

# Consciousness, Haecceitism, and Grounding

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## Abstract

This paper aims to demonstrate that the ontology of consciousness is consistent with both the modal and the metaphysical versions of Haecceitism. I examine the varieties of Haecceitism, and I specify the intended versions that the arguments will vindicate. I define the property of 'being purely qualitative', and examine its relation to the properties of phenomenal consciousness. I draw, inter alia, on Bayesian perceptual psychology, in order to specify the identity-conditions of phenomenal properties in detail. I provide two, abductive arguments for the claim that the identity-conditions on some individuals are metaphysically haecceitistic, in virtue of the relations that hold between those individuals and the phenomenal properties that they instantiate. The first argument is corroborated by empirical results concerning the phenomenological effects of attention. The second argument is corroborated by empirical results from the study of color in vision science. The arguments vindicate a version of Metaphysical Haecceitism, because the individuals are shown to be typed by the phenomenal properties that they instantiate, although quantification over the individuals is an ineliminable condition on their identity and distinctness. I provide, then, a regimentation of the extant proposals in the ontology of consciousness, using the logic of hyperintensional ground, as augmented by the Bayesian probability calculus. The hyperintensional regimentation vindicates a version of Modal Haecceitism, because the probabilistic ontological dependence of the parts of worlds on other parts thereof provides an ineliminable condition on the identity and distinctness of worlds.

## 1 Introduction

This paper endeavors to demonstrate that the ontology of consciousness is consistent with both the modal and the metaphysical versions of Haecceitism. In Section 2, I examine the varieties of Haecceitism, and I specify the intended versions that the arguments will vindicate. In Section 3, I define the property

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of 'being purely qualitative', and examine its relation to the properties of phenomenal consciousness. I draw, *inter alia*, on Bayesian perceptual psychology, in order to specify the identity-conditions of phenomenal properties in detail. In Section 4, I provide two, abductive arguments for the claim that the identity-conditions on some individuals are metaphysically haecceitistic, in virtue of the relations that hold between the individuals and the phenomenal properties that they instantiate. The first argument is corroborated by empirical results concerning the phenomenological effects of attention. The second argument is corroborated by empirical results from the study of color in vision science. The arguments vindicate a version of Metaphysical Haecceitism, because the individuals are shown to be typed by the phenomenal properties that they instantiate, although quantification over the individuals is an ineliminable condition on their identity and distinctness. In Section 5, I provide a regimentation of the extant proposals in the ontology of consciousness, using the logic of hyperintensional ground, as augmented by the Bayesian probability calculus. One aspect of the philosophical significance of the regimentation is that it demonstrates how hyperintensional differences between worlds can express haecceitistic differences between worlds. If so, then the hyperintensional regimentation vindicates a version of Modal Haecceitism, because the probabilistic ontological dependence of the parts of worlds on other parts thereof provides an ineliminable condition on the identity and distinctness of worlds. Section 6 provides concluding remarks.

There are at least two, primary theoretical virtues that the hyperintensional regimentation proffered here can further satisfy.

The first theoretical virtue of the hyperintensional regimentation is that functionalism can be modeled in the semantics, and thereby satisfy some explanatory properties. Block (forthcoming) argues that psychofunctional identity statements cannot be explanatory. Block distinguishes between metaphysical and ontological versions of physicalism. Block's 'metaphysical physicalism' is a non-reductive theory – namely, Phenomenal Realist Type Identity – and the theory is purported to be able to avail of relations of explanatory, ontological dependence (11). Block's 'ontological physicalism' is a reductive, functionalist theory, and eschews of explanation by restricting the remit of its theory to 'what there is'; i.e. to specifying identity statements between entities – namely, functional properties – in the domain of quantification (*op. cit.*). Block poses the following consideration against the functionalist (14-15). Suppose that there is a counterpart of a human organism with isomorphic functional properties, but comprised of distinct biological properties. Suppose that the functional isomorph instantiates phenomenal properties. Block argues that the functional isomorph 'is like us superficially, but not in any deep property that can plausibly be one that scientists will one day tell us is the physical ground of consciousness [...] So there is a key question that that kind of reductive physicalism—ontological physicalism—does not ask nor answer: what is it that creatures with the same phenomenology share that grounds that phenomenology' (*op. cit.*)?

The foregoing does not provide an argument that the neuro- and psychofunctionalist must provide an account of in virtue of what phenomenal properties are instantiated. Rather, Block suggests only that functionalist proposals do not

sufficiently inquire into the realizers of the functional roles that they specify. He suggests that this theoretical approach would be insufficient, if one were to seek an explanation of the psychofunctional correlations between phenomenal property types and the relevant functional roles.

The first theoretical virtue of the hyperintensional regimentation is thus that it demonstrates how Block's analysis might be circumvented. Functionalism can be regimented within the logic of hyperintensional ground; and can therefore satisfy the formal requirements on explaining in virtue of what phenomenal truths ontologically depend upon functional truths.

The second theoretical virtue of the hyperintensional regimentation derives from its expressive power. Phenomenal Realist Type Identity is Block's preferred, non-reductive physicalist proposal (cf. Block, *op. cit.*). Phenomenal Realist Type Identity is defined as follows: Truths about consciousness are identical to truths about biological properties, however phenomenal properties possess the second-order property of being – in a sense to be precisified in what follows – non-reductively real. When regimented using the more coarse-grained tools of modality and identity, Phenomenal Realist Type Identity belies Leibniz's Law, on the condition that the latter can be applied to intensional entities. (Leibniz's Law is codified thus:  $\forall x,y[x = y \iff [\phi x \iff \phi y]]$ .) The second theoretical virtue of the hyperintensional regimentation is that it avoids the putative violation of Leibniz's Law that is entrained by the more coarse-grained modal regimentation; and thereby allows for the expressive adequacy of the non-reductive type identity proposal.

In the following section, I outline the main approaches to the Haecceitism/Anti-Haecceitism distinction that have been delineated since Kaplan (1975). I specify the general contours of the Metaphysical and Modal Haecceitist proposals for which the paper will argue.<sup>1</sup>

## 2 Background

According to Kaplan's (*op. cit.*) delineation of the Haecceitism/Anti-Haecceitism distinction, Anti-Haecceitism is defined as the doctrine that individuals in two worlds 'resemble one another closely', although there are no further conditions of identity and distinctness for the individuals beyond their qualitative resemblance. Kaplan goes further, and claims that Haecceitism entails world-bound identity. He writes: 'Although the Anti-Haecceitist may seem to assert that no possible individual exists in more than one possible world, that view is properly reserved for the Haecceitist who holds to an unusually rigid brand of metaphysical determinism' (722-723). Thus, Kaplan understands Haecceitism as the proposal (i) that identity and distinctness between individuals are not exhausted by relations of qualitative similarity, and (ii) that individuals are world-bound.

