Two Unities of Consciousness

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Abstract: This paper argues for a distinction between possession of a unified consciousness and possession of a single stream of consciousness. Although the distinction has widespread applicability in discussions of the structure of consciousness and of pathologies of conscious experience, I will illustrate its importance primarily using the debate about consciousness in split-brain subjects, suggesting that those who have argued that split-brain subjects have two streams of consciousness apiece and those who have argued that they have a unified consciousness may both be right.

1 Introduction

This paper is about what it is for consciousness to be unified, and whether it might be possible for a subject to enjoy a consciousness that was unified in one important sense, but not in another. I draw a distinction between two ways of thinking about the unity of consciousness, a distinction that has not been widely recognized or sufficiently appreciated in discussions of conscious unity or of pathologies of consciousness. This is the distinction between the coherence of conscious experience on the one hand, and the co-consciousness of experiences on the other. After explaining the concepts of conscious unity that I call ‘coherence unity’ and ‘conscious singularity’, I will consider whether they might in fact pick out at least partly dissociable aspects of conscious mental life.

Here is how the rest of the paper will go. Sections 2 and 3 explain the two concepts of conscious unity: conscious singularity, or possession of a single stream of consciousness, addressed in Section 2, and coherence unity, the subject of Section 3. Section 4 notes that there are bound to be conceptual connections between conscious singularity and coherence unity, as well as empirical connections between conscious states’ coherence and their co-consciousness. For this reason, one might maintain that there is only a single phenomenon picked out by these two concepts. One might, that is, maintain that a subject with a coherence unified consciousness must have a single stream of consciousness, and vice versa. So far as I know, in fact, no one has rejected both halves of this biconditional. I nonetheless present arguments for its rejection in the second part of this paper.

The first half of the biconditional—which states that any subject with a single stream of consciousness must have a coherence unified consciousness—is tackled
in Section 5, in which I simply present a few different cases suggestive of a single stream of consciousness that is not unified. Sections 6 and 7 concern whether coherence unity requires possession of a single stream of consciousness. The claim that it does might seem especially secure: how can two states belong to a unified consciousness if they do not even belong to the same stream of consciousness? I will argue, however, that whatever our initial intuitions, the split-brain cases provide compelling reason to think that non-co-conscious experiences and indeed multiple streams of consciousness can nonetheless contribute to their subject’s enjoyment of a unified consciousness.1

2 Unity through Co-Consciousness: Conscious Singularity

According to one way of thinking about the unity of consciousness, for a subject to possess a unified consciousness is for that subject to possess a single stream of consciousness, where a stream of consciousness consists of all and only those conscious phenomena that are co-conscious with each other. Call this first concept of conscious unity conscious singularity. Conscious singularity is not equivalent to co-consciousness, but is defined in terms of it: conscious singularity is a property of the subject, referring to the possession of a single stream of consciousness; streams of consciousness are constructed out of those conscious phenomena that bear the co-consciousness relation to each other.2

What is it for phenomena to be co-conscious with each other? The very concept of co-consciousness is notoriously difficult to characterize in a manner that everyone can accept (or even admit as coherent; see for instance O’Brien and Opie 1998, 2000), but one dominant articulation of the relation says that that for two experiences to be co-conscious with each other is simply for there to be something it is like for their subject to undergo both of those experiences simultaneously—something that is different from what it is like to undergo the first experience one day and then the second the next, for instance, or something that is different from what it is like for Joan to undergo the first experience while, simultaneously, John undergoes the second.3

One might instead characterize co-consciousness in terms of some kind of joint or simultaneous access to or awareness of co-conscious experience (or of their contents, via bearing those states). Marks, for instance, seems to be speaking of co-consciousness when he offers as ‘a rough necessary condition for two simultaneous conscious experiences belonging to the same stream of consciousness: e1 and e2 belong to the same unified consciousness only if they are known, by introspection, to be simultaneous’ (Marks 1981: 13). Introducing the subject matter of his book Stream of Consciousness—i.e., ‘the unity . . . to be found within our streams of consciousness’—Dainton says that when you watch yourself snap your fingers: ‘You see and feel a movement, and hear a sound. These three experiences—one auditory, one visual and one tactile—do not occur in isolation from one another, they occur together within your consciousness, you are aware of them all at once’ (Dainton 2000: xiii; emphasis added). I will assume in what
follows that these two ways of characterizing co-consciousness—in terms of joint phenomenal character or simultaneous awareness—are basically equivalent.\textsuperscript{4}

While co-consciousness appears to consist in a particular sort of integration, articulating what sort that is remains difficult, and for now we may have to content ourselves with the Gricean strategy of identification of that integrative relation by ostension, followed by deference to experts (Grice 1961). We may for the time being have to content ourselves, that is, with pointing to a number of situations in which the co-consciousness relation appears to obtain (such as that just described by Dainton, above; for a subtler case, see Kingstone and Gazzaniga 1995). It is one of the goals of cognitive psychology to investigate and to eventually illuminate the particular kind of integration that is co-consciousness—or, instead, to discover that there is no single relation that obtains in all the examples we gave, and by which we sought to uniquely identify it.

For the time being, however, the consciousness literature contains several attempts at articulating the ‘singularity’ concept of conscious unity. It is conscious singularity that is the subject of Bayne and Chalmers’ (2003) work on ‘phenomenal unity’, though they characterize this unity not in terms of co-consciousness between (atomistic) experiences but rather in terms of subsuming states of phenomenal consciousness, yielding, ultimately, one ‘single global experience’ (Bayne 2000: 248; see also Bayne 2010). It is something like co-consciousness that Tye (2003) has in mind when he imagines a case of conscious unity despite radical incoherence of contents (a case in which your auditory and visual experience were as if you were riding a roller coaster, while your bodily and tactile sensations were as if you were lying on the ocean floor, breathing through an air tank). It would be, Tye says, as if you were ‘in two radically different worlds’ simultaneously (Tye 2003: 78). Yet ‘Even so . . . one reaction you may well have to your situation is that of asking yourself: How could I be experiencing both of these things? How could I possibly be experiencing these things together? And this presupposes, of course, that there is unity or experienced togetherness, even though its existence seems incoherent to you’ (ibid; original emphasis). A very similar sort of thought experiment is described by Dainton, who similarly concludes that you would ‘have no sense at all that your bodily and audio-visual experiences are taking place within a common space, whether phenomenal or physical. Yet both sets of experiences are co-conscious’ (2000: 72).

