge. Both of them are supported by sources of evidence that are independent from those that we discussed so far. Let us now take a look at those theories and how they support the hypothesis.

Consider first the simulation theory of mental imagery (Hesslow 2002, 2012; see also Currie 1995, Currie and Ravenscroft 1997). This theory has three main claims. It says that we simulate behaviour by starting the process that would normally lead to overt action and then suppressing execution. It says that we simulate perception by internally starting processes that resemble it. And it says that both overt and covert actions can initiate simulations of their consequences. Crucially for our purposes, it should predict that in the experiments described above people will engage in mental simulation of external behaviour. This is because they are given such a task and because the theory says that simulation is there for such tasks. The theory also

⁵ Here is, roughly, where the areas stimulated in this study stand in the sequence that ultimately produces movement, according to a model proposed by two of the study's authors (Desmurget and Sirigu 2009). First is the posterior parietal cortex, which is associated with movement prediction and selection. Second is the supplementary motor cortex, which is associated with the release of motor inhibition. And third is the premotor cortex, which is associated with comparing predictions with actual feedback. As noted, in the stimulation experiment, reports of intending were related to the first area, and movements were related to the third area. The second area was related to either the one, or the other, depending on the strength of the stimulation.

implies that this simulation will give the participants a form of behaviour to be interpreted. For it emphasises that there are very close parallels between simulated and actual behaviour. It therefore suggests that we should expect similar kinds of inference to be needed in order to access decisions from external and internal behaviour. The simulation theory of mental imagery is supported by a wide range of independent behavioural and neurological evidence (for a review, see Hesslow 2012). Therefore, it gives additional plausibility to the imagery hypothesis.

Consider now the interpretive-sensory access theory of self-knowledge (Carruthers 2011; see also Carruthers 2015b). This theory has three main claims. It says that there is only one mental faculty for attributing propositional attitudes, whether to oneself or to others. It says that the faculty has access almost exclusively to sensory mental states, though in a wide sense, which includes mental imagery. And it says that the faculty has only interpretive access to most propositional attitudes. The last claim applies to decisions as well. Therefore, the theory implies that conscious will is an illusion (Carruthers 2007, 2017). It also suggests that mental imagery might play a role in self-attributing decisions. The proposal in this paper is to use this in order to explain the cases that would otherwise challenge the claim that conscious will is an illusion. The theory is supported by a wide range of evidence from behavioural, neurological, development, and comparative experiments (for a recent review, see Rimkevičius 2020). Therefore, it lends additional support for the imagery hypothesis.

The hypothesis also receives support from the available neurological evidence. The evidence in question concerns cases where participants report intentions in absence of external behaviour. It is found that the brain regions that are associated with mental imagery are activated in these cases as well. On both occasions, parietal and supplementary motor areas are found to be activated. They are activated when we think that we intend to move (Fried et al. 1991; Desmurget et al. 2009). And they are activated when we merely imagine moving (Decety et al. 1994; Lotze et al. 1999; Rao et al. 1993; Meister et al. 2004). This suggests that conscious mental imagery might well be available for interpretation in cases where people report intentions before engaging in overt behaviour. Therefore, the available neurological evidence lends some plausibility to the imagery hypothesis.

4.3 How to test the hypothesis

Let us now look at the ways in which the proposal could be tested in future empirical work. Some of them are fairly straightforward. Recall that the hypothesis suggests that mental imagery will be involved in cases where we think that we decided, but we have not engaged in overt behaviour. As far as I can tell, no one has yet asked the participants in such cases whether they have been entertaining a mental image of the action or its consequences. So we could do just that: We could rerun the experiments described above and now collect reports about the presence of conscious mental imagery.

In addition to looking at the state of entertaining a conscious mental image, we could also look at the related trait and capacity. For example, we could empirically

investigate if reports of intending, in absence of overt behaviour, are related to scores on the Vividness of Visual Imagery questionnaire (Marks 1973). We could also try to compare a group of typical participants with a group of participants who report that they never entertain mental imagery at all (Zeman et al. 2015, 2016). That is, we may investigate how people with aphantasia think about their intentions. We would predict that lower scores on mental imagery measures will be associated with fewer reports of intending to act in absence of overt action.

