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Seeking the Neural Correlates of Awakening

Abstract: *Contemplative scholarship has recently reoriented attention towards the neuroscientific study of the soteriological ambition of Buddhist practice, ‘awakening’. This article evaluates the project of seeking neural correlates for awakening. Key definitional and operational issues are identified demonstrating that: the nature of awakening is highly contested both within and across Buddhist traditions; the meaning of awakening is both context- and concept-dependent; and awakening may be non-conceptual and ineffable. It is demonstrated that operationalized secular conceptions of awakening, divorced from soteriological and cultural factors, have little relationship to traditional Buddhist construct(s) of awakening. This article identifies methodological issues for secular conceptions of awakening concerning introspection and neuroimaging yet demonstrates also the value of recent advancements in empirical first-person phenomenology for attenuating introspective bias. Overall, it is contended that significant problems arise when decontextualizing awakening and placing it within a scientific naturalistic framework. Careful attention to the definitional, operational, and methodological neuroscientific obstacles identified herein is required in the responsible approach to the investigation of awakening states.*

Keywords: neural correlates; awakening; enlightenment; subjective experience; pre-reflective experience; pre-reflexive experience; consciousness; first person; phenomenology.

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1. Introduction

This paper evaluates the project of seeking neural correlates for the Buddhist liberation goal of what is commonly termed ‘awakening’ or ‘enlightenment’. In recent years, Buddhist contemplative practices, repackaged as ‘mindfulness’, have gained incredible traction as therapeutic tools for stress reduction, depression alleviation, and productivity gain. Consequently, research into mindfulness-based interventions has, until recently, been divorced from the soteriological context in which these practices originated (Purser, 2021). Emphasis has been placed upon clinical applications, stress reduction, and increased efficiency (Barker *et al.*, 2021).

To counter this trend, an emerging current of contemplative scholarship is reorienting attention towards the historic soteriological ambition of Buddhist practice, what may be termed in English ‘awakening’, and the question of whether awakening may be traced to specific neural correlates, cognitions, or behaviours (Davis and Vago, 2013). While gaining traction, attempts by neuroscientists to measure whether awakening, or facets of awakening, may be traced to specific neural correlates have been given inadequate philosophical attention.

In what follows it is asked: what is the nature of the Buddhist soteriological goal of ‘awakening’? Would discovering a neural correlate support a particular Buddhist tradition’s conception of awakening? Is awakening a non-conceptual epiphany and, if so, can it still be scientifically operationalized? Does attempting to trace awakening to specific neural correlates presume a problematic biological reductionism? Might a neural mapping of ‘awakening’ states, in tandem with biofeedback devices, offer methods for practitioners to deepen their meditative practice? In exploring these questions, it is contended that attention to the definitional, operational, and methodological obstacles identified in this article is required if we are to investigate awakening states and approach the dialogue between Buddhism and science with humility.

This article begins by identifying key definitional and operational issues demonstrating that the nature of awakening is highly contested both within and across Buddhist traditions. This produces difficulties in delineating a convergent or unified model of the stages or content of awakening. It is then demonstrated that the meaning of awakening is both context- and concept-dependent; that the experience of awakening may be non-conceptual and ineffable; and that the ontological assumptions of Buddhism and science regarding the nature of

mind may be mutually inconsistent. As a consequence of each of these points, we find that operationalized secular conceptions of awakening, divorced from soteriological and cultural factors, have little relationship to traditional Buddhist construct(s) of awakening.

This article concludes with an identification of methodological issues that remain even if we adopt such a limited secular conception of awakening. These concern the reliability of introspection and neuroimaging, both general and specific to the study of awakening. Advancements in the field of empirical first-person phenomenology may redress issues identified with introspection by attenuating introspective bias. However, there exist major problems with neuroimaging that call for resolution, such as limitations of the general linear model, and the problem of reverse inference.

Overall, this article identifies the problems and limitations that arise when divorcing awakening from its culturally embedded metaphysics and implicitly placing it within a scientific naturalistic framework. The conclusion is that careful attention to definitional, operational, and methodological neuroscientific obstacles is required for the responsible approach to the investigation of awakening states, and contemplative studies more generally.

2. Definitional Issues in the Operationalization of Awakening

In the rush to trace enlightenment to specific neural correlates, scientists have overlooked foundational problems concerning how to justify any specific operationalization of awakening. ‘Operationalization’ refers to the process of translating an abstract concept into a measurable observation, in order to systematically collect data on the phenomenon. In seeking a usable definition of awakening, we must ask: can the emotional-cognitive-perceptual transformations undergone during ‘awakenings’ be scientifically described, or does awakening refer to a non-conceptual epiphany which principally cannot be so operationalized? Alternatively, might awakening be experienced as a non-translatable epiphany on the *phenomenological* level, yet still be mappable as specific emotional-cognitive-perceptual transformations on the cognitive-scientific level? Even if awakening were to be a singular context-independent transformation, would the ambition to trace this transformation to specific neural correlates presume a questionable neurobiological identity-reduction of the phenomenal domain to the material realm?

Additional problems for operationalization arise in that the nature of ‘awakening’ is highly contested both within and across Buddhist traditions. As will be seen, contention exists regarding defining awakening, issues of historical fact, as well as sectarian disagreements concerning the content, stages, and path to awakening. There is also contention regarding the meaning of various related concepts, such as *nirvāṇa*. As will be illustrated, careful and earnest engagement with the diverse conceptions of awakening across Buddhist traditions is essential to such a project, yet is currently lacking.

While attention has been given to the term ‘awakening’ in this article, we should begin by considering the etymological roots of the more commonly used term ‘enlightenment’. Popularized in nineteenth-century translations in the West, the term ‘enlightenment’ conveys a connotation of general insight into transcendental truth or reality. The English term enlightenment corresponds to various Buddhist concepts; most notably *bodhi* and *vimutti*. Anālayo (2021) has suggested that the Buddha’s *bodhi* ought to be rendered as ‘awakening’, as it involves a sudden shift in level of consciousness due to the realization of *nirvāṇa* — the cessation of the six sense spheres. For simplicity I follow Anālayo in translating *bodhi* as awakening rather than enlightenment, as better conveying the sense that the chief purpose of Buddhist mindfulness practice is to realize a liberating form of insight. While ‘*bodhi*’ refers to the knowledge, or wisdom, or the awakened intellect of a Buddha, ‘*vimutti*’ describes freedom from the fetters and ‘hindrances’ to awakening. It is important to note that what exactly constituted the Buddha’s awakening is arguably unknown, and incontrovertibly contested. Across all Buddhist traditions, nonetheless, the Buddha’s awakening is associated with some mode of liberating insight, an experiential or ineffable understanding of the arising and ceasing of craving, attained through a combination of *Vipassanā*, insight into impermanence, and *dhyāna*, concentration, or a state of one-pointed absorption — distinct components involved in meditative mind training.

