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Degrees of Attention and Degrees of Consciousness

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Abstract: A standing question in consciousness science is whether consciousness arises gradually or in a sudden way. This empirical question is connected to a metaphysical one, concerning the kind of property that consciousness is, i.e., graded or categorical. Recently, Lee (2022) suggested that settling this question requires deciding which theory of consciousness is true. Applying an insight from Wiese (2020), this chapter pursues a way of approximating answers by examining properties that are necessary for consciousness, which consciousness must have regardless of which theory turns out true in the end. One such property is attention. This chapter suggests that attention is connected to consciousness in such a way that a graded view of the former brings support for a graded view of the latter. To this effect, evidence is discussed that degrees of attention are reflected in several acknowledged dimensions of consciousness. The upshot of this view is that the transition from unconscious information processing to conscious experience is gradual and is a function of degree of attention.

1. The structure of consciousness and the structure of attention

Consciousness scientists have long been investigating how phenomenally conscious experience arises out of unconscious information processing in our minds and brains. One standing question is whether this transition is gradual or discontinuous (Del Cul et al. 2007; Asplund et al. 2014; Windey et al. 2014; Eiserbeck et al. 2022).[2] If it is gradual, then there is a spectrum going from completely unconscious to completely conscious states, with at least one

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[2] Lee (2022, 5) argues that gradability comes apart from continuity: some properties are continuous but not gradable (e.g., hue), and some others are gradable but not continuous (e.g., the number of prime factors of a number). Though this conceptual distinction might hold generally, I take it that in the case of consciousness gradability and continuity might in fact go hand in hand.

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intermediate state in between. On the other hand, if the transition is discontinuous, there are no intermediate states: a state is either conscious or it is not. A gradual transition implies that mental states can be *more* or *less* conscious. A dichotomous transition rules this out.

In this way, the empirical question about the unconscious-conscious transition resonates with an open question in the philosophy of consciousness, namely: is consciousness a *gradable* property that you can have more or less of, or is it a *categorical* one that you either full-stop have or full-stop lack?

Recently, Lee (2022) noted that the answer to the philosophical question must probably wait until we know which of our many current scientific and philosophical theories of consciousness are true. This is reasonable, for we must know what consciousness *is* before we can decide whether it is the sort of thing one can have more or less of, or the sort of thing that is all-or-nothing. Nonetheless, since deciding amongst theories of consciousness is no easy task, one might wonder whether there are other ways of approximating answers.

Applying an insight from Wiese (2020), I propose that a plausible way to do this is by looking at necessary properties of consciousness, which can be specified independently of any specific theoretical framework, and which constrain the range of theories that may turn out true in the end. In particular, I propose that *attention* is a property that is especially relevant for considerations about the structure of consciousness, i.e., whether consciousness is graded or categorical.

In folk as well as in experimental psychology, attention is treated as a gradable property. We say things like "you should pay more attention to your surroundings" or "he pays too much attention to politics", and cognitive psychologists often contrast conditions of "less" and "more" attention.[3] Degrees of attention are also frequently invoked in philosophy. Here are some examples (emphases added):

> Many different sensations, for example, might occupy the subject's attention *to a similar degree*. In this case, the relevant sensations are located somewhere relatively high up in a priority system. *The degree to which they occupy the subject's attention* will be roughly measured by how high up in the priority system they are (Watzl 2017, 87).

> Endorsing the view that attention engaged in appreciative practices can be deployed *in varying intensity rather than be reduced to an all-or-nothing affair* enables us to consider instances where aesthetic response comes about gradually (Mortu 2018, 46).

> There is *an amount of attention* such that, if I pay that amount of attention to [a visual stimulus X] when I see [X], I will be poised [to think about X, to reach for X, etc.] (Stoljar 2019, 11).

In this chapter, I suggest that a graded view of attention, which we have prima facie reason to accept, increases the plausibility of a graded view of consciousness. The recommended view is a degrees-degrees model, where higher degrees of attention typically bring about higher degrees of consciousness. In this view, the transition from unconscious information processing to phenomenally conscious experience is gradual and is a function of degree of attention.

[3] See Watzl (2017, 39) for more examples of uses of attention in everyday language. Examples from cognitive psychology include Travis and Hall (1938), Campbell and Davalos (2015), Mack et al (2015). For an empirical argument that attention is graded rather than all-or-nothing, see Pitts et al. (2018).

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Here is the chapter overview. Section 2 sets down an initial requirement for a graded view of attention to support a graded view of consciousness, namely: that the dependence relation of consciousness on attention is of a sufficiently strong and intrinsic kind. Section 3 and section 4 offer initial grounds for thinking that such a connection exists. Section 3 discusses an empirical correlation between measures of degrees of attention and measures of degrees of consciousness, and section 4 explains how several different dimensions of consciousness covary with degree of attention. Section 5 replies to a standing objection, according to which degrees of attention do not modulate degrees of consciousness itself, but rather degrees of properties of consciousness. Section 6 concludes by coming back to the question about the unconscious-conscious transition and showing how a degrees-degrees model helps illuminating it.