5 Conclusion

I have argued that there is some evidence to support the suggestion that conscious will is an illusion. People seem to depend on inferences from behaviour when they make judgements about their own decisions. I have also discussed a challenge to this suggestion that concerns cases where there is no external behaviour from which to infer a decision. Taking up this challenge, I have proposed the response that mental imagery plays the crucial role in such cases. I have pointed out that, in such cases, we can still make inferences from internal behaviour. I then explained the notion of internal behaviour in terms of mental simulation of external behaviour that proceeds by way of mental imagery. I have argued that the proposal has the advantage of helping us explain more evidence than we could otherwise. I also argued that it allows us to do this without demanding us to make too many assumptions that we do not already have reasons to accept. Finally, I have suggested some ways in which the proposal could be tested in further empirical studies.

In concluding, it should be noted that the argument advanced in this paper has some important limitations. First of all, it should be emphasised that the imagery hypothesis does not follow from the claim that there is no conscious will. Some researchers who are sympathetic to Wegner's view might want to resist this proposal. The reason for this could be that the hypothesis makes the theory somewhat more complicated. After all, this is an additional assumption, even if independently supported, to an extent. The reason could also be that the proposal makes the theory somewhat more difficult to test empirically. This is because there are well known difficulties that plague empirical research on mental imagery more than on other subjects. For example, it is more difficult to deal with demand characteristics in such experiments (Thomas 2014).

Similarly, it should be emphasised that the imagery hypothesis is in principle compatible with thinking that conscious will is real. For instance, say that we adopted some form of dual-access view, which says that we mostly access decisions directly but sometimes access them through interpretation. Someone who endorses such a view could then say that mental imagery plays an important role when we turn to interpretation. Of course, such a view would still face the challenge of explaining systematically why we turn to interpretation (and mental imagery) when we do. But it shows that we should keep in mind that the implications of the imagery hypothesis are not all straightforward.

What the imagery hypothesis does imply is that there is an important role for imagination to play in discussions about the will. It has been recognised for some

time that imagination could play an important role in some debates about the will (e.g., Nahmias 2016). Yet the role that is proposed here does not seem to have been considered before. What is more, the two debates—about imagination and about volition—still have relatively few connections. This seems to be the situation in the case of the theoretical debates as well as in the case of the empirical debates about the two topics. Hopefully, the present proposal can contribute to bringing these two fields of research closer together.

Acknowledgements For comments on previous drafts of the paper, thanks to participants of the Second International Conference on Neuroscience and Free Will, Exploring the Mind's Eye: An International Conference on Imagination, and the two anonymous reviewers for this journal. This paper draws on one of the chapters of the doctoral dissertation of the author.

Compliance with ethical standards

Conflict of interest The author declares that there is no conflict of interest.

References

- Andreotta, A. J. (2019). Confabulation does not undermine introspection for propositional attitudes. *Synthese*. <https://doi.org/10.1007/s11229-019-02373-9>.
- Banks, W. P., & Isham, E. (2009). We infer rather than perceive the moment we decided to act. *Psychological Science*, *20*, 17–21.
- Bayne, T. (2006). Phenomenology and the feeling of doing: Wegner on conscious will. In S. Pockett, W. P. Banks, & S. Gallagher (Eds.), *Does consciousness cause behavior?* (pp. 169–186). Cambridge, MA: MIT Press.
- Bem, D. J. (1967). Self-perception: An alternative explanation of cognitive dissonance phenomena. *Psychological Science*, *74*, 183–200.
- Boncalzi, S., & Haggard, P. (2019). From *freedom from* to *freedom to*: New perspective on intentional action. *Frontiers in Psychology*, *10*, e1193.
- Bratman, M. E. (1987). *Intention, plans, and practical reason*. Cambridge, MA: Harvard University Press.
- Carruthers, G. (2015a). A metacognitive model of the sense of agency over bodily actions. *Psychology of Consciousness*, *2*, 210–221.
- Carruthers, P. (2007). The illusion of conscious will. *Synthese*, *159*, 197–213.
- Carruthers, P. (2011). *The opacity of mind: An integrative theory of self-knowledge*. Oxford: Oxford University Press.
- Carruthers, P. (2015b). *The centered mind: What the science of working memory shows us about the nature of human thought*. Oxford: Oxford University Press.
- Carruthers, P. (2017). The illusion of conscious thought. *Journal of Consciousness Studies*, *24*, 228–252.
- Cassam, Q. (2017). What asymmetry? Knowledge of self, knowledge of others, and the inferentialist challenge. *Synthese*, *194*, 723–741.
- Currie, G. (1995). Visual imagery as the simulation of vision. *Mind & Language*, *10*, 25–44.
- Currie, G., & Ravenscroft, I. (1997). Mental simulation and motor imagery. *Philosophy of Science*, *64*, 161–180.
- Decety, J., Perani, D., Jeannerod, M., Bettinardi, V., Tadary, B., Woods, R., et al. (1994). Mapping motor representations with positron emission tomography. *Nature*, *371*, 600–602.
- Desmurget, M., & Sirigu, A. (2009). A parietal-premotor network for movement intention and motor awareness. *Trends in Cognitive Sciences*, *13*, 411–419.
- Desmurget, M., Reilly, K. T., Richard, N., Szathmari, A., Mottolese, C., & Sirigu, A. (2009). Movement intention after parietal cortex stimulation in humans. *Science*, *324*, 811–813.
- Doris, J. M. (2015). *Talking to ourselves: Reflection, ignorance, and agency*. Oxford: Oxford University Press.

