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Degrees of Consciousness

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Abstract

Is a human more conscious than an octopus? In the science of consciousness, it's oftentimes assumed that some creatures (or mental states) are *more conscious* than others. But in recent years, a number of philosophers have argued that the notion of degrees of consciousness is conceptually confused. This paper (1) argues that the most prominent objections to degrees of consciousness are unsustainable, (2) examines the semantics of 'more conscious than' expressions, (3) develops an analysis of what it is for a degreed property to count as degrees of consciousness, and (4) applies the analysis to various theories of consciousness. I argue that whether consciousness comes in degrees ultimately depends on which theory of consciousness turns out to be correct. But I also argue that most theories of consciousness entail that consciousness comes in degrees.

1 | INTRODUCTION

Imagine we wish to construct a *consciousness meter*—a device for detecting and measuring consciousness.[1] Should the consciousness meter be like a metal detector, with a simple beep if an entity is conscious and silence if it's not? Or should it be more like a food thermometer, giving us a scale that specifies *how* conscious a creature is? In other words, are some creatures (or mental states) *more* conscious than others? Or are those sorts of claims false, or even incoherent?

Some authors—across both the philosophy and the science of consciousness—take it to be obvious that consciousness comes in degrees.[2] This idea has been invoked as a starting point for

constructing empirical measures of consciousness, as a constraint for modeling the structure of consciousness, and even as a fundamental axiom for a theory of consciousness. And if you spend enough time in the world of consciousness research, you will occasionally encounter claims like the following:

(a) A human is more conscious than a fish.
(b) A dog is more conscious than a rock.
(c) A fully awake person is more conscious than a drowsy person.
(d) A clear perception is more conscious than a fuzzy mental image.
(e) A psychedelic experience is more conscious than a sober experience.

But a number of authors—mostly from within the philosophy of consciousness—have recently argued that the idea of degrees of consciousness is conceptually confused.[3] Two arguments have been particularly influential:

1. **The Determinacy Objection**:
   To be conscious is to have a subjective point of view. But having a subjective point of view doesn't come in degrees.

2. **The Ordering Objection**:
   If consciousness comes in degrees, then the set of conscious entities is orderable. But in many cases, neither x nor y can be claimed to be more conscious.

I'll later discuss these arguments in detail. But for now, I'll simply note that these arguments have convinced many that the idea of degrees of consciousness ought to be abandoned. Bayne, Hohwy, & Owen [2016: 408] say that "the notion of degrees of consciousness is of dubious coherence"; Birch, Schnell, & Clayton [2020: 790] say that "[i]f we ask 'Is a human more conscious than an octopus?', the question barely makes sense"; McKilliam [2020: 3] says that "consciousness isn't the sort of property that can come in degrees"; and Carruthers [2019: 23] says that "we can't make sense of degrees of phenomenal consciousness."

Which of these perspectives is correct matters for consciousness research. If the proponents of degrees of consciousness are right, then any theory of consciousness ought to capture the fact that consciousness comes in degrees, and we ought to construct empirical measures of consciousness that are graded, rather than binary. If the skeptics are right, then a great deal of research on consciousness—both empirical and theoretical—is fundamentally confused. And whether consciousness comes in degrees may interact with all sorts of other theoretical questions about consciousness, including questions about its ethical and epistemic significance.[4]

On my view, the idea of degrees of consciousness is neither an obvious datum nor a conceptual confusion. Instead, claims about degrees of consciousness ought to be treated as substantive hypotheses open to confirmation and falsification. No simple empirical observation proves them true, but no simple philosophical argument proves them false. To determine whether *x* might be more conscious than *y*, we must look at what our best theories say about the nature of consciousness.

My initial goal will be to argue that the philosophical arguments against degrees of consciousness are unsustainable. I'll argue that the determinacy objection conflates questions about degrees with questions about indeterminacy. I'll argue that the ordering objection overlooks the fact that

many degreed properties do not yield total orderings. And I'll also address a semantic objection concerning 'what-it's-like' expressions.

From there, I'll develop an analysis of what it is for consciousness to come in degrees. Here's the core idea that motivates the analysis: for x to be more conscious is for x to have more of whatever consciousness is. I'll show how my analysis yields plausible results when applied to various theories of consciousness. On my view, whether consciousness comes in degrees ultimately depends on which theory of consciousness turns out to be correct. Yet I'll also argue that most theories of consciousness yield the result that consciousness comes in degrees. Therefore, the most interesting question might not be *whether* consciousness comes in degrees (it probably does), but instead *what* degrees of consciousness turn out to be.

Here's the structure of the paper. Section 2 clarifies the claim that consciousness comes in degrees; Section 3 answers the determinacy objection; Section 4 answers the ordering objection; Section 5 answers an objection concerning 'what-it's-like' expressions'; Section 6 examines 'more conscious than' expressions; Section 7 develops an analysis of what it is for a degreed property to be degree of consciousness; and Section 8 applies the analysis to various theories of consciousness.

2 | THE DEGREES THESIS

Let's give a name to the view that consciousness comes in degrees:

> **The Degrees Thesis**: Consciousness comes in degrees.

The relevant notion of consciousness is phenomenal consciousness. I'll focus mainly on the idea that some *creatures* are more conscious than others, though I'll also at times address the idea that some *mental states* are more conscious than others. I'll take the degrees thesis to be equivalent to the following claims (listed from the more ordinary to the more theoretical):

(a) some entities are more conscious than others.
(b) consciousness comes in greater or lesser extents.
(c) there are levels of consciousness.
(d) consciousness is graded.
(e) consciousness is an ordered determinable.

Following orthodoxy, I'll assume that it's properties (rather than some other metaphysical kind) that come in degrees.[5] As some examples of degreed properties, consider mass, size, height, temperature, warmth, wealth, and number of prime factors. As some examples of non-degreed properties, consider nationality, blood type, species, and hue.

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It's worth disentangling the degrees thesis from a number of distinct claims. The following clarifications will be brief—the main conceptual distinction I'll focus on (between degrees and indeterminacy) will come in the next section.

Senses of 'Consciousness'. Some authors defend the degrees thesis by appealing to observations that don't disentangle phenomenal consciousness from other senses of 'consciousness', such as wakefulness. *Example*: Latham *et al* [2017: 1] say that "a fully awake, engaged person

has a high level of consciousness, a tired dazed person a moderate level, and a sleeping person a low level." However, the fact that wakefulness comes in degrees doesn't yet establish that phenomenal consciousness comes in degrees. At best, these authors may be taking for granted the substantive assumption that degrees of wakefulness correspond to degrees of phenomenal consciousness. Even if that assumption turns out to be correct, it's certainly not obvious. Analogous considerations apply to other senses of 'consciousness', such as access consciousness.[6]

Features of Consciousness. Some authors defend the degrees thesis by observing that certain features of consciousness, such as intensity, vivacity, precision, and complexity, come in degrees. *Example*: Jonkisz, Wierzchoń, & Binder [2017: 3] say that phenomenal consciousness is graded because "experiences are more or less vivid, sharp, intense, clear, rich, detailed, etc." However, it's not obvious that such observations indicate that consciousness itself comes in degrees, rather than merely that certain features of consciousness come in degrees.[7] As an analogy, some features of quarks come in degrees (such as mass and charge) even though quarkhood itself doesn't come in degrees. In Section 5, I'll explain how to disentangle degreed features of consciousness from degrees of consciousness itself.

