In what sense should we talk about the perception of other minds?

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Abstract
By means of spontaneous and unconscious imitation, an observer may be able to directly experience the inner states of another person because the observer and the observed share similar neural pathways. This discovery of a common neural basis reveals the correlative mechanisms through which the intentions of others are perceived. While analysing the implications of this discovery, this paper notes that the correlation does not provide a complete explanation of our understanding of other minds. Instead, the correlation comes into play only to a minimal degree. The paper also explores the epistemological characteristic of the knowledge harboured by other minds. That is, as a kind of private knowledge, the experience of other minds can help us arrive at a relatively consistent understanding of others and engage in communication with them through public expression and the description of mental states. However, it is impossible to truly understand other minds because conscious experience in the strict sense resides only in its owner, and the unique qualia emerging inside the subject cannot be directly observed from a third-person perspective. In this sense, the so-called perception of other minds is not suited to seeking a causal explanation of the ways in which others act, but for reading the meanings expressed by them in a given situation.

Keywords
Causality, epistemological characteristic, experience, other minds, perception

1. Introduction
The perception of other minds has helped form the foundation of social behaviour. But how do we understand another person’s thoughts? Can we perceive other people’s mental states? If so, what is the basis for and approach to that effort, and what is the nature of such knowledge?

In past centuries, philosophers proposed various solutions based on introspection, which was used to discover evidence and refute conjectures in their examinations of the mind. Today, with significant advances in knowledge and the tools of investigation at our disposal, progress in neuroscience has revealed certain brain processes underlying human thoughts and emotions, which can provide useful insights for us to examine issues pertaining to the mind.

Various solutions to the problem have emerged. In recent research, Sollberger (2017) revisited the received dogma, which holds that people cannot know someone else’s mental life in the same way...
that they know their own minds, and reinforced the dialectical position of inferentialists who believe that we have knowledge of someone else’s mind by virtue of analogical inference. Gangopadhyay and Pichler (2017) addressed the epistemological debate between emerging perceptual accounts of knowing other minds and traditional approaches based on the theory of mind. Roelofs (2018) argued that our knowledge of other minds involves both perception and inference through ‘perceptual co-presentation’, which yields knowledge that is simultaneously perceptual and inferential. These studies have involved a discussion of the epistemological issues of the perception of other minds. Despite progress in this area, consensus on the issue remains elusive. In my opinion, the key to the problem is to determine precisely what we mean when we talk about knowledge of other minds.

I would like to point out that the view under discussion here differs from the conventional view, which is concerned more about whether the knowledge of other minds is epistemically direct in the sense of being inferential and observational, and this paper does not directly argue for the superiority of my view but instead offers a philosophical alternative.

The remainder of this paper proceeds as follows. I first examine the discovery of the neural basis as well as the correlative mechanisms through which the intentions of others are perceived, explain the advantages of direct projection theory over analogical theory and then go on to analyse the predicaments and challenges facing neurological explanations. After a critical analysis of mental causation, I further explore the epistemological characteristic of the knowledge of other minds. That is, as a kind of private knowledge, the so-called perception of other minds is not suited to seeking a causal explanation of the ways in which others act, but for reading the meanings expressed by others in a given situation. I close with a brief summary of the primary results and suggestions for future research in the area.

2. How does imitation create the inner states of others in our minds?

When a person perceives and recognises another person’s mental state (including that person’s feelings, perceptions, intentions and thoughts), we often say that the perceiver’s feelings have attained a level that matches those of the perceived person. Perhaps such inferences can be confirmed by the experience of others, but each person’s experience is owned exclusively by that person. For mental states that cannot be directly reached, observers can extract only the verbal and non-verbal cues displayed. In the empirical world, we cannot expect others to verbally express all their ideas and opinions. In fact, when people try to hide their mental states, focusing on the non-verbal cues provided by them, rather than verbal ones, is probably the best strategy.

A study has shown that people with language impairment as a result of some form of brain damage, such as a stroke, are better at detecting lies (Vrij et al., 2000). What kind of behavioural cues convey information, and what part of the nervous system is sensitive to that information? Another study has shown that attending to the direction of a person’s gaze can provide us with important information about their attentive state (Pelphrey et al., 2004). When someone’s speech is not in line with his or her mental state, the direction of his or her gaze serves as helpful evidence to understand his or her thoughts. The cells of the superior temporal sulcus help us distinguish head motion from gaze direction: some of the cells react only to head motion, while others respond only to gaze direction. Although head motion often corresponds to gaze direction, the ability to distinguish between them enables us to identify whether other people’s external behaviour matches their intention, thereby paving the way for inferences regarding their mental states based on those cues.