- Frankish, K. (2016). Playing double: Implicit bias, dual levels, and self-control. In M. Braunstein & J. Saul (Eds.), *Implicit bias and philosophy, metaphysics and epistemology* (Vol. 1, pp. 23–46). Oxford: Oxford University Press.
- Fried, I., Katz, A., McCarthy, G., Sass, K. J., Williamson, P., Spencer, S. S., & Spencer, D. D. (1991). Functional organization of human supplementary motor cortex studied by electrical stimulation. *The Journal of Neuroscience*, *11*, 3656–3666.
- Ganos, C., Rothwell, J., & Haggard, P. (2018). Voluntary inhibitory motor control over involuntary tic movements. *Movement Disorders*, *33*, 937–946.
- Haggard, P. (2019). The neurocognitive bases of human volition. *Annual Review of Psychology*, *70*, 9–28.
- Hall, L., Johansson, P., & Strandberg, T. (2012). Lifting the veil of morality: Choice blindness and attitude reversals on a self-transforming survey. *PLoS ONE*, *7*, e45457.
- Hall, L., Johansson, P., Tärning, B., Sikström, S., & Deutgen, T. (2010). Magic at the marketplace: Choice blindness for the taste of jam and the smell of tea. *Cognition*, *117*, 54–61.
- Hall, L., Strandberg, T., Pärnmetts, P., Lind, A., Tärning, B., & Johansson, P. (2013). How the polls can be both spot on and dead wrong: Using choice blindness to influence political attitudes and voter intentions. *PLoS ONE*, *8*, e60554.
- Hesslow, G. (2002). Conscious thought as simulation of behaviour and perception. *Trends in Cognitive Sciences*, *6*, 242–247.
- Hesslow, G. (2012). The current status of the simulation theory of cognition. *Brain Research*, *1428*, 71–79.
- Johansson, P., Hall, L., Sikström, S., & Olsson, A. (2005). Failure to detect mismatches between intention and outcome in a simple decision task. *Science*, *310*, 116–119.
- Keeling, S. (2018). Confabulation and rational obligations for self-knowledge. *Philosophical Psychology*, *31*, 1215–1238.
- Libet, B., Gleason, C. A., Wright, E. W., & Pearl, D. K. (1983). Time of conscious intention to act in relation to onset of cerebral activity (readiness-potential): The unconscious initiation of a freely voluntary act. *Brain*, *106*, 623–642.
- Lotze, M., Montoya, P., Erb, M., Hüsmann, E., Flor, H., Klose, U., et al. (1999). Activation of cortical and cerebellar motor areas during executed and imagined hand movements: An fMRI study. *Journal of Cognitive Neuroscience*, *11*, 491–501.
- Marks, D. F. (1973). Visual imagery differences in the recall of pictures. *British Journal of Psychology*, *64*, 17–24.
- Matsushashi, M., & Hallett, M. (2008). The timing of the conscious intention to move. *European Journal of Neuroscience*, *28*, 2344–2351.
- Mele, A. R. (2009a). *Effective intentions: The power of conscious will*. Oxford: Oxford University Press.
- Mele, A. R. (2009b). Mental action: A case study. In L. O'Brien & M. Soteriou (Eds.), *Mental actions* (pp. 17–37). Oxford: Oxford University Press.
- Meister, I. G., Krings, T., Foltys, H., Müller, M., Töpfer, R., & Thron, A. (2004). Playing piano in the mind—An fMRI study on music imagery and performance in pianists. *Cognitive Brain Research*, *19*, 219–228.
- Nahmias, E. (2002). When consciousness matters: A critical review of Daniel Wegner's *The illusion of conscious will*. *Philosophical Psychology*, *14*, 527–541.
- Nahmias, E. (2016). Free will as a psychological accomplishment. In D. Schmitz & C. A. Pavel (Eds.), *The Oxford handbook of freedom*. Oxford: Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780199989423.013.30>.
- Nichols, S. (2015). *Bound: Essays on free will and responsibility*. Oxford: Oxford University Press.
- Nichols, S., & Stich, S. (2003). *Mindreading: An integrated account of pretence, self-awareness, and understanding other minds*. Oxford: Clarendon Press.
- Nisbett, R. E., & Wilson, T. D. (1977). Telling more than we can know: Verbal reports on mental processes. *Psychological Review*, *84*, 231–259.
- Olson, J. A., Landry, M., Appourchoux, K., & Raz, A. (2016). Simulated thought insertion: Influencing the sense of agency using deception and magic. *Consciousness and Cognition*, *43*, 11–26.
- Peters, U. (2014). Self-knowledge and conscious attitudes. *Journal of Consciousness Studies*, *21*, 139–155.
- Rao, S. M., Binder, J. R., Bandettini, P. A., Hammeke, T. A., Yetkin, F. Z., Jesmanowicz, A., et al. (1993). Functional magnetic resonance imaging of complex human movements. *Neurology*, *43*, 2311–2318.
- Rimkevičius, P. (2020). The interpretive-sensory access theory of self-knowledge: Empirical adequacy and scientific fruitfulness. *Problemos*, *97*, 150–163.

