
JOHN JOSEPH DORSCH
University of Tübingen
johnjosephdorsch@gmail.com

IRREDUCIBLE COGNITIVE PHENOMENOLOGY AND THE AHA! EXPERIENCE

abstract

Elijah Chudnoff's case for irreducible cognitive phenomenology hinges on seeming to see the truth of a mathematical proposition (Chudnoff 2015). In the following, I develop an augmented version of Chudnoff's case, not based on seeming to see, or intuition, but based on being in a state with presentational phenomenology of high-level content. In contrast to other cases for cognitive phenomenology, those based on Strawson's case (Strawson 2011), I argue that the case presented here is able to withstand counterarguments, which attempt to reduce cognitive phenomenology to sensory phenomenology. To support my argument, I present findings from Bowden and Jung-Beeman's experiments with the Aha! Experience (Bowden & Jung-Beeman 2004), and argue that the Aha! Experience is a species of the experience of understanding presented here. I interpret the results of these experiments to provide further evidence for irreducible cognitive phenomenology.

keywords

cognitive phenomenology, Aha! Experience, eureka moment

Introduction Consider the following mathematical proposition: if $a < 1$, then $2 - 2a > 0$. Take a moment to see that this proposition is true. Now consider how you determined the veracity of the proposition. If you are like me, you plugged in numbers for a . I started with 1 and saw that 1 was too large. At that point, it became clear that any number smaller than 1 would suffice, which meant the proposition was true. Compare the moment you realized the proposition was true to when you first read the proposition. Is there a difference? If you are like me, there is. In the first moment, I was not aware that the proposition was true and in the second moment I was. Now ask yourself this question: did it feel like anything when you realized the proposition was true? If you are like me, you felt a few things upon realizing the veracity of the proposition. I felt I had understood the proposition in a way I had not at first, I felt joy because I felt I had understood it, and I felt a deep sense of certainty that the proposition is true. I felt all three experiences more or less at once. These experiences characterize the experience of understanding the proposition. In this paper, I shall argue the following: this experience of understanding is an example of irreducible cognitive phenomenology, this case for irreducible cognitive phenomenology succeeds where other cases fail, in particular those cases based on Strawson's case, and a species of this experience of understanding is the Aha! Experience, which provides further evidence for irreducible cognitive phenomenology.

1. Chudnoff's case for irreducible cognitive phenomenology The example of the mathematical proposition above is from Elijah Chudnoff's case for irreducible cognitive phenomenology (Chudnoff 2015, pp. 55-61). I think Chudnoff's case is largely correct, but I also think it can be simplified and augmented. In what follows, I will present an augmented version of Chudnoff's case. But before I discuss the details, I would like to be explicit about what I mean by *irreducible* cognitive phenomenology. By *irreducible* I mean not reducible to sensory phenomenology. So, if you are in a cognitive state and that state possesses some phenomenal property for which no phenomenal property of a wholly sensory state suffices, then the cognitive state possesses irreducible cognitive phenomenology. In other words, what makes a cognitive state irreducible to a sensory state is the possession of some phenomenal property that cannot be reduced to the phenomenal properties of wholly sensory states. If no combination of sensory states is sufficient for the possession of some phenomenal property possessed by a cognitive state, then that phenomenal property of that cognitive state cannot be reduced to the phenomenal properties of wholly sensory states. In that case, it can be said of the cognitive state that it possesses irreducible cognitive phenomenology.

Which phenomenal property is irreducible to the phenomenal properties of wholly sensory states? I wish to present two such properties. I shall call the first property the *presence* property and the second property the *truth-maker* property. I am convinced that these two properties characterize the experience of understanding. To see why I am convinced by this, let us return to the example of the mathematical proposition above. When you understand the mathematical proposition, you seem to be aware of at least two things, and necessarily so. First, you seem to be aware of what the proposition entails. Second, you seem to be aware of a truth-maker for the proposition. Without being in a state that possesses these two properties, I do not see how it can be said that you understand the proposition. Seeming to understand what the proposition entails and seeming to understand how the proposition is true, seem to me to be necessary requirements for understanding the proposition. How could you otherwise understand the proposition other than seeming to understand its entailment and seeming to be aware that the proposition is true? If you do not seem to be aware of what it entails, you do not understand what it means. If you do not seem to be aware of a truth-maker for the proposition – something which seems to tell you that the proposition is true – you do not understand that the proposition is true and so do not understand the proposition. I will discuss in more detail what is meant by a truth-maker, but first I need to dismiss a possible misconception.

The state that you are in when you understand the proposition might be said to possess some property other than the two properties I just mentioned, presence and truth-maker. Though there might be additional properties that characterize the experience of understanding, I believe that any additional properties are inessential. For example, I had an experience of joy at understanding the mathematical proposition above. The experience of joy might be thought of as a property that characterizes the experience of understanding. As such, you might like to say that it is a phenomenal property of the cognitive state that you are in when you understand the proposition. That said, I can easily imagine that you understand the proposition without experiencing joy. Instead, the emotional state might be one of indifference toward understanding the proposition. So, the feeling of joy is a contingent phenomenal property of the state of understanding the proposition. On the other hand, I cannot imagine how you could understand the proposition without being in a cognitive state that possesses the two phenomenal properties, presence and truth-maker. Both seeming to be aware of what the proposition entails and seeming to be aware of a truth-maker for the proposition are necessary for understanding the proposition and therefore necessary for the experience of understanding the proposition.