Nonetheless the relative weight assigned to the practices of *dhyāna* in achieving liberation, against the cultivation of insight, is itself highly contested (Vetter, 1988), with some scholars suggesting that the emphasis on insight’s role in awakening was a later development (Gombrich, 2006). Thus, while Buddhist traditions commonly regard *bodhi* as referring to full and complete awakening (Skt: *samyaksambodhi*) there remains ambiguity over what ‘gaining’ *bodhi* means. Hence, while we are accustomed to the translation

‘enlightenment’ for *bodhi*, this is misleading. As Norman notes, it is not clear what the Buddha was awakened to, or at what particular point the awakening came (2005, p. 25). We see this contention across lineages. *Bodhi* in Theravadin Buddhism, for instance, refers to the realization of the four stages of enlightenment and becoming an *arhat* (Pali: *arahant*). However, later developments within Indian religious thought deemed modes of ‘liberating insight’ essential to achieving awakening (Schuhmacher, Kohn and Fischer-Schreiber, 1994). Thus, the four noble truths as the liberating insight of the Buddha eventually were superseded by *Pratītyasamutpāda*, the twelvefold chain of causation, and still later by *anatta*, the emptiness of the self, whilst later the Mahayana equated *bodhi* with insight into *śūnyatā*, emptiness of all phenomena. Yet further branches of Indo-Tibetan Buddhism, such as Dzogchen, emphasized the relation between awakening, Buddha-nature, and non-duality (*ibid.*).

2.1. Definitional problems in discerning the content of awakening

Definitional issues relating to historical fact arise if we assume the content of awakening to be derivable from the direct experience of Shakyamuni Buddha. These problems concern our lack of access to the Buddha’s personal experience, assuming he *did* exist and assuming he *did* experience an awakening or awakenings. These problems are exacerbated by the anonymity of the early literature and discourses of the Buddha; ambiguities that arise concerning later emendations, alterations, and discrepancies in the textual sources appealed to; and perhaps most importantly, ambivalence in the literature regarding whether the awakened state involves, or somehow transcends, conceptual thought. These problems require at least some level of redress as, whilst unresolved, they impact any researcher’s capacity to discern a plausible account of awakening with fidelity to the Buddha’s teachings (Gombrich, 2018).

A further problem concerns the nature of *nirvāṇa*. *Nirvāṇa* is said to be an *unconditioned* state of the extinguishment of suffering. A phenomenon being unconditioned, however, refers to a phenomenon that does not arise in dependence upon causes and conditions, and consequently cannot be affected by anything. In which case, the argument could be made that no activity should be able to bring such states about — including meditation. This is a classic issue that arises in the various ‘non-dual’ practice traditions, within which the notions of *practice*, or the *gradualist path*, are considered antithetical to

instantaneous awakening through realization of the unconditioned quality of non-dual awareness (Gregory, 1991, p. 16). This dispute arises between what may be termed ‘sudden’ awakening schools, in which awakening is instantaneous and totalizing, and ‘gradual’ awakening schools that emphasize cultivation and purification practices.

As suggested, further questions arise concerning whether it is deep *concentration* states or rather *insight* practices that constitute the principal path to awakening. This dispute begins in the early Pali commentaries and persists to the present day between, for instance, Theravadin Thai-Forest and Burmese-Vipassana communities (Sharf, 2000). Textual impasse is apparent, for instance, when considering the distinct emphasis upon the respective weightings of *samādhi* and *vipassanā* (Skt: *vipashyana*), frequently translated as *concentration* and *insight* respectively. In the Thai-Forest tradition, for example, Ajahn Brahm (2006) claims that *jhāna* (Skt: *dhyana*) absorption states are the unique contribution of the Buddha, whereas the Burmese Goenka lineage asserts that *vipassanā*, as outlined in the Satipaṭṭhāna Sutta, was the Buddha’s unique contribution. Dispute also occurs between different tenet systems in regards to the nature of the Buddhist construct of ‘no-self’ (Pali: *anattā*, Skt: *anātman*). According to the earlier Vaibashika tenet system, no-self need be taken only to refer to the illusory self-construct, which contrasts with the later Madhyamika tenet system, which holds that *śūnyatā* (Pali: *sunnatā*), a term usually translating to voidness, emptiness, or hollowness, describes the true nature of *all* phenomena (Harvey, 2013).

Indeed, intense disagreement over what constitutes ‘authentic’ awakening occurs between and within those traditions most closely related. Debate amongst distinct Burmese Theravādin traditions accentuates this point, as contention persists to this day regarding those states that constitute mere ‘depth’ concentration, and those which constitute realizations or awakenings. Indeed, within Burmese traditions many such discrete experiential states are not delineated with any sort of consensus, a point well made by Sharf (2000). Davis and Vago (2013) offer us one example of this contention by considering how, in defining the awakened state, the ‘fruition’ attainment (*phala-samāpatti*) of experiencing cessation through insight practice is clearly distinguishable from some of the Burmese Theravādin traditions, which emphasize the ‘awakenings’ resulting from various results of concentration, such as the *cessation of consciousness* — *irodha samāpatti* — as well as distinguishable from Tibetan notions of

awakening (Tib: *byang chub*), and Phyag-rdzogs traditions' understandings of insight as an enlightened awareness that 'sees' all phenomena as truly beyond suffering, as inseparable 'emptiness-luminosity-bliss' states that are not different in nature from awareness itself (Griffiths, 1986). For our purposes it is important to note that debate persists regarding how best to understand the relation between distinct awakening constructs. Naturally, as will be seen, this bears upon neurobiological characterizations of awakening, and their relationship to maps of the stages of awakening offered within various Buddhist traditions.

An operationalization of awakening would require a practicable delineation of the 'four gradations' or stages of enlightenment, culminating in full awakening, in Early Theravadan Buddhism. The first, termed 'stream-entry' (Pali: *Sotāpanna*), represents an irreversible breakthrough thought to constitute an irreversible step on the path towards full awakening. While stream-entry is considered a goal attained by many, full awakening is considered a rare occurrence. How would we assess study participants having accomplished stream-entry? Have they overcome the required number of 'fetters' (*samyojana*) as traditionally conceived? How would such a relinquishment be measured? I will not dwell overly on the details of the four stages; I raise them only to emphasize the complexity of operationalizing such maps. How would we attempt to assess the level above stream-entry, i.e. the level of the 'once-returner' (*sakadāgāmin*), the higher 'non-returner' (*anāgāmin*), and finally full enlightenment (*arahantship*) which calls for abandonment of all remaining fetters? Further, while meditation practice is considered a significant contributor to the actualization of these stages, it is not the only supportive factor. There are indeed four further factors that are thought to support stream-entry — for further see Amaro (2019).