2. Towards a degrees-degrees model

There are many grounds for thinking that consciousness, in a variety of its forms, requires attention.[4] For starters, the essential role of attention in making perceptual information consciously *accessible* is widely acknowledged (Smithies 2011; Stoljar 2019). But extensive psychological research suggests that attention does more than enabling conscious access to perceptual information; especially, if "access" is understood as the ability to report the contents of one's consciousness. There is evidence that some forms of attention are already at work at the earliest stages of perceptual processing (Pitts et al. 2018; Noah and Mangun 2019), which suggests that, if there are conscious contents that are not verbally or otherwise overtly reported (Frässle et al. 2014; Pitts et al. 2014), the corresponding experiences will likely involve attention.[5] Furthermore, many non-perceptual forms of consciousness (e.g., imagining, reasoning, deliberating or daydreaming) seem to require some form of attention as well (Chun et al. 2011; Levy 2022). More generally, evolutionary considerations suggest that human beings might have gained the capacity for consciousness only after gaining the capacity to selectively attend to our environment in specific ways (Montemayor and Haladjian 2015; Graziano 2019). And finally, many influential theories of consciousness either explicitly propose that attention is constitutive of all forms of consciousness (see Baars et al. 2021; Dehaene and Naccache 2001; Graziano 2013; Sauret and Lycan 2014) or entail that attention plays such a constitutive role.[6]

On the assumption that attention is necessary for consciousness, one might reasonably wonder whether a graded view of attention would motivate or even support a graded view of consciousness. I think that the answer is affirmative. However, one should not be too quick to infer a graded view of consciousness from a graded view of attention. Many different properties can be necessary for consciousness in many ways. It is likely that not all of these properties have a graded structure. If so, then one needs a further step to show that if a necessary property F is gradable, consciousness must be gradable as well.

[4] But see Block (2011), Jennings (2020, Ch. 5) for dissent.

[5] In a series of works, Adrienne Prettyman (2014, 2022) argues that there is a diffuse form of attention that plausibly underlies the processing of perceptual information typically deemed unattended. For empirical support, see Treisman (2006).

[6] In ongoing work with Wanja Wiese, we propose that attention constitutes a conceptual building block for the augmentation and refinement of scientific theories of consciousness.

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To illustrate, we can compare the purported argument from attention with a recent argument by Bayne et al. (2016, 407), which reaches the opposite conclusion. Bayne and colleagues argue that degrees of consciousness are *conceptually incoherent* because consciousness requires having a subjective point of view, and subjective points of view are not gradable.[7] Here are the two arguments, side by side.

Argument from attention	**Argument from subjective points of view**
1. Consciousness requires attention. 2. Attention is gradable. Hence, 3. Consciousness is gradable.	1. Consciousness requires a subjective point of view. 2. Subjective points of view are not gradable. Hence, 3. Consciousness is not gradable.

Since the argument from attention and the argument from subjective points of view cannot both be sound, I take this comparison to show that they are both inconclusive as they stand. Of course, proponents of either view could reject the opposing argument. Specifically, proponents of the argument from attention could argue that consciousness may not really require a subjective point of view (as suggested in Metzinger 2020 or Costines et al. 2021),[8] or that subjective points of view might in fact be gradable (as suggested in Sebastian 2020).[9] However, a better strategy for proponents of the argument from attention would be to offer a positive reason for believing that if attention is graded then consciousness must be graded as well.

One way to do this is showing that the connection between attention and consciousness is *of the right kind*. A property F could be necessary for consciousness in many ways. For instance, consciousness could require F because consciousness *just is* F. In such case, if F is graded then consciousness must indeed be graded.[10] Contrastingly, if consciousness requires F because F is *causally required* for consciousness, the structure of F might well be independent from the structure of consciousness. Hence, the argument from attention requires a refined premise 1, establishing a sufficiently strong or intrinsic dependence relation of consciousness on attention.

Importantly, there is reason to think that the relevant relation cannot be as strong as identity. For one thing, studies suggest that attention is sometimes unconscious (see, for example, Norman et al. 2013); hence, consciousness and attention are at least partially dissociable (Montemayor and Haladjian 2015). However, there is also reason to think that attention is constitutive of consciousness in a strong intrinsic way, which makes a degrees-degrees model plausible. Notably, recent studies reveal reliable correlations between measures of degrees of attention and measures of degrees of consciousness (Eiserbeck et al. 2022;

[7] For a compelling reply to this argument, see Lee (2022, 11–12)

[8] Metzinger (2020) suggests that there are *minimal* forms of consciousness which lack a subject-object structure. In turn, Costines et al. (2021) suggest that there are *expanded* forms of consciousness, characterized by ego dissolution. These forms of consciousness do not obviously involve a subjective point of view.

[9] Sebastian (2020, 4) defends a minimal kind of self-awareness: "a non-conceptual identification-free self-attribution that characterizes *the first-person perspective* that consciousness offers us" (my emphasis). Arguably, a first-person perspective that is non-conceptual and identification-free in the ways suggested by Sebastian could be conceptualised as involving less subjectivity, compared to, e.g., conceptual and identification-involving first-person perspectives.

[10] Along these lines, Bayne et al. (2016) could say that the reason consciousness requires a subjective point of view is that to be conscious just is to have a subjective point of view. However, this view might not hold if there are minimal or expanded forms of consciousness (see note 6).

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Pretorius 2014; Nieuwenhuis and de Kleijn 2011), and attention has been shown to modulate almost every recognised dimension of consciousness (Fazekas and Overgaard 2018). I will discuss each of these lines in turn.

3. Attentional blink

In current psychology and neuroscience, one of the best ways to investigate the relation between degrees of attention and the structure of consciousness is the attentional blink paradigm (Raymond et al. 1992). This paradigm provides a way of quantifying degrees of attention, by manipulating the interval between two targets T1 and T2 presented within a string of rapidly succeeding distractors. Since T1 processing consumes attentional resources, it is thought that less attention is available for T2 processing when T2 appears too soon after T1, while more attention becomes progressively available as the lag increases.[11] In this way, conditions of more or less attention to T2 are defined in terms of T1-T2 lag.

In many recent studies, the attentional blink paradigm has been used to assess the graded or categorical structure of consciousness (Eiserbeck et al. 2022; Pretorius 2014; Asplund et al. 2014; Nieuwenhuis and de Kleijn 2011; Sergent et al. 2005; Sergent and Dehaene 2004). To measure potential degrees of consciousness, experimenters give participants a scale where they should rate their subjective percept of T2, usually from no perception at all to very crisp and clear perception. A widely used scale is the Perceptual Awareness Scale (PAS), which comprises four choice points: “not seen”, “slight impression”, “strong impression”, or “clearly seen” (Ramsøy and Overgaard 2004).