The two phenomenal properties, presence and truth-maker, together constitute what Chudnoff calls presentational phenomenology (Chudnoff 2013). There is nothing more to Chudnoff's presentational phenomenology than these two properties. For this reason, I will simply refer to a state's possession of presentational phenomenology as shorthand for the state's possession of the two phenomenal properties, presence and truth-maker. Though my case for irreducible cognitive phenomenology is indebted to Chudnoff's notion of presentational phenomenology, it differs from Chudnoff's case in a number of ways. I would like to discuss these ways.

First, Chudnoff does not make explicit mention of the two properties, which I call presence and truth-maker, as being constituents of presentational phenomenology for cognitive phenomenology. In his case for irreducible cognitive phenomenology, Chudnoff seems to have abandoned presentational phenomenology altogether and to have instead opted for what he calls "seeming awareness". This change is not a mere relabeling, however; for his argument for irreducible cognitive phenomenology does not make use of the properties of presentational phenomenology. Instead, his argument relies on a kind of intellectual perception, which

grants mental awareness of an abstract state of affairs. One might see in Chudnoff's argument the use of the presence property of presentational phenomenology; for example, when he says that "a state of affairs is felt to be before one's mind" (Chudnoff 2015, p. 59). But there is no reference to the truth-maker property. Instead, he argues by positing that you *see* that the proposition is true, not that the state you are in seems to make you aware of a truth-maker for the proposition. It seems to me that his use of intellectual perception is in part due to his own terminus technicus *intuition*, which carries a host of epistemological assumptions (Chudnoff 2013). So, my case augments Chudnoff's in the following way: One does not need to accept the epistemological implications involved in intuition; instead of intuition, my case is simplified, such that one only needs to admit states with phenomenal properties. One advantage of this approach is that it can be applied to determine whether states possess the phenomenal properties of presentational phenomenology, the details of which I will discuss shortly. The challenge facing my case is to provide a convincing argument for the claim that the cognitive state of understanding the proposition possesses two phenomenal properties, presence and truth-maker, and, furthermore, provide a convincing argument for the claim that those phenomenal properties cannot be reduced to the phenomenal properties of wholly sensory states. I would like first to show how the phenomenal properties of presence and truth-maker cannot be reduced to the phenomenal properties of wholly sensory states. Thereafter, I will argue that the cognitive state of understanding the proposition possesses those two phenomenal properties, presence and truth-maker.

To show that these two phenomenal properties cannot be reduced to the phenomenal properties of wholly sensory states, I think it is helpful to see first how those properties are possessed by a state if and only if that state meets corresponding conditions. So, for example, an object, such as vase, has the property of fragility, if and only if that object breaks upon light impact. We can think of phenomenal properties as being possessed by a state in the same vein as the property of fragility being possessed by a vase. So, if we would like to know whether a state possesses the first phenomenal property, presence, we can ask whether it fulfills some condition. If the state seems to make you aware that p , where p stands for some proposition, then that state possesses the phenomenal property of presence. In other words, a state possesses the phenomenal property presence, if and only if that state seems to make you aware that p . The same can be said for the phenomenal property of truth-maker. For a state to possess the second phenomenal property truth-maker, that state must seem to make you aware of a truth-maker for p . In other words, a state possesses the phenomenal property of truth-maker, if and only if that state seems to make you aware of a truth-maker for p . Since presentational phenomenology is nothing less than those two phenomenal properties, it necessarily follows that a state possesses presentational phenomenology if that state possesses the two phenomenal properties, presence and truth-maker. As shorthand, I will refer to these two conditions as the two conditions of presentational phenomenology or as the enabling conditions for presentational phenomenology.

I would like to discuss the layout of this paper. I will first provide an example of a sensory state that fulfills these conditions and thus possesses the two phenomenal properties, presence and truth-maker; but that sensory state will involve only low-level content. What I mean by low-level content is content that does not involve concepts. This example is discussed in section 2. I would like to introduce this example for two reasons. It will help to illustrate what I mean by presentational phenomenology, and set up my argument for irreducible cognitive phenomenology. In support of my argument, I will introduce a sensory state that involves high-level content; which is to say, content that necessarily involves concepts. Unlike the first example of low-level content, a sensory state that involves high-level content will not fulfill the conditions for presentational phenomenology. It follows from my argument that no

wholly sensory states involving high-level content possess presentational phenomenology. In section 3, I will return to the cognitive state of understanding the mathematical proposition above. I will show that this cognitive state, which involves high-level content, does possess presentational phenomenology. The result is that the phenomenal properties of some cognitive states cannot be reduced to the phenomenal properties of wholly sensory states, which is evidence for irreducible cognitive phenomenology. In section 4, I will discuss why my case succeeds where other cases fail, and how my case might be used to augment those cases. In section 5, I will discuss evidence for irreducible cognitive phenomenology, which correlates with my case based on Bowden and Jung-Beeman's experiments with the Aha! Experience. In section 6, I will make the argument that it is plausible to accept this evidence as supporting my case for irreducible cognitive phenomenology.