Disambiguating the various senses of awakening is a markedly under-addressed subject, yet one worthy of deep exploration. Without settling on a 'definitive' definition of awakening it may be noted that very few studies have investigated awakening-style experiences. As such, if one were to utilize the term 'awakening' to refer to a specific outcome or state, one would likely be privileging a *singular conception* of awakening over many others within Buddhist traditions, or otherwise potentially assuming or projecting commonalities between various diverse goals. Furthermore, very few studies have focused explicitly upon *lay* practitioners; and the purported benefits of meditative practice are often established through studies upon *advanced*

practitioners. Yet this raises concerns: are studies of advanced practitioners reflective of the influence of mindfulness practice or rather the pre-existing characteristics of those practised and embedded in a contemplative lifestyle and community for many years?

It may be argued that through the West's secularization and co-option of mindfulness as a technology geared towards health or productivity, contemplative practices have become divorced from their native soteriological goals. Thus, taking meditation out of its cultural, religious, and philosophical contexts may miss the influences that these contexts can have on the observed results of meditation. Future research will need to include consideration of spiritual and religious motivations, ethical concerns, as well as the influence of interpersonal and cultural context (Nash and Newberg, 2013; Dahl, Lutz and Davidson, 2015).

As Davis and Vago (2013) assert, how can we go beyond merely *assuming* there exist commonalities between the transformative changes referred to variously by distinct traditions as '*kensho*', 'stream-entry', 'realizing the nature of mind', et cetera? If there are commonalities, the work needs to be done to demonstrate the existence of genuine coherence underlying the apparent disagreements as to the nature of awakening, which evidently exist between, and indeed within, Buddhist schools. A case well made by Brefczynski-Lewis *et al.* (2007) is that if we are to do empirical investigations of these various constructions of awakening, it must proceed from the particular perspectival, emotional, behavioural, and cognitive outcomes described within the specific tradition. As such, this presents a significant issue for attempts to pin awakening to a specific neurophysiological state. An adjudication of this soteriological issue requires careful philosophical and philological attention, which is not only beyond the scope of science, currently conceived, but also potentially an impossible dream. This is not to say the task *is* impossible but that it requires care, thoughtfulness, and cultural sensitivity. This is the job of responsible philology: a domain estranged from mainstream science. It should be noted, nonetheless, that attempts have been made to bridge the philological, experiential, and scientific; as will be examined below. Brown, Wilber and Engler (1986), provide one of the earliest philological renderings of awakening, and later Ludwig, Brown and Brewer (2020) attempt to identify the neural correlates of different 'levels' of awakening experiences.

Brown, Wilber and Engler (1986) in *Transformations of Consciousness* provide an operationalizable set of stages of awakening. They

postulate an unfolding of meditation experiences in terms of a unified stage model: drawing together models from the Mahamudra, from the Tibetan-Mahayana Buddhist tradition; the Visuddhimagga (Pali: Path of Purification), from the Pali-Theravadin Buddhist tradition; and the yoga sutras, from the Sanskrit-Hindu tradition. Despite the vast cultural and linguistic differences, as well as different styles of practice, Brown, Wilber and Engler (1986) claim these models were sufficiently similar to suggest an underlying common and invariant sequence of stages. This ambition touches, of course, upon the notion of a common underlying religion and a unity through shared mystical experience (Shear, 1994), and ultimately perhaps a faith in the existence of a perennial philosophy (Ferrer, 2000). This approach was, and remains, intuitively appealing. After all, these practice traditions herald from a similar part of the world, share a common ancestry, and the classical metaphors describing the practices they draw upon are rife with references to the ‘path’ (Pali: *magga*, Skt: *mārga*), or ‘development’ (Skt and Pali: *Bhāvanā*). Surely, one might think, we *should* be able to delineate a convergent stage model? Well no, not necessarily, as argued in what follows.

2.2. *One Dharma? Attempts to unify awakening experiences*

The problem arises that in order to defend a singular, operationalizable notion of awakening derived from the ‘One True Dharma’, the argument needs to be made compellingly that diverse Buddhist traditional accounts are, in fact, held together by a shared conceptual reference point: that is, awakening or *nirvāṇa*, a shared identification of a liberatory goal. Yet, whilst appealing, the convergence suggested by Brown forty years ago has yet to be established empirically.² In some ways this critique suggests the problem of ‘front-loading’ the investigation of meditation-related phenomena by imposing existing stage models or existing shared conceptual reference points — such as a shared construction of awakening or *nirvāṇa*. The alternative approach, described earlier, would suggest that there is greater value

² Difficulties in establishing consensus include: the heterogeneity of meditative states, difficulty in controlling for the ‘degree’ of an experience, and difficulties discerning how to properly apply traditional techniques. To address these challenges, attempts have been made to draw upon non-linear dynamical systems (NLDS)-based research to post new models for categorizing the states of consciousness that can occur during the practice of meditation (Almendro and López, 2016).

in first empirically gathering phenomenal data, and only after the analysis comparing the results with the teachings of the different meditation schools and looking for possible matches.

To further elaborate the danger of front-loading empirical phenomenological enquiry, we can consider the similar, more recent attempt by Goldstein (2002) in *One Dharma* to review different conceptions of *nirvāṇa* across traditions (Burmese Mahasi, Thai-Forest, Korean Zen, and Tibetan Dzogchen), and to propose that they may all describe different partial aspects of the same realization. Goldstein, however, provided insufficient grounds for his suggestion. The problem that arises when taking Goldstein's approach of merely *asserting* convergence is, as Thompson suggests, that one runs the risk of smuggling in one particular viewpoint in the name of being universal (2020, p. 154). A point well worth making is that *universalism* is itself a specific viewpoint, and, in the rush to integration or assimilation, the universalist often fails to respectfully acknowledge the existence of different and irreconcilable perspectives. Genuine philosophical and religious differences exist beneath the broad umbrella of Buddhism.

The universalist tendency to seek unification or abstract the 'true essence' of Dharma, evident in emerging Western Buddhism, is problematic in that it bespeaks a belief that our scientific knowledge and rationalist outlook will help us to 'shear' the Dharma of its traditionalist baggage, magical thinking, and cultural foibles. Such an attitude is distinctly modernist, failing to identify our own positionality within culture or to acknowledge that a similar process of acculturation is underway for us, instead situating ourselves above or beyond cultural contingency (Gleig, 2019). A reasonable counter would simply situate the emerging Western Buddhism as equally relative and parochial in outlook to any preceding set of beliefs, and just as valid and useful in application. To counter the argument made by Thompson (2020), it may be noted that the assumption that contemporary Western-influenced Buddhism ought to be held to a higher standard than preceding and concurrent forms of Buddhism is an assumption which in itself indicates a superiorist attitude; as it is unreasonable to assume that any culture, including Western culture, is capable of standing outside its own cultural framework and value sets. Indeed, there is increasing awareness, from a constructivist standpoint, that it is impossible to 'neutrally' study experience outside of one's own cultural framework. This problem itself generalizes of course, beyond the study of awakening states to include any culturally-laden phenomena.