In earlier studies, participants tended to use subjective awareness scales in a dichotomous way (Sergent et al.2005, Sergent and Dehaene 2004). That is, most ratings clustered on the “not seen” or “clearly seen” ends. This suggested that, regardless of available amount of attention as per T1-T2 lag, there were no intermediate conscious states where a target was, e.g., only slightly seen or almost completely seen. From this it follows that differences in degrees of attention are not reflected in differences in degrees of consciousness. Admittedly, a sufficiently high degree of attention might be necessary for consciousness; however, different degrees of attention above this threshold will not bring about differences in degree of consciousness. Likewise, different attention degrees below the threshold correspond to equally unconscious states. The supported model was thus a degrees-dichotomy one.

More recently, however, these earlier results have been called into question, on different grounds. One argument is that dichotomous patterns of response could be an artifact of the chosen subjective scale.[12] For example, Anna Eiserbeck and colleagues (2022, 1245-1246) note

[11] Except for Lag 1 sparing: when T2 appears immediately after T1, T2 processing seems to benefit from full attention.

[12] Differences in stimulus type could also explain these different response patterns. Along these lines, Windey et al. (2014) propose that consciousness arises gradually for lower-level stimuli, such as colours and shapes; however, for higher-level stimuli such as words, it is either categorically present or absent. Though this is a promising account, here I do not discuss it further for two reasons. First, this account might require a clarification of how to draw the line between lower and higher levels of processing. For instance: where should we place faces? It might seem that these are higher-level, for they involve semantic categorization, but then the account would predict that experiences of faces do not arise gradually, contrary to Eiserbeck et al. (2022)’s results (Eiserbeck et al. do offer an explanation, though: unlike words or other higher-level stimuli, faces come in a continuum; see id., 1252). Secondly, and more importantly, an alternative explanation of the dichotomous

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that some of these studies (e.g., Sergent and Dehaene 2004; Sergent et al. 2005) involved a 21-point scale that might have been too difficult to use, thus forcing participants to concentrate on the two end points. In support of this view, recent studies using simpler scales (such as the four-point PAS) obtained response patterns predicted by a graded view of consciousness, i.e., a distribution of responses throughout the entire subjective awareness scale (Eiserbeck et al. 2022; Pretorius 2014; see also Nieuwenhuis and de Kleijn 2011).

On their own, these graded response patterns support a graded view of consciousness. But in addition, these studies also support a degrees-degrees model, insofar as degrees of consciousness, as measured by subjective ratings, covary with degrees of attention, as measured by T1-T2 lag. For example, in the study by Eiserbeck et al. (2022), lower PAS ratings were more frequent at shorter T1-T2 lags, while higher ratings were more frequent at longer lags. See Figure 1.[13]

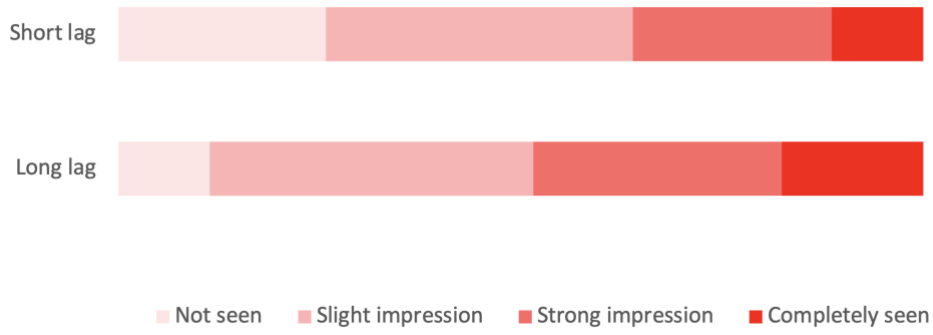

Figure 1. Subjective visibility ratings as a function of T1-T2 lag.

These considerations lend moderate support to a degrees-degrees model. A correlation between measures for degrees of attention and degrees of consciousness suggests that consciousness depends on attention in a way that makes the structure of the former reflected in the structure of the latter. However, one might wonder to what extent these results can be taken at face value. One pressing worry concerns the validity of the deployed measures.

For one thing, one might question what T1-T2 lag really measures. One could suggest that, instead of attentional degree, this is a measure of something like objective visibility. Given that T2 is more difficult to detect at shorter lags, one might think that T2 is less objectively visible at these lags and more objectively visible at longer ones. To be sure, the supported correlation between objective visibility and subjective awareness ratings would still be an interesting one, which may still support a graded view of consciousness. Nonetheless, it is not clear that the graded structure of attention has any role to play in such argument.[14] This removes

response patterns for high-level stimuli is that what arises dichotomously is cognitive access to semantic information (e.g., that the stimulus is a face), but not necessarily the phenomenology. This is an interesting problem to which I cannot make justice here.

[13] Based on Eiserbeck et al.'s (2022) data.

[14] One could link objective visibility with salience and salience with attention: highly visible stimuli are more salient and thus are more likely to capture attention.

the support for a degrees-degrees model and for an intrinsic, constitutive connection between attention and consciousness.

Take now subjective scales. As Michel (2019, 1243–1244) has noted, these scales suffer from a *coordination problem*: they could fail to track the property they purport to measure (i.e., consciousness), because they could just as well covary with different, possibly independent properties. For instance, rather than tracking degrees *of consciousness*, PAS ratings could track properties *of the contents* of consciousness, such as clearness or intensity. Hence, when participants rate their percept of a stimulus X as, say, a "slight impression", this could be either because they had a faint experience of X, or because they had a (full-blown) experience of a faint X. In consequence, at least two interpretations of the attentional blink results are available: degrees of attention could either covary with degrees of consciousness, or they could covary with degrees of properties of (fully) conscious contents. Thus, attentional blink results are still consistent with both degrees-degrees and degrees-dichotomy models. See Figure 2.