Tye’s and Dainton’s remarks on their similar thought experiments are particularly significant, because although the consciousnesses they imagine are unified in the thin sense I have just described, they are not unified in a second sense which I will discuss next.

3 Unity through Coherence: Coherence Unity

A second way of thinking about the unity of consciousness identifies conscious unity both with the internal coherence of conscious phenomena, and with the
successful integration of conscious phenomena with cognition and action more broadly. On this understanding, when we attribute to someone a unified consciousness, we are attributing semantic coherence to the contents of her consciousness, and we are also saying that these contents bear such a relationship to the rest of her mental faculties that she is afforded from them the opportunity for rational thought and unified agency. Call this second concept of conscious unity coherence unity.\(^5\)

A subject with a coherence unified consciousness possesses, first of all, conscious experiences that make sense together, by presenting a unified world, a world that makes sense. Her sensory-perceptual experiences represent the world as being a single way; they don’t have conflicting veridicality conditions. Second, for a subject to possess a coherence unified consciousness is for her conscious sensory-perceptual experiences to be appropriately integrated with her thought and cognitive abilities. She is put in a position to draw rational inferences from her sensory-perceptual experiences, partly on the basis of the contents of those experiences, as just mentioned, but partly in virtue of possessing an overall well-functioning mind. As a consequence, even when the contents of her sensory-perceptual experiences do conflict with each other, she can use reason to make sense of them, to cognitively resolve or reconcile the conflict—at least to some extent, for coherence unity intuitively comes in degrees. Achieving this aspect of coherence unity will therefore require not just that her conscious contents meet certain conditions, but will also depend upon, perhaps, features of her entire ‘web of belief’ and conceptual framework, her general inferential capacities, and so forth.

The subject with a unified consciousness, in this second sense, can also use her conscious mental states to guide her behaviour appropriately, and her conscious mental states are meanwhile appropriately sensitive to her own behaviour. (When she moves, for instance, she perceives herself moving.) A coherence unified consciousness incorporates a sense of self that is an important aspect of agency: the subject with a unified consciousness has a sense of conscious will, and routinely experiences her behaviours as her own intentionally willed actions.

This second concept of what it is to have a unified consciousness explicitly links conscious unity to normative notions (coherence, obviously, and rationality, and successful action), and to agency, and probably to personhood.\(^6\) Many works employing this concept of conscious unity also emphasize coherence over time, for instance narrative coherence: the subject with a unified consciousness is not like someone largely sleepwalking through life, perpetually ‘coming to’ only to look around and find she has no idea how she got there. She has a sense of herself as a consciously experiencing and embodied subject—she knows that this is what she is seeing, that these are her thoughts, that this is her body—both at and across time.

The concept of coherence unity as I have described it here is admittedly broad, even heterogeneous, but that is inevitable. Some discussions of the so-called unity of consciousness appear to be discussions about co-consciousness, and, despite the different characterizations of co-consciousness that exist in the

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literature, there does seem to be a common feature of experience, or a common relation between experiences, that all such descriptions are attempting to articulate. Many discussions of the unity of consciousness appear instead to be about what I have termed ‘coherence unity’, however, and these latter discussions do not seem to all pick out a single feature of experience. They seem instead to concern a range of properties and capacities.

The concept of coherence unity may therefore itself be something of a ‘mongrel concept’ (to borrow Block’s (1995) phrase). For instance, the kind of integration of reflexive consciousness the absence of which Nikolinakos (2004) suggests characterizes anosognosia, appears to be one aspect of coherence unity, while the phenomenal relationship between the taste of an egg and the smell of an egg, a relationship that Baumann (2007) calls one of ‘phenomenal unity’, is another aspect of coherence unity. These are very different kinds of conscious coherence, and will require different kinds of explanation. Shoemaker’s unity of consciousness is ‘is in part a matter of one’s beliefs forming, collectively, a unified conception of the world’ (1996: 184; emphasis added), while other accounts of coherence unity are concerned only with occurrently active mental states, and in some cases only sensory-perceptual experiences. Faint echoes of Nagel’s emphasis on the pooling of information ‘to yield integrated behavioural control’ (1971: 406), no matter the means by which this is achieved, can be found in Hurley (1998), and this emphasis on the relationship between conscious experience and adaptive behaviour is found also in Gennaro, Herrmann and Sarapata (2006), but only the latter require, as a condition for conscious experiences being unified, that they be related in content to their subjects’ current intentional action. (See also Von der Malsburg 1997: 193; Bisiach 1997: 243, and occasionally Baars 1988.)

I have, therefore, deliberately sketched the concept of coherence unity only in a broad and open-ended manner, since I mean the discussion to refer to a number of views on the nature and basis of conscious unity. These views appear to concern a number of relations between conscious experiences, and between conscious experience and cognition, action, and the objects of sensation and perception. Despite this, I do believe that we can distinguish the conscious singularity concept of conscious unity from all these other conceptions of it, and that these latter do have something in common, albeit something fairly abstract: according to all of them, a subject has a unified consciousness when she is afforded from her consciousness the capacity for rational thought and successful agency and action. So long as there are different ways in which a subject might be afforded from her experience the capacity for rational thought and successful agency, however, different theorists might, with equal justification, ground the unity of consciousness in different psychological features and properties and mechanisms.

I hope that even in describing these two different concepts of what it is for consciousness to be unified, I have motivated suspicion that coherence unity and co-consciousness are dissociable relations. In what follows I will provide some reasons to think that in fact someone with two streams of consciousness might
still have a largely unified consciousness, and that a single stream of consciousness can still be disunified. Let me first explain how I will use this terminology going forward.