Recent neural attempts to justify universalist claims have suggested that there exists a specific physiologically mappable trajectory, or pattern of development, for meditation-naïve practitioners — regardless of culture, background, or technique applied. These accounts seek to discover ‘common neural denominators’ which correspond to, and unify, accounts of awakening. I will examine some recent studies that have attempted to find such neural denominators across different Buddhist traditions. This provides a set of markers which occur in an identifiable sequence alongside the accrual of meditative experience. However, as suggested, work is required to demonstrate that a specific pattern of development maps to any *particular* (or indeed any *universal*) set of ‘stages of awakening’. To this end, researchers have drawn upon a number of recent studies that have found gamma-band activity at different electrode sites to correlate with particular meditative states across diverse contemplative traditions. See Davis and Vago (2013), who identify the list as including Lehmann *et al.* (2001); Vialatte *et al.* (2009); Cahn, Delorme and Polich (2010; 2013); Rubik (2011); Berkovich-Ohana, Glicksohn and Goldstein (2012); Ferrarelli *et al.* (2013); Kozhevnikov *et al.* (2013), though it has expanded since.

A vital subject for future research is the need for an earnest adjudication between these works, yet this lies beyond the scope of the current paper. Nonetheless, such attempts may offer at best tentative conclusions, until such time as the philosophical problems identified herein are addressed. If a researcher is to operationalize awakening — that is, if they are to draw upon a number of such common neural denominators in defining awakening — then there is great value in framing one’s research findings with cultural sensitivity. The danger of unwittingly engaging in reductive universalizing discourse is a tendency unfortunately common to the history of scientific engagement with non-Western cultural traditions and practices.

2.3. Problems concerning naturalism and awakening

Beyond problems that arise when scientists attempt to unify diverse Buddhist accounts of awakening, problems result from incompatible metaphysical commitments. Buddhism and scientific naturalism rest upon mutually inconsistent ontological assumptions regarding the nature of mind. The mechanism, essentialism, reductionism, and referentialism that characterize the prevailing materialistic paradigm of Western science conflicts with the Buddhist metaphysical picture(s) of the universe, out of which awakening constructs derive. As will be

illustrated, this incongruence may render the search for neural correlates untenable, at least as regards the concept of ‘awakening’ in traditional Buddhist context(s).

It is important to begin by noting that almost all threads of Buddhist philosophy have some mind–body substance dualism at core.³ Thus, while there may be a dependence, or permissive substrate, for the operation of mind, from traditional Buddhist metaphysical perspectives awakening in itself is generally not understood as a physical event, process, or state. Nonetheless, this does not discount the possibility that a physical correlate for awakening exists. When discussing the neurological study of ‘awakening’, we may indeed be referring to traits associated with practitioners on the *path to* awakening, and to the development of meditative states and mental factors conducive *to* awakening, rather than to awakening *per se* and its neural correlates. This is an important qualification, as there is a question mark over whether there are ‘awakened’ individuals who can be studied neurologically. While there are studies that have purported to investigate the neural correlates of awakened beings, and cessation experiences, it is important to mark the contentiousness of such claims (Ramnani and Owen, 2004; Young, 2016).

Traditionally, the Buddha’s awakening was accepted as a matter of *śrāddha* (Skt: *shradda*) — which may be translated as faith or confidence derived from trust in a reliable source or witness (Garfield, Peterson and Perry, 2001). Today, by contrast, attempts are being made to demythologize awakening by turning it into a rationally comprehensible psychological state as part of the broader endeavour of making awakening consistent with a scientific worldview. Those who may be termed ‘Neural Buddhists’ have gone further, suggesting that by finding their *neural correlates* in the brain, we can both gain a better understanding of and *validate or justify belief in* the existence of ‘awakening experiences’ (Arnold, 2012). Thus, attempts have recently been made to seek just such neural correlates, cognitions, or behaviours associated with awakening (Davis and Vago, 2013). This speaks to how given inconsistent metaphysical beliefs there is significant confusion in our understanding of awakening.

Consequently, assessing the status of the existing scientific research on awakening, and its relation to therapeutic intervention, calls for

³ Though this is arguably less true in regards to the Tantric rLung ‘subtle energy of mind’ and the Madhyamika phenomenological approaches.

consideration of whether scientific-naturalist and Buddhist-philosophical assumptions may be made foundationally consistent. This consideration bears on the validity of a naturalistic reading of Buddhist philosophical traditions and the correct understanding of the doctrine of ‘no-self’ or ‘non-self’ (Pāli: *anattā*, Skt: *anātman*). Should a naturalistic understanding of Buddhism prove incoherent, this would affect the possibilities for a legitimate naturalistic understanding of awakening.⁴ As such, understanding the Buddhist *no-self* is required for an operationalized understanding of awakening congruent with Buddhism.

In assessing this possibility, we should attend to an issue raised by Thompson against what may be described as ‘Naturalistic Buddhism’. Thompson describes the dilemma well:

Naturalistic Buddhists proceed as if the mind can be grasped, as if it can be pinned down and identified as essentially the ‘biological reality’ of the brain... The deep question is whether it’s possible for science to be mindful of the mind’s un-graspability... (2020, pp. 77–8)

Thompson is pointing here towards an inconsistency between a naturalistic attitude concerning cognition — which asserts a narrow supervenience of mind on brain states (identity-reductionism) — and a Buddhist metaphysics in which mind is substantially distinct from any physical state, or at most broadly supervenient upon the physical. Indeed, a distinct argument can be made that Buddhism and naturalism rest upon mutually inconsistent ontological assumptions.⁵ As Thompson claims:

Naturalistic Buddhists uncritically accept philosophically problematic forms of naturalism and realism. They fail to see how the deepest and

⁴ It might be argued, for instance, that in terms of Western cognitive framings of the self, awakening may be poorly described as a ‘no-self’ experience, and may be better characterized as an *extended*-self experience in which the agent — or reflective ‘I’ — is maintained but extended into a greater field; an expansion of mind that accompanies a deactivation of certain brain functions which may grant practitioners access to a ‘background quality’ of awareness.