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<sup>1</sup>See Stalnaker (2012), for a more extensive taxonomy of the varieties of Haecceitism. Stalnaker (*op. cit.*) ends his discussion with agnosticism about which proposal to endorse. However, a further benefit of his presentation is that he emphasizes the distinct roles that semantics and that ontology play in the various definitions of the proposals.

I see no reason for the Haecceitist to accept Kaplan's second condition, (ii). On the contrary: For the Haecceitist, it is precisely because individuals can be individuated in a non-qualitative manner – e.g., not by counterpart relations capturing qualitative similarity across worlds – that trans-world identity for individuals is about the individuals themselves, rather than about the qualitatively similar representations thereof.

According to Adams' (1979) approach, Haecceitism is captured by identity, quantification over individuals, and the property of 'thisness'. Thus: 'being NN' is a property of thisness; the property is NN's haecceity; and it is codified as follows:  $\forall x, y \exists \phi [\phi x \iff x=y]$ . Because the property of thisness depends only on identity and on quantification over individuals, it does not constitutively involve the notion of being purely qualitative. Adams refers further to the property of 'being purely qualitative' as the property of 'suchness'. On the most popular way of understanding the notion of 'being purely qualitative', the property is *general*, by prescindng from quantification over individuals (cf. Fine, 1977: 137).

According to Lewis' (1986) approach to the distinction, difference in qualitative character among worlds amounts (i) to differences in the 'patterns of instantiation of the [superlatively] natural, intrinsic properties and external relations' in the world (221); and (ii) to differences among *de re* representations, i.e. what the counterparts are in the worlds at issue.

According, then, to Lewis, Anti-Haecceitism can be defined as follows: The specification of (ii) supervenes on the specification of (i).

By contrast, Haecceitism is defined, such that difference in counterpart (ii) does not supervene upon difference in perfectly natural properties (i). As Stalnaker observes: For Lewis, 'haecceitistic differences are differences in the way possible worlds are used to represent the properties of individuals in different worlds, not differences between the worlds themselves' (Stalnaker, op. cit.: 59).

Lewis (op. cit.) allowed eventually for the existence of intra-world counterparts, under the label, 'Cheap Haecceitism'. On the Cheap Haecceitist proposal: 'Possibilities are not always possible worlds'. Thus, in a possible world,  $w_x$ , 'NN could be President' is understood as follows: (i) In  $w_x$ , NN concretely exists and satisfies the description  $\phi$ , and (ii) In  $w_x$ , there is a qualitatively indiscernible counterpart of NN which represents NN as being the President; so ' $\exists w_x [\phi(\text{NN}) \wedge \diamond \neg \phi(\text{NN})]$ '.

In response to this maneuver, Skow (2007: 107) and Russell (2013) raise the following, compelling worry:

Suppose that the 'Possibility Role' is thus characterized:

'p is possible iff p is true at some world' (Russell, op. cit.: 4).<sup>2</sup>

If possible worlds satisfy the 'Possibility Role', such that possibilities just are possible worlds, then what sense can be made of Lewis' Cheap Haecceitist distinction between possibilities and possible worlds?

One way to understand Lewis' Cheap Haecceitist distinction between possi-

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<sup>2</sup>Russell includes two subsidiary constraints: (i) If  $p_1; p_2; \dots$  entail q and  $p_1; p_2; \dots$  are true at a world w, then q is true at w; and (ii) Either p is true at w or not-p is true at w (op. cit.).

bilities and possible worlds is examined by Russell (op. cit.: Section 7). Russell endeavors to capture the distinction between possibilities and possible worlds via introducing a 'factuality' operator. The application of the factuality operator is intended to capture both the notion of being qualitative and the possibility that there are grades of realism: Propositions are said to be factual if they are qualitative, and – following Lewis – therefore supervene on the perfectly natural properties. Thus, propositions mapping to 1 can be 'factually defective' and satisfy only deflationary conditions on their truth, whereas there are also propositions mapping to 1 whose factuality is in some sense more realistic. In step with Lewis' definition of Haecceitism, Russell argues, then, that there are possibilities that are not possible worlds, because possibilities can be factual or non-factual depending on whether they supervene on the qualitative, natural properties of the worlds in which they exist.

Finally, Fine (2005) emphasizes the distinction between Metaphysical Haecceitism and Modal Haecceitism, and the respective Modal and Metaphysical Anti-Haecceitist proposals.

- Modal Anti-Haecceitism

On the Modal Anti-Haecceitist proposal, trans-world identification of individuals is purely qualitative. As Fine writes:

'All necessity is ultimately general corresponds to the claim that all possible worlds must ultimately be given in purely qualitative terms. It must be possible to specify the worlds without making reference to any individuals [...] Suppose we have a model or representation  $A$  of the set of possible worlds. Then in such a model we will be forced to settle questions of 'external' or cross-world identity; for given an individual  $x$  from one world and an individual  $y$  from another world, either  $x$  will be identical to  $y$  or  $x$  will be distinct from  $y$ . But if the possible worlds are given in purely qualitative terms, such external identities should be incidental to the representation. It therefore follows, if  $B$  is 'locally isomorphic' to  $A$ , i.e. differs from  $A$  only in the identities of the individuals that figure in the different worlds, then  $B$  should serve as an equally good representation of the underlying modal reality' (31).

Fine (1977) endeavors to capture this notion of 'local isomorphism' via automorphisms. He writes, e.g.: 'An automorphism is a permutation of individuals and worlds that respects the structure of each world [...] Intuitively speaking, two worlds are isomorphic if they are qualitatively the same [...] Thus an automorphism systematically correlates each world with a qualitative counterpart' (136).

The Modal and Metaphysical Haecceitist proposals are then defined as follows.

- Modal Haecceitism

Possible worlds are individuated by reference to the individuals that comprise them. Trans-world identification of individuals is then non-qualitative.

By contrast to the modal versions, Fine (2005: *op. cit.*) claims that the issue of Metaphysical Haecceitism concerns the identity of individuals simpliciter. The Metaphysical Haecceitist proposals can then be delineated as follows.

- Metaphysical Anti-Haecceitism

Bundle theory; i.e. 'there is nothing to a particular over and above its properties' (*op. cit.*).

- Metaphysical Haecceitism

Individuals are identical to 'bare particulars', rather than being typed by a set of properties (*op. cit.*).

- Hybrid Metaphysical Haecceitism

The properties by which to identify individuals – their haecceities – are identical to a distinct set of properties instantiated by the individuals. However, the individuals themselves must still be quantified over within the conditions on their identity and distinctness.

### 3 Qualitative Properties

Formally and intuitively countenancing a version of the hybrid approach to Haecceitism is one of the primary aims of this paper. In order for a hybrid approach to be developed, the notion of a qualitative property type must be precisified.