Degrees vs. Continuity. Some authors use the term 'continuous' to characterize the idea that consciousness comes in degrees. *Examples*: Doerig, Schurger, & Herzog [2021: 43] suggest that "[t]here is a continuum from death, to coma, anaesthesia, drowsiness, and fully alert states" and Overgaard *et al* [2006: 707] claim that "conscious perception is a continuous phenomenon" (as opposed to all-or-nothing). However, not all continuous properties are degreed and not all degreed properties are continuous. Hue may be continuous, but it's not degreed (x cannot be greater in hue than y). Number of prime factors is degreed, but it's not continuous (for any number x, its number of prime factors must be an integer). For F to be continuous is for there to be no breaks or jumps between the values of F;[8] for F to be degreed is for the values of F to come in greater or lesser extents. In other words, the mark of a degreed property is that it exhibits *ordinal structure*, meaning that we can say that some things are greater or lesser with respect to that property.

There's more that could be said about each of the points above, but they are all relatively straightforward. Let's now turn to a more subtle distinction.

3 | THE DETERMINACY OBJECTION

The determinacy objection can be found in many places across the philosophical and scientific literature on consciousness. But let's focus on Bayne, Hohwy, & Owen [2016], the most influential article in the recent consciousness literature that criticizes the idea of degrees of consciousness. These authors characterize the target of their criticism as follows:

> This idea [of degrees of consciousness] is frequently expressed in consciousness science. For example, consciousness is described as involving 'a scale ranging from total unconsciousness (e.g., death and coma) to vivid wakefulness'; as a 'continuous variable'; and as 'being graded' rather than being an 'all-or-none property'. Are these claims plausible? Can individuals be ordered on the basis of how conscious they are, just as they can be ordered on the basis of their age, height, or blood pressure? (p.406)

Then they go on to present a version of the determinacy objection:

> [T]he notion of degrees of consciousness is of dubious coherence. According to the standard conception of consciousness, a creature is conscious if and only if it possesses a subjective point of view. Arguably, the property of having a subjective point of view is not gradable—it cannot come in degrees. (*p*.407)

Though the determinacy objection may initially feel compelling, the reasoning is unsustainable. Compare the determinacy objection (on the left) with a structurally analogous argument against degrees of size (on the right):

The Determinacy Objection:
To be conscious is to have a subjective point of view. But one either has a subjective point of view, or not: there is no middle ground. Even if an entity has only a sliver of feeling, that entity still counts as being conscious. Therefore, consciousness doesn't come in degrees.

An Absurd Argument about Size:
To have size is to occupy a region of space. But one either occupies a region of space, or not: there is no middle ground. Even if an entity occupies only a tiny region of space, that entity still counts as having size. Therefore, size doesn't come in degrees.

Since the conclusion of the analogous size argument is false but each preceding sentence is true, there must be something wrong with its inferential structure. And it's easy to see that many other degreed properties—mass, velocity, height, temperature—could likewise be used to generate structurally analogous arguments with false conclusions.

Here's my diagnosis of what went wrong. The determinacy objection conflates the following two questions:

DETERMINACY:	Can it be a matter of degree whether some entity is F?
DEGREES:	Does F come in degrees?

If it can be a matter of degree whether some *x* is F, then F allows for *indeterminacy*; if not, then F is always *determinate*.[9] If F comes in degrees, then F is *degreed*; if not, then F is *dichotomous*. The independence of these questions is illustrated by the following examples:

Determinate + Degreed:	It's not a matter of degree whether *x* **has mass** (*x* either has mass or doesn't), but **mass** comes in degrees (*x* can have more mass than *y*).
Determinate + Dichotomous:	It's not a matter of degree whether *x* **is a quark** (*x* either is or is not a quark) and **quarkhood** doesn't come in degrees.
Indeterminate + Dichotomous:	It's a matter of degree whether *x* **is a tree** (seeds grow gradually into trees) but **treehood** doesn't come in degrees.[10]
Indeterminate + Degreed:	It's a matter of degree whether *x* **is warm** (lukewarm is borderline warm) and **warmth** comes in degrees (*x* can be warmer than *y*).

Suppose F is a degreed property. Then we can distinguish the property *being F* (or *having F*), which we specify via gerund-phrases ('having mass', 'being warm'), from the property F itself, which we specify via noun-phrases ('mass', 'warmth'). The determinacy objection draws upon the intuition that *being conscious* doesn't come in degrees, but that's compatible with *consciousness* coming in degrees. Consider how *having mass* doesn't come in degrees, even though *mass* itself comes in degrees.[11] Notice also that if F is dichotomous, then ordinary language usually lacks a grammatical distinction of the form described above (hence the awkwardness of terms such as 'quarkhood' and 'treehood').

Questions about determinacy concern membership within categories. Questions about degrees concern values of magnitudes. If membership within a category itself has a degreed structure, then both kinds of questions concern degreed structures.[12] But in cases of determinacy, the degrees characterize the extent to which something has a property, whereas in cases of degrees, the degrees characterize the structure of the property itself. If it can be a matter of degree whether an entity is F, then perhaps the property of *being F* comes in degrees. But that doesn't mean that F itself comes in degrees. Hence, the claim that it can be a matter of degree whether an entity is F doesn't entail the claim that F comes in degrees.

The conflation between degrees and indeterminacy generates a great deal of confusion. Some work that talks of 'degrees of consciousness' focuses on whether consciousness allows for indeterminacy. Other work that talks of 'degrees of consciousness' focuses on whether consciousness comes in degrees. This would be harmless if the literatures themselves were appropriately divided, with one literature on determinacy and another on degrees. But that isn't the case: articles on one issue draw upon or criticize arguments concerning the other, usually with no indication that the issues are distinct.[13] In most cases, degrees and determinacy are treated interchangeably, leaving it unclear which issue is really at stake and unobvious which arguments are relevant.[14]

Let's look at one more example to illustrate the point. A central claim in Carruthers [2019] is that "consciousness is all-or-nothing" (20), meaning that "either a mental state is like something for its subject to undergo, or it is not" (27), that "phenomenal consciousness is either categorically present or categorically absent" (74), and that "phenomenal concepts are sharp" (155) rather than vague. Yet Carruthers takes this conclusion to invalidate any theory that takes consciousness to come in degrees. That is, he takes the claims above as grounds for thinking that "we can't make sense of degrees of phenomenal consciousness,"(23), that it's incoherent to say that a bee is "to some small degree phenomenally conscious" or conscious "to some small extent" (77), and that theories that entail the degrees thesis are philosophically untenable (23, 74, 142). Now, Carruthers may very well be right that it's never a matter of degree whether an entity is conscious. But that conclusion doesn't provide a basis for dismissing theories that take consciousness to come in degrees.[15]

It's worth emphasizing that a proponent of the determinacy objection cannot escape simply by claiming that sentences of the form 'F comes in degrees' are ambiguous. For one thing, such a claim is dubious, since it would entail that there is a sense in which even paradigmatic degreed properties (such as mass) do not come in degrees, and that there are true readings of sentences of the form 'F comes in degrees but F doesn't come in greater or lesser extents'. But more importantly, the intended conclusion of the determinacy objection isn't merely that there exists a true reading of the sentence 'Consciousness doesn't come in degrees'. Instead, the conclusion is that there are no true readings of the sentence 'Consciousness comes in degrees'. This means that no matter how one reads the sentence 'F comes in degrees,' the determinacy objection remains fallacious, since it's indisputable that the sentence 'Consciousness comes in degrees' may be interpreted as

saying that consciousness comes in greater or lesser extents. The problem is with the inferential structure of the argument, rather than with the use of terms.

