

Kripke's modal argument is challenged by his implausible conception of introspection



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Abstract

Kripke presented one of the most influential modal arguments against psycho-physical identities. His argument as exemplified by the identity of pain and its respective neural correlates will be analysed in detail.

It shall be argued that his reasoning relies on an implausible conception of introspection implying an implausible conception of mental phenomena such as pain. His account does not consider possible interaction of pain and attention as well as the interaction of pain with other psychological factors. Theoretical and empirical evidences for a different account of pain, which represent a challenge for Kripke's argument, will be discussed.

1 Introduction

There is an increasing interest of empirical neuroscience in mental phenomena such as pain, feeling and emotion. Using experimental techniques ranging from single-cell recording to sophisticated functional imaging as, for example, positron-emission-tomography and functional magnetic resonance imaging a large amount of data has already been collected on these issues.

However, the interpretation of these data is still controversial. Especially in the contemporary philosophy of mind, the relationship between the empirical data on the one hand and the subjective experiences of the subjects including their mental states on the other hand remains a matter of debate. Among the most common arguments are the so-called 'modal arguments'. The modal arguments contain strong criticisms by claiming that empirical research may be systematically blind with regard to subjective experience as in mental phenomena which therefore, as argued, cannot be accounted for empirically, i.e., neuroscientifically.

Kripke [17] presented one of the most influential modal arguments in 'Naming and Necessity'. Though the modal argument has been developed in several variants, we here focus on the common structure of

modal arguments as it is paradigmatically put forward in Kripke's line of thought. In accordance with Kripke's argument this paper focuses on pain perception as a paradigmatic case of subjective experience.

Kripke's argument will be reconstructed thereby emphasizing his explicit and implicit assumptions as well as the way he justifies these assumptions. It is aimed to show that these assumptions rely on an oversimplified view of our abilities to access our own subjective experience via introspection.

It will be argued that a more realistic account of introspection may question Kripke's assumptions and represent therefore a challenge to his argument.

1.1 Preliminaries

To avoid confusions while discussing Kripke's argument some stipulations have to be done. The term 'heat' will only be used to refer to the publicly observable physical entity which can be measured by thermometers and which is assumed to exist independent of any observer. The term 'heat sensation' will only be used to refer to the subjective feeling of heat by an experiencing person. It is assumed that the existence of heat without heat sensation as well as the existence of heat sensation without heat is possible.¹

Whether the distinction can be drawn in an analogous way in the case of pain and pain sensation is the central point of Kripke's argument that will be discussed in further detail.

1.2 Kripke's modal argument

Kripke starts his investigations with reflections on the nature of identity statements as used in psycho-physical identity theories. He exemplifies his argument with a statement on the identity between pain and firing of C-fibres [17, p. 146-155]. Kripke points out that his argument does not include the claim that the firing of C-fibber is the exact neural correlate of pain. This term is rather used in a metaphorical way to indicate the neural correlate of pain, whatever this might be. In this article the term

¹We are aware that these assumptions are controversial and may be criticised in various ways especially with respect to the underlying ontological implications. Our justification is that they represent what may be considered as common sense assumptions in a large part of the community of neuroscientists and that they are equally shared by Kripke [17].

‘firing of C-fibres’ is used in the same way.² Briefly, Kripke’s argument might be summarised in the following way:

- P1: Pain and the firing of C-fibres dispose both of rigid designators.
- P2: The identity of the phenomena that rigid designators name is necessary.
- C1: If pain and the firing of C-fibres are identical they are necessarily identical.
- P3: A separation of pain and the firing of C-fibres is conceivable.
- P4: It is not possible to explain this conceivable separation away.
- C2: Pain and the firing of C-fibres cannot be identical.