In the foregoing, the property, 'being purely qualitative', was taken to concern generality. Either (i) the identity-conditions of worlds are specified without quantification over individuals, or (ii) the identity-conditions on individuals make no explicit reference to the individuals, writing away their existence, as it were, by instead availing of quantification strictly over properties. Further, 'being qualitative' was taken to be a constitutive property of the similarity-relation on worlds. The interest in the notion of qualitative similarity has familiarly been witnessed by its aid in the analysis of counterfactual conditionals. A second, familiar extension of qualitative similarity – which is of more crucial relevance to the present discussion – has been to the counterpart analysis of alethic possibility.

Qualitative properties fall within at least two types.

The first type of qualitative property is the class of primary qualities – i.e., the empirical or 'perfectly natural' properties postulated by fundamental physics, such as mass and charge. It is to this category that the second-order condition of being general might best apply. Thus, two worlds are qualitatively similar if and only if they instantiate all of the same perfectly natural, primary-qualitative properties. At the level of identity conditions of individuals rather than worlds, an individual will satisfy conditions on being a qualitatively similar counterpart of a distinct individual if and only if they instantiate the same

massive properties. In the setting in which the purely qualitative types include primary qualities, it is then open to debate whether the properties themselves can be eliminable by reference strictly to the structural profile of worlds such as laws – codified, e.g., by higher-order Ramsey sentences – or whether the purely qualitative, primary-qualities must be retained, such that the Ramsey sentence expressing the law must include a formal clause which specifies a relation to those properties.

The second type of qualitative property concerns secondary qualities, i.e. the properties of consciousness. A property of consciousness – that is, a phenomenal property type – falls itself into higher types. The first type of phenomenal property is the property of awareness. Thus, if phenomenal properties are instantiated on an individual's perceptual representational states, then the phenomenal properties are properties of the individual's awareness of their perceptual representations. The second type of phenomenal property includes the class of secondary qualities; e.g., pain and color hues. An example of the second type of phenomenal property is targeted in Jackson's (1982) scenario, in which Mary the brilliant scientist comes to possess knowledge by acquaintance with color-phenomenal properties such as the redness of a rose, upon exiting her black and white room.

It is important not to elide these two types of phenomenal property, although I will here assume that both types are constitutive higher-order properties of the properties of phenomenal consciousness. In the following section, I argue that a hybrid version of Metaphysical Haecceitism can be secured, by providing identity-conditions for individuals in which the notion of being qualitative satisfies both of the foregoing interpretations.

As background for the arguments for Haecceitism, we must be more precise about the ontology of phenomenal properties, interpreted as a property of awareness.

Bayesian perceptual psychology seeks to answer the problem of underdetermination. The problem of underdetermination concerns how proximal, spectral wavelengths that are sensed by the retina can be transformed into perceptual representations as of distal particulars. Vision science answers the underdetermination problem by providing the following model. When sensory retinal activation occurs, the visual system is presented with a state space,  $\Omega$ , of possibilities with regard to the direction of a lightwave source.  $\Omega$  forms a  $\sigma$ -algebra, in virtue of being closed under complementation and intersection. Define a random variable as a mapping from points in  $\Omega$  to values in the  $[0,1]$  interval. Interpret the random variable as a probability density, where the density is itself interpreted as representing an alethic probability. The alethic probability satisfies the Kolmogorov axioms: namely, 'Normality' (which states that the probability of a tautology maps to 1); 'Non-negativity' (which states that the probability operator must take a non-negative value), 'Additivity' (which states that for any two, disjoint probability densities, the probability of their union is identical to the first density added to the second density); diachronic update-measures, such as 'Conditionalization'; and perhaps synchronic update-measures, such as the log-likelihood-ratio. The visual system computes which of the points in  $\Omega$  rep-

representing the direction of a light-source is constant. The constancy calculated by the visual system places, thereby, an accuracy-condition on the subsequent attribution of properties to distal particulars.

Suppose, e.g., that  $\Omega$  is comprised of two points, one of which is the possibility that the source of light is coming from above, and the second of which is the possibility that the source of light is coming from below. The underdetermination problem is solved by the visual system, by the implicit calculation of the alethic probability that one of the possibilities is the constancy.<sup>3</sup> The constancies comprise accuracy-conditions on the attribution of properties – such as being concave or being convex – to distal particulars.

- **Normality**

$$Pr(T) = 1$$

- **Non-negativity**

$$Pr(\phi) \geq 0$$

- **Additivity**

If  $\phi$  and  $\psi$  are disjoint, then

$$Pr(\phi \cup \psi) = Pr(\phi) + Pr(\psi)$$

- **Synchronic Confirmation (Log-likelihood ratio)**

$$\log[Pr(E | w_x)/Pr(E | \Omega - w_x)]$$

- **Diachronic Confirmation (Conditionalization)**

$$Pr(\Omega | E) = [Pr(\Omega \wedge E)/Pr(E)]$$

- **Phenomenal Properties**

Comprehension:

$$\text{Comp} = \lambda\alpha\forall x.\alpha(x) \iff A$$

with  $\alpha$  not free in  $A$ .

Let phenomenal properties be denoted by the symbol,  $i_n$ , where  $i$  represents the phenomenal representation of an agent at a context,  $n$ .

A necessary condition on the right-hand-side of the phenomenal property comprehension principle is the deployment of the kinds of attention; in particular exogenous attention, spatial-based attention, and property-based attention.<sup>4</sup> The mechanisms of attention can here be targeted at the neurofunctional level – where the neurofunctional level concerns how attention modulates the temporal-firing rates of neural populations – by contrast to the psychofunctional level – where the psychofunctional level concerns how attention functions by making information available to working memory stores.

<sup>3</sup>The visual system's implicit calculations are a vindication of Helmholtz's conjecture that visual perception is derived by types of 'unconscious inductive inference'. Cf. Helmholtz (1878/1977: 132, 175-176).

<sup>4</sup>Cf. Block (2013), for empirical results adducing against the necessity of object-based attention for conscious object-based perception.

- **Normalized Attention**

$$\bar{E}_i(n) = \frac{E_i(n)}{\sigma^2 + \sum_i E_i(n)} \quad ^5$$

So, the formula,  $A$ , in the phenomenal property comprehension principle, **Comp**, includes ' $\bar{E}_i(n)$ ' as a necessary clause.

Finally, the target Metaphysical Haecceity comprehension principles can thus be precisified:

- **Metaphysical Haecceity Comprehension**

$$\Box \forall x, y \Box \exists \Phi [\Phi x \iff (x=y)]$$

iff

$$\Phi(x) = \Phi(y) \text{ iff } \Box \lambda i \Box \exists t x. \Box [i_c](x).$$

## 4 Consciousness and Metaphysical Haecceitism

In this section, I advance two arguments for hybrid Metaphysical Haecceitism. According to the hybrid proposal, individuals are typed by the phenomenal properties that they instantiate; however, the identity of individuals is not purely qualitative, because quantification over individuals remains an ineliminable condition on their identification. The two arguments adduce in favor of the thesis that quantification over individuals must remain ineliminable, despite that individuals are typed by the phenomenal properties that they instantiate.