There are also studies showing that people’s inferences regarding others’ beliefs about their behaviour are based on a generalisation of their own choices and personality traits, whereas their judgments about other aspects of others depend on their memory of specific events in their lives. In other words, people’s perception of other minds is connected to their self-perception.

An experiment using functional magnetic resonance imaging (fMRI) has shown that both the perception of a similar person and self-perception activate a region of the medial prefrontal cortex (MPFC), whereas the perception of a different person
does not activate the MPFC. Social cognition is fundamentally different when we interact with others rather than merely observe them (Sameen et al., 2013). In another scenario, we may have stored abundant emotional information about ourselves and about our loved ones, which is supported by an experiment conducted by Jiang et al. (2016). To address the electrophysiological bases underlying the decoupling mechanism (the mechanism for distinguishing the mental states of others from one’s own), they compared the temporal course of neural activities associated with belief-related reasoning of the self and of others when the belief held by the self was consistent or inconsistent with that held by others. They found that, during a 450–600 ms period, belief reasoning of the self elicited a larger late positive component than of others when beliefs were inconsistent. This result was not caused by the perception of the similarity between the close others and the self, and might have represented the commonalities between the information that we have stored about ourselves and that about the close others, in terms of its complexity or emotion.

In either of the above cases, the participation of the same region of the brain in the perception of others and self-perception may indicate that a shared mental function is capable of accomplishing two types of tasks. The involvement of the MPFC in the two perceptual phenomena suggests that this region of the brain is important for self-reflection and reflection on others, and that the perception of others requires the participation of self-perception. We rely on our own mental states to understand someone we hardly know but who is similar to us. And when we have a rich store of information about ourselves and close others, those processes may be correlated as well. We use non-verbal cues (such as facial expressions and gaze) to gather information about others’ mental states, characterise the abstract information and use it to form an impression of their possible inner states.

In this sense, an intrinsic connection exists between the perception of others and self-perception. People may rely on certain characteristics of self-perception to infer the mental states of others. This conclusion supports the simulation theory; that is, that the understanding of other minds is based on the ability to place oneself in others’ shoes, so to speak – to speculate on the mental states of others by imagining being in their position. With the help of imitation, we are not only aware that others have different mental states, including desires, intentions and beliefs, but are also able to form a general and accurate theory of their mental states and use this information to predict and explain their behaviour (Goldman, 2012). The simulation theory assumes that, because humans cannot directly observe other minds, we assume that other people have similar mental states to ours, and use this hypothesis to speculate about the intentions, responses and actions of others or imaginatively put ourselves in the position of the simulated persons to experience their feelings.

People’s ability to undertake normal social activities is directly related to their ability to simulate. Simulation provides us with a way into the inner world of others. Nevertheless, such simulation can be used to target only animate objects because responses to our impressions of inanimate objects do not exhibit a connection with the MPFC (Mitchell et al., 2005). We have specialised neural circuits in our brains to recognise the movements of animate and inanimate objects, as well as circuits to identify faces and facial movements. These circuits enable us to understand that we are similar to other people. This also explains why we imitate only the behaviour of humans rather than inanimate objects.

How does imitation create the perception of the inner state of others in our minds? Since the end of the 20th century, scientists have obtained evidence, based on transcranial magnetic stimulation and positron emission tomography, that shows that primate brains, including the human brain, have certain type of neuron in the area of F5 that is activated both when one performs an action and when one observes the same action performed by another. The neuron ‘mirrors’ the action of another person and hence is called the ‘mirror neuron’ (Lurz et al., 2018; Rizzolatti and Craighero, 2004). In other words, our understanding of the actions of others seems to depend on the neural structure activities that also occur in us when we perform the actions ourselves. Due to this correlation, neuroscientists use mirror systems to describe neural networks that also participate in understanding actions. In their view, mirror
neurons enable us to empathise with others by imitating their inner states in our own brains. Mirror neurons can be viewed as a dynamic part of larger circuits that support our understanding of the options and action potentials that we, and perhaps others, have in the affordance space (Brincker, 2015).