Let us begin by examining whether a sensory state involving low-level content possesses presentational phenomenology in respect to its content. Recall that the first condition ensures that the state seems to make you aware that *p*. This condition is just as basic as it sounds. Consider the state of looking at a red apple. Does this state fulfill the first condition of presentational phenomenology? Does it seem to make you aware that the apple is red? I believe it does. What else seems to make you aware that the apple is red, except the sensory state of looking at the red apple? So, it is a rather simple affair that a state of looking at a red apple seems to make you aware of the apple's being red. One objection you might want to raise is the use of *seem*: by only seeming to be aware of *p*, you may not actually be aware of *p*. But actually being aware of *p* is not necessary for present purposes: it is only relevant how things seem to you, not how things are in reality.

The second condition for presentational phenomenology stipulates that the state seems to make you aware of a truth-maker for *p*. This condition is simpler than it sounds. Let us consider the state of looking at a red apple again. To determine whether this state fulfills the second condition, we need to determine the truth-maker for *the apple is red*. The apple is red just in the case that red is the color of the apple. That is simply a reformulation, though. Let us ask this question instead: when you have an experience of a red apple, how do you know that the apple is red? You know it is red because you have an experience of redness. Does the state of looking at a red apple seem to make you aware of redness? This seems uncontroversial. You have an experience of redness when looking at the red apple, so the sensory state of looking at the apple seems to make you aware of the truth-maker for the apple is red.

Do sensory states with high-level content possess presentational phenomenology? I shall argue along with Chudnoff that they do not (Chudnoff 2013); but unlike Chudnoff, I will support this claim by examining whether sensory states meet the conditions for possessing the two phenomenal properties of presentational phenomenology, presence and truth-maker. To get started, we need an example. Let us take the word *drawer*. The low-level content of a visual sensory state that concerns the word *drawer* is constituted by the color and shape of the word's letters. The high-level content of a sensory state that concerns this word is constituted by its semantic content¹. Let us discuss whether this sensory state meets the two conditions of presentational phenomenology.

Recall the first condition of presentational phenomenology. It stipulates that the state seems to make you aware that *p*. Does the sensory state seem to make you aware that *drawer means xyz*? Affirming this question is not as straightforward as it was with low-level content. What

2. No wholly sensory states possess presentational phenomenology of high-level content

¹ The high-level content of a word might be constituted by more than just its semantic content, depending on your philosophy of language. But for present purposes, semantic content will be enough.

are you aware of when you are aware of the meaning of the word *drawer*? I think you are first and foremost aware of drawer's *wordhood*; which it to say, you are aware that *drawer* is a word and not just a string of squiggly lines. If the sensory state seems to make you aware that *drawer* means something, then this entails that *wordhood* is sensed in the act of sensing the word *drawer*. To see the contrast, compare *wordhood* to drawer's low-level content: When looking at the word *drawer*, the sensory state seems to make you aware of its color, its blackness, its low-level content. But in the case of high-level content, does the sensory state seem to make you aware of drawer's *wordhood*? Does the state seem to make you aware that *drawer* is a word? If you think it does, you need to argue that the sensory state seems to make you aware that *drawer* refers to something. To see the need for referentiality, consider the invented word *ewitzle*. Even though you have never seen this word before, you might take it for a word, and if you take it for a word, it is because you believe it refers to something. Furthermore, you might take it to refer to something independently of knowing what the word actually denotes. If you are like me, you might read the word and feel some sense of what *ewitzle* might mean. If you contrast *wordhood* with blackness, it is clear that there is a way in which the sensory state seems to make you aware of blackness, which is wholly different from how you might be aware of *ewitzle's* (or drawer's) *wordhood*. Being in a state of awareness of a word's *wordhood* goes beyond any wholly sensory state because this awareness requires cognition.

Recall the second condition of presentational phenomenology. It stipulates that the state seems to make you aware of a truth-maker for p. What is the truth-maker for *drawer means xyz*? *Drawer means xyz* precisely when *xyz* is the meaning of the word *drawer*. But a reformulation does not help. So let us ask the question, when looking at the word *drawer*, how do you know that *drawer means xyz*? You know *drawer means xyz* because you have an awareness of the meaning of the word *drawer*. That claim is in need of defense, so allow me to unpack it.

Consider the following sentence: *The letter is in the drawer*. How do you know what *drawer* means in this sentence? If you are like me, you imagine a wooden desk with a series of drawers. You imagine that there is a letter, perhaps in a sealed envelope, in one of these drawers. In this sentence, *drawer* means the place where the letter can be found, which I presumed is a part of a desk. But why a desk? Why not a filing cabinet? Perhaps this is because *desk* is associated with letter writing. So, it can be said that I inferred that *drawer* was a part of a writing desk from the association of letter writing. Drawing this inference is an example of having an awareness of the meaning of the word *drawer*. So, I know what *drawer* means in this sentence by having an awareness of how *drawer* is being used.

Does the sensory state seem to make you aware of the meaning of the word *drawer*? That this is false is easier to see than the first condition. Does the sensory state of looking at the word *drawer* in the sentence *The letter is in the drawer* seem to make you aware of a wooden desk with a series of drawers, wherein a letter is kept? Patently, the visual experience of looking at the word *drawer* in the above sentence does not seem to make you aware of a desk. To claim that it did would be tantamount to overseeing crucial steps in describing and explaining the experience of understanding the meaning of the word *drawer* in the sentence above. Compare this to low-level content once again. When looking at a red apple, you *do* see redness. When looking at *drawer*, you do not see *drawerness* or drawer's *wordhood*. The visual experience of looking at the word does not make you aware of the fact that the word is a word. It follows from this that the truth-maker for linguistic meaning is too abstract to be reducible to properties of wholly sensory states. Since neither condition was met by the sensory state, it is plausible to maintain that sensory states do not possess presentational phenomenology of high-level content.