4 | THE ORDERING OBJECTION

The other main objection to the degrees thesis is the ordering objection. Here's a statement of this objection from Bayne, Hohwy, & Owen [2016: 408]:

> There is good reason to doubt whether all [states of consciousness] can be assigned a determinate ordering… Although the level-based analysis entails that one of [conscious state] must be absolutely 'higher' than [another conscious state], we see no reason to grant that claim.

Other authors have made similar remarks. Bayne & Carter [2018: 2] say that the idea of "distinct 'levels of consciousness'… assumes that… for any pair of conscious states, one member of that pair must be higher than the other." Birch, Schnell, & Clayton [2020: 790] say that it "barely makes sense" to ask whether a human is more conscious than an octopus because "there is no single scale along which species can be ranked as more or less conscious." And Whiteley [forthcoming: 10] says that "while there may be an intuitive sense in which some global states of consciousness are 'lower' than others, further… reflection reveals that global states of consciousness in fact differ from each other in multiple respects and are not measurable along a single dimension." The last remark evinces the basic reasoning behind the ordering objection. The idea is that consciousness is multidimensional, and if humans are higher on some of these dimensions while octopuses are higher on others, then we cannot say that either is more conscious. Here's the reasoning in a more regimented form:

The Ordering Objection
P1: Consciousness is multidimensional.
P2: If consciousness is multidimensional, then the set of conscious states isn't orderable.
P3: If the set of conscious states isn't orderable, then consciousness doesn't come in degrees.
—
C: Consciousness doesn't come in degrees.

The reasoning of the ordering objection is flawed. Consider again an analogy with size. Size is multidimensional: its dimensions are length, width, and depth. Consequently, there are pairs of objects such that neither is bigger (simpliciter) than the other: an apple is bigger than a banana with respect to width, but smaller with respect to length.[16] Yet size nevertheless comes in degrees: an apple is bigger than a blueberry and smaller than a watermelon. We thus have an example of a property that is both multidimensional and that comes in degrees. And there are plenty of other examples: consider physical fitness, intelligence, health, or logical strength.[17] By similar lights, even if it turns out that humans are more conscious than octopuses on some dimensions while octopuses are more conscious than humans on other dimensions, it may still be the case that both are more conscious (simpliciter) than fish and less conscious (simpliciter) than Alpha Centaurians.

The ordering objection trades on an equivocation between total orderability and partial orderability. It's undeniable that if F comes in degrees, then F is *partially* orderable, since orderability

is the essential mark of degrees. But the ordering objection asserts that if consciousness comes in degrees, then consciousness is *totally* orderable, meaning for all x and y, either $x \geq y$ or $y \geq x$ with respect to degree of consciousness.[18] That conditional stands in need of justification, since many degreed properties aren't totally orderable. What is missing from the ordering objection is an argument for the claim that the degrees thesis requires total orderability. As far as I can tell, no author has argued for this.[19]

Objection: Massive Multidimensionality. Consciousness varies along innumerable dimensions. If a property F varies along only a few dimensions (as with size), then we can sometimes say that $x >_F y$. But if F varies along a massive number of dimensions, then we can almost never say that $x >_F y$. **Response**: The sentence 'F varies along many dimensions' is ambiguous. One interpretation is that Fs—that is, individuals that are F—vary along many dimensions. Another interpretation is that F itself—that is, the property F—varies along many dimensions. Consider how objects that have mass vary along many dimensions (shape, color, material composition, etc.), even though mass itself is unidimensional. It's undeniable that conscious subjects (and conscious states) vary along innumerable dimensions. But it's not obvious that consciousness itself (*qua* property) is multidimensional at all, much less massively multidimensional. Perhaps consciousness is more akin to mass (which is unidimensional) than to health (which is massively multidimensional).

5 | 'WHAT-IT'S-LIKE'

There's one more objection worth considering. Though I haven't seen this objection expressed in the literature, the objection is interesting, and addressing it will further clarify what it means to say 'consciousness comes in degrees'.

> **The 'What-it's-like' Objection**: For x to be conscious is for there to be something it's like to be x. But one cannot say 'There's something it's like to be x more than there's something it's like to be y' or 'What it's like to be x is more than what it's like to be y'. Even 'There's more it's like to be x than there is to be y' sounds peculiar.

I'll argue that none of these sentences generate problems for the degrees thesis. To see why, we need to consider each sentence individually.

1: *'There's something it's like to be x more than there's something it's like to be y'*. The phrase 'there's something it's like to be x' attributes the property *being conscious* to x. But, as we saw previously, the kinds of properties denoted by gerund-phrases ('being conscious') are distinct from the kinds of properties denoted by the corresponding noun-phrases ('consciousness'). The fact that *being conscious* doesn't come in degrees isn't evidence that *consciousness* doesn't come in degrees, for the same reason that the fact that *having mass* doesn't come in degrees isn't evidence that *mass* doesn't come in degrees.[20] Compare 1*a* with 1*b*:

# (1*a*)	There's something it's like to be x more than there's something it's like to be y.
# (1*b*)	x has mass more than y has mass.

2: '*What it's like to be x is more than what it's like to be y*'. The phrase 'what it's like to be *x*' stands to the phrase '*x* is conscious' as the phrase 'the shape of *x*' stands to the phrase '*x* has size'. That is, the phrase 'what it's like to be *x*' denotes the character of *x*'s conscious experiences, or the specific *way* in which *x* is conscious.[21] Similarly, the phrase 'shape of *x*' denotes the "character" of *x*'s size, or the specific *way* in which *x* has size. In general, the fact that F comes in degrees doesn't entail that the way in which something is F comes in degrees. Compare 2*a* with 2*b*:

(2*a*) What it's like to be *x* is more than what it's like to be *y*.
(2*b*) The shape of *x* is more than the shape of *y*.