The first argument is from the metaphysical relevance of attention to phenomenal consciousness.

The second argument draws on the philosophical significance of empirical results concerning how differences in molecular genetics underpin differences in peak retinal cone sensitivity to electromagnetic radiation (i.e. sensation of light and perception of color).

### 4.1 Metaphysical Haecceitism and Attention

The phenomenological effects of attention have recently been confirmed in experimental results in psychophysics (cf. Carrasco et al., 2004). In Carrasco's famous experiment, a subject is first instructed to fixate on a point at the center of a template for 500 milliseconds. For 67 ms, the subject is then presented with either a neutral cue at fixation, or a cue at the periphery of the fixation point. After an interstimulus interval (ISI) lasting 53 ms, the subject is then presented, for 40 ms, with a template in which (i) a stimulus (a 'Gabor' patch) is located to the left of fixation and possesses a contrast-level of 6%, and (ii) a Gabor at 2.5-16% contrast is located to the right of fixation. Finally, the subject is instructed to report both which of the Gabor patches to the right and left of fixation she perceived to be at higher contrast, and whether the 45% tilt of the

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<sup>5</sup> $\sigma$  is a constant that is relevant to response saturation, i.e. the strength of sensory inputs as encoded by  $E_i(n)$ . For further details, see Reynolds and Heeger (2009).

Gabor was either directed to the right or the left (p. 309). The results of the experiment demonstrated that, after stimulus-onset, the subject's exogenous attention was distributed to that stimulus location, and 'observers reported that stimulus as being in higher contrast than it really was' (op. cit.). The effects of attentional distribution on the perceived value of phenomenal properties have, further, been verified for cases of endogenous attention (cf. Liu et al., 2009).

The phenomenological effects of attention demonstrate that a necessary and explanatory condition on the instantiation of phenomenal properties is the deployment, by individuals, of attentional functions. The first part of the Argument from Attention provides an abductive vindication for Metaphysical Haecceitism, by demonstrating that the deployment of attention unique to individuals is a necessary and explanatory condition on the instantiation of the phenomenal properties by which the individuals are typed. Quantification over individuals must, therefore, be retained when specifying conditions on their identity and distinctness.

The Anti-Haecceitist might respond that, if a necessary and explanatory condition on the instantiation of phenomenal properties is the functioning of the kinds of attention, then attentional mechanisms might constitute the 'perfectly natural', purely qualitative properties at the level of worlds. They might, then, opt for the Modal, rather than the Metaphysical, variation on Anti-Haecceitism; and insist that two worlds which instantiate the same functional properties are identical.

However, the Anti-Haecceitist transition to the Modal version of their proposal can be blocked as follows. Attentional mechanisms are distinct from other types of functional properties, because they are modulated by several other properties unique to individuals, such as emotional valence and implicit bias. Gottlieb and Balan (2010) note, for example, that the function of attention, as measured in lateral intraparietal cortex, is modulated by 'action-reward associations'.<sup>6</sup> The associations comprise the implicit biases which modulate the distributions of attentional mechanisms and oculomotor decisions. They thereby enable the salience of value-theoretic properties in the environment. The results demonstrate that functions of attention without valenced information are blind. If this is correct, then there are clear evolutionary benefits entrained by the deployment of attentional mechanisms, as a type of mental act by individuals, which enables the salience of optimal value-theoretic properties in the environment (cf. Wu, 2011).

Against the Modal Anti-Haecceitist, two worlds with a uniform distribution of the functional properties of individuals will not, therefore, be identical, because attentional functions are modulated by emotional and associative, valenced information. Suppose that such valenced information is not identical, although might stand in a less unyielding relation than identity, to biological or functional properties. Because valenced information modulates the deployment of attention, two worlds with the same functional profile which includes atten-

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<sup>6</sup>For further experimental results which corroborate this conjecture, see Padmala and Pessoa (2008); Lim et al. (2008); and Carrasco (2011).

tional mechanisms will yet be distinct, because functional isomorphism does not capture all of the attentional truths.

The major premises in the Argument from Attention are as follows.

(i) Because individuals' attentional mechanisms comprise necessary and explanatory conditions on their instantiation of phenomenal properties, quantification over individuals must be retained. This provides an abductive argument against Metaphysical Anti-Haecceitism.

(ii) Because attentional functions are not identical to the valenced information that modulates them, two worlds with isomorphic functional properties can instantiate different phenomenal properties; and the worlds are therefore not identical. This provides an abductive argument against Modal Anti-Haecceitism.

## 4.2 Metaphysical Haecceitism and Reflectance

Block (2007) discusses the following experimental results, in one of his arguments against the proposal that differences in phenomenal properties must invariably be tracked by differences in the accuracy-conditions of perceptual states. The experimental paradigm that he targets is called a 'Rayleigh Test', in which 'subjects are asked to make two halves of a screen match in color, where one half is lit by a mixture of red and green light and the other half is lit by yellow and orange light,' and the 'subjects can control the intensities of the red and green lights' (op. cit.: 574).<sup>7</sup> Light is defined as 'electromagnetic radiation in the wavelength zone' of 400-700 nanometers (573).

Cells in the lateral geniculate nucleus (LGN) – i.e., the neural bridge between retinal information and primary visual cortex – fall into at least two categories, based on the cones in the retina by which they are stimulated.<sup>8</sup> The retinal cones themselves are individuated by their sensitivity to different wavelengths of radiation, i.e. their 'peak cone sensitivity' (op. cit.). These peak cone sensitivities are distinguished by responsiveness to long, medium, and short wavelengths.

The first type of LGN cell is referred to as a 'red-green opponent' cell, and is individuated by instances in which the retinal activity of medium-wavelength cones inhibits the activity of long-wavelength cones. The second type of LGN cell is referred to as a 'yellow-blue opponent' cell, and is individuated by instances in which the retinal activity of small-wavelength cones is inhibited by the summed activity of the medium- and long-wavelength cones.

The Rayleigh Test confirmed that there is color vision variation, in virtue of variation with regard to the number of X chromosomes that the subject possesses. With regard to the success rates in completing the experimental task, there is also color vision variation in virtue of differences in macular pigmentation, where the latter varies both with age and with skin pigmentation (574).

Block argues that, because there is variance in color vision both in virtue of variance in molecular genetics – i.e., whether the subject has one or two X

<sup>7</sup>Cf. Neitz and Jacobs (1986); and Neitz and Neitz (1998).

<sup>8</sup>The details here on the science of color vision are owing to Papineau (2015: 9.6).

chromosomes – and in virtue of variance in subjects’ ages and skin pigmentations, it would therefore be at best unethical – i.e., sexist, racist, and ageist, as he puts it in the title of his paper – to suggest that the perceived color variation based on these differences of sex, race, and age entrains ineluctable, systematic visual misrepresentation. Thus, difference in the instantiation of color-phenomenal properties does not invariably track difference in the accuracy-conditions of perceptual representational states.