- Scaife, R. (2014). A problem for self-knowledge: The implications of taking confabulation seriously. *Acta Analytica*, 29, 569–485.
- Schlegel, A., Alexander, P., Sinnott-Armstrong, W., Roskies, A., Tse, P. U., & Wheatley, T. (2015). Hypnotizing Libet: Readiness potentials with non-conscious volition. *Consciousness and Cognition*, 33, 196–203.
- Schurger, A., Sitt, J. D., & Dehaene, S. (2012). An accumulator model for spontaneous neural activity prior to self-initiated movement. *PNAS*, 109, E2904–E2913.
- Shepherd, J. (2013). The apparent illusion of conscious deciding. *Philosophical Explorations*, 16, 18–30.
- Sinnott-Armstrong, W., & Nadel, L. (Eds.). (2011). *Conscious will and responsibility*. Oxford: Oxford University Press.
- Thomas, N. J. T. (2014). Mental imagery. In E. N. Zalta (Ed.), *The Stanford encyclopaedia of philosophy* (Summer 2019 edition). <https://plato.stanford.edu/archives/sum2019/entries/mental-imagery/>. Accessed 15 July 2020.
- Vierkant, T. (2015). How do you know that you settled a question? *Philosophical Explorations*, 18, 199–211.
- Walter, S. (2014). Willusionism, epiphenomenalism, and the feeling of conscious will. *Synthese*, 191, 2215–2238.
- Wegner, D. M. (1989). *White bears and other unwanted thoughts: Suppression, obsession, and the psychology of mental control*. London: Penguin.
- Wegner, D. M. (2002). *The illusion of conscious will*. Cambridge, MA: The MIT Press.
- Wegner, D. M., & Wheatley, T. (1999). Apparent mental causation: Sources of the experience of will. *American Psychologist*, 54, 480–492.
- Wilson, T. D. (2002). *Strangers to ourselves: Discovering the adaptive unconscious*. Cambridge, MA: Harvard University Press.
- Zeman, A., Dewar, M., & Della Sala, S. (2015). Lives without imagery—Congenital aphantasia. *Cortex*, 73, 378–380.
- Zeman, A., Dewar, M., & Della Sala, S. (2016). Reflections on aphantasia. *Cortex*, 74, 336–337.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.