3: *'There's more it's like to be x than to be y'*. This sentence admits of multiple readings, some of which sound off, but some of which sound fine. Here are some paraphrases designed to elicit the bad readings:

(3*a*) There's more of a way it feels to be *x* than a way it feels to be *y*.
? (3*b*) There are more ways it feels to be *x* than ways it feels to be *y*.
? (3*c*) *x* has more feelings than *y* does.[22]

In 3*a*, the degreed modifier specifies the extent to which there is a way it feels to be *x*. Since that doesn't come in degrees, this sentence sounds defective. In 3*b*, the degreed modifier specifies the number of ways that it feels to be *x*, and in 3*c* the degreed modifier specifies the number of feelings that *x* has. Since it may seem dubious to quantify over ways it feels to be *x* or feelings of *x*, these sentences may strike some as peculiar. Given that there exist these questionable readings of 'There's more it's like to be *x* than to be *y*', it's unsurprising that the sentence can sound odd. But, I think that alongside the questionable readings, there is also a good reading:

(3*d*) *x* feels to a greater extent than *y* does.

This sentence most closely matches the intended interpretation of sentences that involve degreed modifications of '*x* is conscious'. And this sentence strikes me as clearly felicitous. Now, it's not obvious whether it's in fact true that some creatures feel to a greater extent than others; it seems at least conceptually possible that all creatures that feel at all feel to an equal extent; and there may be many different ways of precisifying what it would be for *x* to feel to a greater extent than *y*. But all that merely indicates that the truth-value of the sentence is unknown, rather than that the sentence is linguistically defective. This aligns with the view I favor: the degrees thesis may turn out to be true or may turn out to be false—but it's not incoherent.

6 | 'MORE CONSCIOUS THAN'

What about the semantics of expressions that invoke the term 'conscious' (rather than 'what it's like')? I'll argue that when we examine the term 'conscious', we acquire further evidence that the degrees thesis is conceptually coherent.

The linguistic expressions that denote degreed properties are *gradable adjectives*, such as 'round' or 'smart'.[23] These terms exhibit two notable characteristics. The first is that gradable adjectives can be modified by gradable adverbs (such as 'a little', 'very', or 'extremely'). The second is that gradable adjectives have comparative and superlative forms ('round', 'rounder', 'roundest').[24] The fact that 'round' and 'smart' are gradable adjectives is illustrated by the following examples:

(4*a*) Baba is very round.
(4*b*) Baba is the smartest creature in the room.

By contrast, if an adjective is non-gradable, then gradable adverbial modifications and comparative / superlative forms sound odd:

? (5*a*) Baba is very digital.
? (5*b*) Baba is the most quadrupedal creature in the room.

For many dichotomous properties, there simply aren't any adjectival terms that denote that property. In these cases, adverbial modifications and comparative / superlative constructions are ungrammatical:

(6*a*) Baba is very tree.
(6*b*) Baba is the most quark entity in the room.

Now let's apply these tests to the term 'conscious'. We immediately find that it behaves like a gradable adjective:

(7*a*) Baba is very conscious.
(7*b*) Baba is the most conscious creature in the room.

To my ears, 7*a* and 7*b* remain felicitous even if we substitute in the term 'phenomenally conscious'. This is evidence that the felicity of these sentences isn't due to non-phenomenal readings of 'conscious'. The sentences from *p*.1 involving 'more conscious than' constructions also sounded fine, at least if we focus on linguistic felicity (rather than on whether those sentences are in fact true). And if we look at other syntactic constructions, we find that 'conscious' continues to behave like a gradable adjective:

(8*a*) Baba is far more conscious than Keke.
(8*b*) Baba is at least as conscious as a crab.
(8*c*) How conscious is Baba?

What should we make of this? Well, one option would be to resist their relevance. Perhaps we should be wary of drawing metaphysical conclusions from observations about natural language: after all, the semantic structures of our adjectival terms need not reflect the metaphysical structures of the properties they denote. The skeptic could still ask: "But what does it *mean* for consciousness to come in degrees?" At this point, I think that remains a fair question.

Nevertheless, the evidence that 'conscious' is a gradable adjective surely carries some dialectical weight. Gradable adjectives tend to denote degreed properties. While 'conscious' might turn out to be an exception to the rule, exceptions to rules demand explanation. And whether or not the observations above are reasons to think that the degrees thesis is in fact true, they are reasons to think that the degrees thesis is at least conceptually coherent.

7 | THE ANALYSIS OF DEGREES

Enough semantics; it's time for metaphysics. We are now ready to face the main question: what exactly does it take for consciousness to come in degrees?

One strategy for finding the answer would be to examine the abstract question of what it takes for any property to come in degrees. But that strategy risks getting entangled in more general issues in metaphysics and the philosophy of science, and it's unlikely anyhow that answering the abstract question will yield any clear verdict on our target question.[25] In most cases, figuring out whether F comes in degrees requires looking at the nature of F (rather than at the nature of degrees). Fortunately, there is another strategy that is more promising: instead of asking what it takes for any property to come in degrees, we should ask what it takes for a given degreed property to count as degree of consciousness. The goal of this section is to answer that question.

Here's a preview of the basic idea behind my answer. To find out whether consciousness comes in degrees, we must first ask what consciousness *is*. Then we can ask whether a given creature (or mental state) can have more of that than another creature (or mental state). In some cases, the answer will be 'yes'; in other cases, the answer will be 'no'. Hence, whether consciousness comes in degrees—and what exactly degrees of consciousness are—will depend on which theory of consciousness turns out to be correct.

A note on terminology. For the remainder of the paper, I'll use '$\textsc{f}(x)$' and '$\textsc{f}$-value of x' to denote the degree of x with respect to F. Whenever I talk about degreed properties in general, I'll use the predicate '$\textsc{f}$'. But whenever I talk about a degreed property that is a candidate for degrees of consciousness, I'll use the predicate 'ϕ'.

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Let's start with a basic observation. If consciousness comes in degrees, then differences in degrees of consciousness should entail differences in phenomenology. Otherwise, it would be unclear why we ought to think of the relevant degreed property as degrees of *consciousness*, rather than degrees of something else.

Suppose then that ϕ is a degreed property, and that we wish to know whether ϕ is degree of consciousness. If it's possible for x and y to be phenomenal duplicates yet differ in ϕ-values, then we can rule out ϕ as a candidate for degree of consciousness. This idea follows from a more general principle about degreed properties—if $\textsc{f}(x) \neq \textsc{f}(y)$, then x differs from y (with respect to F)—alongside the natural assumption that what it is for x and y to differ with respect to consciousness is for what it's like to be x to differ from what it's like to be y.

With this observation, we can construct the first criterion for what it takes for a degreed property ϕ to count as degree of consciousness:

The Difference Criterion
If $\phi(x) \neq \phi(y)$, then what it's like to be x differs from what it's like to be y.

Here's a second observation. If consciousness comes in degrees, then we should expect greater differences in degrees of consciousness to entail greater differences in phenomenology. Put another way, if the difference in degree of consciousness between x and y is smaller than the difference in degree of consciousness between x and z, then there must be some respect in which what it's like to be x is more similar to what it's like to be y than what it's like to be z.