Since the terms ‘unity’ and ‘disunity’ connote harmony and discord, I will henceforth reserve them for use in discussions of coherence unity whenever possible. Discussions of co-consciousness, however, are not essentially concerned with whether a subject’s conscious experience feels cohesive or discordant, and often concern the individuation of token experiences, such as whether ‘unified’ conscious experiences are somehow components or aspects of some ‘larger’ or more encompassing single conscious entity. For this reason I will continue to reserve talk of ‘streams of consciousness’—and of conscious singularity and duality—for use in such discussions, since streams are countable.

Using this terminology, asking how many streams of consciousness a subject has is not equivalent to asking whether or not the subject’s consciousness is unified, and the statement that a subject has a disunified consciousness does not mean the same thing as the statement that he has a dual consciousness (i.e., that he possesses two streams of consciousness).

### 4 Some Connections between Unity and Singularity

So far I have drawn a conceptual distinction between a subject’s possession of a unified consciousness and her possession of a single stream of consciousness. Even one who allowed that we can distinguish these things in our thought, however, might nonetheless believe that the concepts of conscious unity and conscious singularity pick out the same worldly phenomenon, and might therefore accept the following claim: if a subject has a unified consciousness, then that subject has a single stream of consciousness—and vice versa.

Though just expressed as a simple material biconditional, the claim, when accepted, is no doubt given a modal reading, as about what is metaphysically, conceptually, or physically necessary. In the rest of this paper I hope to provide some grounds for rejecting the claim whatever its modal form and force. (Readers may find the arguments more convincing as they concern the conceptual and the metaphysical necessity claims than as they concern the physical necessity claim, of course, given the present lack of an adequate theory of the functional and physical basis of consciousness and co-consciousness, and given lack of an adequate psychophysical theory of the mind generally.) Indeed the cases I discuss in Sections 5 and 6 at least suggest that conscious unity and conscious singularity are not even contingently co-extensive.

The biconditional, which asserts that conscious unity and conscious singularity always go together, is of course intuitive, in part because unity and singularity do appear to co-occur in the normal case. Since my aim is to challenge the (already intuitive) biconditional, I will say only very little, here, about the connections between unity and singularity, although I concede that there are bound to be many. Some of these are obvious and ordinary, though of profound
import: co-conscious experiences are, in all the cases we know of, the experiences of a single creature, with a single spatiotemporal location, and thus represent the same body and world; this representational consistency is one aspect of coherence unity, as mentioned in Section 3.

There may be many subtler empirical connections between coherence unity and co-consciousness as well. Consider the likelihood that the contents of conscious experiences are regularly determined together, as in the so-called ‘McGurk effect’ (McGurk and MacDonald 1976).\(^9\) The McGurk effect is only a particularly famous example of the ‘great lengths’ to which the nervous system goes ‘to bind multisensory cues presented in close spatial and temporal proximity so as to form a coherent perceptual gestalt’ (Laurienti et al. 2004: 405). Work on multisensory integration demonstrates a number of fascinating respects in which conscious perception operates under a ‘unity assumption’ (Welch and Warren 1980), such that properties represented in various sensory modalities are attributed to a single object or event in the world. This integration is without question a significant aspect of coherence unity, and one that helps determine the contents of co-conscious experiences as well.

It seems reasonable to hypothesize that there may be a general neurophysiological connection between co-consciousness and coherence unity, due to the phenomena of representational competition and lateral inhibition. If neural events whose contents would conflict tend to stand in mutually inhibitory relationships, reducing the likelihood of their becoming conscious together, then certain kinds of coherence or consistency of content would in essence pose a pre-condition for two states’ becoming co-conscious.

Note, however, that the suggestion in these cases is that the semantic coherence of their contents poses a precondition for two states becoming even simultaneously conscious, rather than that failures of coherence typically result in simultaneously conscious, yet non-co-conscious, experiences. So even if there is a kind of causal relationship here, broadly speaking, between coherence unity and conscious singularity, it needn’t be one in which coherence unity causes what would otherwise have been non-co-conscious experiences to become co-conscious.

Whatever the causal relationship between things like lateral inhibition and multisensory integration on the one hand, and co-consciousness on the other, there are nonetheless also ways in which co-conscious experiences can fail to be coherence unified. (I provide a few dramatic examples in Section 5.) Indeed, one reason why it is wise to distinguish coherence unity from co-consciousness at this point in time is that it is not yet possible to state the kinds of coherence that do and that do not always accompany co-consciousness, much less to account for the underlying architectural features that explain this difference.

While I have so far mentioned only empirical connections between coherence unity and co-consciousness and conscious singularity, there are bound to be profound conceptual connections between these as well. Consider a classic example: that it does not appear possible to bear two co-conscious experiences of a Necker cube, at one time, that each represent it from a different spatial
perspective. Though one can switch back and forth between the two perspectives from moment to moment, one never appears co-aware of one side of the cube as both in front and in back at once. This is arguably not, or not only, a consequence of the particular architecture of the human visual system, an architecture that could have been differently constructed. Rather, it appears to be a partly conceptual matter concerning what it is to take or to have a perspective in the first place: taking a perspective seems to preclude taking certain others together with it.

At the same time, again, caution is needed in determining even the conceptual connections between coherence unity and co-consciousness and conscious singularity. It might seem just a conceptual truth that, for instance, perceiving two objects in some kind of a spatially unified field (see discussion in Dainton 2000) suffices for visual experiences of those objects to be co-conscious. A case could nonetheless be made for split-brain subjects’ possessing a unified visuospatial field in some informative sense, despite (plausible) failures of interhemispheric visual co-consciousness in such subjects (see for instance Trevarthen and Sperry 1973; and also Holtzman 1983; Holtzman et al. 1981; Holtzman, Volpe, and Gazzaniga 1984).

Of course, the most obvious connection between coherence unity and conscious singularity is that they both pertain to consciousness and integration. When one first begins thinking about the so-called unity of consciousness, it is therefore natural to think of co-consciousness and of the various aspects of coherence unity all together, as all picking out a single, possibly very rich, kind of integration. It is only upon further investigation, and, especially, investigation into the variety of ways in which integration can break down (from agnosias to blindsight to binding errors to dissociative identity disorder to callosal syndromes), that it emerges that the unity of consciousness is no one single thing, but that it rather consists in a number of kinds of integration, operating at a number of (potentially very different) levels. I have chosen to pull apart conscious singularity in particular from coherence unity as a whole in part because co-consciousness, at least, appears to consist in one very particular sort of integration.