	Minimal attention	**Less than maximal attention**	**Maximal attention**
Degrees-degrees model	Minimal consciousness	Less than maximal consciousness	Maximal consciousness
Degrees-dichotomy model	Minimal intensity, maximal consciousness (if any)	Less than maximal intensity, maximal consciousness (if any)	Maximal intensity, maximal consciousness

Figure 2. Two interpretations of attentional blink results.

To decide between degrees-degrees and degrees-dichotomy models, we once again need a positive reason for thinking that a graded view of attention motivates a graded view of consciousness, but this time with the following caveat: degrees of attention must be reflected in the degrees *of consciousness itself* and not in degrees of properties associated with consciousness. Once again, this will heavily depend on our reasons for thinking that the dependence relation between attention and consciousness is of a sufficiently strong and intrinsic kind. I will now consider one such promising line.

4. Dimensions of consciousness

An influential proposal in consciousness research is the *multidimensional approach* (Bayne et al. 2016; Jonkisz et al. 2017; Birch et al. 2020). This approach recommends a conceptualization of conscious states as regions in a multidimensional state space (Bayne et al. 2016, 410). Sometimes, this view is cast as opposite to graded views of consciousness, for if degrees of consciousness are thought of as points in a unidimensional continuum, important dimensions of variation will be neglected. According to Birch et al. (2020), some of these dimensions are:

- *Perceptual richness:* the amount of detail with which an organism perceives aspects of its environment.
- *Evaluative richness:* an organism's range of affective states with positive or negative valence.
- *Synchronic integration*: how unified under a single perspective an organism's experience is at a time.
- *Diachronic integration*: how experiences of an organism at different times are integrated within a single stream of consciousness.
- *Selfhood*: how much an organism is aware of itself as a being distinct from its environment.

In turn, Bayne et al. (2016) suggest that dimensions of consciousness include:

- *Content gating*: how deeply processed the contents of consciousness are (e.g., textures and edges vs. objects; strings of sounds vs. speech).
- *Global availability*: to what extent a conscious state can guide cognitive and behavioural processes (i.e., control thought and action).

Given that these dimensions can vary independently, a conscious state can score very high on some while scoring very low on some others. For example, compared to human visual experience, corvid vision has greater perceptual richness but poorer synchronic integration: corvids have higher motion and spectral sensitivity (they see UV light), but their two brain hemispheres process information separately and without integrating it (Birch et al. 2020, 795). In light of these differences, one cannot simply say that either human beings or corvids are *more conscious*. Hence, proponents of the multidimensional approach suggest that, as a theoretical construct, degrees of consciousness are not as adequate or useful as the notion of *consciousness profiles* (Birch et al. 2020, 799). Unlike degrees of consciousness, consciousness profiles need not be orderable along a single scale; yet, they enable us to make interesting comparisons amongst different conscious organisms.[15]

That said, the multidimensional approach need not be incompatible with graded views of consciousness. True, some proponents imply that while consciousness has many gradable dimensions, it is in itself a categorical property. For example, we saw above that Bayne et al. consider degrees of consciousness to be a conceptual impossibility. However, we also saw that at least one argument is inconclusive. Now, if graded views of consciousness are not ruled out on conceptual grounds, the possibility that consciousness is a gradable property with multiple gradable dimensions remains open. Indeed, nothing in the notion of dimensions of consciousness makes these incompatible with degrees of consciousness. At most, the multidimensional approach entails that degrees of consciousness (if they exist) are more complex than one might have initially thought. But as Lee (2022, 15) points out, this seems to be the standard for many gradable properties, such as intelligence or health. Moreover, since dimensions of consciousness are gradable, it still makes sense to compare conscious states along some of these dimensions. Even if there is not always a fact of the matter as to which of

[15] Part of the motivation for rejecting degrees of consciousness in favour of consciousness profiles is that while any two degrees of consciousness are supposed to be comparable with respect to how conscious they are, for some pairs of consciousness profiles this is not possible. Lee (2022) calls this the *orderability objection*, and offers a compelling reply, namely: degrees of consciousness do not require that *every* pair of conscious states are comparable with respect to how conscious they are. It suffices that this is possible for *some* conscious state pairs. Degrees of consciousness require only *partial*, but not *total* orderability.

two states is more conscious across the board, a state can still be, e.g., perceptually richer or more unified at a time than another. In these cases, we can say that the first state is more conscious than the second, *with respect to the relevant dimension*.

Crucially, many of the dimensions of consciousness identified to date are modulated by attention, such that more attention amounts to higher "scores" along these dimensions. A recent framework by Fazekas and Overgaard (2018) illustrates this for at least two dimensions: *perceptual richness* and *content gating*.

Fazekas and Overgaard argue that attentional mechanisms modulate *representational* features of conscious perception, such as intensity, precision and level of processing. These representational features underlie *phenomenal* features of perceptual consciousness, such as saliency, crispness and experienced wholeness (Fazekas and Overgaard 2018, 1837–1838). Attention modulates each of these phenomenal features by modulating the underlying representational features. For example, attention can make a content of experience more salient or crisper by making the relevant representation more intense or precise.[16] See Figure 3.