Mirroring and resonance also appear in the context of pain and moods. Studies have shown that perceiving emotions also triggers neural mechanisms that play a key role in the generation of emotions, and many of the same areas of the brain are activated when the subject mimics and observes the facial expressions of others representing various emotions. A series of experiments have shown that both nausea and aversion activate similar areas of the insula, and the intensity of both activities is positively correlated with the activation of the insula. This is supported by experiments conducted by Vaughn et al. (2018) on pain: there is a common mechanism for feeling an emotion and perceiving the same emotion in others. Watching another person in pain activates areas of the brain involved in the sensation of our own pain. Rodriguez (2018) offered an argument for a non-relational conception of expression and, therefore, for the view that we directly perceive people’s mental states from their expressive features.

We know the pain we experience, but how do we feel the pain of others? Nowadays, brain imaging technologies have led to the discovery of a network of areas called the pain matrix that becomes active when people experience pain. However, subjective pain is not directly coupled to the physical properties that constitute the painful stimulus. When we are distracted, we do not find the pain caused by a very hot object unbearable even if it remains burning hot. The feeling of pain can be strengthened by psychological suggestion. So how can we experience the feelings of others? By closely observing the relevant areas of the brain when we empathise with others, it can be seen that areas related to the physical aspects of pain, such as the temperature of an object and the point of contact with the skin, are not active, while areas related to the mental experience or subjective feeling of pain become active. In this case, we share the mental experience of pain rather than its physical aspects.

It should be pointed out that mirror neurons do not respond only to a visually observed action. For example, they can be activated through sounds or the imagination, thus conveying the meaning of the aurally perceived or considered action. The mechanism of mirror neurons connects simple actions to the semantic network, thus allowing us to quickly and directly understand the actions of others. This direct perceptual capacity depends upon recognizing the manner in which the other person is responsive to the affordances of the environment (Kiverstein, 2015). Such a shared neural mechanism seems to allow a direct exchange of experience between the observer and the observed. And, if we adopt a certain kind of pluralism about social cognition, then the mirror neuron system can play a role in social cognition even if it provides no access to the minds of others at all (Borg, 2017).

3. The advantages of direct projection theory over analogy theory

By observing the physical movements and facial expressions of others, hearing their meaningful words and reading their writing, we can determine their mental states, thoughts, intentions and desires. This is because our knowledge of other minds is based on the causal inference of ‘mind–behaviour’, which uses the principle of mental causation: a behaviour is always accompanied by a mental state, and that causal relationship is regular and universal. If the general induction of mind–behaviour causation is correct, and if the behaviours of others are similar to ours, then, by analogy with ourselves, such generalisation also applies to others. Through such generalisation, we have reason to arrive at specific inferences regarding the mental states of a specific individual.

Causal inference in psychological studies is based on the premise that the law of mental causation has been established. There are two ways to establish the law of mental causation:

- by establishing a universal law for mental phenomena through scientific research on vision, inference, language acquisition and various cognitive mechanisms
- by establishing a law between mental phenomena and individual behaviours by empirically
generalizing the observation of the causal relationship between the mind and behaviour.

The latter constitutes our common sense, which serves as the basis for the mental causal inference applied by people.

It seems that the mind–behaviour causal inference and the principles of mental causation have been accepted by most philosophers. However, is there any reason to conclude that similar mental states between any pair of individuals would result in similar behaviours? We do not doubt our ongoing thoughts and experiences. However, although we can infer the mental states of others by observing their behaviour, what kind of reasonable evidence do we have to support these mind–behaviour inferences? The regularities suggested by the principles of mental causation do not fully apply to all mental causal phenomena. Moreover, the mind and behaviour perhaps have a many-to-many, rather than a one-to-one, relationship. In other words, in response to a certain environmental stimulus, the subject has many mental states at the same time and then exhibits many behaviours. Rarely do people exhibit one-to-one mind–behaviour relationships. In addition, by inferring other people’s mental states using the principles of mental causation, we fall victim to the fallacy of circular reasoning because, when we make a causal inference, we must assume that the principles of mental causation are applicable to the given object. Only in this way can we infer the object’s mental states from the observation of his or her behaviours. If this condition cannot be established, how can we apply the principles of mental causation to other people? This is the very question that needs to be dealt with in the problem of other minds.

Of course, asking this question is not an attempt to deny its possibility; nor, by extension, is it an assertion of the impossibility of understanding other minds. My question aims to illustrate that perceiving other minds somehow has a kind of epistemological characteristic and involves the acquisition of knowledge in a private manner.