Suppose again that ϕ is a degreed property, and that we wish to know whether ϕ is degree of consciousness. If (1) $\phi(x) > \phi(y) > \phi(z)$, yet (2) there is no respect in which what it's like to be x is more similar to what it's like to be y than what it's like to be z, then (3) we can rule out ϕ as a candidate for degree of consciousness. As before, this observation is related to a more general principle: if $\text{F}(x) > \text{F}(y) > \text{F}(z)$, then x is more similar (with respect to F) to y than to z.[26] This enables us to construct our second criterion:

The Similarity Criterion
If $\phi(x) > \phi(y) > \phi(z)$, then what it's like to be x is more similar in some respect to what it's like to be y than what it's like to be z.

One technical remark. The above formulation of the similarity criterion appeals only to ordinal structure. But there are cases where ϕ might have a richer structure. Suppose, for example, that ϕ has ratio structure, meaning we can make sense of one ϕ-value being (say) twice another ϕ-value.[27] Then it's plausible that the ratio structure of ϕ must match the ratio structure of the relevant dimension of phenomenal similarity. More generally, whatever structure one takes ϕ to have, it's plausible that the corresponding dimension of phenomenal similarity must have the same structure. For simplicity, though, I'll focus only on ordinal structure.

The similarity criterion is formulated as an existential claim: all that's required is that there is *some* aspect of phenomenal similarity corresponding to ϕ. This may initially strike some as too permissive. For now, I'll simply make two brief remarks. First, it would be untenable to instead formulate the similarity criterion as a universal claim. It's plausible that most aspects of phenomenal similarity (consider hue, pleasantness, or sweetness) have nothing to do with degrees of consciousness. Second, the similarity criterion still places substantive constraints on which degreed properties may count as degree of consciousness. Most degreed properties won't satisfy the similarity criterion, since most degreed properties don't correspond to any aspect of phenomenal similarity whatsoever. In Section 6, where I apply the analysis to various theories of consciousness, I'll say more about this point.

The difference and similarity criteria are straightforward to identify. There is only one more criterion that we need, but crafting it will take more work.

§

For every degreed property F, there is a dichotomous counterpart: namely, the property *being* F. What is the relationship between being F and degrees of F? In other words, how high of a degree of F must x possess in order to pass the threshold for being F simpliciter? Well, the answer varies across different cases. Consider the following possibilities (let 'max_{F}' denote the maximum value of F, if there is one):

MINIMAL:	x is F $\leftrightarrow \text{F}(x) > 0$.
MEDIAL:	x is F $\leftrightarrow \text{F}(x) > n$ (where $0 < n < max_{\text{F}}$).
MAXIMAL:	x is F $\leftrightarrow \text{F}(x) = max_{\text{F}}$.
UNIVERSAL:	x is F $\leftrightarrow \exists n\, f(x) = n$.

Mass is a property with a minimal threshold (anything with a positive mass value has mass). Warmth is a property with a medial threshold (10°C is warmer than 0°C, but is not warm; 30°C is warm, but still less warm than 40°C). Circularity is a property with a maximal threshold (some

shapes are more circular than others, but being a circle requires being perfectly circular). Valence is a property with a universal threshold (anything that is either pleasant, unpleasant, or neutral is valenced).

If consciousness comes in degrees, then is it minimal, medial, maximal, or universal? Since anything with a positive degree of consciousness would still count as conscious simpliciter (even if there is barely something it's like to be that entity), we can rule out the medial and maximal options. Since the idea of negative degrees of consciousness is dubious, and since it's not clear what it would mean for a conscious entity to have zero degrees of consciousness, the universal option seems implausible. Therefore, the only plausible candidate is the minimal option: if ϕ is degree of consciousness, then x is conscious just in case $\phi(x) > 0$.

We are nearly done. But we need to address one more issue before constructing the last criterion.

§

One of the principal difficulties for assessing whether consciousness comes in degrees is disentangling degrees of consciousness from degreed features of consciousness. We know that properties of experiences such as intensity, precision, vivacity, and complexity come in degrees. But are any of these degrees of consciousness? Or are they all merely degreed features of consciousness? The problem is particularly difficult because some degreed properties, including the ones mentioned above, may very well be instantiated by every conscious experience. But unless one is willing to say that any degreed phenomenal property that is necessarily co-instantiated with consciousness counts as degree of consciousness, we need a way of disentangling degreed features of consciousness from degrees of consciousness itself.

We can solve this problem by appealing to the following idea: for x's F-value to be greater than y's F-value is for x to have more of whatever F is than y. This principle may strike some as close to trivial when it's stated abstractly. But it provides the basis for disentangling degreed features of consciousness from degrees of consciousness itself. The principle entails that for x to be more conscious than y is for x to have more of whatever consciousness is than y. It's not obvious that creatures that have (say) more intense experiences thereby have more of whatever consciousness is. So it's not obvious that intensity will be a measure of degrees of consciousness.

We can substantiate this idea by invoking the notion of a *just-is statement*.[28] This is a metaphysical claim of the form 'for x to be F just is for x to be G'. These claims are intended to express the idea that the expressions on either side denote the same aspect of reality. As examples, (*a*) for x to be water just is for x to be H_2O, (*b*) for x to be a bachelor just is for x to be an unmarried male, and (*c*) for x to be an even number just is for x to be a natural number divisible by 2. An important point is that even if it's necessarily the case that x is F iff x is G, it need not follow that for x to be F just is for x to be G. As examples, it's necessarily the case that (*d*) $2 + 2 = 4$ iff everything is self-identical, and (*e*) Oslo is north of Paris iff Oslo is north of Paris and Fermat's Last Theorem is true. But it's standardly denied, for these sorts of examples, that for the left-hand statement to obtain just is for the right-hand statement to obtain. Now, there's much more that may be said to substantiate the notion of a just-is statement, but most of the details won't matter for our purposes. The important point is that this piece of metaphysical machinery enables us to connect degrees of consciousness to the nature of consciousness.

This puts us in position for the final criterion in the analysis of degrees of consciousness. This criterion combines the minimality requirement discussed earlier with the notion of a just-is statement discussed above. Let '$Fx \equiv Gx$' mean for x to be F just is for x to be G:

The Threshold Criterion
x is conscious $\equiv \phi(x) > 0$.

This reads: for x to be conscious just is for x to have a positive ϕ-value.

§

Now I can state the full analysis of what it is for a degreed property ϕ to count as degree of consciousness:[29]

ϕ is degree of consciousness $\leftrightarrow$
THRESHOLD: x is conscious $\equiv \phi(x) > 0$.
DIFFERENCE: $\phi(x) \neq \phi(y) \rightarrow$ what it's like to be $x \neq$ what it's like to be y.
SIMILARITY: $\phi(x) > \phi(y) > \phi(z) \rightarrow$ what it's like to be x is more similar in some respect to what it's like to be y than what it's like to be z.

As reminders, the threshold criterion says that for x to be conscious just is for it to have a positive ϕ-value, the difference criterion says that differences in ϕ-values entail differences in phenomenology, and the similarity criterion says that greater differences in ϕ-values entail greater differences in phenomenology.

I'll briefly address some objections to the analysis.