One might finally ask about the evidential connections between conscious unity and conscious singularity. The first thing to note here is that we should probably expect any conscious creature to have a (significantly) unified consciousness, given the adaptive importance of conscious unity on the one hand and the variety of means of achieving it on the other. It is also possible that a creature’s possession of a single stream of consciousness provides some evidence of the general structural/functional integrity of its mental architecture (though see Section 5), an architecture that would therefore look capable of supporting a unified consciousness. It even seems reasonable to think that having a single stream of consciousness always makes some contribution toward coherence unity, however slight.

It is particularly difficult to say how much evidence for conscious singularity would be provided by evidence of conscious unity. This is partly because...
evidence of many co-conscious experiences is not yet evidence of conscious
singularity: a creature with more than one stream of consciousness may still
possess many experiences that are co-conscious with each other, i.e., all those
experiences that are within a single stream. Furthermore, there appear to be a
number of ways in which two experiences can be related such that they
contribute to a unified consciousness; whether their belonging to a unified
consciousness provides evidence that they belong to a single stream of
consciousness depends upon the particular relation to each other, and to the
rest of the creature’s mental and perhaps physical architecture, that they bear.
Indeed, since non-conscious phenomena can contribute to and perhaps even
participate in a unified consciousness, there may be some phenomena that belong
to a unified consciousness for which the question, ‘But are they also co-conscious?’
will not even arise.

Since there is so little that can be said here with confidence and without
controversy, I am willing to grant, if only for the sake of argument, that conscious
singularity provides compelling evidence for conscious unity, and vice versa.
This concession, combined with acknowledgement of important conceptual and
empirical connections between conscious unity and conscious singularity, places
more than the burden of proof upon one who would hold that conscious unity
and conscious singularity dissociate in some instances: it also places, at least
ultimately, the burden of explaining how those dissociations are possible.
Accordingly, while Section 6 provides an initial defence of the proposition that
conscious unity and conscious singularity dissociate in split-brain subjects, a
truly adequate defence of this proposition would ultimately require elucidating
the features of split-brain conscious and cognitive architecture that enable non-
co-conscious experiences to contribute to an overall unified consciousness.

Ultimately, the existence of a multitude of connections between coherence
unity and conscious singularity is still compatible with their coming apart in
some cases. In what follows I shall argue that there are neuropsychological
conditions showing that a subject can possess a single stream of consciousness
that is disunified, and a unified consciousness that is nonetheless dual,
embracing multiple streams of consciousness.

5 Singularity without Unity

In this section I contend, by simple appeal to example, that a subject might
possess a single stream of consciousness without possessing a unified
consciousness. It is, of course, an open and an interesting empirical question to
what extent co-consciousness (and thus conscious singularity) requires coherence,
and of what sort. And there is obviously evidence (e.g., the phenomenon of
binocular rivalry) that there are at least pressures upon streams of consciousness
to be coherent in certain respects. This remains compatible with significant
dissociations between coherence unity and conscious singularity. Indeed, there
are subjects who appear to possess streams of consciousness whose contents are

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radically incoherent, or from whose contents the subjects cannot draw minimally rational inferences. We might reasonably resist concluding that such subjects enjoy a unified consciousness.

Consider first a subject with what Liepmann (1908) called ‘disjunctive agnosia’, who described his condition thus:

if I saw a complex object, such as a person, and there were several people in my field of view, I sometimes saw the different parts of the people as not, in a sense, belonging together ... there was this confusion of lots of things, all of which were there, but did not seem to belong together ... (if somebody I knew was speaking to me) ... it sounds quite absurd but there were two distinct things. One was that so and so was speaking to me and I could hear and understand what he said; two, that he was standing in front of me and I could see his mouth moving, but I noticed that the mouth moving did not belong to what I heard any more than a—than if one of the old talking pictures would make sense if the voice tape had been the wrong tape for the conversation. That was absolutely quite fantastically exciting ... (Interviewer: Was this a failure to localize the sound of the voice?) No. No. It was as though they were two different things. (Interviewer: They didn’t belong together.) Didn’t belong together at all. (Cited in Marcel 1983: 292–3)

The disunified nature of this subject’s consciousness is readily apparent, if difficult to imagine. At the same time, his various experiences were apparently co-conscious in some minimal sense as well. As Marcel says, ‘These extracts make it obvious that he was simultaneously aware of ... all features present in a static scene together with their correct values’, even if he ‘could not put them ... together as objects’ (Marcel 1983: 278). There was apparently something—albeit something totally off—that it was like for him to experience sight and sound simultaneously, since he was aware of their co-occurrence.

However disunified his (co-conscious) sensory-perceptual experiences were, at least that particular subject’s experiences were embedded within an otherwise (it would seem) well-functioning mental architecture, allowing him to think rationally, and talk quite lucidly, about his discordant experiences. Consider, in contrast, this self-description by a woman with schizophrenia:

I cry, tears roll down my cheeks and I look unhappy, but inside I am angry because they are using me in this way, and it is not me who is unhappy, but they are projecting unhappiness on my brain. They project upon me laughter, for no reason, and you have no idea how terrible it is to laugh and look happy and know it is not you, but their emotions. (Davidson and Neale 1986: 340)

As Radden (1998) points out, there is something apparently paradoxical about this case. Although the subject doesn’t believe she is unhappy, or perhaps even experience the unhappiness she refers to here as her own, she does nonetheless
seem to describe experiencing a state of unhappiness. She does not merely describe being pushed and pulled to behave as if she felt something she in no way actually felt, like a puppet; she instead seems to describe herself as the victim of some even deeper, more horrifying violation: she is being forced to experience someone else’s misery; someone else’s emotions are being ‘projected’ onto her brain. For our purposes, we might at least tentatively conclude that the subject is genuinely co-conscious of her own anger and (what she feels and believes is someone else’s) unhappiness. Yet it would seem perverse to describe this woman’s consciousness as therefore unified.