We need to discuss whether presentational phenomenology of high-level content exists.

As of now, my argument only shows that wholly sensory states lack two phenomenological

properties of presentational phenomenology, presence and truth-maker. Call this the negative argument. Now we need the positive argument. Setting up the positive argument requires answering the following question: Do some cognitive states possess presentational phenomenology of high-level content? Since the two phenomenal properties of presentational phenomenology cannot be reduced to phenomenal properties possessed by wholly sensory states, if some cognitive states possess presentational phenomenology, it is plausible to maintain that the phenomenology of those cognitive states cannot be reduced to the phenomenology of wholly sensory states.

Do some cognitive states with high-level content possess presentational phenomenology? I shall argue along with Chudnoff that they do (Chudnoff 2013), but, unlike Chudnoff's argument, my argument is not based on whether cognitive states involve intuition; instead, my argument is based on whether cognitive states meet the conditions of presentational phenomenology. To get started, we need an example. Let us return to the mathematical proposition from earlier. The high-level content of the proposition if $a < 1$, then $2 - 2a > 0$ is an abstract state of affairs. I use the term *abstract state of affairs* because there are many different abstract components to the high-level content of the proposition: there is the meaning of *if*, $<$, $>$, etc. – not to mention a host of real numbers less than 1.

I have already discussed how the two phenomenal properties of presentational phenomenology are not possessed by wholly sensory states involving high-level content. I will now address whether some cognitive states possess those properties. For the sake of clarity, the state in question is the state that involves the awareness of the veracity of the mathematical proposition. So the question becomes, does the state involving awareness of the veracity of the mathematical proposition meet the conditions whose satisfaction is required by the two properties of presentational phenomenology?

Recall the first condition. It stipulates that the state seems to make you aware that p . Does the state seem to make you aware that if $a < 1$, then $2 - 2a > 0$? Recall our discussion at the introduction. If you are like me, this state was characterized by these experiences: the feeling of understanding the proposition, the feeling of joy because of the feeling of understanding the proposition, and the feeling of certainty that the proposition is true. I have already discussed why the feeling of joy is unnecessary for understanding the proposition. So, I will remove it from consideration. The first characterization, *the feeling of understanding the proposition*, seems to indicate a phenomenal property possessed by the state that meets the first condition of presentational phenomenology. The feeling of understanding the proposition seems to indicate that the state of understanding the proposition seems to make you aware that if $a < 1$, then $2 - 2a > 0$. I think that this point is uncontroversial, so I will not argue anymore for it here. However, because fulfilling this condition is rather simple, a greater burden now lies on arguing for the fulfillment of the second condition.

Recall the second condition of presentational phenomenology. It stipulates that the state seems to make you aware of a truth-maker for p . What is the truth-maker for if $a < 1$, then $2 - 2a > 0$? To answer this question, you might simply reformulate the proposition: $2 - 2a > 0$ is true, if $a < 1$. But reformulation is of no use for present purposes. So let us ask the question, when considering the mathematical proposition, how did you know that the proposition is true? I believe the proposition seemed true to you at least in part due to your feeling of certainty that the proposition is true. This claim is in need of defense, so allow me to unpack it. In determining the truth of the proposition, you performed a mental calculation, and as a result of that calculation you had the feeling that the proposition is true. That said, I believe that the feeling of certainty that the proposition is true played a role in your awareness of the veracity of the proposition. In the example above, if you had not had the feeling of certainty,

3. Some cognitive states possess presentational phenomenology of high-level content

you might not have known that the proposition is true. In other words, if you had never felt certain that if $a < 1$, then $2 - 2a > 0$, then you could have thought that the proposition is false or could have thought that you did not know either way. So, the question becomes, is it possible to know that a proposition is true without first having a feeling of certainty in regard to its truth? I do not think so. For example, I believe, not know, that Goldbach's conjecture is true. Since I do not feel certain about my belief, I do not know whether that belief is true. Moreover, I cannot imagine a case of *knowing p* and *not feeling certain that p*². If the feeling of certainty is necessary for an awareness of veracity, then it is plausible to think that the feeling of certainty in the above example of the mathematical proposition indicates that the state of understanding the proposition seems to make you aware of a truth-maker for the proposition. If the proposition seems true to you, you have an awareness of the veracity of the proposition, and if you have an awareness of the veracity of the proposition, then you necessarily have a feeling of certainty that the proposition is true. So the feeling of certainty that the proposition is true is indicative of an awareness of what makes the proposition true and therefore the feeling of certainty is indicative of an awareness of a truth-maker for the proposition. This awareness of the veracity of the proposition is analogous to the awareness of the meaning of the word *drawer*. There the awareness of *drawer's* meaning was the result of a combination of association and inference; in the case of the mathematical proposition, similar cognitive processes develop an awareness of veracity. In particular, you deduced from a range of real numbers a possible set that might hold for the proposition and assessed the validity of that deduced set against what the proposition might entail. Does the state of understanding the proposition seem to make you aware of the veracity of the proposition? The third characterization, *the feeling of certainty*, seems to indicate that you are aware of the veracity of the proposition in the state of understanding the proposition. The feeling of certainty seems to indicate that, in this state, you seem to be aware of a truth-maker for if $a < 1$, then $2 - 2a > 0$ ³. Since the two conditions of presentational phenomenology are met, this cognitive state possesses the presentational phenomenology of high-level content. Recall that presentational phenomenology of high-level content is not possessed by wholly sensory states. So, the phenomenology of this cognitive state is not reducible to that of wholly sensory states. Hence, this phenomenology is irreducible cognitive phenomenology. If you wish to reject this claim, I can see two possible routes you might take. Either you need to build a convincing case for the presentational phenomenology of high-level content of sensory states or you need to deny that a state that involves the awareness of the veracity of high-level content is cognitive. I simply do not see how the second route is possible, so let me discuss why I think the first route implausible.