Objection: Triviality. The analysis renders it trivial that consciousness comes in degrees. So long as we are sufficiently permissive about properties, there will always be some property that satisfies the analysis, no matter which theory of consciousness one favors. **Response**: Whether we will always be able to find some property that satisfies the analysis depends on unsettled questions about how demanding the relevant just-is statements are. But suppose, for argument, that it's guaranteed that some property will satisfy the analysis. Then the interesting question will be whether some natural property satisfies the analysis. In other words, this objection doesn't impugn the analysis of degrees of consciousness. Instead, it merely draws attention to the fact that only reasonably natural conceptions of degrees of consciousness will be interesting for philosophical and scientific purposes. If no natural property satisfies the analysis, then that may reasonably be taken to be vindication of the dichotomous theory. Still, I'll argue later that on many theories of consciousness, there does exist a natural property that satisfies the analysis.

Objection: Confounds. To establish that ϕ is degree of consciousness, one must isolate the phenomenological contribution made by degrees of consciousness. This requires identifying a minimal pair: a pair of conscious subjects who differ with respect to their ϕ-values but who are otherwise phenomenologically indistinguishable. Otherwise, we will be unable to know whether the phenomenological differences that result from differences in ϕ-values are differences in degree of consciousness itself (rather than differences in some feature of consciousness). **Response**: This objection makes an unreasonable demand. If consciousness comes in degrees, then it's extremely plausible that differences in degrees of consciousness will always entail differences in other aspects of phenomenology. As analogies, consider how differences in number of prime factors always come with differences in cardinality, or how differences in degree of health always come with differences in bodily function.

8 | THEORIES OF CONSCIOUSNESS

A good test of any analysis is to check that it yields plausible results across a variety of cases. In what follows, I'll apply my analysis of degrees of consciousness to various theories of consciousness. A caveat: I won't cover all major theories—I'll focus on a selection that yields interesting or illustrative results.

CASE 1: Atomism

A *total experience* is an experience that completely characterizes what it's like to be a subject at a time. Let *atomism* be the view that some total experiences are composed from multiple atomic experiences, where an *atomic experience* is an experience that isn't composed from any other experiences.[30]

Though 'atomism' isn't a widely-used term in the contemporary consciousness literature, many current theories of consciousness can reasonably be construed as atomistic. Consider (*a*) an intentionalist who thinks that ordinary subjects phenomenally represent many propositions (rather than a single complex proposition), (*b*) a relationalist who thinks that ordinary subjects are perceptually aware of many external objects (rather than a single complex state of affairs), (*c*) a sense-datum theorist who thinks that ordinary experiences involve acquaintance with many sense-data (rather than a single complex sense-datum), (*d*) a higher-order theorist who thinks that ordinary subjects have many higher-order thoughts about many first-order mental states, or (*e*) a micropanpsychist who thinks that the macroexperiences of ordinary subjects are composed from microexperiences of fundamental particles.

It's natural for atomists to say that if *x*'s total experience is composed from a greater number of atomic experiences than *y*'s total experience, then *x* is more conscious than *y*. If we check the analysis of degrees of consciousness, we will see that all the conditions—the threshold, difference, and similarity criteria—are satisfied. More precisely, it's plausible (given any atomist theory) that for *x* to be conscious just is for *x* to have at least one atomic experience, that what it's like to be *x* differs from what it's like to be *y* whenever *x* and *y* have a distinct number of atomic experiences, and that if $x > y > z$ with respect to number of atomic experiences, then there is some respect in which what it's like to be *x* is more similar to what it's like to be *y* than what it's like to be *z*. This indicates that the analysis yields the intuitively correct verdict for atomist theories.

Let *holism* be the view that every total experience *is* an atomic experience, meaning that total experiences are not composed from more basic experiences. For each of the atomist theories mentioned above, there is a holist counterpart. Consider (*a*) an intentionalist who thinks that every conscious subject phenomenally represents one complex proposition, (*b*) a relationalist who thinks that every conscious subject is perceptually aware of a single complex state of affairs, (*c*) a sense-datum theorist who thinks that ordinary experiences involve acquaintance with a single complex sense-datum, (*d*) a higher-order theorist who thinks that what it's like to be a subject is determined by a single higher-order thought about a single first-order mental state, or (*e*) a cosmopsychist who thinks that the macroexperiences of ordinary subjects are abstractions from the cosmic experience of the universe.

Does holism entail that consciousness doesn't come in degrees? Well, if holism is true, then number of atomic experiences is no longer a candidate for degree of consciousness, since holism entails that every conscious entity has exactly one atomic experience. But there remains the question, for any particular holist theory, of whether there is some other degreed property that satisfies

the threshold, difference, and similarity criteria. We will turn next to one way for that to be the case.

CASE 2: Graded Awareness

Many theories of consciousness accept some version of the following idea: consciousness is a matter of awareness of a certain kind of entity. Some think that the relevant object of awareness is a mental state, and that what it is for a mental state m to be conscious is for its subject to be aware of m. Others think that the objects of awareness are ordinary external objects or are certain kinds of universals. For our purposes, it doesn't matter much how exactly we think of the nature of the awareness relation; instead, what matters is whether the awareness relation comes in degrees. Let a *graded-awareness theory* be any theory that accepts some version of the following conjunctive claim: (**1**) consciousness is a matter of awareness of a certain kind of entity, and (**2**) the awareness relation comes in degrees.[31]

As examples of theories that accept that first claim, consider (*a*) a higher-order theorist who takes consciousness to be a matter of higher-order awareness of first-order mental states, (*b*) an attentional theorist who takes consciousness to be a matter of mental states occupying one's attention, (*c*) a self-representationalist who takes consciousness to be a matter of mental states representing themselves, (*d*) a relationalist who takes consciousness to be a matter of perceptual awareness of external objects, or (*e*) a sense-datum theorist who takes consciousness to be awareness of sense-data. For each of these cases, we could consider versions of the view that take the relevant awareness relation to come in degrees.

It's natural for graded-awareness theorists who take the objects of awareness to be mental states to say that if subject x is more aware of m_1 than m_2, then m_1 is more conscious than m_2. It's also natural for any graded-awareness theorist to say that if subject x is more aware of every object it's aware of than subject y is aware of every object it's aware of, then x is more conscious than y. These conclusions align with the results yielded by the analysis of degrees of consciousness. At least, I suspect most graded-awareness theorists will accept that what it is for x to be conscious is for x to have a positive degree of awareness of an object o, that differences in degrees of awareness entail differences in phenomenology, and that greater differences in degree of awareness entail greater phenomenal dissimilarity.

Notice that many graded-awareness theories are compatible with either atomism or holism. If one accepts both atomism and a graded-awareness theory, then there will be multiple degreed properties that satisfy the criteria for degrees of consciousness. If such a theory is correct, then in some instances it may be correct to say that x is more conscious than y with respect to number of atomic experiences, but that y is more conscious than x with respect to degree of awareness.