Finally, consider the early visual experiences of recently blind subjects, i.e. subjects who have just gained sight. In a discussion of the relationship between perception and action, Wallis and Wright say: ‘Such patients report that their postoperative vision is at first swirling and blurred and cannot in any sense be taken to represent the world in a way that would enable successful interaction, object recognition, and the like’ (2009: 293). The patients would offer descriptions like ‘There was light, there was movement, there was color’ (cited in Noë 2004: 5)—as if they were simultaneously aware (co-conscious) of features that did not belong or make sense together somehow, and thus not properly describable as contributing to a unified (visual) experience of the world.

### 6 Unity without Singularity

Hopefully I have made plausible the claim that a subject can possess, and indeed that there are subjects who do possess, a single stream of consciousness, without possessing a unified consciousness. Someone might respond, however, that it is not surprising that there should be such instances. The co-consciousness concept of conscious unity is a relatively spare and minimal one; perhaps the coherence concept of conscious unity just poses additional requirements upon a subject’s consciousness, in order for it to be unified (Hurley 1998). If so, then perhaps it is still true that a subject with a unified consciousness cannot possess multiple streams of consciousness.

I believe that the split-brain phenomenon suggests otherwise, however. If this is correct, it might explain some of the apparent intractability of the debate about the structure of consciousness in split-brain subjects: many of those who have argued that split-brain consciousness is unified may have been employing the concept of coherence unity, while many of those who have argued that it is ‘disunified’ (or, better, dual) may have been employing the concept of conscious singularity. In that case, people on both sides of the debate may have been basically right.

I will focus on two differences between coherence unity and conscious singularity that make it possible for the former to hold while the latter does not. The first difference is that co-consciousness is a very particular relation between experiences, while unified experiences might bear any one of a number of
relations to each other. The second difference is that there is an especially strong conceptual connection between coherence unity and integrated behaviour.

Let us begin with the first of these two reasons. For two experiences to be co-conscious, their subject must be aware of their co-occurrence, or co-aware of them (see Section 2). While the precise functional/causal basis of this relation is not presently known, experimental results seem to show that it holds only, or at least largely, intrahemispherically in the split-brain subject. The conclusion that split-brain consciousness is not singular swiftly follows.12

There seem to be, in contrast, a multitude of means by which a subject could come to enjoy a unified consciousness—a multitude of means by which a subject could come to enjoy the capacity for rational action and so forth on the basis of her conscious experience. These distinct means are not just physically distinct bases of a common psychological relation between conscious phenomena; they involve distinct psychological relations, each of which makes some contribution towards enabling rational thought and agency. Experiences need not bear, with respect to each other, the co-consciousness relation in particular, in order for them to participate in a unified consciousness.

For one illustration of these ideas, consider the proposal (defended by both advocates of ‘conscious unity’ and advocates of ‘conscious duality’ in the split-brain subject) that, outside of experimental situations, the two hemispheres of a split-brain subject will be subject to largely the same conscious contents. Call this the ‘duplication hypothesis’. What implications would the truth of the duplication hypothesis have for the structure of split-brain consciousness?

Marks (1981) and Tye (2003) have both (independently) defended a model of split-brain consciousness according to which split-brain subjects have two streams of consciousness under experimental conditions, when the hemispheres are subject to different conscious contents, but a single stream of consciousness at other times, when conscious contents are (they assume) basically the same in the two hemispheres. I rejected this model of split-brain consciousness in earlier work (Schechter 2010), arguing that it rests in part upon a type-token confusion. But perhaps whether this ‘duplication model’ of conscious unity is plausible depends upon whether we take it as a model of the overall degree to which a split-brain subject’s consciousness is unified, or rather as a model of interhemispheric co-consciousness in the split-brain subject.13

Where the question of interhemispheric co-consciousness is concerned, the truth of the duplication hypothesis would have no obvious implications. The mere consistency or even identicality of their contents clearly cannot suffice for conscious neural events to be part of a single stream of consciousness; inter-subject cases make this immediately obvious. Some further functional/causal relationship between content-carrying neural events is necessary for them to be co-conscious, and again, whatever this relationship is, it appears largely to fail, interhemispherically, in the split-brain subject.

The (putative) bihemispheric duplication of contents in split-brain subjects may well constitute an aspect of coherence unity, however. As mentioned in Section 3, semantic coherence in and of itself constitutes one aspect of coherence.

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unity. Moreover, to the extent that the two hemispheres of a split-brain subject bear similar conscious contents, this is hardly a coincidence (in the way that the similarity of your conscious contents to those of your twin earth twin’s would be). The two hemispheres of a split-brain subject are experiencing roughly the same aspects of the world, through the same body, at roughly the same time, and they always have done. This form of causal relationship between experience and the represented and acted upon world may constitute a further aspect of coherence unity.

The duplication of conscious contents could also contribute to the unity of split-brain consciousness by making more likely consistent or compatible behavioural decisions from the two hemispheres, since even multiple subjects can coordinate their activities partly on the basis of possessing the same conscious information. Indeed this is how many theorists—including defenders of conscious duality in the split-brain subject—have sought to explain behavioural differences between split-brain subjects under experimental versus non-experimental conditions.

Note, however, that the split-brain experiment is also designed both to reduce interhemispheric behavioural cross-cuing, and to elicit separate behavioural responses from right and left hemisphere. These features of the experiments surely also help to account for the behavioural differences observed between split-brain subjects under experimental versus under non-experimental conditions. And this in turn suggests that a subject’s own behaviour, too, can serve the purpose of unifying her consciousness (just as various philosophers from Marks (1981) and Hurley (1998) to Korsgaard (1989) have suggested).