Let us consider high-level content that specifies that something belongs to a kind. Now consider the two conditions for presentational phenomenology. Does the sensory state seem to make you aware that, for example, *this person is a priest*? I would be open to considering a case that does, but that would meet only one of the conditions for presentational phenomenology. Does the sensory state seem to make you aware of a truth-maker for *this person is a priest*? I do not believe this is plausible. The truth-maker would need to be the experience of *priestness*, and *priestness*, like *wordhood*, like mathematical entailment, is too abstract to be the content of

2 Feeling certain *that p* is not sufficient for knowing *that p*, but that does not matter for my claim: I only need to establish a necessary, and not a sufficient, condition.

3 I would like to note that it might be the case that the state you are in when you are *not* aware of the veracity of the proposition might be indicative of some form of cognitive phenomenology. But the only cognitive phenomenology that concerns me in this paper is that which meets the conditions of presentational phenomenology, such that you are aware of a truth-maker.

a wholly sensory state. For that reason, I do not think a convincing case can be established for the presentational phenomenology of high-level content of sensory states.

I would like to discuss why my case for irreducible cognitive phenomenology succeeds where other cases do not, particularly those cases based on the experience of understanding in Strawson's case. It is often thought that Strawson's case is not sufficient for establishing irreducible cognitive phenomenology. I will briefly discuss the reasons for thinking so. After that, I will show how my case succeeds where Strawson's case fails, and I will discuss how Strawson's case might be augmented in light of my case. Later, in section 6, I will argue that Bowden and Jung-Beeman's experiments provide evidence for two different experiences of understanding – one is my case and one is Strawson's – which is the reason why my case succeeds where Strawson's case does not. I will discuss the two different experiences of understanding in this section.

One prototypical argument for cognitive phenomenology is the Jack/Jacques example developed by Galen Strawson (Strawson 1994, pp. 5-6). It turns on the phenomenology of language comprehension, which is taken *prima facie* as cognitive. Both Jack and Jacques are listening to a radio broadcast in French. But Jack does not speak French. Thus Jacques is in a different cognitive state than his counterpart. The argument is that this difference is attributed to the phenomenology of the cognitive state of understanding the broadcast. There are two objections to this argument, both of which amount to denying one of the premises the argument depends on. The first objection to the argument denies the premise that there is no sensory difference between Jack and Jacques' experience. In other words, Jack and Jacques' perceptual states do not, contrary to the premise, have the same auditory content. In addition to the objections discussed in the literature (e.g. Chudnoff 2015, pp.45-49, Carruthers & Veillet 2011), I can provide testimony for these objections. Having spent several years teaching English as a foreign language, I have experienced teaching phonetic accuracy. While learning the phonemes of a foreign language not produced in the languages already known, the learner's first step is to learn to hear the foreign phonemes. This learning process is not complete until the student has learned to produce those phonemes herself. Since Jack must first learn to produce the phonemes before hearing them accurately, Jack cannot hear what Jacques does. My testimony may not be enough to convince some of you, but for me it makes the objections to this premise all the more tenable.

The second objection to the Jack/Jacques example denies the premise that ordinary language comprehension is cognitive. By *ordinary* I mean cases of language comprehension such as reading this sentence and understanding it in a word-to-word, compositional fashion. There is much debate about whether this language comprehension is a cognitive process. This is because the admission of high-level sensory content compels us to consider whether ordinary language comprehension is not merely sensory. In order to defend against this counterargument, I believe Strawson's case can be augmented using presentational phenomenology. In order to see how this might work, we need to discuss the difference between the experience of understanding in my case and in Strawson's case. But before the difference between the experience of understanding in the Jack/Jacques example and the experience of understanding in the mathematical proposition example can be presented, we need to first discuss the difference between the two experiential states of Jack and Jacques. This will help settle the matter that needs to be discussed when comparing the two experiences of understanding.

Arguably, Jacques' experiential state is at least in part constituted by his understanding of the meaning of the broadcast. And Jack's state is likewise constituted by his understanding of the meaning of the broadcast, but Jack does not understand, to what the sounds of the broadcast refer. The words are perhaps felt by Jack just as French sounding sounds. One difference between