CASE 3: Integrated Information & Global Workspace

According to integrated information theory, what it is for x to be conscious is for x to have a ϕ-value, where x's ϕ-value (in the context of integrated information theory) is a matter of "the amount of information generated by a complex of elements, above and beyond the information generated by its parts."[32] Famously, integrated information theory explicitly endorses the degrees thesis, taking a system's ϕ-value to be a measure of its degree of consciousness. Does my analysis of degrees of consciousness align with this verdict?

Well, it's clear that if integrated information theory is true, then ϕ would satisfy the threshold criterion and the difference criterion. But what about the similarity criterion? One noteworthy

discussion on this is Pautz [2019], who argues that it's not clear what it means to say that the "level of a system's consciousness is determined by its ϕ-value" and who questions whether there is any phenomenal dimension that can be reasonably identified with degree of ϕ. Now, integrated information theorists might respond by characterizing the relevant phenomenal dimension (or by defending the claim that such a dimension exists, even if we can't identify it). If such a response is viable, then Pautz's challenge can be answered, and the criteria for degrees of consciousness will be satisfied. On the other hand, suppose Pautz is right. Then it's plausible that integrated information theory would be false, since that would mean that ϕ does not in fact satisfy the criteria for degree of consciousness. Therefore, a fruitful line of inquiry (for both proponents and skeptics of integrated information theory) is to examine whether integrated information satisfies the similarity criterion.

Let's now turn to global workspace theory, according to which what it is for a mental state *m* to be conscious is for *m* to be broadcast to a wide range of cognitive systems, such as those involved in reporting, planning, reasoning, decision-making, and remembering. It's sometimes claimed that global workspace theories entail that consciousness doesn't comes in degrees, since global broadcasting is all-or-nothing. However, the evidence that tends to be cited indicates only that it's never a matter of degree whether a given mental state is globally broadcast.[33] That leaves open whether global workspace theory allows for consciousness to come in degrees. To assess that, we need to ask: is there any property that will satisfy (for global workspace theories) the criteria for degrees of consciousness?

The answer may depend on the philosophical details. Consider, for example, a global workspace theory that says that what it is for a mental state *m* to be conscious is for *m* to be broadcast to a wide range of cognitive systems. The righthand-side of that analysis clearly denotes a degreed property. If it turns out to also be the case that the number of cognitive systems that *m* is broadcast to corresponds to a dimension of phenomenal similarity, and that differences in that number entail differences in phenomenology, then it would be natural for such a theorist to endorse the degrees thesis. On the other hand, consider a global workspace theory that says that what it is for *m* to be conscious is for *m* to be in working memory. It seems doubtful that one mental state can be more in working memory than another. But even on this latter view, one might still think that what it is for a subject *x* to be conscious is for *x* to have some mental states in working memory, which then suggests that a subject with more mental states in working memory is more conscious than a subject with fewer mental states in working memory.

CASE 4: A Dichotomous Theory

I've provided examples of theories that entail that consciousness comes in degrees. I've considered contrasting theories that do not generate the same reasons for endorsing the degrees thesis. Yet I've also argued that for each contrasting theory, there could still turn out to be other reasons for taking consciousness to come in degrees. As a result, I haven't yet identified any theory that clearly *negates* the degrees thesis. What would such a theory look like?

Here's one example. Suppose that to be conscious just is to have a soul. Every subject has exactly one soul, souls do not come in degrees, and none of the justifications for the degrees thesis discussed above apply in this case. Therefore, someone who favors the soul theory should probably deny the degrees thesis. Of course, few philosophers and scientists endorse the soul theory, so this conclusion won't have much impact on contemporary debates about consciousness. But the example serves to illustrate a more general point: it's hard to deny the degrees thesis.

If consciousness comes in degrees, then there must be some property that satisfies the threshold, difference, and similarity criteria. But if consciousness *doesn't* come in degrees, then there must be *no* property that satisfies those criteria. Since it's easier to demonstrate the existential claim than the universal negation, it's easier to identify theories that confirm the degrees thesis than ones that negate it. Though I've focused here on illustrative examples rather than on theoretical joints, I think the considerations in this section indicate that most theories of consciousness will support degrees of consciousness, in some form or another.

My speculation, then, is that consciousness *probably* comes in degrees. We don't know yet what exactly degrees of consciousness are. The answer will depend on which theory is correct. And there are some theories where there will be no reasonable measure of degree of consciousness. But when we consider what it would take for consciousness to come in degrees, and when we look at the contemporary theoretical landscape, it seems likely that the degrees thesis will be vindicated in some way or other.

9 | CONCLUSION

Is a human more conscious than an octopus? Is a fully awake person more conscious than a drowsy person? Is a psychedelic experience more conscious than a sober experience? Skeptics of degrees of consciousness have contended that such questions barely make sense. I've argued, by contrast, that such questions are both sensible and interesting. We don't yet know the answers. Perhaps it will turn out that consciousness doesn't come in degrees. Perhaps it will turn out that consciousness does come in degrees, but such creatures (or mental states) are incomparable with respect to degree of consciousness. Or perhaps the answer will be a straightforward 'yes' or 'no'. The answers depend on which theory of consciousness turns out to be correct, and what that theory says about the nature of consciousness. But while the answers remain unknown, they're out there for us to find. Nevertheless, I've argued that there's a good chance that the degree thesis will be vindicated. The most interesting question may be not *whether* consciousness comes in degrees, but instead *what* exactly degrees of consciousness turn out to be.

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NOTES

[1] The idea of a consciousness meter was introduced by Chalmers [1998].

[2] See Searle [1992: 83], Lycan [1996: 39], Morin [2006], Mormann & Koch [2007], Seth [2009], Boly *et al* [2013], Bachman & Hudetz [2014], Oizumi, Albantakis, & Tononi [2014], Tononi & Koch [2015], Fazekas & Overgaard [2016], Jonkisz, Wierzchoń, & Binder [2017], Latham *et al* [2017], Aru *et al* [2019], Liang *et al* [2020], Pal *et al* [2020], Tsuchiya & Saigo [2020], and Walter [2021]. Others who tentatively express sympathy for degrees of consciousness include van Gulick [2007], Rosenthal [2018], and Godfrey-Smith [2020].

[3] See Bayne & Hohwy [2016], Bayne, Hohwy, & Owen [2016], Bayne & Carter [2018], Carruthers [2019], Birch, Schnell, & Clayton [2020], Birch [2020], Mckilliam [2020], and Whiteley [forthcoming]. Others who tentatively express skepticism about degrees of consciousness include Kahane & Savulescu [2009], Pautz [2019] and Lee [2020].

[4] See, for example, Lee [2022, 2018: 19] and Smithies [2019].

[5] Peacocke [2015] distinguishes magnitudes (which are what come in degrees) from properties. But there is no substantive disagreement between Peacocke and me: I use the term 'property' in a way that includes magnitudes.

[6] See Block [1995] on other notions of consciousness.

[7] This issue often arises when authors invoke the Perceptual Awareness Scale as a measure of degrees of consciousness (see, as examples, Overgaard *et al* [2006], Windey & Cleeremans [2015], and Fazekas & Overgaard [2016]). For a compelling criticism, see Michel [2018].