More generally, even if the two hemispheres of a split-brain subject don’t interact with each other in a way that sustains interhemispheric co-consciousness, the ways in which they do interact may allow the split-brain subject to draw rational conclusions and to behave in a unified fashion on the basis of non-co-conscious right and left hemisphere experiences. For instance, various studies have suggested that even when information about some (consciously perceived) stimulus cannot transfer between the hemispheres in split-brain subjects, ‘response information’ (e.g., to push one button rather than another) may still transfer (e.g. Corballis and Forster 2003; Sergent 1986). For all we know, the non-cortically sustained coordination of response information plays a significant role in explaining the degree of behavioural unity observed in split-brain subjects; Pashler et al. (1994) suggest as much, writing, ‘Whatever the exact role of subcortical structures in scheduling stimulus-response sequences, it seems reasonable to suspect that this role may be critical for the remarkable intactness of bilaterally coordinated behaviors in the everyday lives of comissurotomy patients’ (Pashler et al. 1994: 2384).

Now it is of course possible that, ‘in coordinating multiple streams of sensorimotor performance’ (Pashler et al. 1994: 2384), these non-cortical structures will turn out to have been producing a single, bihemispheric stream of co-conscious experiences all along (contrary to the hypothesis of split-brain conscious duality). But it is also possible that they serve merely to coordinate
‘independently generated decisions’ (Sergent 1986: 365), each arrived at within a hemisphere subject to its own stream of consciousness. The crucial point is the following. The postulation of subcortical mechanisms for the integration of independently cortically generated response decisions makes the attribution of interhemispheric co-consciousness less explanatorily necessary. This explanatory move need not be understood as an alternative to the postulation of coherence unity, however. It instead constitutes an appeal to it.

Such examples could be multiplied, for there are a number of respects in which it makes sense to describe a split-brain subject as enjoying a unified consciousness. But most if not all of those who have argued against various versions of the ‘conscious unity model’ for split-brain subjects have willingly acknowledged that the consciousness of any such subject will nonetheless be unified in some sense or other. We can of course still maintain that conscious singularity makes some important contribution (directly or indirectly, causally or conceptually) to conscious unity. We could if we wanted even insist that possessing a ‘perfectly unified’ consciousness requires possessing a single stream of consciousness. This is compatible with a great deal of conscious unity even without conscious singularity.

The second difference between coherence unity and conscious singularity that makes ‘unified duality’ possible is that coherence unity is particularly closely linked, conceptually, with behavioural unity. This gives the generally ‘normal’ and unified-seeming behaviour of split-brain subjects different evidential significance, depending on whether it is conscious unity or interhemispheric co-consciousness that is at issue.

Consider first the question of interhemispheric co-consciousness in the split-brain subject. While the generally integrated nature of split-brain subjects’ behaviour may constitute compelling evidence that they each possess a single (bihemispheric) stream of consciousness, that evidence is still defeasible, particularly when there appear to be so many other ways of explaining that behaviour that do not appeal to interhemispheric co-consciousness (see, for example, discussions in Bogen 1990: 220–1, and in Lockwood 1989: 85–6). Most famously, defenders of conscious duality in the split-brain subject have sought to explain the generally unified nature of split-brain subjects’ behaviour in terms of the fact that, outside of experimental situations, the two hemispheres will have largely overlapping sensory-perceptual access to the world (though see Bayne 2008 and Schechter 2010, for some scepticism on this point). More interestingly, a defender of conscious duality in the split-brain subject might refer to a variety of non-conscious and even non-mental factors serving to coordinate or integrate the behaviour of a split-brain subject: everything from inhibition of one hemisphere’s motor intentions, to pattern generators in the spinal cord, to resolution of otherwise conflicting motor programmes at the level of the basal ganglia, to the maintenance of posture via the reticular formation, to possession of a single physical body, to interhemispheric, non-cortical interchange of potentially non-conscious representations (e.g., via the intertectal commissure of the superior colliculus).
Furthermore, both hemispheres of a human split-brain subject seem to identify with the subject as a whole, and to sustain (background) desires that the subject behave in a rational and socially acceptable manner. It is also at least arguably the case that neither hemisphere sustains recognition (except perhaps occasionally, and on a purely intellectual level) of the existence of a separate centre or source of agency, or even a separate stream of consciousness, associated with the other hemisphere. Even that cross-cuing behaviour that most looks like deliberate communication between persons (e.g., L.B. attempting to spell, on the back of his right hand, using the finger of his left, the response to a question only his right hemisphere knows the answer to (Sperry, Zaidel and Zaidel 1979)), may be better viewed in terms of one hemisphere’s attempting to jog the (whole) subject’s memory, or to help the (whole) subject get the answer, and so forth, and is unlikely to be best viewed in terms of one hemisphere’s attempting to help out the other hemisphere (or the other hemisphere’s mind, or whatever). It seems plausible, therefore, that, whatever precise form self-understanding takes in the two hemispheres, it too plays some role in integrating the split-brain subject’s behaviour.

These are just a few of the means by which a proponent of conscious duality in split-brain subjects might attempt to account for the unity in such subjects’ behaviour. Now of course it may turn out that none of these alternative explanations can, alone or together, sufficiently account for the degree of behavioural integration observed. It may turn out that we will need to appeal to thoroughgoing interhemispheric co-consciousness in the split-brain subject, as well. The philosophically interesting point is that the appeal to interhemispheric co-consciousness would be an additional, distinct appeal. In contrast, to appeal to the various factors just listed may already be to appeal to coherence unity, at least so long as those factors all involve relations to conscious experience in some way. But of course everything in a subject’s nervous system and body will be causally related to her conscious experience in some way.