⁵ Thompson, for instance, contends that the Buddhist conception of *nirvāṇa* as unconditioned entails that *nirvāṇa* cannot be the result of any cause, and specifically cannot be the result of any mental cause. This implies that *nirvāṇa* cannot be the result of following the Buddhist path (2020, p. 78). This being the case, at least one fatal inconsistency could be said to exist between Buddhist soteriology, which requires the acceptance of a causeless state, and a naturalistic metaphysics on which all phenomena have causal explanations.

most radical insights of the Buddhist intellectual tradition undermine these ideas. (2020, pp. 77–8)

Some insights undermining a *narrow-supervenience* naturalism concern the limits of conceptuality and the emptiness of the conceptually-designated, interdependently-originated scientific methods we draw upon as a means of grasping the world. These limits are identified by, for instance, the doctrine of the universal emptiness of inherent natures (Skt: *svabhāva-sūnyatā*), a hallmark of the Tibetan Buddhist Mādhyamaka school (Garfield, 2014).

Thompson's (2020) arguments against neurocentrism remain a foundation for my critique. If consciousness itself is not in the brain, but, rather, distributed in various ways (through, for instance, being embodied and socially embedded), then assessing 'awakening' in the brain is already a completely wrongheaded project. Attention ought to be given to the enactivist understandings of the embodied, embedded, enacted, and extended facets of mind, and thus meditative technologies for transforming minds (Fuchs, 2020). On such a view, mind must be understood as critically involving organism-in-environment relations (Tempone-Wiltshire and Dowie; 2023a; Dowie and Tempone-Wiltshire, 2022). Which is not, however, to deny the possibility that certain meditative factors, or facets of awakening, may be explorable via neurological studies. Nonetheless, it is a point well made that Neural Buddhism proves largely philosophically naïve regarding the mind–brain relation, an idea expanded upon in our work upon the contemporary understanding of brain function *à la* McGilchrist (Tempone-Wiltshire and Dowie, 2023b) which provides the stronger basis for understanding psychological practice and mindfulness's process of therapeutic change (Tempone-Wiltshire and Matthews, 2023). Culturally a Neural Buddhist perspective is apparent in the widespread infatuation with the colourful scans of monks' brains in fMRI machines and the accompanying belief that 'awakening' states are narrowly supervenient upon, or *identical to*, specific brain states. There remains, however, the potential for a non-reductive *broad* supervenience of psychological states on the physical. In fact, such an approach can reasonably be described as naturalistic *without* requiring a mind–brain identity reductionism.

2.4. *The case for secular awakening*

An important illustration of the incompatibility of scientific naturalism and Buddhist metaphysics arises out of the ambition of researchers to

strip out traditional or cultural facets of awakening and forge a forthrightly ‘secular’ construction. ‘Secularization’ here describes the rendering of awakening as a rationally comprehensible, psychological state more easily translated into scientifically operationalizable language for which neural correlates can then be sought. This ought to involve an admission that the operationalizable notion of awakening does not refer to awakening(s) as they have been understood across Eastern traditions. Rather, what they are describing is a new metaphysically paired-back phenomenon merely *termed* awakening. At present there remains a tacit neuroscientific research assumption that awakening can be rendered as a *psychologically plausible phenomenon*: that is to say, consistent characteristics of the state can be made *specifiable* in scientifically acceptable terminology.

In neuroscientific validation studies of awakening, researchers have sought to establish independent empirical measures for relating the reports of practitioners with the cognitive and experiential changes described in traditional Buddhist texts. However, as I have argued, it cannot be had both ways. One cannot retain awakening in its traditional form(s), within metaphysical and cultural tradition, while simultaneously assessing its verisimilitude with scientific instruments. Awakening must be secularized and redescribed in scientifically specifiable terms if it is to be operationalized in neuroscience. Yet this is a bad translation, as the neural correlates need not necessarily map to the experiential states described variously across Buddhist traditions.

One attempt to secularize awakening involves understanding it as the limiting case of secularized mindfulness, that is, as a theoretical end goal that our existing data on mindfulness may be said to point us towards. The argument may be run that, if short-term mindfulness interventions demonstrate neuroplastic changes, as evidenced by Zeidan *et al.* (2010) amongst others, what would the very deep levels of mindfulness practice culminate in? Such researchers contend that even within secular mindfulness contexts, as they stand, practitioners are making progress towards awakening.

A further illustrative example is the research of Brown *et al.* (2020). While their conception of awakening is derived from the wider value system of the Tibetan Mahamudra tradition, their conception is nonetheless a secularly operationalized and stripped-back formulation of awakening. This means that they cannot reasonably be said to be ‘evidencing’ awakening *tout court*, or even assessing the validity of Mahamudra notions of awakening. Yet they may be justified in their

more minimalist claim to have discovered the associated biophysical correlate of a particular experiential state. Indeed, given the project so defined, and the clarity with which they have integrated measurable behaviour, first-person phenomenology, and neuroimaging evidence, there is reason to be optimistic about the value of this exchange.

One argument to be made for such secularized awakening models is that, while Buddhism may offer insights for science, cognitive sciences may too offer valuable insights for Buddhism (Garfield, 2011). This is reflected in the ambitions for biofeedback's utility evident in Ludwig, Brewer and Brown's (2020) endeavour to utilize brain scans to identify neurological patterns for awakening states. The suggestion is that practitioners could then utilize such technologies to sculpt their practice in order to deepen their 'realization', or cultivate awakening traits. Furthermore neurofeedback technologies might provide objective measures for attenuating introspective biases.

Such approaches to secularization face several issues. As illustrated, by offering a secular construction of awakening, researchers may be tacitly claiming to have discovered a 'universal' or 'fundamental' element to all contemplative practices across traditions. Furthermore, such approaches may arise from the problematic modernist tendency to claim that secular understandings are superior, or more ultimately true, for having shed the outdated magical thinking and 'cultural baggage' of preceding traditions. Understanding awakening within a scientific naturalist framework creates problems that are compounded by the fact that awakening is not only context- but also concept-dependent, a fact that produces problems in neuroscientific operationalization.

2.5. Operationalization and the concept-dependence of awakening

The scientific operationalization of awakening faces problems resulting from a number of neurocentric assumptions that generalize across the contemplative and cognitive sciences. As I examine in a forthcoming paper concerning Wittgenstein's critique of conceptual confusions in psychology (Tempone-Wiltshire and Dowie, 2023a), there exist clear parallel problems — concerning essentialism, reductionism, and referentialism — when describing soteriological constructs (such as awakening) as when describing psychological kinds. Both face the danger of the *reification* of entities or states described as inherently existent and singular — that is, we step from the *utility* of constructs to the *ontological reality* of the construct. Therefore,

awakening may serve a valuable function for guiding self-enquiry, yet this need not imply the objective reality of awakening states. In the case of psychological kinds, as with awakening, we need not presume that it is possible to read-off thought processes from brain processes. Even assuming a system of impulses going out from the brain is correlated with thoughts, this does not provide reason to think these thoughts would proceed systematically. In the case of awakening, as with other psychological kinds, it is plausible that certain psychological phenomena cannot be investigated physiologically, as there are no physiological 'kinds' which by necessity correspond to the psychological kind. As Wittgenstein writes: 'why should there not be a psychological regularity to which no physiological regularity corresponds?' (Wittgenstein, 2007, p. 609). Whether the core foundations of science, causality, and systematization are applicable to psychology and contemplative sciences should be held in mind as we navigate the confusions that arise when one fails to recognize the concept-dependent nature of awakening, explored below.