The experience produced by mirror neurons offers an ‘internal perspective’ through which we can experience what others do. We do not first perceive their behaviours, and then infer or assume that their behaviours are caused by some similar experience or internal state that leads us to perform similar behaviours. Instead, we see others as entire persons; that is, as intentional beings whose gestures and actions can express their experiences or mental states. Here, the living body has the characteristics of both the first person and the third person: I can experience the body from the first-person perspective and others can feel it from the third- or second-person perspective. When I empathise with you, I treat myself as another person relative to you. With regard to the first person (proprioception) and the third person (external feeling) in social interaction, we can establish a connection between their cognitive patterns so that we can imagine our perceptions of each other – we are all involved in an intersubjective perspective.

The body is the interface between the mind and perception. Without the body, we cannot have emotional interactions. We understand others through cycles of cognition–behaviour interaction, which is often carried out by our bodies: emotional understanding and resonance are gained through gestures, expressions, movements and interactions of bodies. In this sense, the perception of other minds works more like reading body language rather than mental states. The emotional communication between infants and their parents embodies the most primitive form of intersubjectivity. Early infants’ social cognitive abilities do not develop continually into, say, a 4-year-old’s capabilities of belief attribution (Fenici, 2015). Newborns are ignorant of any concept or knowledge such that they cannot infer or understand the emotions of others by applying theories. Their way of imitating and responding to the facial expressions of adults is a direct physical interaction that also functions in the emotional interaction among adults. For example, the tacit cooperation between dancers relies on the interaction between body movements and eye contact. An opposite example is that patients with impaired amygdalas can neither experience nor recognise fear, which shows that experiencing and expressing fear – the two states that were previously believed to be independent – have an important commonality.

People unconsciously experience the feelings of others, not through indirect theoretical approaches,
but through direct emotional response and expression. By ‘direct’, I mean that the emotions of an individual and others occur through the same neural pathways without mediation (causal inference or simulation). The importance of mirror neurons in perceiving the intentions of others means that, through spontaneous and unconscious imitation, humans may, through direct projection mechanisms, activate regions of the brain that elicit instinctual action responses, thus taking the first step in understanding others and building social relationships. At the same time, the human mind has the ability to understand other minds through imagination. We feel, through imagination, a sense of proximity and physical equivalence to others that forms the basis of our understanding of other minds. It consists of two aspects: one is the ability to attribute a cause to one’s own mental state or that of others. The mental states include belief, desire, intention, thought, knowledge, concept attention and all emotions. Take intention as an example. The average person can distinguish between a moving, living being with an intention (such as a human or an animal) and a moving natural object (such as a stone or a leaf) without any intention. The other aspect is a corresponding emotional response to the mental states of others. We not only attribute a cause to an individual’s mental state, but also become involved in and respond appropriately to his or her mental state. In terms of experience, people are emotionally connected with one another and can appropriately respond. Human beings can develop an understanding of other people’s inner mental states (such as deception and belief), respond to and express emotions, share ideas with others and so on. Such empathy and resonance form the foundation of social behaviour (Ferrari and Rizzolatti, 2014).

4. An analysis of causation in the context of neurological explanations

The discovery of neural structures and their activities has revealed the relevant mechanisms for perceiving the inner experience of others, thus providing an objective explanation of their minds. But that explanation is incomplete, and we cannot establish a causal relationship between the understanding of other minds and neural correlation.

First, evidence to explain the perception of other minds through only physical imitation is insufficient at present. Is the activation of the premotor cortex when observing a behaviour sufficient for understanding it? Does that understanding require the involvement of the motor cortex? It is currently difficult to definitively answer those questions. Besides, the imaging system composed of mirror neurons is not the only way or the decisive factor for understanding behaviour. For example, patients with Möbius syndrome have facial paralysis that prevents them from making any facial expression, but they can easily recognise and understand other people’s facial expressions. Moreover, patients with congenital physical disabilities can provide reasonable explanations for the physical expressions of others. Such phenomena cannot be explained through physical imitation. Perhaps, when interpreting the relevant experimental data, we should think more carefully about what is activated and how it is activated in those regions of the brain, rather than which neural structure determines the perception of other minds.