4. My case succeeds where other cases fail

Jack and Jacques' experience is that the former knows the referents of the sounds. To see this difference clearly, imagine you do not speak French. Consider the sentence: *il pleut. Il pleut* translates in English as *it is raining*. Now consider the sentence again. This time you see *il* and know that it refers to what *it* refers to and you see *pleut* and you know that it refers to what *is raining* refers to. Is there a difference between the first and second reading of the sentence? If you are like me, the French words were first read as words without referent and then, in the second case, the words were read as words with referent. That said, there might be other differences between Jack and Jacques' experiential state, perhaps sensory differences, but for present purposes the only difference under consideration concerns the knowledge of the words' referent, or lack thereof. Let us discuss the difference between the experience of understanding in the Jack/Jacques example and the experience of understanding in the mathematical proposition example. If my case is able to succeed where Strawson's case fails, then there should be a significance difference between the two experiences of understanding. Recall the three characteristics of the experience of understanding the mathematical proposition: the feeling of understanding the proposition, the feeling of joy because of the feeling of understanding the proposition, and the feeling of certainty that the proposition is true. For reasons already discussed, the feeling of joy can be omitted from consideration. After reading *il pleut* the second time, did you have a feeling of understanding the proposition? If you are like me, you did. That said, does this experience of understanding meet the first condition of presentational phenomenology? In other words, does the state of understanding the linguistic proposition seem to make you aware that it is raining (*il pleut*)? Though you understand that *il pleut* means what *it is raining* means, the experience of understanding does not seem to make you aware of the weather conditions. Compare this to the example of the mathematical proposition. Does the state of understanding the mathematical proposition seem to make you aware that if $a < 1$, then $2 - 2a > 0$? The state you are in when you understand the mathematical proposition does seem to make you aware of the abstract conditions that make this conditional true. So the experience of understanding in the Jack/Jacques example does not meet the first condition of presentational phenomenology. Neither does it meet the second condition. When reading *il pleut*, do you have a feeling of certainty that it is raining? The difference between the two experiences of understanding is presentational phenomenology. The experience of understanding in my case possesses it; the experience of understanding in Strawson's case does not. If the experience of understanding in Strawson's case were augmented to possess presentational phenomenology, then Strawson's case might be able to withstand counterarguments that attempt to reduce the phenomenology of this experience of understanding to sensory phenomenology.

I believe that presentational phenomenology is not contrary to Strawson's case; instead, I believe that presentational phenomenology might be used to augment it. Discussing how this might work exactly would go beyond the scope of this paper, but I will briefly sketch how I think it possible. Consider the Jack/Jacques example once again. Jacques' experiential state might have presentational phenomenology with respect to the broadcast. How is this possible? Let us say the broadcast is a reading of a recently published crime novel. When the author reads *il pleut*, Jacques' state of understanding might be said to have presentational phenomenology with respect to the context of the story. Does this state seem to make him aware of the weather conditions in the story? Does this state seem to make him aware of a truth-maker for the weather conditions in the story? Thus augmented, I believe Strawson's case might be able to withstand the counterarguments⁴.

⁴ I would like to point out that Jung-Beeman has conducted experiments involving subjects drawing inferences when reading and understanding short stories; he provides evidence for a connection between the underlying mechanism

The most palpable example of the Aha! Experience is the story of Archimedes and the golden crown. Hiero of Syracuse posed the problem of how to determine whether his newly forged crown was made of pure gold without melting it down. Perplexed, Archimedes decided to take a bath. Upon getting into the tub, Archimedes noticed that the water displaced must be equal to his submerged body. At that moment, Archimedes realized he could measure the volume of irregular objects like Hiero's crown. Archimedes was so excited by his discovery that, as the story goes, he ran naked through the streets shouting *eureka* – I've found it. The eureka moment is synonymous with the Aha! Experience.

The cognitive mechanism underlying the Aha! Experience has been of much interest to the scientific community in the past two decades. There have been two theories about this mechanism. The majority of psychologists have theorized that the Aha! Experience is the result of a unique process different from ordinary experiences of understanding. This uniqueness thesis depends on solutions reached by what researchers call *insight*. If a problem is solved by insight, then the upshot is the Aha! Experience. Bowden and Jung-Beeman developed two experiments to test this thesis (Bowden & Jung-Beeman 2004). The result is empirical evidence for the case that the cognitive mechanism underlying the Aha! Experience is unique. Before we discuss the relationship between Aha! Experience and the experience of understanding in my case for irreducible cognitive phenomenology, it is important we discuss the details of these experiments. Bowden and Jung-Beeman's experiments involved subjects solving compound remote associate problems. These problems were first developed by Sarnoff Mednick in order to test for creativity (Mednick 1962). An example of one of these problems is *crab / tree / pie*. Subjects are presented with three words and asked to name a fourth that builds a semantic association with each. The answer to this compound remote associate problem is *apple* – so, crab apple, apple tree, and apple pie. The solving of compound remote associate problems is found to depend on insight and leads to subjects reporting having undergone an Aha! Experience (Bowden & Jung-Beeman 2004). Researchers developed 144 of these problems and measured subjects' brain activities via functional magnetic resonance imaging (fMRI) and electroencephalogram (EEG) while solving the problems (Bowden & Jung-Beeman 2004). After each solution, subjects were asked whether they had solved the problem with insight and had undergone an Aha! Experience. The Aha! Experience was found to be the upshot of an insight-based solution (Bowden & Jung-Beeman 2004). In the first experiment, images of brain activity were taken via fMRI. If the unique thesis is true, fMRI ought to reveal neuroanatomical locations unique to insight solutions. In the second experiment, neural oscillations were measured via EEG. If the unique thesis is true, EEG ought to reveal both the suddenness of insight as well as frequency characteristics of the neurophysiological differences. Concerning the first experiment, activity in anterior superior temporal gyrus of the right hemisphere (aSTG RH) was detected in insight-based problem solving. This activity was not detected in problems solved without insight (Bowden & Jung-Beeman 2004). Concerning the second experiment, a sudden gamma burst was detected above the anterior temporal lobe of the right hemisphere (Bowden & Jung-Beeman 2004). These gamma bursts were not detected in problems solved without insight (Bowden & Jung-Beeman 2004). These two detections suggest that insight has unique neuroanatomical locations and possesses frequency characteristics of this difference. Moreover, there was a third finding that contributes to our discussion of irreducible cognitive phenomenology. Alpha bursts over the right posterior