The Metaphysical Anti-Haecceitist will argue that quantification over individuals can be eschewed of, because quantification over properties is sufficient for the identification of individuals. However, quantification over sets of properties cannot be a substitute for quantification over the individuals which instantiate that set, because individuals’ unique biological profiles provide necessary and explanatory conditions on their instantiation of the target set of phenomenal properties. This provides an abductive argument against the Metaphysical Anti-Haecceitist. The foregoing empirical considerations adduce in favor of the hybrid Metaphysical Haecceitist proposal, according to which a necessary and explanatory condition on the instantiation of the phenomenal properties of individuals is the biological profiles unique to those individuals. While individuals are typed by the phenomenal properties that they instantiate, quantification over individuals must then be retained, because necessary and explanatory conditions on the instantiation of phenomenal properties include the individuals’ biological properties. The biological properties can be thought of as that individual’s qualitative haecceity, i.e. the properties serving to uniquely identify that individual.

The first part of the Argument from Reflectance provides, therefore, an abductive vindication for Metaphysical Haecceitism, by demonstrating that the biological properties unique to individuals are necessary for the instantiation of the phenomenal properties by which the individuals are typed. Quantification over individuals must, therefore, be retained when specifying the conditions on their identity and distinctness.

The Anti-Haecceitist might respond that, if a necessary and explanatory condition on the instantiation of phenomenal properties is biological, then those biological properties might constitute the ‘perfectly natural’, purely qualitative properties at the level of worlds. They might, then, opt for the Modal, rather than the Metaphysical, variation on Anti-Haecceitism; and insist that two worlds which instantiate the same biological properties are identical.

However, the Anti-Haecceitist transition to the Modal version of their proposal can be blocked as follows. The second part of the Argument from Reflectance draws on work by Hardin (1988: 65-76), whose discussion is based on further results in color science. Let a ‘reflectance property’ of an object be a physical property. It can be defined as ‘the proportion of light that the object reflects at each wavelength of the visual spectrum’ (cf. Byrne and Hilbert, 2007: 75). Against the proposal that color hues can be identified with unique sets of reflectance properties, and thereby be physically reducible, Hardin (op. cit.) observes that color hues are divided into those that are ‘primary’ – e.g., red, green, yellow, and blue – and those that are mixed or ‘binary’ – e.g., orange,

indigo, and violet. However, variations in the perception of each of the primary and binary color hues is not constant across physical conditions on reflectance. Thus, it is not the case that unique sets of reflectance properties can be identified with each of the primary and the binary color hues. Because unique sets of reflectance properties cannot be identified with each of the primary and the binary color hues, Hardin (op. cit.) argues that color-phenomenal property tokens cannot be identical to physical property tokens. The significance of Hardin's observations is that they demonstrate why biological – i.e., physical – property tokens are not sufficient for the instantiation of phenomenal properties. Thus, two worlds with a uniform distribution of the biological properties of individuals will not be identical, because they do not satisfy sufficient conditions for the instantiation of phenomenal consciousness.

The major premises in the Argument from Reflectance are as follows.

(i) Because individuals' biological properties comprise necessary and explanatory conditions on their instantiation of phenomenal properties, quantification over individuals must be retained. This provides an abductive argument against Metaphysical Anti-Haecceitism.

(ii) Because there is a mismatch between physical reflectance and color-phenomenal properties, the biological properties of the individuals do not comprise a sufficient condition on their instantiation of phenomenal properties. Thus, two worlds with uniform biological profiles can instantiate different phenomenal properties, and thereby not be identical. This provides an abductive argument against Modal Anti-Haecceitism.

## 5 Consciousness, Grounding, and Modal Haecceitism

In the foregoing section, I augmented my arguments for Metaphysical Haecceitism by offering preliminary arguments against Modal Anti-Haecceitism. The arguments for Modal Haecceitism proceeded by suggesting that two worlds with identical functional and biological truths might still be distinct, because the worlds might instantiate distinct phenomenal truths. Thus, functional and physical truths provide necessary and explanatory conditions on whether phenomenal truths obtain. However, the functional and physical truths are not sufficient for securing that phenomenal truths obtain. So, the argument against Modal Anti-Haecceitism is that two worlds with identical physical and functional truths could yet be distinct, because the foregoing truths are not sufficient for ensuring that the same phenomenal truths obtain in both worlds.<sup>9</sup> In this section, I argue that the hyperintensional regimentation of the ontology of consciousness might further serve to vindicate a version of Modal Haecceitism. The section

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<sup>9</sup>One objection to this maneuver might be that it is yet metaphysically possible for there to be two worlds in which the same physical, functional, and phenomenal truths obtain. The proponent of the objection owes an explanation of what the set of quiddistic truths might be which – along with the physical and functional truths – could be jointly sufficient for inducing the obtainment of phenomenal truths.

advances a novel regimentation of the extant proposals in the ontology of consciousness, using fine-grained, hyperintensional ontological dependence rather than the more familiar, coarse-grained tools of modality and identity. The hyperintensional regimentation is of interest in its own right. However, the hyperintensional regimentation – as augmented by the Bayesian probability calculus – is of interest to the present discussion, because it is consistent with Modal Haecceitism.

The Modal Haecceitist proposal is to the effect that the identity and distinctness of worlds is not general; i.e. that differences with regard to the individuals in worlds is sufficient for the distinctness of the worlds themselves. Thus, quantification over individuals is necessary for the identification of worlds, and distinctness of individuals in two worlds entails the non-identity of the worlds.

According to the version of Modal Haecceitism that will here be targeted, two worlds are distinct if and only if, and because, there are hyperintensional differences between the relations on the constitutive elements of the worlds. The constitutive elements are propositional in form, and can thus either be facts or truths; what is crucial is only that the constitutive elements are evaluable for truth and falsity, and can thus fall within the scope of intensional and hyperintensional operators. Hyperintensional differences are expressed by operations of ontological dependence between the facts comprising the possible worlds.<sup>10</sup> Thus, even if two worlds possess a uniform distribution of facts, distinctness in the hyperintensional ontological dependencies between the facts will entail that the worlds are distinct.<sup>11</sup> Hyperintensional ontological dependencies between parts of – i.e., the facts comprising – worlds vindicates a version of Modal Haecceitism.

I will argue, further, that a second level of haecceitistic difference between possible worlds is witnessed, because alethic probability operators are definable on the operations of hyperintensional ontological dependence.

In the next subsection, I discuss how considerations with regard to how Haecceitism interacts with chance measures provide further motivation for the Modal Haecceitist thesis. In Subsection **5.2**, I provide definitions of the approaches to the ontology of consciousness that will here be examined. I outline, then, a Modal Haecceitist thesis based on hyperintensional ontological dependence, rather than on Lewis' counterpart theory. In Subsections **5.3-5.4**, I provide the hyperintensional regimentation of the ontological proposals in the philosophy of consciousness.