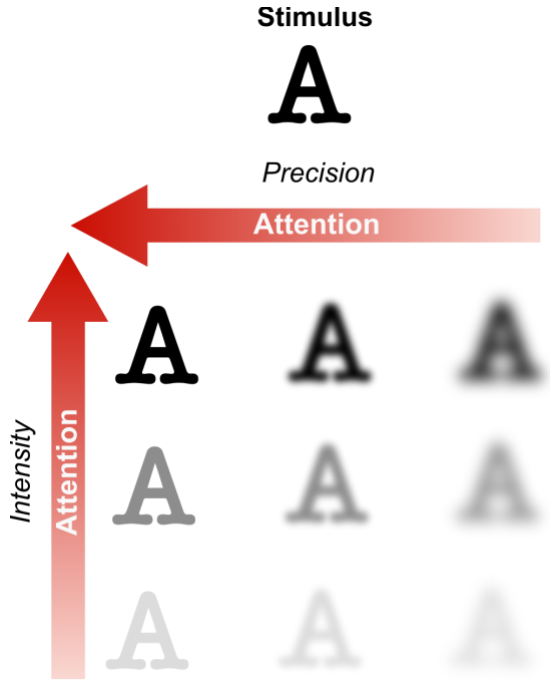

Figure 3. Quality of visual representations as a function of attention.

Intensity and precision are part of what Fazekas and Overgaard call a *horizontal axis* of variation for degrees of consciousness. Along this axis, consciousness degree depends on representational *quality* within a single level of processing. Figure 3 illustrates variations within high-level processing, where stimuli are semantically categorised (in this case, stimulus is categorised as an 'A'). Besides precision and intensity, another dimension of representational quality is temporal stability: how well the signal is sustained over time. There is evidence that

[16] Plausibly, the attentional mechanisms modulating intensity and precision are signal amplification and signal tuning, respectively. See Fazekas and Nanay (2021) for discussion.

attention also modulates this dimension: attention protects stimuli from decay (Matsukura et al. 2007) and helps stimulus maintenance in short-term memory (Kuo et al. 2012).

In addition, Fazekas and Overgaard propose that degrees of consciousness can vary along a *vertical axis*, depending on level of processing (i.e., low, intermediate or high; see Windey et al. 2014, 5–6). Notably, level of processing is also plausibly modulated by attention. For example, classical studies on dichotic listening suggest that unattended auditory stimuli are not processed all the way to semantic categorisation: though participants can distinguish low-level features of unattended spoken words, such as pitch, they cannot recover meanings (Wood and Cowan 1995).

In this way, there is reason to think that degrees of attention are reflected in two recognised dimensions of consciousness, i.e., perceptual richness and content gating, such that higher scores on these dimensions are connected to higher degrees of attention. Nonetheless, an objector might insist that these are clearly modulations of conscious *contents*. So even if all the discussed features are gradable as a function of degree of attention, this is no conclusive reason for embracing a graded view of consciousness. Take, for example, the percept in the lower right corner of Figure 3, which involves minimal degrees of both precision and intensity. To the extent that the stimulus is in fact *seen*, as opposed to not seen, the percept is conscious, full-stop. In this respect, it does not differ from the percept in the upper left corner, even though the latter involves maximal degrees of intensity and precision. Hence, the picture we have so far is still consistent with a degrees-dichotomy model.

One can put this worry at ease, to some extent, by noting that attention in fact modulates many other dimensions of consciousness that are not obviously reducible to aspects of represented contents. To illustrate, we will now consider *synchronic integration* and *selfhood*.

5. Beyond conscious contents

Synchronic integration is the dimension of consciousness constituted by how unified an organism's consciousness is at a time. It concerns what in philosophy is called *the unity of consciousness* (Bayne and Chalmers 2003/2010). An organism's consciousness can be more unified or disunified, depending on how integrated the different parts of their conscious experiences are. For example, we saw above that corvid brains do not combine the information processed in the right and left hemispheres; this is reason to think that corvid consciousness might be less unified than it is for organisms whose brains bring together information from both hemispheres.[17]

Synchronic integration is not so much about the contents of consciousness, as it is about the relations between these contents. Recently, Watzl (2017, 266–270) has argued that attention is key for understanding why the diverse contents of consciousness are related in such a way that they are experienced as part of a unified field of consciousness. In his view, this is because

[17] Specifically, corvid consciousness might have less of what Bayne and Chalmers (2003/2010, 505) call *access unity*: two contents of consciousness are unified in this sense when the subject can access them both at once. Contrastingly, two contents are *phenomenally unified* when there is something it is like to experience the two of them together. Following Bayne and Chalmers' (2003/2010, 504) observation that access consciousness and phenomenal consciousness go together empirically, I assume that lack of access unity is a good indicator of lack of phenomenal unity (for a similar position, see Wiese 2018, sect. 1.3.2). Thus, corvid consciousness might also be less *phenomenally* unified. As the focus of this chapter is phenomenal consciousness, the discussion in this section is primarily concerned with phenomenal unity.

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attention creates priority and centrality relations where some of these contents are experienced as *more central* or *more peripheral*. Since a content is only experienced as more central or peripheral with respect to other contents that are experienced at the same time, they all must be experienced as parts of a single centrality system. Importantly, Watzl (2017, 173–180) further argues that centrality relations are structural aspects of consciousness, that cannot be reduced to properties of represented contents.

If attention is constitutive of synchronic integration in the way Watzl suggests,[18] one can further argue that phenomenal fields are more unified when they involve higher degrees of attention. But, what does it mean for a phenomenal field to involve a higher degree of attention?

Suppose, with Watzl (2017, 87), that degrees of attention to a given content can be measured by the position this content occupies within a priority system, and that degrees of priority are reflected in degrees of phenomenal centrality (Watzl 2017, 184). If this is what degrees of attention are, then they are properties of parts of phenomenal fields, not of whole phenomenal fields. Since synchronic unity is a property of whole phenomenal fields, it is not clear how having parts with higher degrees of attention should contribute to the field as a whole being more unified.