Evidently, issues that emerge in the neuroscientific study of awakening are frequently instantiations of more general problems in studying complex mental phenomena. We might further consider the 'experience of beauty'. In that case, similar questions require redress: is the experience of beauty *merely* an epiphenomenon? What is the relation between the experience of beauty and its possible physical correlates, and with what value does identifying existing correlates provide us? Does identifying correlates offer insights in the domain of aesthetic enquiry, dictate the products to which we ascribe artistic value, propose a new research programme in galleries, or influence a particular artist's creative practice? Such fundamental questions underlie much of cognitive-neuroscientific research, yet remain concerningly under-examined by neuroscientists concerned with questions in aesthetic, epistemic, or soteriological domains.

Given these generalized problems around the concept-dependent nature of psychological kinds, compelling doubts can be raised as to whether there even is an objective, concept-independent referent for the word 'awakening'. It may be argued, rather, that the concept of awakening has meaning only within context. Indeed, as Thompson (2020) describes, the term awakening, like the term 'love' or 'happiness', has both culturally-dependent and conceptually-dependent connotations. Asserting something is culture- or concept-dependent is to suggest that the concept is a necessary constituent of the thing-in-itself. That is: like love, money, or games, the meaning awakening

carries requires the conceptual or symbolic system in which it functions.

To illustrate, one might assert that love is 'real' in that it has a referent outside the sphere of concepts. Upon closer examination, however, it is evident that love is a multivalent term which does not refer to any singular thing outside the sphere of concepts, but rather refers to many things, events, and processes. Furthermore, we have many forms of intimate connection we may describe as, and many culturally-variant ideas about, love. The same is true of awakening: its referents are many and diverse. The meaning of awakening is dependent upon the conceptual system within which it is described, and as such is prone to contestation. This is not to suggest that there are no experiential *states* to which we are referring; only that awakening, like most everything else in our language, is metaphoric, multi-variant and concept-dependent in nature. As our concepts shape our experience, the state(s) we describe as awakening are at least partially informed by how we *conceptualize* it. The experience of awakening would not be what it is without the concepts and cultural practices that describe *and* inform it (Sharf, 2000). This raises important problems concerning how theory-laden observation inflects awakening experiences. That is: are people having the 'awakening' experiences as described, or are their consciousnesses being shaped by the presuppositions that affect them through the doctrine? There is much evidence surrounding this phenomenon in psychotherapeutic research, i.e. as a general rule *Jungian patients don't have Freudian dreams*, and *Freudians don't have Jungian dreams*. People start to adopt the symbolic structure and assumptions of the interrogative, introspective system that they are utilizing.

2.6. *Non-conceptuality: Operationalizing ineffable experience*

Not only the conceptual but the non-conceptual aspects of awakening provoke problems for scientific operationalization. Buddhism has utilized the puzzles and paradoxes surrounding non-conceptuality and awakening experiences throughout its history. This has included utilizing paradox, as well as developing analytic or koan-style meditative practice, for philosophical insight (Foulk, 2000). Nonetheless, the relation between awakening and conceptuality is a topic on which the traditional texts are equivocal. Some suggest that the awakening occurs in a state of advanced meditative absorption, in which ideation is completely absent. Others suggest that an awakening experience is a

complexly structured cognitive insight into the four noble truths, dependent arising, and emptiness.

If awakening is taken — as understood within certain traditions — to be a non-conceptual and intuitive realization of how things are *in and of themselves*, then difficulties arise in reporting on such insight in language. In this case the non-conceptual nature of the awakening realization cannot be *fully* conveyed via conceptual means — awakening (a concept) gives rise to insight (a concept) into the nature (a concept) of reality (a concept). Disputation exists concerning not only how one could report on the characteristics of such non-conceptual states, but also in discerning the congruence of one non-conceptual awakening experience with another. Further questions remain unaddressed: for instance, does a Buddha, upon awakening, retain cognitive processes and warrants by which they perceive the world? Seeking neural correlates for soteriological projects like awakening is a problematic undertaking whilst such questions remain unresolved (Thakchoe and Tempone-Wiltshire, 2019). As I have suggested elsewhere, understanding exceptional experiences requires addressing foundational ontological and epistemological questions that are as yet unresolved, such as the hard problem of consciousness, the metaphysical understanding of the self, and the aesthetic meaning of the sublime (Tempone-Wiltshire and Dowie, 2023c,d). It appears that we are either made to adopt the traditional conceptions of awakening as a state that *transcends* conceptual thought, in which case awakening cannot be evaluated for legitimacy by neuroscience; or awakening is reconceived in terms that can be made scientifically comprehensible by recourse to empirically verifiable concepts. To understand how possible it is to integrate awakening insights into conceptual frameworks requires further exploration of the nature of, and relation between, conceptuality and non-conceptuality: for adjudication over this subject see Thompson (2020) and Garfield (2020).

This newly described *secular* awakening, which bridges this gap, may be potentially corroborated and its mechanisms of action understood, although it diverges from Buddhist awakenings. If we begin with the assumption that there are a number of experiential states associated with awakening that cannot be conceptualized then it is quite possible such states cannot be quantitatively operationalized. A neuroscience of ‘quantities’ alone, then, may be incapable of adequately operationalizing awakening. This does not, however, discount the possibility that they may be researched utilizing an

integration of experiential epistemic methodology, as will be discussed below.

2.7. *Divorcing awakening from soteriological context*

Awakening, then, being potentially non-conceptual in nature as well as both context- and concept-dependent, is challenging to operationalize. Secular conceptions of ‘awakening’, divorced from soteriology and other significant contextual elements, are resultantly materially distinct from traditional Buddhist constructs of ‘awakening’. Many of the correlates of ‘awakening’ sought are concerned with *meditative factors*, such as mindfulness or concentration, rather than ‘awakening’ *per se*. While factors such as concentration are relevant in the path to enlightenment, they exist alongside other awakening factors: such as ethics and wisdom which, whilst historically considered integral to awakening, are often ignored. Many other relevant elements of Buddhism have been ignored, such as the five hindrances and ten ‘fetters’ (*pañca nīvaraṇāni* in the *Vimuttimaggā* Pali commentaries), or the seven ‘factors of’ enlightenment (Pali: *satta bojjaṅgā*, Skt: *sapta bodhyanga*).