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<sup>10</sup>A relational approach to ontological dependence is pursued by Schaffer (forthcoming). A defense of the operator-based semantics is advanced in Fine (2012b) and Author (ms). Fine (2015) notes that the dependence relations that he avails of in his (1985) examination of arbitrary objects converges with Schaffer's relation-based semantics.

<sup>11</sup>Facts and the dependencies under which they fall scope are of different types. Thus, the set of dependencies does not itself comprise a fact.

## 5.1 Ontology

*Psychofunctionalism* is a proposal about the relation between consciousness and physical properties, which claims that phenomenal properties are identical to functional properties, yet not identical to biological properties.<sup>12</sup>

*Type Identity* is a proposal about this relation which claims that phenomenal properties are identical to biological properties, yet not identical to functional properties.<sup>13</sup>

*Property Dualism* claims that phenomenal properties are identical neither to biological nor to functional properties, yet stand in some relation - e.g., nomological supervenience - on the properties of fundamental physics.<sup>14</sup>

*Neurofunctionalism* claims that phenomenal properties are identical to the conjunction so to speak of Psychofunctionalism and Type Identity; thus to both biological properties and the functional properties of mental states.<sup>15</sup>

*Panpsychism* claims, finally, that phenomenal properties are identical neither to biological properties, nor to reductive functional properties.<sup>16</sup> Panpsychism is Russellian if and only if phenomenal properties are the intrinsic realizers of extrinsic functional properties and their roles (cf. Russell, 1927). Russellian Panpsychism is Constitutive if and only if (i) fundamental microphysical entities are functionally specified and they instantiate microphenomenal properties, where microphenomenal properties are the realizers of the fundamental microphysical entity's role/functional specification; and (ii) microphenomenal properties constitute the macrophenomenal properties of macrophysical entities, e.g. human organisms.

## 5.2 Chance, Counterpart Theory, and Anti-Haecceitism

In his (2012), Kment endeavors to vindicate Modal Haecceitism, by providing arguments against Anti-Haecceitism from chance and from counterfactuals. In order to vindicate Modal Haecceitism, Kment targets Modal Anti-Haecceitist Counterpart Theory. Counterparts are thus defined:

'An individual  $a$  is P at world  $v$  (or  $v$  represents  $a$  as being  $P$ ) [...] just in case  $v$  contains an individual that is a 'counterpart' of  $a$ , that is that stands to  $a$  in the right kind of similarity relation and that is  $P$ ' (575-576).

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<sup>12</sup>Proponents of Psychofunctionalism include, inter alia, Ryle (1949); Lewis (1972); Dennett (1991); Dretske (1995); Dehaene and Naccache (2001); and Dehaene and Changeux (2004).

<sup>13</sup>Proponents of Type Identity include, inter alia, Place (1956); Smart (1959); Levine (1983); Loar (1990); Hill (1997); Block and Stalnaker (1999); Papineau (2002); Block (2007); McLaughlin (2007); and Balog (1999).

<sup>14</sup>Proponents of Property Dualism include, inter alia, Jackson (1982); Chalmers (1996; 2010); Kim (2005); and Pautz (2010).

<sup>15</sup>The proposal is introduced and advocated in Prinz (2012).

<sup>16</sup>Committed or borderline proponents of general Panpsychism, or a variant on which the relevant intrinsic properties are proto-phenomenal, include Russell (1927); Feigl (1958); Maxwell (1979); Seager (1995); Chalmers (1996); Strawson (2006); Goff (2009); Coleman (2012); and Stoljar (2014). Non-reductive phenomenal properties are, by some property dualists and panpsychists, conceived as being relational (cf. Goff, op. cit.; Pautz, op. cit.).

For the purposes of this note, one of the crucial moves in Kment's paper is his observation that not every counterpart theorist is an Anti-Haecceitist (577). An approach to counterpart theory that takes counterparts to be in some sense not perfectly qualitative will therefore constitute a version of Haecceitism, and Kment makes explicit mention of Lewis's (op. cit.) Cheap Haecceitist proposal.<sup>17</sup> Thus, one of Kment's rebuttals to the Modal Anti-Haecceitist hinges on the observation that Anti-Haecceitist Counterpart Theory can actually be reinterpreted as being a type of Haecceitist Counterpart Theory – what he refers to as 'Sub-World Possibilia Theory' (5.2).

### 5.2.1

The first argument from chance proceeds as follows. Kment avers that, for the Modal Anti-Haecceitist Counterpart Theorist: 'the chance that  $a$  is  $F$  equals  $x$  [...] is true iff the chance measure of the set of worlds where it's true that  $a$  is  $F$  equals  $x$ ', i.e.

'(7) The chance that  $\Phi(a)$  equals the chance measure of the set of possible worlds that contain a counterpart of  $a$  that satisfies  $\Phi(x)$ ' (586).

He specifies, then, the following scenario:

Suppose that there are two perfectly symmetrical, and purely qualitatively indiscernible, halves of the universe,  $w_1$  and  $w_2$ . There is one 'X boson' in  $w_1$ ; and there is one X boson in  $w_2$ . At  $t$ , both X bosons concretely exist; however, there is a .5 chance that either Condition A or Condition B is satisfied.

A: Particle  $A$  decays within a year after  $t$

B: Particle  $B$  decays within a year after  $t$

$S_0/S_1/S_2$ : Exactly zero/one/two X bosons decay within a year after  $t$ .

$OP_t$  designates the 'set of possible worlds that are like  $w$  up to  $t$  and follow the laws of  $w$  thereafter', where the laws 'allow for the possibility that an X boson decays and disappears but not for the possibility that a new X boson is created' (587).

Crucially, the Anti-Haecceitist Counterpart Theorist accepts that, from the vantage of both  $w_1$  and  $w_2$  in  $OP_t$ , A and B are purely qualitative counterparts, representing indiscernible possibilities.

Then,

(12) the chance at  $t$  of Condition  $S_1$  being satisfied – i.e. exactly one X boson decaying within a year after  $t$  – is .5.

However,

(13) given that  $Ch_t(w_1) = Ch_t(w_2)$  s.t.  $Ch_t(w_1) = S_1 = .5$ , the chances of  $S_0 = .25$  and of  $S_2 = .25$ , in order for  $S_0/S_1/S_2$  to sum to 1.

However,  $S_1$  and  $S_2$  are compatible with Condition A, and are also compatible with Condition B. This is problematic for the Anti-Haecceitist, because –

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<sup>17</sup>For more recent non-qualitative approaches to counterpart theory, see Fara (2008), and Bacon (2014).

given that, on their view, all worlds and counterparts are qualitatively indiscernible and should therefore receive the same chance value – (13) cannot be consistent with (12), because (13) entails that A’s chance of decay is .75 ( $S_1 + S_2$ ) rather than .5 (588).