5. The Aha! Experience is a species of the experience of understanding in my case

of the Aha! Experience and the underlying mechanism of story comprehension (Jung-Beeman, 2005). If you grant the conclusion of my argument in section 6, i.e. the correlation between presentational phenomenology and the Aha! Experience, there is reason to agree with me about how to refine Strawson's case.

parietal cortex proceeded gamma bursts during insight-specific activity from 1.4s until 0.4s before the solution response (Bowden & Jung-Beeman 2004).

Before we discuss the significance and relevance of these findings, I shall argue that the Aha! Experience meets the sufficient conditions for the experience of understanding in my case for irreducible cognitive phenomenology. We already know that there are two phenomenal properties that a state involving high-level content must possess in order for that state to be a candidate for irreducible cognitive phenomenology. The existence of these two properties is determined by assessing whether the state in question meets the two conditions of presentational phenomenology. Does the state that someone is in when she undergoes an Aha! Experience concern high-level content? Does this state meet the two conditions of presentational phenomenology? I take it for granted that compound remote associate problems concern high-level content. So the question is whether the state involving the Aha! Experience possesses presentational phenomenology.

A theoretical account of the Aha! Experience is proposed by Topolinski and Reber (Topolinski & Reber 2010). They give four defining characteristics. *Suddenness*: the solution to the problem occurs suddenly. *Ease*: After the solution has been found the problem-related processing is fast and easy. *Positive Effect*: the experience is a genuine positive one that arrives before the solution has been assessed. *Truth and confidence*: Before systematically assessing the veracity of the solution in formal analysis, problem solvers judge the solution to be true and express confidence in that judgment. Before we begin arguing that the *Truth and Confidence* characteristic indicates the properties needed to fulfill the conditions for presentational phenomenology, let us simulate an experiment. Consider the following compound remote associate problem: *horse / human / drag*. Take a moment to discover the fourth word that creates a semantic association with each. Now ask yourself, what was it like for you to discover the answer? If you are like me, you felt three things. You felt you had understood the answer to the problem, you felt joy at having understood the problem, and you felt a sense of certainty that the answer to the problem was correct. These three sensations match the *Ease*, *Positive Effect*, and *Truth and Confidence* characteristics. Let us compare these characteristics to the two conditions for presentational phenomenology. Recall the first condition. The state seems to make you aware that p. For clarity, I take the state in question to be the state you are in when you first realize the answer to the compound remote associate problem. Does this state seem to make you aware that *race* builds a semantic association with *horse*, *human*, and *drag*? This appears to be uncontroversial. The state of understanding the solution to the problem seems to make you aware of the solution to the problem. Recall the second condition. The state seems to make you aware of a truth-maker for p. Does this state seem to make you aware of a truth-maker for *race builds a semantic association with horse, human, and drag*? What is the truth-maker for *race builds a semantic association with horse, human, and drag*? *Race* builds a semantic association with *horse*, *human* and *drag* if and only if *horse*, *human* and *drag* semantically associate with *race*. But reformulation gets us nowhere. So let us ask, when you discovered that *race* is the solution, how did you know that *race* is correct? You knew *race* is correct in part because you had an experience of veracity – same as with the mathematical proposition. Thus the state that you are in when you become aware of the solution to the compound remote associate problem meets the two conditions of presentational phenomenology. Therefore the Aha! Experience is a species of the experience of understanding in my case for irreducible cognitive phenomenology⁵.

⁵ I would like to be more explicit about what I mean by a *species*. I understand the experience of understanding, as I have presented it here, to include more cognitive experiences, not only the Aha! Experience. In the afterword, I will suggest two more possible candidates.