Nonetheless, one can still trace a connection between degrees of synchronic unity and experienced centrality. Imagine an organism with two disconnected centrality systems (maybe this organism is a corvid, or a split-brain patient). Suppose that, within one of these two systems, a phenomenal part P1 is experienced as more central than any other part in the same system. Correspondingly, within the other system a phenomenal part P2 is experienced as more central than any other part. There is no question as to which of P1 or P2 is more central for the organism, as P1 and P2 might both be equally central with respect to the relevant centrality system. This very fact seems to account well for why the phenomenal field of this organism might strike us as more disunified than that of an organism with a single centrality system, where a single phenomenal part P is experienced as more central than any other part. On the other hand, an organism with three disconnected centrality systems where each of these has a single more central part would be even more disunified. One could thus argue that P is, in a sense, more central than either P1 or P2, for P is more central within a priority system *and for the entire organism*. Notably, this proposal entails that P involves a higher degree of attention than either P1 or P2. But this is in consonance with Watzl's proposal that degrees of attention are determined by the *position* of a phenomenal part within an organism's mental life and cognitive economy.[19]

In addition to these mostly theoretical and phenomenological considerations, there is abundant empirical evidence that attention has a key role in informational integration at different stages of processing. Attention is crucial for binding perceived features (e.g., "yellow", "curved") into coherent object representations (e.g., a banana; see Treisman 2006) and is also required for many forms of perceptual organisation, including shape formation and figure-ground segmentation (Kimchi 2009). Furthermore, attention not only facilitates

[18] This view is challenged by Wiese (2022), who argues that centrality structures generate disunity rather than unity. However, Wiese's recommended view still retains the key role of attention in explaining the unity of consciousness.

[19] Furthermore, degrees of attention need not exclusively concern the "amount" of attention allocated to a single content. Degrees of attention can also concern the attentiveness of an overall state. For example, compare the vigilant state of a lifesaver watching the beach with the wandering mind of a bored student. Intuitively, the former involves a higher degree of attention than the latter, even if none of these states has a single part that is experienced as more central. One can argue that degrees of synchronic unity follow degrees of attention in this sense: perhaps the phenomenal field of the mind wandering student is more disunified than that of the vigilant lifesaver.

integration of information within a single modality, but also across modalities (Talsma et al. 2010). To be sure, I am not suggesting that synchronic unity is reducible to integration of information (Bayne and Chalmers 2003/2010, 499-500). My suggestion is only that informational integration is plausibly required for synchronic unity, and that this is a plausible, empirically supported way in which more attention can contribute to making the field of consciousness more unified.

In line with these ideas, Wiese (2018) has recently offered an analysis of the notion of phenomenal unity in terms of an experience of *wholeness*, which connects the distinct contents of experience at a time but also over time (Wiese 2018, sect. 9.7). Based on considerations about the predictive nature of processing in the human brain, Wiese proposes that this experience of wholeness tracks perceived regularities in the environment, and thus comes in degrees, depending on how strict these regularities are. The stricter the regularities, the stronger the sense that a collection of phenomenal parts "go together" (Wiese 2018, sect. 9.3). The field of phenomenal consciousness is thus constituted by a hierarchy of experienced wholes (Wiese 2018, sect. 9.6.3). More *local* wholes, like apples or barking dogs, have a greater degree of experienced wholeness than more *global* ones, like perceptual scenes or even an overarching object we can call "the world" (Wiese 2018, sect. 9.2.4). The synchronic unity of consciousness can then be conceptualized as an experience of wholeness at the most global end of this hierarchy. Accordingly, the entire phenomenal field would be the most global experienced whole.

Crucially, Wiese notes that degrees of experienced wholeness are not only due to the strength of perceived regularities, but also to variations in attention (Wiese 2018, sect. 9.6.3). Since attention is often selective, more local wholes typically benefit from higher degrees of attention, as they are easier to single out (compared to more global wholes).[20] Figure 4 illustrates this idea.

[20] Further support for this idea could come from conceptualizations of attention as a resource that can be distributed in various ways (e.g., Young and Stanton 2002) or a mechanism for controlling the distribution of cognitive resources (e.g., Luck et al. 1996). In these views, a broader focus of attention brings about a "thinner" resource distribution.

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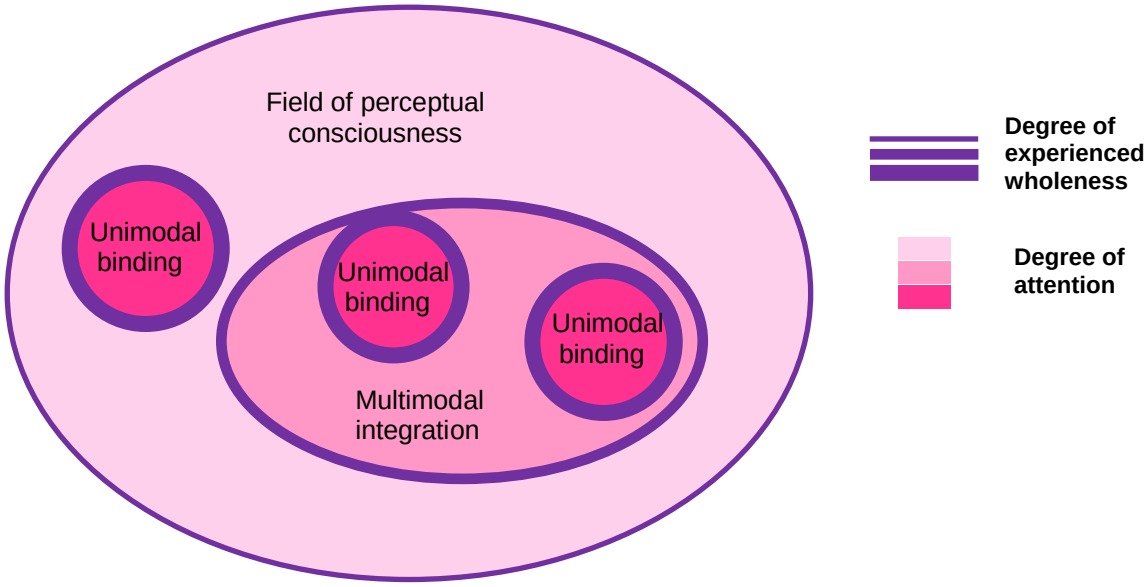