[8] See Spivak [2008: 115] for a more precise definition of continuity.

[9] It's arguably more perspicuous to ascribe determinacy to propositions than to properties. But for brevity, I'll simply say 'F allows for indeterminacy' instead of 'it's metaphysically possible that there exists an x such that the proposition that x is F is indeterminate'.

[10] For many dichotomous properties, one could say 'x is more of an F than y' (for example: 'William Howard Taft is more of a walrus than Woodrow Wilson'). But this is arguably shorthand for saying that x more closely resembles F's than y, or that x is a more prototypical example of an F than y, rather than that x has a higher degree of F than y.

[11] See Engel [1989] for discussion of what it is for something to be a matter of degree. As far as I can tell, Engel is likewise guilty of conflating the question of whether F comes in degrees with the question of whether F allows for indeterminacy.

[12] Is indeterminacy best explained by appealing to some kind of degreed structure? That's an open question. One might think that indeterminacy is best explained by an epistemicist or a supervaluationist theory of vagueness, which don't require invoking any notion of degreed membership. But for a recent analysis of degreed membership, see Decock & Douven [2014].

[13] There are exceptions. Rosenthal [2018: 260] is careful to disentangle indeterminacy from degrees. And articles on whether 'consciousness' is vague, such as Simon [2017], are clearly concerned with indeterminacy.

[14] For some discussions that seem to conflate the issues, see Lycan [1996: 39], Bostrom [2006: fn.11], Overgaard *et al* [2006: 700], Windey & Cleeremans [2015: 2], Carruthers [2019: 20], Fortier-Davy & Millière [2020: 3], Godfrey-Smith [2020: 12], Mckilliam [2020: 4], and the quoted passages from Bayne, Hohwy, & Owen [2016]. For some discussions where it's unobvious which issue is at stake, see Johanson et al. [2003: 280], Sergent & Dehaene [2004], Van Gulick [2007: 528], Nani & Cavanna [2014: 3], Doerig, Schurger, & Herzog [2021: 43], and Anzulewicz *et al* [2015: 7].

[15] A sidenote: Carruthers [2019] takes the claim that "any given mental state (in humans, at any rate) is either categorically conscious or definitely unconscious" (142) to be compatible with the claim that there is "no fact of the matter whether another animal has phenomenally conscious experiences" (155). I'm skeptical that these claims can be reconciled, but I won't discuss that here. See Birch [2020] for a critical discussion.

[16] One might contend that size is simply equivalent to volume, in which case all objects would be comparable with respect to size. But even if one adopts this view of size, there are other degreed properties (for example, physical fitness) that arguably don't satisfy comparability. Thanks to Daniel Hoek for some helpful discussions about size.

[17] If $P \vDash Q$ but $Q \nvDash P$, then P is logically stronger than Q. But if neither $P \nvDash Q$ nor $Q \nvDash P$, then neither P nor Q is logically stronger.

[18] A technical clarification. A total ordering is usually defined to be anti-symmetric (meaning if $x \geq y$ and $y \geq x$, then $x = y$). If we are concerned with orderings over the individuals that are F, then the relevant ordering won't be anti-symmetric (since distinct objects can have the same F-value). On the other hand, if we are concerned with orderings over F-values themselves, then anti-symmetry plausibly holds.

[19] Dorr, Nebel, & Zuehl [forthcoming] argue that *all* gradable adjectives (such as 'tall' or 'big') are comparable (meaning it's always the case that either $x \geq_F y$ or $y \geq_F x$). However, the arguments of these authors don't help the ordering objection. This is because their arguments for comparability are intended to apply even to expressions denoting multidimensional properties, such as 'size'. In other words, their arguments for comparability would support the claim that 'conscious' is totally orderable, but only at the cost of undercutting the entailment from multidimensionality to lack of total orderability.

[20] A similar point can be made about phrases like 'x has a subjective point of view'.

[21] See Hellie [2007]'s and Stoljar [2016]'s analyses of 'what it's like' expressions.

[22] There's a narrow sense of 'feelings' that covers only emotions and bodily sensations. But obviously 'feelings' is to be understood here in a broader sense, where it's roughly synonymous with 'conscious experiences' or 'phenomenal characters' or 'qualia'.

[23] Halliday [2007: 390] says a "term is [gradable] if it may be predicated of two objects, such that there is a higher degree of its applicability to one object than to the other." Qing & Franke [2014: 23] say "the denotation of a gradable adjective…is a function that maps individuals to degrees on an abstract scale structure." See Cresswell

[1976] for a canonical analysis of gradable adjectives, and Castroviejo, McNally, & Sassoon [2018] for a general discussion.

[24] Jackson [2002: 66] says: "Adjectives fall into [the gradable and non-gradable] subclasses according to two criteria: (1) whether the adjective can have a 'comparative' and a 'superlative' form; (2) whether the adjective can be modified by an intensifying adverb."

[25] For some discussions of the nature of quantities and magnitudes, see Armstrong [1978], Mundy [1987], Bigelow and Pargetter [1988], Mitchell [2006], Eddon [2013], Peacocke [2015], and Dees [2018]. As far as I can tell, none of these discussions has any straightforward implications for whether consciousness comes in degrees.

[26] In the case of consciousness, similarity with respect to F should be interpreted as similarity with respect to degrees of consciousness (rather than similarity with respect to all aspects of consciousness). Otherwise, the criterion would generate the incorrect result that similarity in degree of consciousness always outweighs all other aspects of phenomenal similarity.

[27] See Stevens [1946] for a classic paper on measurement scales.

[28] See Rayo [2013] and Dorr [2016] for much more detailed discussions. Following Rayo, I'll assume that just-is statements are symmetric, that the expressions on either side may differ in syntactic form, and that for any given expression, there may be multiple true just-is statements containing that expression.

[29] To be precise, each criterion should begin with a necessity operator followed by universal quantifiers over each variable. I omit these to make the analysis more readable.

[30] For discussions of atomism and holism, see Sprigge [1983: Ch.5], Searle [2000], Tye [2003: 25], Dainton [2010], and Chudnoff [2013].

[31] As examples, Kriegel [2009: 372] says that the kind of awareness constitutive of conscious mental states can be either peripheral or focal, Watzl [2017: 183] says that consciousness essentially involves "attention structur[ing] consciousness into what is more central and what is more peripheral," and Rosenthal [2018: 260] suggests that subjective awareness might be "a graded phenomenon, not simply present or absent but admitting of degrees."

[32] Tononi [2008: 216]. See Tononi & Koch [2015] and Oizumi, Albantakis, & Tononi [2014] for more recent developments of integrated information theory. To be precise, integrated information theory is best interpreted as saying that for x to be conscious just is for $\phi_{max}(x) > 0$, where only "maximally irreducible" subsystems have ϕ_{max}-values. See Oizumi, Albantakis & Tononi 2014: 3] on the "Axiom of Exclusion."

[33] See Sergent & Dehaene [2004] and Carruthers [2019: 99] for examples of this claim. See Dehaene & Naccache [2001] and van Vugt *et al* [2018] for examples of the cited evidence.

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