From the premises P1 and P2 Kripke draws the conclusion C1. C1 then serves as a premise for the second part of the argument. Together with P3 and P4 it leads to the conclusion C2. The premises P1 and P2 originate from Kripke’s conception of rigid designation [17, p. 55-60], a posteriori necessity [17, p. 35-38] and natural kinds [17, p. 134-144]. These premises shall not be questioned further. This does not imply that Kripke’s premises P1 and P2 are considered as unquestionable.³ It is rather to proceed to the core of Kripke’s argument, which is independent of these premises and can be found in other versions of modal arguments, which do not rely on them. In this article it should be demonstrated that given the premises P1 till P3 are all true, P4 still has to be rejected and thus C2 is not a necessary consequence.⁴

²Kripke focuses in his argument on type-type- identities, but he also holds that his argument can be transferred easily into an argument against token-token identities. However, in this article this distinction shall not be considered in detail. It is focused rather on the general structure of the argument thereby referring to both versions of the argument.

³See for example Carney & von Bretzel [5] who hold that a materialist should refute Kripke’s essentialist’s view of necessity. However, such a refutation of Kripke’s argument does not exclude the vulnerability of the materialistic account against other versions of modal arguments.

See also Feldman [9, 8] who argues that pain sensation does not need to be considered as an essential property of pain thereby trying to establish a contingent event identity theory against Kripke.

⁴Thus the possibility of identity theories within the constraints of Kripke’s view shall be demonstrated. Such an approach, which differs to the one presented in this article, is also put forward by Hill [12]. Hill holds that Kripke’s intuition about the

Kripke aims to illustrate his conclusion C2 by comparing the identity statements of the identity theories with those from science thereby referring to the identification of heat (publicly observable physical entity) and the motion of molecules [17, p. 148-154]. Kripke agrees that on first sight it may be conceivable that heat and the motion of molecules may be separated in the same way as the firing of C-fibres can be separated from pain. But he thinks that there is a fundamental difference between the two statements. According to Kripke the separation of heat and the motion of molecules is only conceivable if we identify heat and heat sensation [17, p. 150f]. However, since heat can still exist without any sensation of heat this identification is unsound. Therefore it is not the heat sensation, but the heat itself which is the rigid designator and to which the necessary identity refers. The pretended contingency between heat and the motion of molecules can be explained by referring to the contingent relationship between heat sensation and the motion of molecules.

In contrast Kripke holds that it is impossible to perform an analogous way of reasoning for the identification of pain and the firing of C-fibres. Kripke's main point is that heat sensation is a *contingent* property of heat, whereas pain sensation is a *necessary* property of pain [17, p. 146f].

possible separation of pain and the firing of C-fibers is not reliable. He aims to explain how such wrong modal intuitions are generated. According to Hill the conception of the firing of C-fibers differs fundamentally from the conception of pain. Therefore there is no a priori connection between them. Thus Hill holds that we are able to imagine them as separated. That means that there is a certain (psychological) mechanism M, which takes pairs of concepts as inputs and delivers intuitions of separability as outputs. This is always the case if the pairs of concepts include commonsense kinds and theoretical kinds, which are correlated with them. According to Hill this group can be divided into two sub-categories: 'Cartesian' and non-'Cartesian' members. The non-'Cartesian' members consist of pairs such as heat and the motion of molecules or light and the stream of photons. In contrast the 'Cartesian' members consist of psycho-physical identifications such as the firing of C-fibers and pain. Hill then argues that the modal intuitions about the non-'Cartesian' members are uniformly unreliable, since the empirical investigation has shown their identity in spite of the contrary modal intuition. Since the intuitions about the 'Cartesian' members are of the same kind, Hill holds that there is a strong inductive argument for their unreliability.

Hill's argument succeeds in presenting a possible mechanism to explain why certain modal intuitions may go wrong. However, he is not able to account for the difference between the 'Cartesian' and the non-'Cartesian' members as pointed out by Kripke. Hill's inductive argument might be refuted by referring to the difference between the 'Cartesian' and the non-'Cartesian' members. It still seems possible to argue that we have reasons to understand why the intuitions about the non-'Cartesian' members are wrong, whereas we do not have such reasons for the 'Cartesian' members thus the inductive inference may not be reliable in this case.