One of the most important reasons why we cannot clearly localise brain functions is that they are usually based on many processes, each of which contains many independent neural activities, and we need to refer to different levels of the brain to locate the relevant function. The function of a complex neural circuit is achieved through coordination among the activities of multiple regions of the brain. Except for the most basic physiological actions and conditioned reflexes, most of our behaviours are the products of complex neural circuits that are widely distributed and interrelated. No single neuron can by itself trigger any specific complex behaviour. Take the basic qualia as an example: an external stimulus stimulates our senses, and the nervous system receives and transmits the corresponding nerve impulses to evoke a certain feeling. There is no one-to-one mapping between the qualia produced in this way and the external stimuli because the qualia are determined by the positions of the corresponding nerve impulses in the entire nervous system. Even if the physical properties of the external stimuli are the same, different nerve effects may be induced as long
as the positions of the nerve impulses produced are different, which in turn generates different qualia. Moreover, those positions are defined by the inter-relationship between nerve impulses; that is, the qualia are determined by the relationship between the corresponding nerve impulses and other impulses. Further, all other complex behaviours cannot be determined by the presence or absence of a specific type of cell or a specific brain structure.

Second, the activation of mirror neurons depends on the entire chain of action: the goal of the action, the situation at the time and what the actor has done before (Gallese et al., 2004). An action is in fact a sequence composed of different parts. An experienced dancer’s mirror neural network is more active when they are watching a familiar video than when they are watching an unfamiliar one. Compared with the observation of isolated actions, the observation of actions in a certain context leads to higher levels of activation of the mirror neuron system. This suggests that observers can relate actions outside their field of view to behaviours within their field of view, and a certain meaning is necessary for the establishment of such an association. That is to say, the reappearance of an action in the brain includes both the representation of the action and the understanding of its meaning. It can then be inferred that reflection is based on cognition and requires the mirror neuron system to process and convert visual information into knowledge without excluding the possibility that theoretical or background knowledge may be involved in that process.

When we try to explain a person’s action, it is necessary to find its underlying causes. Actions are motivated by reasons, which form the rational basis for action. Whether an action is reasonable is the basic premise of whether it can be understood. A reason is normative in nature. It is related to choices that ‘should be made’, and to the way people look at things and the rules that they follow. It is also related to the personality and emotions of the actors as well as their beliefs, wishes, intentions and evaluations (Davidson, 1993). For example, when I turn on a light switch, the explanation for that behaviour requires references to my wish (wanting the room to be lit up) and belief (believing the room will be lit up if I turn on the switch), and so on. In addition, our understanding of the motives and intentions of others is not so much the result of our being influenced by their behaviours or emotions, but rather the environment that causes such behaviours or emotions. In other words, the information generated by imitating the inner life of others is perceived and processed along with information from other sources, and is combined with the assessment of similar situations. This is because behaviour is related to context. For example, the action of a nod in one context may mean an approval of what is proposed, and in another context may mean indifference to the outcome. The key here is that the involvement of mental processes enables one person to better understand the situation that another person is in. Therefore, complete information about the processes required to understand other minds should not be based solely on the results, but also on the relationship between the perceptions of the observer and the observed. It is clear that, if we want to grasp the mental states of others, we must go beyond physical experience and examine their behavioural motives, emotions and wills.

Third, although the basis of understanding other minds can be located, to a certain extent, in the human mirror neuron system, the activation of the mirror neurons is only a copying and reproduction of the consciousness and feelings of others, rather than an endogenous activity of the consciousness. Mirror neurons are activated when people act and when they observe other people’s actions; we cannot tell who the actor is, and thus cannot conclude that the mental state inspired by the mirror neurons is that mapped by the actor. We can simply see emotions, and not just low-level features of facial and bodily expressions. However, seeing emotions is not sufficient for recognizing them as mental states in order to ascribe them to others (Smortchkova, 2017). If I simply watch someone else being beaten, why do I not mistakenly think that I am being beaten? This is because there are tactile receptors on our skin that send a message to the brain telling us that, although the feelings of others resonate with us, we do not truly experience the process of being touched; otherwise, we would be rendered confused and confused. A feedback signal rejects the information sent by the mirror neurons so that we do not have a ‘real’ experience in our consciousness. But what if
our arms are removed or an anesthetic is injected into them? There are anatomical connections between regions that compose the pain system in the brain that are highly interactive. However, there appears to be a separation between the sensory and the emotional perceptions of pain. MRI scans show activity in both the observer and the recipient of pain in the part of the brain that is active with the emotional perception of pain, but only in the recipient is activity recorded in the area that is active with sensory experience. If we see another person suffering from pain, we feel anxious but do not physically feel the pain ourselves.