Arguably, attempts to explore the neural correlates of awakening without attending to the greater Buddhist framework — which is understood traditionally as inseparable from the path to awakening — result in an ‘operationalization’ that is problematically reductive. The Noble Eightfold Path — a set of core principles laid out by the Buddha leading to Arhatship and awakening — consists of eight practices: right view, resolve, speech, conduct, livelihood, effort, mindfulness, and samadhi (Bodhi, 2010). Some attention has been given already to the shortfalls that exist in contemporary secularized definitions of mindfulness that detach from the Eightfold Path — that is, exclusion of the traditional relation drawn between wisdom, ethics, and meditative insight (Huxter, 2015). The existing research tendency to emphasize merely meditative states ignores this synergistic relation.

Within the scientific study of contemplative practice, there exist various models for understanding the cognitive mechanisms at work in different types of meditative practice — these include attentional, deconstructive, and constructive models (Dahl, Lutz and Davidson, 2015). Further work is required to put these models and cognitive mechanisms into relationship with the factors of the path to awakening. For example, greater work may be carried out examining the neural correlates linked to various aspects of awakening, such as

access to right view about the self (not-self or selflessness), the extinction of hindrances (afflictive mental states), or the development of wisdom and compassion (Shireen *et al.*, 2022).

As I have suggested, the assertion that awakening is merely a higher-level description of a brain state is demonstrably confused in that it relies upon a category error. A state of ‘awakening’ cannot be said to be reducible to a brain state, given that awakening is inescapably concept-dependent (Garfield, 2011, p. 39). Consequently, the phenomenon of ‘awakening’ cannot be an entirely non-conceptual epiphany, even while it may contain non-conceptual elements, as will be discussed below. As authors such as Coseru (2015) have noted: when a particular mental state, such as awakening, reflects the embodied patterns of moral conduct that characterize the Buddha’s way of being-in-the-world, an account of not only their conceptual designation, but also their intentional and normative status, and related awakening factors, becomes indispensable. Reduction of that mental state to a neural correlate alone proves limiting, as a failure to recognize the dependent nature of awakening draws attention dangerously away from the conceptually-structured social context within which the awakening-concept arose. To understand the significance of neural patterns of activation in the brain, correlated with experiential states, we must understand the concepts that constitute the meaning of awakening both *within* and *across* Buddhist traditions.

3. Methodological Issues

Given what has preceded, I have demonstrated that operationalized secular conceptions of awakening, divorced from soteriological and cultural factors, have little relationship to traditional Buddhist constructs. In what follows I identify methodological issues that remain even if we adopt such a limited secular conception of awakening. These concern the reliability of introspection and neuroimaging, both general and specific to the study of awakening. First, we will examine issues surrounding introspection and advancements in the field of empirical first-person phenomenology which may attenuate introspective bias. Second, we will examine major problems with neuroimaging that call for resolution: in particular, limitations of the general linear model, and the problem of reverse inference.

3.1. Problems of introspection

A critical methodological problem in the case of awakening concerns where to find participants who have experienced ‘awakenings’ — and the ‘same’ awakenings at that. If you cannot find possibly-awakened and willing participants, then there is no empirical research to be carried out in the first place. Identifying such awakened beings has generally relied upon the introspective report of participants. Yet this faces issues concerning the accuracy of introspective self-report upon experiential states (Garfield, 2011). Attempts to relate mental events to neuro-cortical processes are informed by a belief that a person can accurately report on subjective mental events, which may then be inductively correlated with neural processes. Yet why assume the accuracy of an individual’s introspective reports? Significant obstacles exist which inhibit our scientific ability to study mental phenomena directly without our interpretation being distorted by both the subjects’ and researchers’ biases. As such, introspection may lead not to self-knowledge but rather self-deception.

In the case of meditative self-report, as with other forms of introspective observation, individuals may be implicitly shaped by theory and thus subject to potential cognitive illusion. Furthermore, meditators may have inadequate conceptual resources to characterize what is found during meditation, consequently being subject to the distortions of wishful thinking and confirmation bias. In which case our self-report may be responsive to affective biases, poor validity, and poor generalizability. It should be noted, however, that recent work explicates the way in which certain meditative practices function precisely by *attenuating* such biases (Kang, Gray and Dovidio, 2014) and, further, that objective measures of such affective biases of perception and cognition have elsewhere been constructed (Elliott *et al.*, 2011). I will consider these arguments.

The reason meditative practice may appear to attenuate introspective bias will be apparent to anyone who has sat a meditation retreat. There is a common sense of experiential insight: a felt sense that one has greater access to one’s own underlying motivations, and consequently may pre-empt or identify defence mechanisms — in short, may derive insight into one’s own ‘unconscious’ levels of processing. Scholars such as Breczynski-Lewis *et al.* (2007) have drawn upon evidence suggesting that experienced meditators can more accurately report their experiences than average subjects. While this may be the case, perennial issues with introspection remain. These issues concern, for

instance, the influence of the language and beliefs of the tradition to which meditators belong upon the choice of contents reported and the manner of reporting. This points to the need to train subjects in modern methods of empirical phenomenological research, such as *epoché*, or ‘bracketing’. This method enables the cultivation of pre-dispositions to block biases and assumptions so as to explain a phenomenon in terms of its own inherent system of meaning, as will be discussed further in what follows.

3.2. *Empirical phenomenology and bypassing introspective biases*

To redress many of the issues identified with introspection, I turn then to advancements in the field of empirical phenomenology and first-person enquiry. A number of objective measures of affective biases of perception and cognition have been developed in order to address introspective issues (Elliott *et al.*, 2011). Seminal research in this area was carried out by Varela and various colleagues, in *The View from Within* (Shear and Varela, 1999), ‘Neurophenomenology’ (Varela, 1996), and especially *On Becoming Aware* (Depraz, Varela and Vermersch, 2003). Varela contends that, to address introspective fallibility, the ‘content’ of experience ought not be viewed as the primary focus. First-person enquiry should be concerned with the *how* rather than the *what*: e.g. ‘*How* is it to experience a particular phenomenon?’. Consequently, first-person data-gathering techniques are designed to orient away from explanations, conceptualizations, and objectifications. As physiological correlates are correlates of experience, neurophenomenology prioritizes the study of experience rather than its *conceptualization*. As a consequence, definitions may be held lightly, and can come gradually and secondarily to the researchers’ growing intimacy with the phenomenon reported.