With regard to heat two different situations are conceivable which may result in identical heat sensations in the experiencing subject. In the first case a heat sensation may be caused by heat. However, it is equally conceivable that a similar heat sensation may be caused by electrical stimulation of the respective receptors in the skin of the experiencing subject in the complete absence of heat. Thus the experiencing subject may be in the same epistemic situation in both cases.

According to Kripke the situation is fundamentally different with regard to pain. “No such possibility exists in the case of pain and other mental phenomena. To be in the same epistemic situation that would obtain if one had a pain *is* to have a pain; to be in the same epistemic situation that would obtain in the absence of pain is not to have a pain” [17, p. 152]⁵

Furthermore, Kripke holds that in the case of heat and molecular motion there is an *intermediary* property (i.e. heat sensation) which normally allows us to recognise heat, but which is only contingently connected with heat [17, p. 151]. Thus the apparent contingency in the identification of heat and the motion of molecules could also be explained by the confusion of the non-rigid designator ‘heat sensation’ and the rigid designator ‘heat’. Since the non-rigid designator is only contingently related to heat this contingency could account for the intuition of separability of heat and the motion of molecules.

In contrast there is no such property in the case of pain. “Pain, on the other hand, is not picked out by one of its accidental properties; rather it is picked out by the property of being pain itself, by its immediate phenomenological quality.” [17, p. 152].

Therefore Kripke states that the apparent contingency in the identification of pain and its corresponding neural correlate cannot be explained analogously to case of heat. From these arguments he draws the conclusion that pain cannot be identified with a neural correlate as written in C2.

So far it has become clear that Kripke's central point is that the pain sensation (i.e. its immediate phenomenological property) is a necessary property of pain. Therefore pain is not conceivable without the sensation

⁵It should be noted that at this point Kripke generalises his argument from the particular case of the identification of pain and C-fibers to other psycho-physical identification without specifying them further. This means that also other mental phenomena may be considered in the context of his argument and that they may serve as evidence in favour of or against it. However, since it is not clear to which phenomena Kripke exactly refers, we will only deal with his example of pain and the firing of C-fibers.

of pain and vice versa.

How does he justify this statement and what are the evidences he presents in favour of it? Kripke's arguments rely basically on intuitive evidences, which he holds to be highly important for the quality of a theory. He states with regard to intuitive evidences:

“I think it is very heavy evidence in favour of anything, myself. I really don't know, in a way, what more conclusive evidence one can have about anything, ultimately speaking” [17, p. 42].

In the case of pain sensation as a necessary property of pain it is exactly this kind of evidence that he cites in favour of his arguments. For him this is intuitively completely convincing therefore he considers it as a necessary truth. According to Kripke any separation of pain and pain sensation is “self-evidently absurd” [17, p. 147].

Thus it can be stated that Kripke does not refer to any specific reason or argument. He only refers to his own intuition on pain and its properties. By that means he establishes a fundamental difference between pain and pain sensation on the one hand and heat and heat sensation on the other hand. Since the latter pair is not necessarily linked the contingency in the relationship can account for the intuition of separability in the identification of heat and the motion of molecules.

1.3 The significance of introspection for Kripke's assumptions

Summing up, Kripke's thesis on the contingent identity between the firing of C-fibres and pain relies on the following assumptions: In the first place, there is the intuition of their separability. However, he does not consider this intuition as sufficient, since analogous intuitions (e. g. on heat and the motion of molecules) have failed. Therefore he proposes two strategies to evaluate the reliability of such intuitions. If however both strategies fail to disregard such intuitions in the case of pain, the assumption of contingent identity between the firing of C-fibres and pain cannot be accounted for.