Furthermore, simply understanding the intention of an action is not enough to understand the psychology of the other. Understanding the intention of an action does not mean knowing the other’s thoughts because the intention is not identical to the purpose of the action. It can be the result of a completely different state of mind: the action can be the representation of the actual intention, or maybe the actor deliberately assumes a certain posture to try to create an illusion. This involves the understanding of consciousness from the perspective of phenomenology – the consciousness of oneself as a distinct existent versus the objects of one’s truthmaking endeavours. Simulation requires more than mere interpersonal mental resemblance: A simulation must have the purpose or function of resembling its target (Herschbach, 2012, 2015). Yet, mirror neurons are effective at identifying simple intentions and actions, and this low-level cognitive process is relatively simple, primitive, spontaneous and, to a great extent, unconscious.

Fourth, mental states and their neural properties are two different objects. We can use the counter-evidence method to prove this. According to the principle of identity substitution, the same expressions can be replaced with each other: For any x and y, x is equivalent to y if and only if x and y have the same properties (Leibniz, 1982). We can break this up into two conditional sentences:

- L1 (indistinguishability of identical things): For any x and y, if x and y are the same, then x and y have the same properties
- L2 (indistinguishable identity): For any x and y, if x and y have the same properties, then x and y are the same.

According to this principle, if a pleasant mental state is equivalent to a certain brain state, then states of the cranial nerve have all the properties that belong to pleasure, and vice versa. Then, all mental states, and cranial nerve states equivalent to them, are consistent with such inferences. However, that does not appear to be the case. For example, when a finger is cut, it produces a ‘finger pain’ mental state, and then the pain appears in the finger. If this is equivalent to a certain brain state, does the cranial nerve state also appear in the finger? That does not make sense unless we think that, when the finger hurts, the pain does not appear in the finger but in the brain. In addition, ‘equivalent’ is a transitive relationship. In other words, if x is equivalent to y and y is equivalent to z, then x is equivalent to z. Assume that the pain of a dog is equivalent to that of a person: if the pain of the person is equivalent to the state of his or her brain, and the pain of the dog is equivalent to the state of its brain, then is this type of cranial nerve state of the person equivalent to that of the dog?

In short, it is crucial to make a distinction between the following two things: the information about the stimulus defined by the observer, and the information about the meaning of the stimulus for the subject. The former provides correlation data, and correlation is easy to achieve in terms of research method, while the latter gives a description of causality, which is composed of a correlation between concepts, such as knowledge, beliefs, conjectures, evidence, grounds and reasoning. Moreover, the description is also linked to the defensive logical implication of considerable content, such as certainty and uncertainty, what is obvious and what needs evidence and so on. In addition, in-group and out-group distinctions and related phenomena must be taken seriously, all of which have been neglected in the mainstream social cognition literature (Gallagher and Varga, 2014). On none of these issues can we achieve a breakthrough by discovering more information about the brain. The normativity of experience at the personal level will not be replaced by neurological processes at the sub-personal level. Those two different levels of information explain human behaviours from different perspectives, and are complementary in solving the relevant problems.

Some may argue that we already know that direct electrical stimulation on the cortex creates a variety
of conscious experiences. This fact provides a sound reason for the claim that certain neural substrates are at least adequate for the creation of consciousness. There is undoubtedly a correlation between internally observable ‘mental’ events and externally observable ‘physical’ events, but their relationship can be discovered only by the simultaneous observation of these two independent phenomena. For example, when electrical stimulation is applied to the brain cortices of people, they feel pain in their fingers, which means that it is one thing to recognise neural activity as the minimum sufficient condition for instantiating the phenomenal consciousness of an instant fragment, but quite another to consider neural activity as the minimum sufficient condition for instantiating consciousness in the sense of a coherent intentional experience of the world. The normalisation of experience at the individual level will not be replaced by neural processes at the sub-individual level. The two different theoretical levels explain the causes of human behaviour, respectively, and complement each other in terms of their shared problems and purposes.