### 5.2.2

The second argument from chance proceeds as follows. Kment argues that the Modal Anti-Haecceitist Counterpart Theorist must also reject the following principles:

(14)  $P(\neg A) = 1 - A$ ; and

Additivity, i.e.: (15) If A and B are disjoint, then  $P(A \cup B) = P(A) + P(B)$  (op. cit.).

Kment argues for this as follows:

(I)

1. Suppose that  $Ch_t(S_1) > 0$ .

By the qualitative indiscernibility of  $w_1$  and  $w_2$ :

2.  $Ch_t(A) = Ch_t(S_1) + Ch_t(S_2)$

3.  $Ch_t(\neg A) = Ch_t(S_0) + Ch_t(S_1)$  (where, again,  $S_0$  designates the condition according to which neither X boson decays).

By (2) and (3),  $Ch_t(A) + Ch_t(\neg A) =$

4.  $Ch_t(S_1) + Ch_t(S_2) + Ch_t(S_0) + Ch_t(S_1)$ .

Now, the exhaustive possibilities,  $S_0, S_1, S_2$ , should sum to 1.

However – by (4) –  $Ch_t(A) + Ch_t(\neg A)$  are clearly going to be  $> 1$ .

Thus, the Modal Anti-Haecceitist Counterpart Theorist cannot satisfy the intuitive Principle (14), i.e.  $P(\neg A) = 1 - A$ .

(II)

The Modal Anti-Haecceitist Counterpart Theorist cannot satisfy finite Additivity, either, because  $Ch_t(A \text{ or } \neg A) = 1$ , and yet – by (2)-(4) above – is going to be  $> Ch_t(A) + Ch_t(B)$ .

Kment argues that, if they should like to satisfy the Kolmogorov axioms while retaining the principle (6) – i.e., ‘The chance that  $P$  is  $x$  just in case the chance measure of a set of possible worlds where it’s true that  $P$  is defined and equals  $x$ ’ (586) – then they have, further, to endorse:

(17): ‘If  $P$  and  $Q$  are mutually logically inconsistent, then there is no possible world where it is true that  $P$  and where it is also true that  $Q$ ’ (590).

Kment argues that they cannot endorse (17), because it is consistent with Modal Anti-Haecceitist Counterpart Theory that there can be intra-world counterparts. He writes: ‘The antihaecceitist counterpart theorist, however, needs to reject (17). Remember that for the antihaecceitist, it’s true at world  $w$  that  $\Phi(i)$  just in case  $w$  contains a counterpart of  $i$  that satisfies  $\Phi(x)$ . Now, *when a world  $w$  contains more than one counterpart of  $i$* , then one of them may satisfy

$\Phi(x)$ , while another satisfies  $\neg\Phi(x)$  [my emphasis – Author]. Then it’s true at  $w$  that  $\Phi(i)$ , and it’s also true at  $w$  that  $\neg\Phi(i)$ ’ (op. cit.).

Note, however, that while Anti-Haecceitist Counterpart Theory is consistent with there being intra-world counterparts, intra-world counterpart theory is not a necessary condition for Anti-Haecceitist Counterpart Theory. Thus, if the Anti-Haecceitist Counterpart Theorist were to reject that there are intra-world counterparts, then they would be able to endorse (17), because – barring the existence of metaphysically impossible worlds – there would be no metaphysically possible world where both possibilities hold.

Kment writes: ‘To avoid the failure of (14) and (15), the antihaecceitist needs a theory according to which every world in  $OP_i$  represents that A if and only if it doesn’t represent that  $\neg A$ . How would such an account go’ (591)?

He suggests a revision to his principle that: (7) ‘The chance that  $\Phi(a)$  equals the chance measure of the set of possible worlds that contain a counterpart of  $a$  that satisfies  $\Phi(x)$ ’. (7) might be revised by barring intra-world counterparts. With regard to this response, Kment notes that ‘ $u$  represents that  $\Phi(a)$  just in case  $u$  contains some counterpart of  $a$  and every counterpart of  $a$  that exists in  $u$  satisfies  $\Phi(x)$  [. . .] On that account, a single world cannot represent both that  $\Phi(a)$  and that  $\neg\Phi(a)$ . But another, equally serious problem arises now: a world can contain a counterpart of  $a$ , but it may represent neither that  $\Phi(a)$  nor that  $\neg\Phi(a)$ , since it could be that some counterparts of  $a$  in the world satisfy  $\Phi(x)$  while others satisfy  $\neg\Phi(x)$  [my emphasis – Author]. That is indeed the case in the above example’ (op. cit.).

Against Kment’s contention, if one were to endorse counterpart theory without intra-world counterparts, then every counterpart will be world-bound, such that there will be one counterpart per world. Against, then, what Kment is claiming, (17) can be secured, and Anti-Haecceitist Counterpart Theory is consistent with the satisfaction of the Kolmogorov axioms; and is thus consistent with principles (14) and (15) above.

Thus, by denying that there are intra-world counterparts, Anti-Haecceitist Counterpart Theory can validate the principle that no contradictory possibilities can hold at a possible world. This would circumvent Kment’s argument that the Anti-Haecceitist cannot validate the principles concerning the probability of negated propositions and the axiom of finite Additivity.

Kment advances a further suggestion, in the guise of a reply on behalf of the Anti-Haecceitist. Kment claims that his arguments might not go through, even if the Anti-Haecceitist were to retain the thesis of intra-world counterparts (603). If the Anti-Haecceitist Counterpart Theorist were embrace intra-world counterparts, then a model of their theory would have the following properties:

- (i) Individuals comprise the proper parts of worlds;
- (ii) Similiarity between worlds is defined by reference to the individuals rather than to the worlds of which they are a part; and
- (iii) Objective chance measures are definable on counterpart relations on the proper parts of worlds (603-605).

Condition (iii) might diffuse the arguments from chance, because now chance measures are defined on the counterpart relations on individuals in a world,

rather than on the worlds themselves. This might be sufficient for ensuring that  $S_0/S_1/S_2$  sum to 1, even though – by qualitative indiscernibility at the level of the worlds as a whole – it would be inconsistent to observe that  $Ch_t(w_1) = Ch_t(w_2) = .5$ , while the chance of  $S_0 = .25$  and the chance of  $S_2 = .25$ . Thus, targeting the qualitative indiscernibility of counterparts at the level of similarity among individuals within worlds rather than at the level of worlds themselves can allow for the chance values of counterparts to be .25, as in  $S_0$  and  $S_2$ , rather than being indiscernibly uniform given  $S_1$ 's chance value of .5.

The observation by Kment on which I will build is, then, as follows. Kment observes that the foregoing 'Sub-world Possibilia Theory' appears to be a 'notational variant' of Modal Haecceitism. Cheap Haecceitist intra-world counterparts appear to permit of haecceitistic differences between worlds. Furthermore, difference in the values of the chance measures defined on the intra-world counterpart relations on individuals (as proper parts of worlds) appears to provide a second method for securing haecceitistic distinctness between metaphysically possible worlds.