The first strategy refers to the confusion of logical possibilities with the possibility of certain epistemic situations (e. g. the confusion of the epistemic possibility of the presence of heat without a heat sensation with the logical possibility of the presence of heat without the motion of molecules). The second strategy deals with the confusion between rigid designators and non-rigid designators, which are usually used to fix the reference (e. g. ‘heat sensation’, which is normally used to fix

the reference, is confounded with the rigid designator 'heat', thereby confounding the contingent relationship of the non-rigid designator with the relationship of the rigid designator).

Since Kripke assumes a pain sensation to be an essential property of pain, he believes that both strategies can be excluded. Kripke holds that the first strategy cannot be applied, since the ontological entity of pain is identical with the feeling of pain (i.e. a certain epistemic situation). Thus, according to Kripke, a different epistemic situation would necessarily differ ontologically [17, p. 150-153]. The second strategy is excluded as well since the designator, which is normally used to fix the reference of a pain (i.e. a pain sensation), is necessarily linked with pain and thus a rigid designator [17, p. 148f].

Heat is considered the rigid designator of a natural kind, thereby referring to some publicly observable physical entity accessible to empirical investigation. Kripke cites the case of gold as analogous to the one of heat. For example, empirical investigation may discover that the yellowness of gold turns out to be an optical illusion or that gold has a different periodic number and so on [17, p. 116f]. There is subsequently a possible deception in the concepts of gold or heat, which therefore can principally be modified by new empirical discoveries. This contrasts with the case of pain. It seems that Kripke excludes any possibility of changes in the concept of pain by empirical discoveries. In order to hold this assumption, he must presuppose that we principally cannot be deceived about pain in our subjective experience of pain sensation. This implies that Kripke has to assume that pain is a phenomenon, which reveals its nature first of all not to any empirical investigation, but as pain sensation in subjective experience. Kripke seems to come close to the concept of subjective mental states put forward by Nagel [23]. Like Nagel, he holds that facts about our subjective mental states such as pain can only be adequately accessed in a specific subjective perspective via introspection. This subjective perspective is thought of as fundamentally different from a more objective perspective as it is presupposed in empirical research. This fundamental difference prevents any possible explanation or even modification of the concept of pain sensation, as subjectively experienced in terms of empirical discoveries about pain. Therefore it seems that Kripke considers pain as an essentially subjective phenomenon upon which introspection has a privileged access contrasted to that of empirical investigation. This principally excludes the possibility that any empirical evidence may force us to change our pain sensation based concept of pain in the same way as we are forced to change our

concept of natural kinds like heat or gold due to new empirical discoveries. Accordingly, Kripke is forced to argue that, unlike in the case of heat and heat sensation, pain and pain sensation must necessarily be linked to each other.

From his assumption on the necessary connection between pain and pain sensation Kripke draws the conclusion of the identification between pain and the firing of C-fibres. Kripke thus presupposes a fundamental difference between identity statements in science and psycho-physical identifications because of different epistemic situations. It is possible to feel a heat sensation in the absence of heat (as publicly observable physical entity) in the same way as in its presence. Such difference is however not possible in the case of pain. According to Kripke, there is no pain without pain sensation and no pain sensation without pain [17, p. 146f]. Thus, there is no possible way to be fooled about having pain by a pain sensation that appears in the absence of pain and vice versa. Kripke concludes that, due to this fundamental difference, the intuition of the contingent relationship between pain and the firing of C-fibres cannot be accounted for.

In contrast to the case of heat sensation, pain sensation can thus not be considered an intermediary property between pain and C-fiber firing. However, this does not exclude that such an intermediary property, as requested by Kripke, may be found otherwise. We demonstrated that introspection, as the way how we perceive our own subjective experience of pain, constitutes the core of Kripke's argument and thus of his pain conception. We now aim to demonstrate that our ability to introspectively perceive our pain sensation does not always lead to pure subjective pain experience. In contrast to Kripke, we hold that via introspection we are indeed not always clear about each aspect of our pain sensation so that we may be deceived about our pain sensation in subjective experience. We may thus not always subjectively experience pain sensation even though there is pain. We will show that this case is empirically possible because our introspection can be modulated and thus distracted by other cognitive processing such as, for example, attention causing a certain fuzziness with regard to the pure pain sensation. If, however, such dissociation between pain and pain sensation via attentional modulation of introspection as an intermediary property is possible, this must be considered a challenge for Kripke's modal argument that is based upon the intuition of principal inseparability between pain and pain sensation. Once pain and pain sensation can be shown to possibly dissociate, there is no reason anymore to maintain a principal difference between the cases

of heat/heat sensation and pain/pain sensation the latter then becoming analogous to the former.