The investigation here does not suggest that neuroscience cares only about the development of brain imaging technology, and attempts only to provide an image of every point in the brain as it completes a certain job. One criticism of neuroscience is that it seems to offer ‘a location map of certain events in the brain’; some even mock neuroscience for showing merely that behaviour is caused by the activities of the nervous system. However, no one has ever doubted that (Burton, 2014). In fact, the significance of neuroscience is by no means exhausted by the provision of an image of mental activity. By recording regions of the brain activated by certain tasks, especially by seeking the intersections of regions of the brain activated by different tasks, neuroscientists have gained a better understanding of these problems: What are the functions of different areas of the brain? How do the different regions of the brain interact? How does the brain process different types of problems? Neuroscientists have begun to use data on differences in brain activation and other clues to clarify the patterns and functions of the brain tissue, which in turn can significantly enhance our understanding of the way the brain works. By contrast, the philosophy of mind is concerned with: What is mental ability or mental state? What is pain? What is the characteristic of feeling? As we ask these ‘what’ questions, we are investigating the commonalities of having some kind of mental capacity or state for all real or possible living beings that have the relevant mental capacity or state (Tye, 2017). Thus, neuroscientists do not provide answers directly to questions pondered by the philosophers of mind, but the latter should pay close attention to the answers provided by the former to the relevant ‘how’ questions.

5. Epistemological characteristic of other minds

As is clear from the above analysis, there are some things that we are perfectly aware of by ourselves but can never make others understand. I cannot share my own feeling of performing a certain action with another, and vice versa. When performing an action, I cannot share all my feelings with the other because I have a particular, privileged access to such information that imbues in me a sense of subjectivity that another can never experience. But does it then mean that there is a dichotomy between my experience and that of another? Our daily experience tells us that that is not the case. I can analyse the given condition of a specific event, roughly predict its results and when the results occur, and then monitor how those predictions work. The cause and effect are linked to become the actions to be carried out by me, just as colours, shapes and motions are combined to form objects. By connecting the causes and consequences of the actions that I perform, my brain creates my experience with me as the subject. And when the subject of action is not me, but another, I will still be able to connect the cause and effect of the action.

It is thus clear that, according to the connection between cause and effect, I can feel someone else’s ability to act in the manner in which I can feel actions of my own. Let us consider an example. Although the receptors in our bodies are stimulated when we exercise our limbs so that we can feel them even without touching ourselves or anything else, the brain’s response to the stimulus is usually suppressed when we act as the subject and actively move our limbs. By contrast, if our limbs are exercised passively
(e.g. when our arms are lifted by someone else), our cerebral cortex reacts so strongly to the stimulus that we can clearly recognise these internal signals. Here, we regard ourselves as the subject and, in the same way, regard others as subjects. Thus, instead of resorting to our own physical experience, we focus on the relationship between the action and its outcome, taking account of the previous intentions of which we are aware. The model of the physical world that we recognise is created by the brain by combining sensory signals and our transcendental expectations, and, in the same way, we acquire knowledge of the spiritual world—the minds of others. We make use of transcendental knowledge and clues derived from feelings to create models of other minds. When we act in this world and interact with other people, our brains use those models to predict what happens next. If our predictions about others turn out to be correct, then we have succeeded in 'reading' their minds.

A subject who is observing another person can reconstruct the mental process of the observed. Such inner reconstruction is made possible because the neural structure of the observer is similar to that of the observed, and basic human emotions can be exhibited through common facial expressions, in which the visual medium plays a special role. Due to the publicity and social nature of the language system, we can reach a relatively consistent understanding of others by grasping common words and expressions that express states of the mind when we talk about the characteristics of ‘other minds’ (Wittgenstein, 2000). In this sense, it is possible to obtain knowledge of other minds. The purpose of such mind-reading is to obtain useful information from the person observed.

However, it is fundamentally impossible to understand other minds. Everyone enjoys special access to his or her own inner world—he or she is the only one who has the privilege to acquire information about that inner world. This passage to the experience of one’s own state of mind is beyond the reach of others. The ‘privacy’ of the state of mind makes itself ‘directly observable’ only for its holder, while others can merely speculate about it through the ensuing material consequences. You can tell me what is on your mind, and I can speculate about it from your expressions. Neuroscientists can even infer your thoughts by detecting your pattern of neural activities. But our detection of your mental life can never be as direct as what you feel yourself. We cannot observe or measure your state of mind. Consider a person suffering from a headache, for example. Even if we use a sophisticated instrument that shows the brain structure well, what we observe remains completely different from the person’s feeling. Provided that we are familiar with physiological knowledge of headaches but have never experienced one, we can never feel the state of the headache. In the situation just described, we are essentially comparing two things. First, what does conscious experience mean to observers? Second, what does conscious experience mean to someone who is experiencing it? The former is a neural activity, while the latter is a neurological event.