Figure 4. Degrees of attention and degrees of experienced wholeness

Admittedly, this picture entails that the whole field of consciousness is unified to a much weaker degree than some of its parts. This would be partially due to our relative incapacity to maintain attention to larger and larger collections of objects and properties at the same time. For example, the totality of perceptual contents of experience at a time (the "field of perceptual consciousness" in Figure 4) would be less unified than any single perceptual content (e.g., a multimodal whole like a barking dog), but more unified than the organism's total phenomenal field at a time (including, for example, affective, volitional or cognitive components).[21]A consequence of this view is that if we had a much greater capacity to focus attention (on much greater wholes), our consciousness would be more greatly unified.

The discussed considerations about centrality systems and experienced wholeness suggest that degrees of synchronic integration plausibly reflect degrees of attention. At this point, a defender of a degrees-dichotomy model can insist that there is a gap between degrees of synchronic integration and degrees of consciousness: synchronic integration is just one more dimension of consciousness, which might well be graded while consciousness itself is categorical. However, the case for degrees-dichotomy models plausibly becomes weaker as evidence accumulates that degrees of attention correlate with degrees of several different dimensions of consciousness. The more correlations like these we find, the more reason we have for thinking that consciousness bears a strong and intrinsic relation to attention, such that the structure of the former may plausibly reflect the structure of the latter.

To bring further strength to this case, consider now the selfhood dimension of consciousness. This is constituted by an organism's awareness of itself as separate from its environment. Plausibly, human beings have one of the highest forms of self-awareness, which involves the capacity of forming thoughts about the organism's present and past bodily and

[21] Along these lines, practitioners of open monitoring meditation, who train to maintain a state of high attentiveness to their entire phenomenal field at every passing moment (Lutz et al. 2008, Fujino et al. 2018) would have a more unified field of consciousness.

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mental states. Contrastingly, a very basic form of self-awareness will just involve some way of disentangling those changes to the organism's internal state that are due to its own activity from those that are due to environmental input (Birch et al. 2020, 797). Arguably, these constitute the two ends of a spectrum from higher to lower degrees of self-awareness.

One reason for thinking that degrees of self-awareness are modulated by degrees of attention is that organisms with more developed forms of self-awareness have also developed more sophisticated forms of attention. Several researchers have tied the emergence of consciousness in the animal kingdom to the evolution of sufficiently sophisticated forms of attention. Prominently, Montemayor and Haladjian (2015) distinguish five main attentional skills, appearing at successive evolutionary stages. They suggest that the two earlier ones can occur with or without consciousness. Similarly, Graziano (2019) distinguishes three forms of attention, of which only the latest necessitates consciousness. Figure 5 offers a rough comparative summary of this research.

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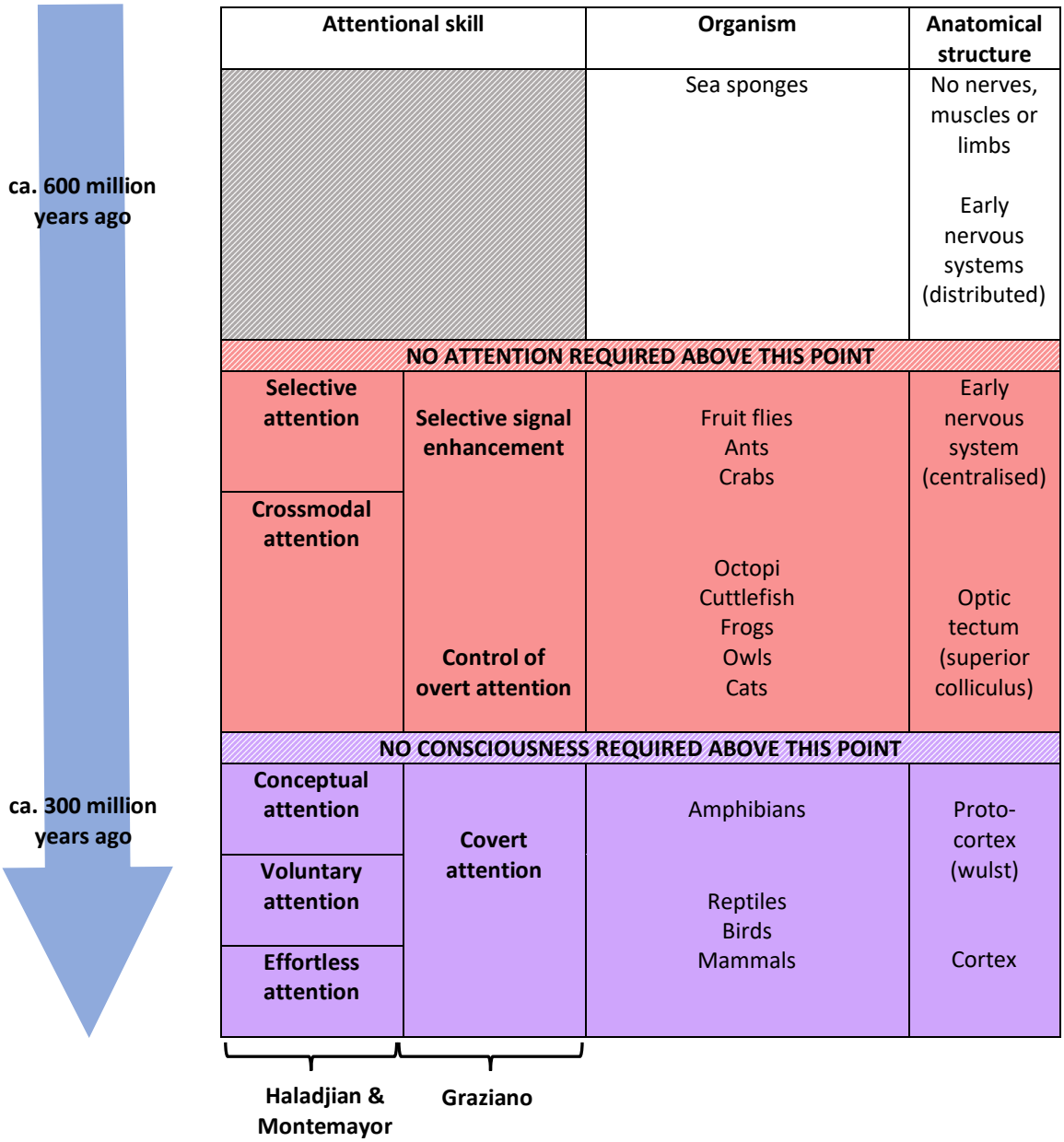