1.4 *The possibility of having pain without noting it*

In our daily life we often speak of a present pain while not noting it. The following case example may represent a well-known situation:

John, a passionate soccer supporter, is suffering from strong pains in his right leg after a car accident some days ago. The pain is continuously present. It is so strong that he is hardly able to move. But yesterday evening when he watched a game of his favourite team, he was so involved in the game that he did not notice his pain during the game. However, shortly after the end of the game he noticed it again.

There are two possibilities to account for this situation with respect to John's pain. Either John had a certain pain A before the game, no pain during the game and another pain B after the game, or it was the same pain during the whole time, i.e. before, during and after the game.

The first alternative does not seem to fit in with our intuition that it is the same pain that John is having before and after the game. Moreover, it seems to be conceivable that during the whole day John changes between noting and not noting his pain in short periods. Maybe it changes even within a minute. That would implicate that John is experiencing different pains—maybe a thousand different pains—throughout the whole day. In spite of such rather counterintuitive conclusions this alternative is often favoured, since it seems to be the only way to avoid the notion of unfelt feelings, which is generally accepted to be a contradiction [2, 20]. With regard to Kripke's line of argument it seems to be clear that he holds a similar opinion on the basis of similar reasons, i.e. that the first alternative leads necessary to the notion of unfelt pain which is contradictory.

Thus the second alternative, although it fits in with our intuition that John is having the same pain during the whole time, is often rejected to avoid the contradiction of unfelt pain. However, this is not a necessary conclusion. This becomes possible by considering the notion of attention in the context of consciousness. In addition to the distinction between conscious and unconscious experience also within the conscious experience certain degrees can be distinguished. This distinction refers to the degree of attention, with which we focus on a certain conscious experience. From that point of view any conscious experience may be

considered analogously to a visual perception in our visual field of possible perceptions.⁶

It sometimes appears in the centre, the part of our visual field where we see it with the most detailed resolution, and sometimes it rather appears in the peripheral part of our visual field such that we hardly notice it, especially if we focus our attention on something else. This can be easily applied to the case example of John. Before the game John is suffering from the pain A, which is in the focus of his attention. During the game this focus is shifted. John is not even noticing his pain A, which is nonetheless still present. After the game the focus of John's attention shifts back to pain A. Thus by using the notion of attention in the context of our case example it seems to be possible to avoid the contradiction of an unfelt feeling and to hold at the same time that it is always the same pain that John is experiencing.

Furthermore, this account of John's situation is able to explain a part of John's behaviour during the game. Although John did not notice his pain he is still anxious to avoid certain movements that may increase his pain again. For instance, when he got up to celebrate a goal of his team, he took only postures that did not bring weight on the injured part of his body etc. Moreover, it seems plausible that a constant questioning during the game might have revealed the constant presence of the pain.

Still, one might hold that, according to Kripke's notion of pain, as soon as attention interferes with pain the patient is simply not in pain any more. However, that would imply that the notion of being in pain is necessarily linked to the notion of attention. Thus, being in pain would include that the attention is not distracted by anything else, but focussed on the pain. However, attention is not a binary phenomenon. There are many different degrees to which we may focus our attention. It ranges from completely focussing on the pain to completely ignoring the pain. It seems plausible to assume a more or less continuous scale with no sharp boundaries to be drawn. Especially, it is difficult, if not impossible, to distinguish between ignoring and very slightly focussing on pain. A notion of pain that aims to include the focus of attention has to define what degree of focus is necessary. However, the nature of attention does