As Hurlburt notes, the resurgence of introspective reporting has only recently been accompanied by an increase in the sophistication of methods guiding that reporting (Hurlburt and Heavey, 2006, p. 64). This is a mistake given the failings of introspection as a tool for the exploration of consciousness demonstrated in the past century. Hurlburt argues that more accurate introspective observations are possible, provided an adequate methodology is developed and utilized. His ‘Descriptive Experience Sampling’ (DES) technique emphasizes reporting upon a single moment at a time, asking the participant: ‘What are the details of your inner experience at this very moment?’ To understand Hurlburt’s ambition requires acknowledging that we

lack phenomenological access to ‘the world in itself’, as experience is always already constructed; indeed, attending to one’s own experience is, in itself, a constructive act. It remains an important question, however, whether observation-independent pre-reflective experience is accessible via report on present-moment experience, as Hulburt contends.

Nonetheless, emerging is an experiential-epistemic language around important dimensions of self-enquiry and the translation of internal experience. This includes the process of becoming aware of one’s subjective experience and the types of ‘interior gestures’ that enable us to ‘connect with’ ourselves. Such an argument for the plausibility of scientific insight via first-person research is offered by Pettimengin (2007) who demonstrates how potential interview methods may be developed that support individuals in describing their subjective experience with greater precision. More recently, Kordeš and Demšar (2021) have offered the ‘Horizon of Attending to Experience’, referring to a horizon which defines experiential phenomena that end up being observed and reported, yet is simultaneously itself an element of experience and therefore amenable to phenomenological investigation. These authors have suggested these as means by which first-person methodologies remain reflexive about their blind spots, thereby attenuating introspective bias. Yet work is required examining and articulating the specific horizons of particular methods of first-person enquiry in relation to awakening, and in the contemplative sciences broadly.

The investigation of pre-reflective conscious activity is an ongoing and animating current in first-person enquiry. While the field of first-person phenomenology may not be complete, it is vital to note that there is room for error margins in introspection. Indeed, socio-psychological data struggle with much less statistical rigour — thus while neuroscientists may hope for harder data, there will always be a point of contention over the standards of proof and as such the determinate outcomes that can be said to be ‘proven’. Science does not require perfect data. As such, if there are enough people providing a description of an experiential state which can be correlated with sufficient regularity to a neural phenomenon, then that suggests the existence of an experiential state mapping to that phenomenon, irrespective of the fallibility of introspective methods. Finally, let us consider methodological problems that arise in relation to neuro-imaging technology.

3.3. Problems with neurobiological characterizations of awakening

In utilizing fMRI neuroimaging technology to investigate the effects of long-term meditation, attempts have been made to correlate neurophysiology with a range of experiential awakening ‘indicators’. This has required establishing ‘markers’ that measure progress along the paths described by any particular tradition (Garrison *et al.*, 2013). Such experiential markers have included, for instance: clarity, somatic awareness, non-dual experience, and mind-wandering in adept meditators (Josipovic *et al.*, 2012; Davis and Vago, 2013). However, two major problems exist concerning attempts to utilize neuroimaging methodologies to this end.

Firstly, the general linear model (GLM), on which fMRI typically depends, relies upon assumptions and limitations which may result in a failure to capture the subtle changes associated with normative, yet transitory, states of enlightenment. For instance, the GLM requires that the *state of interest* being assessed must be contrasted with a state of *no-interest*. In which case investigating the functional correlates of, for instance, deep cessation experiences must be done in comparison to the common, or everyday, experience of the passing away of sensory objects. As such, the findings, even if suggestive of particular or significant brain region activations, cannot justifiably be claimed to be describing a neural correlate for cessation *in itself*. Rather, they only point to a potential biomarker for experiences of cessation *as defined* by the system or method utilized, and as *relative* to the baseline state of no-interest — such as mind-wandering (Davis and Vago, 2013).

Secondly, we face the problem of ‘reverse inference’. This problem concerns the attempt to specify correlates of particular conscious states. If a subject provides a reliable phenomenal report of being in conscious state ‘X’, and if that report aligns with imaging that shows a set of brain activations ‘Y’, we might conclude $X \rightarrow Y$. Even this much is contentious due to the multiple realizability or ‘degeneracy’ involved in the relationship between conscious states and brain states. However, if we grant $X \rightarrow Y$, this does not allow us to conclude $Y \rightarrow X$. Consequently, even if we observe the same set of activations called ‘Y’, this does not guarantee that a subject is in conscious state ‘X’. This is the primary methodological issue confronted in neuroscientific imaging studies (see Machery, 2014). While it may be possi-

ble to overcome these obstacles, present research falls short in this area.

3.4. *Scientism and the significance of neural findings*

These issues have ramifications. In light of widespread scientism, there is a popular tendency to misconstrue the significance of purported neural findings. Indeed, the quest for physiological correlates for something termed awakening may foster in the lay readership a belief in the Buddhist soteriology and its various entailments, as suggested in Wright's (2017) work *Why Buddhism is True*. Should this be the case, we might anticipate newspaper articles titled: 'Neuroscientist Discovers Enlightened Monk' or 'Science Proves Buddhist Notions of Emptiness!' or 'There Really IS No-Self!'. Or alternatively, they may suggest to the readership that science has somehow proven the falsity of Buddhist metaphysical and cosmological beliefs. Yet either conclusion, I have argued, is several steps too far. As I have demonstrated, even if neural correlates were established for deep states of meditation, due to the manner in which awakening must be operationalized, we can derive from this no direct validation or invalidation of the fuller metaphysical systems of any specific Buddhist doctrine. This principle applies more broadly. Whether it concerns the four noble truths (Skt: *catvāri āryasatyāni*), the doctrine of ultimate (Skt: *paramārtha*) and conventional (Skt: *saṃvṛti*) reality, the claim to the universality of dependent origination (Skt: *Pratītyasamutpāda*), or the moral ideal of the four immeasurables (Skt: *brahmavihāras*) — these core articulations of Buddhist thought and practice are built on philosophical argumentation and experiential insight, and are distinctly normative and soteriological claims. There should be no assumption that such philosophical or experiential insights, soteriological or religious claims, can be made subject to scientific verification or falsification.

4. Conclusion

While Buddhist contemplative practices, in recent years, have had a revolutionary impact upon cognitive science in the West, they have also been appropriated for various purposes that have drawn attention away from their traditional soteriological functions. The uncritical approach present in the neuroscientific treatment of awakening, and meditation-related phenomena more broadly, is a subject that requires greater philosophical attention than it presently receives. In the quest

for the neural correlates of awakening, I have suggested the need for a return of attention to its cultural roots.

The conclusion of the findings presented here is that careful attention to definitional, operational, and methodological neuroscientific obstacles is required in the responsible investigation of awakening states, and soteriological ambitions more generally. Science should not be taken to legitimate religion, nor should it strive to merge with religion. When one begins with an explicit or implicit desire to accomplish such a merging, one arrives commonly at methodological incoherence, an incoherence that all too frequently characterizes scientific research into awakening. Dialogue around these subjects must proceed with both cultural sensitivity and epistemic humility.

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