Since the Aha! Experience is established as a species of the experience of understanding in my case for irreducible cognitive phenomenology, we can discuss the findings of Bowden and Jung-Beeman's experiments as they pertain to our discussion of irreducible cognitive phenomenology. Recall that the activity in the right hemisphere and the gamma bursts above anterior temporal lobe of the right hemisphere are evidence for the thesis that the mechanism underlying the Aha! Experience is unique. Regarding our discussion of the two different experiences of understanding (mine versus Strawson's), the unique mechanism underlying the Aha! Experience further supports the argument that there are two different experiences of understanding: one for my case and one for Strawson's. Recall that the state associated with the experience of understanding in the example of the mathematical proposition meets the conditions for presentational phenomenology, but the example of Jack/Jacques does not. If we assume that there is a correlation between the unique mechanism underlying the Aha! Experience and the experience of understanding that possesses presentational phenomenology, it is plausible to think that the unique mechanism thesis endorsed by Bowden and Jung-Beeman provides evidence for the two different experiences of understanding⁶. Recall the third finding. Alpha bursts were located over the parietal-occipital cortex. Bowden and Jung-Beeman concluded that these alpha bursts meant that the visual cortex had been inhibited or idled (Bowden & Jung-Beeman 2004). Recall that alpha bursts preceded the gamma bursts. Gamma bursts play a critical role in the accessibility of semantic representations; in these experiments, they reflected "the sudden conscious availability of a solution word resulting from insight" (Bowden & Jung-Beeman 2004, p. 506). Before subjects discovered the solution to the compound remote associate problem, the visual cortex had been either inhibited or idled, and visual information flowing into the perceptual system had been gated (Bowden & Jung-Beeman 2004). From this, Bowden and Jung-Beeman concluded, "...allowing one process to proceed relatively *independently* requires active attenuation of this interaction" (Bowden & Jung-Beeman 2004, p. 507, emphasis added). This *relatively independent process* is integral to the underlying mechanism of solving a problem with insight, whose upshot is the Aha! Experience. In other words, the Aha! Experience is the result of a process that is relatively independent of the visual information flowing into the perceptual system. Recall the claim for irreducible cognitive phenomenology: some phenomenal property of some cognitive state cannot be reduced to the phenomenal properties of wholly sensory states. The argumentative crux of this claim is presentational phenomenology of high-level content. As already discussed, sensory states do not possess presentational phenomenology of high-level content, while some cognitive states do. The Aha! Experience possesses presentational phenomenology of high-level content, which means the Aha! Experience is sufficient for a cognitive state with irreducible cognitive phenomenology. Recall that gamma bursts in the right hemisphere were indicative of the Aha! Experience; recall that the gamma bursts were preceded by alpha bursts and that the alpha bursts over the parietal-occipital cortex indicated the inhibition or idling of visual information flowing into the perceptual system. This means, having the Aha! Experience requires first attenuating the flow of visual information into the perceptual system. If you make the assumption that there is a correlation between the gamma bursts and the presentational phenomenology of high-level content, then it is plausible to think that this correlation indicates that the cognitive phenomenology of the Aha! Experience

**6. The Aha!
Experience
provides evidence
for irreducible
cognitive
phenomenology**

⁶ That is, the experience of understanding that corresponds to solving problems with insight is reflective of being in state of high-level content that possesses presentational phenomenology, while an experience of understanding that corresponds to solving problems without insight is reflective of being in a state of high-level content that does not possess presentational phenomenology.

is decoupled from sensory phenomenology, which provides further evidence for irreducible cognitive phenomenology.

Afterword If everything presented here is correct, I see two ways forward. Either presentational phenomenology of high-level content, with its two phenomenal properties presence and truth-maker, is an example of irreducible cognitive phenomenology in every case, or presentational phenomenology of high-level content is an example of irreducible cognitive phenomenology only in the case of the Aha! Experience. The latter claim is more defensible, since one has additional evidence to support it: testimony from solvers of compound remote associate problems on the one hand, and the correlation of irreducible phenomenal properties with the underlying neurological mechanism of the Aha! Experience on the other. For my part, I am inclined to believe that the experience of understanding, which I have presented here, is phenomenologically related to the Aha! Experience as the experience of drinking water is related to the experience of drinking juice. If you compare what it is like to taste water versus what it is like to taste juice, patently juice stands out as having a more prominent taste. That said, that does not mean that water is insipid. It is my opinion that an experience of understanding that possesses presentational phenomenology of high-level content reflects a ‘ground’ of cognitive phenomenology, from which other variants of understanding sprout. Not only would there be the feeling of suddenly realizing the solution to a problem (the Aha! Experience), but also the feeling of realizing what you had previously held for true is in fact false (the Achso! Experience), and the feeling of realizing what you currently have in mind is in fact the solution you had been seeking (the O-Duh! Experience). I believe each one of these variants is indicative of a state that possesses presentational phenomenology of high-level content. If this is correct then presentational phenomenology of high-level content is not merely an indicator of an experience-token, but an indicator of an experience-type possessing irreducible cognitive phenomenology.

REFERENCES

- Bowden, E. & Jung-Beeman, M.. (2004), “Neural Activity When People Solve Verbal Problems With Insight”, *PLoS Biology*, 2(4), pp. 500-510;
- . (2005), “New Approaches to Demystifying Insight”, *Trends in Cognitive Science*, 9(7), pp. 321-328;
- Carruthers, P. & Veillet, B. (2011), “The Case Against Cognitive Phenomenology”, in T. Bayne & M. Montague (eds.), *Cognitive Phenomenology*, Oxford University Press, Oxford, pp. 35-56;
- Chudnoff, E. (2013), *Intuition*, Oxford University Press, Oxford;
- . (2015), *Cognitive Phenomenology*, Routledge, New York;
- Jung-Beeman, M. (2005), “Bilateral Brain Processes for Comprehending Natural Language”, *Trends in Cognitive Science*, 9(11), pp. 512-518;
- Mednick, S. (1962), “The Associative Bias of the Creative Process”, *Psychological Review*, 69(3), pp. 220-232;
- Strawson, G. (1994), *Mental Reality*, MIT Press, Cambridge, MA;
- . (2011), “Cognitive Phenomenology: Real Life”, in T. Bayne & M. Montague (eds.), *Cognitive Phenomenology*, Oxford University Press, Oxford, pp. 285-325;
- Topolinski, S. & Reber, R. (2010), “Gaining Insight into the ‘Aha’ Experience”, *Current Directions in Psychological Science*, 19(6), pp. 402-405.