⁶In contrast to the presented rather metaphorical conception [18] gives a more detailed conception of the link between attention and consciousness. Since all such models must be considered as highly speculative as long as they are presented without any empirical evidence, in this article it is not attempted to present such a model. It is rather restricted to the thesis that attention is playing an important role without further specifying this in terms of specific psychological or neurophysiological mechanism.

not allow for such a definition. The consideration of borderline cases, including a very slight attentional focus on pain, demonstrates that the idea of a complete transparency of one's own mental states is not always consistent with the reality. Attention to one's own pain may be stronger or less strong and it seems perfectly conceivable that at a certain point it is difficult to decide on the presence of pain at all.

Additionally, empirical studies have shown that attention is not a unitary process. Different subtypes of attention are distinguished; they comprise, for example, visual, auditory and tactile attention. Attention often involves complex interactions across and within multiple sensory modalities (see, e.g., [15, 27]).

Moreover, it has to be considered that attention is not isolated but strongly dependent on other cognitive functions, such as, for example, personal attitudes on pain, memories of painful experiences from the past, etc. (see 1.6). Thus, it would not be sufficient to define the required degree of attention. A notion of pain has to define the degree of attention against the background of all other cognitive functions with possible influences on attention.

Therefore, a definition of pain that relies on a certain degree of attention faces serious difficulties and might even be impossible.

Summing up there are different kinds of behavioural evidences as well as our intuition in favour of the thesis of a continuous pain to account for the case example. Considering the notion of attention, the contradiction of unfelt feelings can be avoided in this context.

The notion of attention allows us now to challenge the premise P4 of Kripke's argument. As described above this premise includes the claim that the intuition of contingency in the identity of pain and the firing of C-fibres cannot be explained in the same way as in the identity of heat and the motion of molecules. The intuitive contingency in the latter identity statement can be explained by referring to an intermediary property, whereas according to Kripke such an intermediary property does not exist in the case of the identification of pain and the firing of C-fibres.

With regard to the notion of attention this claim can be refuted by the following means:

Firstly, it is possible not to note one's own pain while directing the attention to something else in spite of having a phenomenal pain experience. Secondly, it is, of course, also possible to note the own pain by directing the attention to the own pain and having a phenomenal pain experience at the same time. Since according to Kripke the phenom-

enal quality is an essential property of pain, pain must be present in both cases. Thus we have two situations, which differ epistemically, but which are identical ontologically with respect to the presence of pain. An analogy to the identification of heat and the motion of molecules can therefore be established. It can be argued that the apparent possibility to separate pain and the firing of C-fibres is due to the contingent relationship between pain and attention towards pain, which are mistakenly identified. Their difference may account for the intuition of separability between pain and the firing of C-fibers, which are in fact necessarily linked in the same way as heat and the motion of molecules.

Thus attention can be considered as the intermediary property in empirical respect, which is required to disregard the apparent possibility of separation between pain and the firing of C-fibers. Therefore Kripke's thesis that there is not such an intermediary property in the case of pain and the firing of C-fibers can be refuted, and subsequently his argument can be undermined on empirical grounds.

1.5 Attention and other cognitive functions

In the last part we demonstrated how our introspection of pain might be influenced by the way we direct our attention thereby implying a close relationship between pain as experience via introspection and attention. This relationship has to be considered as mutual. Pain itself modifies our ability to focus attention. It is part of our daily experience that especially strong pain sensations are attention-demanding such that when our attention shall be divided between pain and other perceptions very often the pain experience dominates.

Furthermore, other types of mental processing may influence our introspection of pain. To draw attention to something or to shift the focus of attention to something else is not an isolated independent ability. The way the attention is shifted is closely linked to several cognitive functions. These functions may influence our attention. For instance, if one is convinced that a certain object is crucial for the survival, his conviction may shift the attention towards this object. It is also conceivable that attention itself may influence other cognitive functions. This may even lead to the change of certain beliefs including the change of beliefs concerning the phenomenal experiences. Thus it seems to be conceivable that this may result in wrong beliefs about the own phenomenal experience.