Conscious experience is the sole property of its owner. My conscious experience belongs only to me and cannot be transferred to become another’s conscious experience. Once the owner of consciousness is changed, the original consciousness no longer exists. We can transplant someone’s organ into another person, but we cannot transplant someone’s feelings into that person. Even if my own joy can influence others, the joy they experience is not the same as mine. My happiness can be experienced only by me. That is to say, the subject of experience does not belong to an observer or a detector, which means that the subject of experience is not in an entity that monitors experiential events. We cannot observe our own experiences; they are part of us. We are partly made up of those experiences. Based on the example of bats, Nagel describes this feature of conscious experience. The bat flies with its unique echo detection system. With the rapid development of science and technology, we gain an increasing understanding of the physiological structure of bats. However, if bats are as conscious as human beings, can we scientifically determine what is going through their minds in the process of prey detection? Can we know their conscious experience? The answer is no. Why? Conscious experience is perceived in the first-person perspective while the physical world can be perceived in the third-person perspective. We can never be its subject. Conscious experience must be presented to the cognitive subject in a certain way. We
cannot infer the inner life of a bat according to our own experience (Nagel, 2000). However imaginative we are, when we imagine ourselves as bats, we are still using our own conscious experience to speculate about that of a bat.

Indeed, we have learned how to describe the nature of our states of mind with the aid of objects that we can publicly observe and that remind us of those qualities. The way in which I describe my own experience is the same as yours when you are describing your experience. For example, we all acknowledge that we have experienced the colour of ripe tomatoes, for we describe that experience in the same way. Thus, it seems that the link between the types of neural and mental activities can be attributed to that between the descriptions of mental activities by neural activities, which indicates that different states can share the same description. However, why should we believe that two kinds of experience described as such are exactly the same? Perhaps your experience is similar to mine when we see a lemon, and our descriptions are exactly the same, but the nature of the state of mind I have described is completely different from that of yours. Ultimately, the qualia presented by the empirical subject are more than a physical concept. No description in the physical aspect can exhaust everything about qualia, and this ‘interpretation gap’ causes difficulties in understanding other minds in an objective way.

6. Discussion

From the above, we can conclude that our perceived ability to compare our own activities with what we have observed in other people’s physical activities is a type of understanding at the primary level. The method of analogy adopted is not intended to trace back to the cause from the result, nor to inquire about a causal explanation for the behaviours of others, but to read other people’s expressions (movements, postures and facial expressions). That reading process has to be placed in a certain situation that forms the background and context of understanding others. For that reason, the neural correlation of understanding the minds of others cannot provide sufficient and necessary explanations for the cognition of their minds. The examined targets of studies that have clearly established such associations have mostly been adapted during the history of human evolution, and are more related to reflective behaviour, but rational processes in real life are much more complicated, involving the capabilities to process abstract symbols and conceptual skills. Neurological interpretations apply to the simplest behaviours of humans and other animals, such as sensory exchanges, movements, foraging and so on. They are only useful at a minimal level compared with thinking about abstract and complex decisions and choices with far-reaching influences, which falls precisely in the realm of traditional cognitive theory that requires the shift in the focus of neuroscience research from basic cognitive processes to the so-called advanced functions (such as reasoning, social judgment and decision-making). In the case of self-knowledge, we focus on the so-called ‘transparency method’ and the extent to which its use delivers inferential self-knowledge. By contrast, in the case of our knowledge of others’ thoughts, we discuss the role of perception as a source of such knowledge and argue that even so-called ‘perceptual’ knowledge of other minds is inferential.

When discussing the nature of the knowledge of other minds, we should not pursue knowledge that is absolutely unmistakable and universally inevitable, and should not expect the sender and receiver of the information to both have the same realisation of the meaning of the given information. That kind of knowledge does not exist. The true meaning of understanding the minds of others is to be able to predict their behaviours; that is, to already ‘know’ what action other people would take, or tend to take, before they do anything. And, in cases where the action has already been completed, we can explain the reasons or motivation for it. If we view the problem of other minds from this perspective, we may still be able to obtain some knowledge with a certain degree of certainty and reliability. The point is to make clear the following three questions:

- In what circumstances do the two mechanisms of direct perception and mental speculation apply to daily life?
- Are they in a competitive or a cooperative relationship?
- If the latter, in what circumstances is cooperation between them possible?
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