Given the very tight conceptual relationship between integrated behaviour and coherence unity, Marks may be right there will be ‘considerable pressure’ on psychology to make ‘the integrated action of both split-brain patients and us depend upon the same thing, the scientific successor of unity of consciousness’ (1981: 42). He may be right only where coherence unity is concerned, however, for it is only this concept of conscious unity according to which to possess a unified consciousness is to be afforded from one’s conscious experience the capacity for unified behaviour and so forth, whatsoever the details of how that occurs.14

In contrast, the concept of conscious singularity specifies a particular relation between conscious experiences (i.e., the relation of co-consciousness) in order for them to be ‘unified’, while the extent to which conscious singularity is conceptually connected to unified behaviour is, at best, an open question. Acting in a unified fashion and possessing a single stream of consciousness could of course turn out to be strongly empirically connected, meanwhile, but it is not yet clear that they will be, and indeed I think that the cases discussed in this and in the previous section suggest that they may not. So although it may well be that unified behavioural control is significantly interhemispheric, or at least bihemi-
spheric, in split-brain subjects, this would not yet suffice to show that the subjects possessed a single stream of consciousness.\textsuperscript{15} Marks seems to reject a concept of conscious unity that was not so tightly linked to integrated behaviour, saying that a scientific psychology would make no place for such an epiphenomenon (1981: 42). Split-brain subjects could have two streams of consciousness without possession of a single stream of consciousness turning out to be strictly epiphenomenal, however, since, among other things, there are indeed cognitive and behavioural differences between split-brain and non-split subjects, even if these are not immediately obvious to the casual observer.

Moreover, we need to be careful to distinguish co-consciousness—the relation out of which streams of consciousness are constructed—from possession of a single stream of consciousness per se. Co-consciousness is very likely to be highly functionally and behaviourally significant. Indeed, even if we assume that a split-brain subject has a dual consciousness, \textit{intra}hemispheric co-consciousness in such a subject surely contributes to the integrated nature of his behaviour, and to his enjoyment of an overall unified consciousness. This is consistent with there being not much behavioural difference between (to take an extreme, hypothetical example) a creature with one stream of entirely co-conscious experiences, and a creature with two, type-identical streams of (internally) entirely co-conscious experiences (see Schechter 2010).

I would therefore accept that possession of a single stream of consciousness \textit{per se} is neither necessary nor sufficient to explain unified behaviour. Indeed, a developed psychology may not end up employing any concept referring to the property of possessing a single stream of consciousness. This does not mean that it will employ no concept referring to \textit{co-consciousness}, however—a concept referring to a relation that happens to obtain on the whole only intrahemispherically in the split-brain subject.

If this is correct, and if split-brain subjects have other means, besides conscious singularity, of achieving rational agency and unified behaviour, and so forth, partly on the basis of both their right and their left hemisphere experiences, then a split-brain subject could possess two distinct streams of consciousness that were still part of a significantly unified consciousness. In which case those who have believed that split-brain consciousness is unified and those who have believed that it is dual have both been right.

\section*{7 The Question of Inter-Subject Unity}

I have just come from arguing that conscious singularity is not necessary for conscious unity. One question raised by this claim, and by the general distinction between conscious singularity and conscious unity, is whether multiple creatures—each with their own stream of consciousness—could share a unified consciousness. Indeed, one might worry that there is a \textit{reductio} of my arguments lurking here. Imagine that you and your identical twin have been best of friends
for as long as either of you can remember; you have similar tastes and temperaments, and many of the same (type-identical) memories, memories of many of the same actual people and events; you now run a business together, and so on. You and your twin might very intricately coordinate your behaviour, partly on the basis of your conscious experiences, many of which might also be type-identical, partly in virtue of the richness of your interactions. If conscious unity does not require conscious singularity, then, it might be said, there is nothing to prevent you and your twin from sharing a unified consciousness. Intuitively, however, you do not. Therefore, conscious unity must require conscious singularity after all.

While this may be the most obvious objection to the claim that conscious singularity and conscious unity doubly dissociate, it is perhaps not a very strong one. For one thing, there are clearly a multitude of forces operating within a single creature—both upstream of conscious experience, to ensure the cohesion of contents, and downstream of conscious experience, to ensure unified action—that will not hold in the case of multiple creatures. Furthermore, the concept of coherence unity might turn out to presuppose something like a single creature. The intuition that you and your twin could not share a unified consciousness could therefore be upheld without compromising the claim that conscious unity and conscious singularity can doubly dissociate within a single conscious creature, such as a split-brain subject.

Moreover, someone might take the case of you and your twin not as an objection to but as an exemplification of the distinction between conscious unity and conscious singularity—especially since coherence unity, recall, may come in degrees. One might claim, that is, that given my description of the case, you and your twin do share a unified consciousness, at least to some small degree, even if none of your experiences are co-conscious with your twin’s, for you and your twin are engaged in some degree of joint agency, made possible in part by both of your conscious experiences. This suggestion would be in line with Korsgaard’s proposal both that ‘the unity of consciousness is simply another instance of the unity of agency’ (1989: 119)—a proposal that seems to me at least significantly right, where coherence unity is concerned—and that this unity ‘does not require a common psychological subject . . . a common subject of psychological experiences’ (ibid).16

Now, one might still attempt to resist this conclusion by arguing that there is simply no real need to appeal to you and your twin sharing a unified consciousness in order to explain, for example, your joint decision-making, or your cooperative and unified action, and so forth, and such scepticism might motivate scepticism about the usefulness or import of the concept of conscious unity in general. That is, one who thinks that we can account for inter-subject rational decision-making and unified behaviour without appealing to conscious unity might then question whether there is any need to appeal to conscious unity to explain rational decision-making and unified behaviour in the intra-subject case.

This same sort of scepticism about the explanatory value of the concept of conscious unity may follow more directly from the fact that it appears to pick out a number of relations between conscious phenomena. For, if it does, then one
could argue that it is the various distinct psychological means of achieving what I have called ‘coherence unity’ that do the serious explanatory work in any particular instance in which the attribution of coherence unity is warranted. Such attributions would then serve as no more than a convenient shorthand; ascribing a unified consciousness to a creature might lead us to form some very broad or general expectations about the kinds of behaviour in which that creature should engage, without allowing us to predict its behaviour in any more fine-grained way, and without explaining how the creature manages to do whatever it does. Still, this shorthand might still be quite useful, perhaps especially when seeking psychological understanding and behavioural predictions in non-scientific contexts. (And these, of course, are the majority of contexts in which we do seek such things.)