What are the possible reasons for such mistakes? If we ask a person A about a past pain during a certain period, it is conceivable that the

person denies his pain although he had had a phenomenal pain experience at that period. A possible explanation are memory effects. It is of course conceivable that A forgot about his pain during the period if he is asked some hours later, but the same mechanism is also conceivable for very short time periods such as seconds or even less. Thus it seems to be possible that A has a phenomenal pain experience at a certain time, which he can only report if he is asked about it at the same time, because afterwards he forgets about it. Therefore he may be of the opinion that he never had any pain at that certain time although he had had a phenomenal pain sensation at that time. Furthermore, it could be possible that the memory of a certain phenomenal experience depends on the degree of attention, which is directed towards it. That means if a certain phenomenal experience lies in the focus of attention, then it is very likely that it will be stored in the memory. But if there is a phenomenal experience, which lies far outside the focus of attention, it may be very unlikely that it will be stored.⁷

These considerations imply another possible explanation for the wrong identification of pain and attention to pain. If it is true that my pain experiences are only stored if they have been accompanied by my attention to them, I will not have any memories of pain without attention. Of course, it is well known that this does not allow for any conclusion about the logical possibility of a separation, but still it cannot be excluded that our intuition on this subject may be influenced. For instance, one may confound the lack of memory of a separation between attention and pain with the fact that one never experienced any separation so far. This may then lead to the conclusion that the possibility of such a separation is very unlikely.

On first sight the inference from my memory to a logical possibility may seem pretty implausible, but some additional points have to be taken into consideration to understand, how it may come to this kind of conclusion. Firstly, the one who does such an inference does not believe

⁷These points have also been studied empirically. About forty years ago Averbach & Sperling [1] and Sperling [28] already aimed to investigate the relationship of memory and attention. They hold the opinion that all incoming visual information first passes through a kind of pre-categorical memory. It seems that it depends on the amount of attention, which is directed to these information if they are converted into a different longer lasting memory or not.

More recently [13] investigated the relationship between spatial attention and consciousness. He argues that two kinds of conscious processing have to be distinguished. One to recognize objects in the focus of the attention, but also another one to monitor the background activity outside the focus of attention, which operates as a default mode for global scene analysis and early warning of anomalies.

that he infers something on the basis of his memories, but on the basis of his subjective experiences.

Secondly, it is hold that there is a privileged access to one's own subjective experiences via introspection. This has been shown above to be a fundamental assumption in Kripke's argument. Therefore the own experience is considered as highly conclusive with regard to the properties of subjective experiences. Thus from a different point of view it may appear to be a reflection on the properties of our subjective experience, whereas the assumed properties of the subjective experience are in reality the properties of the memory. To avoid these problems it would be important to distinguish between the properties of the actual subjective experience on the one hand and the properties of memories of subjective experience on the other hand. However, it remains unclear if and how this can be realized.

Moreover, it appears to be conceivable that such confusions may happen not only with the memory, but also with other cognitive processing such as the generation of beliefs or certain ways of reasoning. The fundamental problem seems to be that via introspection we might be perfectly able to access our subjective experience, but still we cannot exclude confusion with cognitive processing. While considering our own mental states, we might be able to distinguish between a pain sensation and a logical reasoning, but still we cannot exclude that they are sometimes confounded.

With regard to Kripke's argument this means that the apparent contingency in the relationship between pain and the firing of C-fibers may not only be accounted for by the contingent relationship of pain and attention, but also by the contingent relationship of pain and attention closely linked with other kinds of cognitive processing. Taking into account any conceivable combination of attention with other cognitive processing, the number of situations, which differ epistemically, but which are identical ontologically with respect to the presence of pain, seems to become almost indefinite.