Figure 5. An evolutionary perspective on degrees of attention and consciousness.

On this broad evolutionary picture, consciousness can be most safely attributed to those creatures with capacities for, e.g., conceptual or covert attention. This does not entail that creatures lacking these capacities lack consciousness altogether; as we have seen, these creatures could plausibly have good scores on some dimensions of consciousness. However, one respect in which creatures in the bottom half of Figure 5 may plausibly have higher consciousness scores than creatures in the upper half is precisely self-awareness. Take a creature that can selectively enhance environmental signals but cannot use attention covertly (i.e., in a way that is decoupled from sensory input). This creature might be able to discern external from internally generated signals, and thus might have a basic form of self-awareness. Still, since this creature does not have the capacity to disengage its attention from its current

input, it might not be able to have awareness of itself as a persisting entity within that environment.

To be sure, this argument raises a question about how exactly degrees of attention must be conceptualised. In the previous discussion, we have been loosely thinking of degrees of attention as amounts of some resource that can be allocated in different ways under different conditions. For example, within the attentional blink task, degrees of attention are thought of as something that can be consumed or restored within an organism's cognitive system. Within Fazekas and Overgaard's (2018) multifactor model, degrees of attention are cashed out in terms of the operation of the mechanisms for amplification and fine-tuning of input signals. Considerations about centrality systems and experienced wholeness are still in consonance with this resource view of degrees of attention, but they also introduce new aspects, such as relative and absolute position with respect to other parts of an organism's cognitive system.

The argument from evolution, in turn, takes what seems to be a steeper departure from these conceptions. For the claim is now that degrees of attention are higher for the more evolutionarily recent attentional skills, and lower for the more ancient ones. True, this might hold to some extent. For example, conceptual attention (the capacity to see a stimulus as, e.g., either a duck or a rabbit; Montemayor and Haladjian 2015, 26, 194) plausibly involves a higher amount of processing resources than some automatic form of selective attention where the organism responds to, say, small dark moving objects in its environment. In this sense, conceptual attention can be thought of as generally involving higher degrees of attention than automatic forms of selective attention. But contrast, on the other hand, covert versus overt attention, that is, the capacity for directing attention independently of current sensory stimulation versus the capacity for directing attention to current input from sensory channels, respectively (see Carrasco 2011). Covert attention is a more recent adaptation; yet, covertly attended stimuli might benefit from lesser processing resources, compared to than overtly attended ones. Covert *spatial* attention requires moving attention around to different locations, while the eyes remain fixed. Since visual processing in the periphery is significantly more limited than at the fovea, attentional amplification operates on a lower baseline when attention is directed covertly. One may plausibly think that this limits the strength of the attentional effect, so that covert attention effectively involves a lesser degree of attention than overt attention.

I take these considerations to suggest that the right picture of degrees of attention is probably multidimensional as well. In this view, degrees of attention would be determined, at least partially, by an interaction of cognitive sophistication and amount of processing resources.

Admittedly, the arguments in this section are far from conclusive. Still, they can at least hint at interesting covariations between degrees of attention and degrees of consciousness, when these are measured along dimensions that are not obviously reducible to contents. At this point, proponents of degrees-dichotomy models may insist that even if degrees of attention do covary with degrees of selfhood and synchronic integration, these are still *features* of consciousness, which can be gradable while consciousness itself remains categorical. In the closing section of this chapter, I offer a tentative reply.

6. The unconscious-conscious transition

At the outset of this chapter, I suggested that considerations about the structure of attention could throw light on the question of whether consciousness is graded or categorical. We have

now seen that, though degrees-degrees models are an appealing possibility, degrees-dichotomy models are not yet ruled out. Does this mean that attention is not of help for understanding the kind of property that consciousness is? Not necessarily.

The way in which dimensions of consciousness covary with degrees of attention is indicative of strong intrinsic connections between attention and consciousness. The more such covariations are found, the more pressure falls on the view that consciousness itself does not reflect the graded structure of attention. Importantly, I am not suggesting that consciousness is reducible to consciousness dimensions. Instead, I have in mind a more modest claim: even if consciousness is a categorical property, for all we know it might be a categorical property *with a graded basis*. In this respect, consciousness might be like mass: while *having mass* is a categorical property, its basis, i.e., the property in virtue of which things instantiate *having mass* (i.e., mass) is graded.[22]

Crucially, it is *the basis* of a property like *having consciousness* that raises the most interesting questions. For instance, when scientists inquire whether consciousness arises gradually or suddenly, presumably what they care about is the property that makes it the case that a state is conscious. We do not know yet what this property is, but if the considerations offered here are on the right track, this property will likely be modulated by degrees of attention and may be gradable itself.

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[22] This example is due to Lee (2022, 12). The view that consciousness is a categorical property with a graded basis is defended in an unpublished manuscript by Eric Schwitzgebel (sect. 4).

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