8 Conclusion

The paper has aimed to locate and to describe two distinct ways of thinking about the unity of consciousness, and to illustrate some of the work that distinguishing between possession of a unified consciousness and possession of a single stream of consciousness can do in discussions of the structure of conscious experience. There are bound to be many important connections between coherence unity and co-consciousness and conscious singularity. It could even turn out that all unified experiences are also co-conscious with each other, and vice versa. I have nonetheless offered reasons to suspect that this is not the case, and that a subject might possess a single stream of consciousness that was still disunified, or a significantly unified consciousness that was nonetheless comprised of multiple streams of consciousness.17

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NOTES

1 Throughout the paper I will use ‘subject’ synonymously with ‘creature’ or ‘animal’, and mean it to be neutral with respect to personal identity issues. For instance, in referring to a split-brain subject as a (single) subject, I mean to leave entirely open whether such a subject is or is associated with one or two subjects of experience, one or two persons, and so on.

2 To the extent possible I am going to confine myself to talking about only synchronic co-consciousness. Attempting to narrow the focus in this way will hopefully simplify an already complicated discussion somewhat. While the term ‘stream of consciousness’
admittedly connotes and has its origins in the phenomenology of conscious experience
over extended periods of time, I think it can also be used to refer to ‘time-slices’ of such
extended entities.

We might want to allow that synchronic co-consciousness within a single stream of
consciousness need not be perfectly transitive (see especially Lockwood 1989). The
proposal is controversial, but it is not necessary to resolve in this paper whether any cases
of ‘partial co-consciousness’ exist.

3 I will often refer to conscious experiences in particular, but do not mean to exclude the
possibility that there are conscious phenomena that aren’t sensory-perceptual in nature.

4 Given the lack of resolution on whether there might be conscious states that lack
phenomenal character, it seems preferable to avoid characterizing co-consciousness in
exclusively phenomenological terms, at least for the time being. I will assume that the co-
awareness that characterizes co-consciousness could be cashed out either in higher-order
or in first-order terms, e.g., in terms of co-availability to reasoning and decision-making (as
in Tye 2003).

5 Hurley (1998), in her discussion of the role that ‘norms of coherence’ play in
constructing an objective account of the unity of consciousness, comes closer than anyone
to articulating the distinction between the two concepts of conscious unity that are the
subject of this paper (see also Bayne 2000, 2010). There remain significant differences
between the two accounts, perhaps most saliently, here, on the issue of whether coherence
unity requires possession of a single stream of consciousness (see, e.g., Hurley 1998: 120).

6 Since different accounts of what I am calling ‘coherence unity’ would probably
disagree on the status of these norms, I leave their status open here. There are difficulties
with trying to formulate rational constraints on human psychology that will escape being
either trivial on the one hand or obviously false on the other (see Rey 2007); I set aside
these concerns here, however.

7 Baumann’s (2007) use of ‘phenomenal unity’ here differs from that of Bayne and
Chalmers (2003), who mean by it something closer to what I’ve called ‘conscious
singularity.’

8 Here I mean to allude not only to Hurley’s discussion of the role of norms of
coherence in conscious unity but even of her ideas concerning the subpersonal basis of co-
consciousness.

9 The McGurk effect is a perceptual phenomenon illustrating the integration of visual
and auditory content in speech perception: if a listener watches a video in which the sound
of a speaker pronouncing/ba/ has been dubbed over an image of the speaker saying/ga/, the
listener often reports hearing the speaker say/da/.

10 There are, to take one example, several different kinds of ‘binding’, and at least a
good deal of binding must occur automatically and non-consciously (as the phenomenon
of semantic priming using non-consciously perceived words reveals), even if some also
requires consciousness and serial focal attention (Treisman 2003).

11 I will in fact basically assume that this is the case, thus arguing that conscious
multiplicity is compatible with an overall or on-the-whole unified consciousness, rather
than with a ‘perfectly’ unified consciousness; the latter may be an unachievable ideal
anyway (see, e.g., Shoemaker 1996).

12 I realize that this is in fact exceedingly swift, but more detailed attention to the
question of interhemispheric co-consciousness in the split-brain subject is given in
Schechter 2010. The conscious duality claim is admittedly more controversial than the
claim that there are some failures of interhemispheric co-consciousness in split-brain
subjects (though against even the latter claim, see Bayne 2008). The heart of this section’s
argument could be given more conservative expression: even non-co-conscious experiences can contribute and belong to a unified consciousness. The arguments and examples of this section are meant to show that functional/causal relations other than co-consciousness can suffice to unify conscious phenomena.

13 I am claiming here that Marks’ and Tye’s arguments for conscious unity in split-brain subjects via the bi-hemispheric duplication of conscious contents are read more naturally and can only succeed as arguments for coherence unity in such subjects. Interestingly, however, as mentioned in Section 2, Marks characterizes the unity of consciousness in terms of conscious singularity (1981: 13), and Tye’s characterization of the unity of consciousness is also offered in terms of co-consciousness, at least in some respects (2003: 25–41, especially p. 38). Both philosophers may implicitly accept that only a subject with a single stream of consciousness can have a unified consciousness, and therefore believe that showing that a split-brain subject has a coherence unified consciousness suffices to show that she has a single stream of consciousness. If the reasoning pursued in this section is correct, however, then showing that split-brain subjects have one stream of consciousness apiece would in fact require separate argument.

14 Though if the concept of coherence unity is a ‘mongrel’, as suggested in Section 3, denoting a variety of unity relations, these are unlikely to constitute a natural kind, and the concept is unlikely to have a successor in a scientific psychological theory. A developed psychological theory might still contain concepts referring to particular unity relations that all fall under the umbrella term ‘coherence unity’, however.

15 In reality, of course, behavioural control appears significantly non-cortical, and non-conscious. Even consciously (and cortically) initiated actions depend upon a downstream chain of complex non-conscious (and non-cortical) nervous system events. This, again, makes coordinated behavioural control prima facie consistent with failures of the precise kind of conscious integration that is co-consciousness.

16 Significantly, Korsgaard also believes that to a large extent ‘the unity of agency . . . is forced upon us by our embodied nature’ (1989: 119). This would make a split-brain subject a good prima facie candidate for possessing a (coherence) unified consciousness regardless of how many streams of consciousness he had (or, to use Korsgaard’s terminology, regardless of how many subjects of experience he was associated with or constituted by).

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