In the remainder of this section, I will eschew the approach to possibility that is based on Lewis' counterpart theory. I will examine, by contrast, a variation of 'Sub-world Possibilia Theory', in which Bayesian alethic probability is defined on hyperintensional, ontological dependencies between phenomenal and physical truths comprising worlds. I argue that hyperintensional, ontological dependence induces haecceitistic differences in the identification of worlds. A second level of haecceitistic difference is witnessed by variance in the values of the probability measures, as defined on the ontological dependence relations on truths in worlds.

### 5.3 The Pure Logic of Ground

A polyadic operator has a *ground-theoretic* interpretation, only if the profile induced by the interpretation concerns the *metaphysically explanatory* connection between an antecedent set of truths or properties and the relevant consequent.

Let a grounding operator be *weak* if and only if it induces reflexive grounding. A grounding operator is *strict* if and only if it is not weak. A grounding operator is *full* if and only if it uniquely provides the explanatory ground for an entity. A grounding operator is *part* if and only if it - along with other entities - provide the explanatory ground for an entity.

Fine (2012a; 2012b) defines the following combinations of the foregoing operators:

- $x < y$   
if and only if x is a *strict full* ground for y
- $x \leq y$   
if and only if x is a *weak full* ground for y
- $x \prec y$   
if and only if x is a *strict part* ground for y

- $x \preceq y$   
if and only if  $x$  is a *weak part* ground for  $y$ .  
One can then derive three other, unique interpretations for the grounding operator:
- $x \preceq y \wedge \neg(y \preceq x)$   
if and only if  $x$  is a *strict partial* ground for  $y$
- $x \prec^* y$  if and only if  $\frac{x_1, \dots, x_n}{y} \leq$   
if and only if  $x$  is a *partial strict* ground for  $y$
- $x \prec' z$  if and only if  $[x \prec^* y \wedge y \preceq z]$   
if and only if  $x$  is a *part strict* ground for  $z$ .

The derivation is induced by the following proof-rules:

- Subsumption

$(<, \leq)$ :

$$[(x_1, \dots, x_n < y)] \rightarrow (x \leq y)$$

$(<, \prec)$ :

$$[(x_1, \dots, x_n) < y] \rightarrow (x \prec y)$$

$(\prec, \preceq)$ :

$$(x \prec y) \rightarrow (x \preceq y)$$

$(\leq, \preceq)$ :

$$(x \leq y) \rightarrow (x \preceq y)$$

- Distributivity:

$$\begin{aligned} & \forall x \in X, y \in Y \\ & [\mathbf{G}[(\dots x \dots)(\dots y \dots)], \text{ s.t.} \\ & f_{1-1}: [x_1 \rightarrow y_1], \dots, f_{1-1}: [x_n \rightarrow y_n]] \end{aligned}$$

## 5.4 The Regimentation

The proposals in the metaphysics of consciousness can then be regimented in the hyperintensional framework as follows.

- Functionalism (traditionally: truths about consciousness are identical to truths about neuro- or psychofunctional role):

Functional truths (F) ground truths about consciousness (C) if and only if the grounding operator is:

-strict full, s.t.  $F < C$

-distributive (i.e. bijective between each truth-ground and grounded truth), s.t.  $\exists f_{1-1}\langle F, C \rangle$

- Phenomenal Realist Type Identity (traditionally: truths about consciousness are identical to truths about biological properties, yet phenomenal properties are – in some sense – non-reductively real):

Biological truths (B) ground truths about consciousness (C) if and only if the grounding operator is:

-strict partial, s.t.  $B \preceq C \wedge \neg C \preceq B$ ;

-distributive, s.t.  $\exists f_{1-1}\langle B, C \rangle$ ; and

-truths about consciousness are weak part (i.e. the set partly reflexively grounds itself), s.t.  $C \preceq C$

- Property Dualism (traditionally: truths about consciousness are identical neither to functional nor biological truths, yet are necessitated by physical truths):

Physical truths (P) ground truths about consciousness (C) if and only if the grounding operator is:

- $P \preceq C$ ;

-non-distributive, s.t.  $\neg \exists f_{1-1}\langle P, C \rangle$ ; and

-truths about consciousness are weak part, s.t.  $C \preceq C$

- Panpsychism (in Russellian guise: Phenomenal properties are the intrinsic realizers of extrinsic functional properties and their roles; in Constitutive guise: (i) fundamental microphysical entities are functionally specified and they instantiate microphenomenal properties, where microphenomenal properties are the realizers of the fundamental microphysical entity's role/functional specification; and (ii) microphenomenal properties constitute the macrophenomenal properties of macrophysical entities):

Truths about consciousness (C) ground truths about functional role (F) if and only if the grounding operator is:

-strict full, s.t.  $C < F$ ; and

-non-distributive, s.t.  $\neg \exists f_{1-1}\langle C, F \rangle$

In the hyperintensional setting, the relevance of attention can be witnessed via iterations of the grounding operator. Thus, the phenomenal realist type identity theorist will take biological truths to ground truths about consciousness, where the grounding operator is strict partial and distributive, while truths about consciousness weakly, i.e. reflexively, partly ground themselves. Suppose that types of attention are necessary for the instantiation of phenomenal properties. In the hyperintensional setting, the relevance of attention can then be simulated by iterating the grounding operator, such that the iterated grounding operator encodes the truths about attention and explains in virtue of what the first-order explanatory connection between biological and phenomenal truths obtains.

Defining alethic probability operators on grounding operators is a straightforward task, and mirrors the presentation in Section 3 above. The value of the probability of a grounding operator will be governed by the Kolmogorov axioms. Gradable ontological dependencies provide another means of interpreting the dependence operator, such that it expresses explanatory properties. Facts can be instantiated in virtue of others, and the gradability of ontological dependence entrains a further level of fineness of grain beyond necessitation. Differences in the probability that hyperintensional ontological dependence obtains provide a further level at which haecceitistic difference is witnessed.

## 6 Concluding Remarks

This paper has sought to achieve three, theoretical aims. The first was to provide an analysis of the property of 'being purely qualitative' and to examine how phenomenal property types – the properties of phenomenal consciousness – can precisely interact with the former notion. The second theoretical aim was to demonstrate how consciousness has a Metaphysical Haecceitistic profile. Two abductive arguments were advanced, in order to demonstrate that the relations between some individuals and the phenomenal properties that they instantiate vindicate a version of Metaphysical Haecceitism. The third theoretical aim was to demonstrate how consciousness has a Modal Haecceitistic profile. This aim was secured, by way of a hyperintensional regimentation of the extant proposals in the ontology of consciousness. The theoretical virtues adducing in favor of the hyperintensional regimentation were examined. Finally, I argued that differences in the hyperintensional dependencies among the parts of worlds – as well as differences in the probability values taken by the ontological dependencies – may be marshalled in order to vindicate a version of Modal Haecceitism.

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