1.6 Neuroscientific evidence

These considerations shall be complemented by the results of corresponding neuroscientific studies. Due to its relevance to patients suffering from pain, a lot of empirical research has been done on the neural correlates of how we perceive pain, and how this perception may be influenced by attention and other cognitive functions.

Probably the most studied phenomenon is how an attentional state

modifies the pain experience [30]. It has been demonstrated that pain is perceived as less intense when individuals are distracted from the pain [4, 19, 22, 26, 30]. The shift of attention has been achieved by requiring the subject to focus on various sensory modalities, such as visual, auditory or tactile stimuli. Tracey et al. [29] simply instructed the subjects to 'think of something else' without presenting any additional stimulus. They likewise observed a significant decrease of pain perception under this instruction. To detect the changes of the pain experiences most of the studies used visual analogue scales for intensity rating of pain. However, Miron et al. [22] found that distraction during pain does not only reduce the intensity of the pain, but also its unpleasantness. These data have also led to consequences in the treatment of pain. Distraction is recommended as an adjunct in pain management [11].

Related functional imaging studies are in accordance with these results by showing that the subjective experience of the subjects is reflected in the neural correlates of pain. Without going into the neurophysiological detail it can be stated that attention-related modulation of neural activity correlated to pain sensation has been observed throughout the whole afferent pain system [30]. For instance the primary sensory cortex is assumed to play an important role as a neural correlate of pain perception. Bushnell et al. [4] observed that when the subjects attended to the pain the neural activity in the primary sensory cortex increased whereas when they were distracted the activity decreased. The increase and decrease of the neural activity correlated significantly with the subjective pain experiences.

Similar observations have been made regarding the influence of psychological factors other than attention such as mood and emotional state or expectancy. It has been shown in various studies that stimuli, such as pleasant music or pleasant films, generally reduce pain perception [7, 10, 21, 31, 32]. Positive expectations can powerfully reduce the experience of pain, whereas negative expectations may result in an increased pain sensation [3, 6, 16, 24, 25].

1.7 Conclusion

We demonstrated that Kripke's argument relies on a conception of introspection that does not appear plausible. His account of pain does not consider the close interaction of pain and attention as well as the interaction of pain with other psychological factors. The crucial point is not that Kripke has to deny such interactions. However, he has to hold that we are able to identify and to separate the various influences

and interactions of our pain sensations. As discussed above, it is presupposed in his argument that introspection allows for infallible access to our pain sensation. Due to various possible influences, this thesis of infallibility appears implausible. When our pain sensation is decreasing we are not always able to decide if this is due to a decrease of the pain sensation itself, distracting or emotionally pleasant circumstances or our expectancy that the pain sensation may decrease. Our introspection does not provide us with well separated clear-cut and infallible perception of our mental processing, but may instead be rather fallible and fuzzy. This fuzziness may account for our intuition of contingency in the identification of pain and its neural correlates as it is claimed in Kripke's modal argument. However, once it is clear that we may be deceived about our own inner mental states such as the subjective experience of pain sensation by attentional or cognitive modulation of introspection, the principal difference between pain/pain sensation and heat/heat sensation can no longer be maintained.

Our refutation of Kripke's argument challenges the hypothesis that empirical research is completely blind with regard to mental phenomena, because they can only be accessed by introspection. We demonstrated that the notion of infallible introspection is not plausible. Therefore, the idea of a privileged access to one's own mental states is questioned. The neuroscientific investigation of subjective phenomena such as pain, is not impossible in principle. It may even be speculated that such research could contribute to a deeper understanding of subjective experience. That does not imply a devaluation of introspection or a devaluation of subjective experience per se. It only implies that we may sometimes be wrong or not completely sure about our subjective experience. In these situations it is at least in principle conceivable that neuroscientific techniques may help to reveal what we are experiencing.

However, it has to be acknowledged that our refutation of Kripke's argument does not refute other arguments focussing on other aspects of the special character of subjective experience such as, for example, the "knowledge argument" as put forward by Jackson [14].

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