**AVOIDING RUSSELLIAN MONISM’S PROBLEMS**

**Abstract** Russellian monism (RM) attributes experience to the intrinsic nature of physics’ abstract mathematical accounts of the world. It’s touted as a promising mind-body solution, for it avoids dualist and physicalist issues. Yet this status is imperiled by its deeply obscure ideas of mental combination, protophenomenal entities, emergent experience, grounded abstractions, et cetera. This “metaphysical magical mystery tour” may render RM as problematic as competing views. A clear, simple panpsychism akin to Strawson’s might avoid these issues. In this theory (NPP), experience is the real, underlying nature of matter-energy, hidden beyond its sensory appearances. NPP may avoid panpsychist combination problems by showing how neurons can electrically bind their minimal experience to form percepts, thoughts, and subjects. This might explain combination in testable ways, while RM instead turns to questionable microsubjects and binding mechanisms. NPP’s virtues are its metaphysical simplicity, empirical support, testable foundations—and its avoidance of the issues in RM and other standard theories. It might point to a mind-body solution.

Keywords: Russellian monism; panpsychism’s combination problem.

**1. Russellian Monism**

Russellian monism (RM) is a sprawling, complex theory of mind derived primarily from Bertrand Russell’s *Analysis of Matter* (1927). For the sake of consistency, its description below sticks mainly to the prominent account of Alter & Pereboom (2019). Only RM’s most basic claims will be sketched below (primarily including those relevant to its problems).[[1]](#footnote-1)

 RM is arguably a response to structuralist views of theoretical physics, according to which physics describes the world only in terms of structures and dynamics. “All that physics gives us is certain equations giving abstract properties of their changes. But as to what it is that changes . . . physics is silent” (Russell, 1959, p. 18; cf. Russell, 1927, pp. 10, 264, 320, 384, 400). Energy fields, for example, are described via abstract equations that specify their effects on particles. Physics thus omits the underlying nature of fields—it shows what fields do, not what they are.

 RM’s reply to this structuralism is to claim that these underlying natures—“quiddities”—actually exist and help explain how experience (consciousness) fits into the world. A photon’s quiddity is said to be its intrinsic nature apart from the extrinsic behavior physics studies—it’s what exerts the photon’s force that underlies its effects. (This extrinsic-intrinsic contrast is also cast as dispositional-categorical or relational-nonrelational, but this isn’t essential to this paper.)

 RM says that such quiddities ground the abstractly described entities of physics. Without this ground, the world would be abstract structure “devoid of substance or qualities” (Chalmers 2013, p. 254). This extrinsic structure thus needs “intrinsic properties of quiddities so that the world has some substance to it” (Chalmers, 1996, p. 153).

 So, in sum, RM says that while physics describes the world only in terms of abstract mathematical structures and dynamics, these are grounded in underlying quiddities that help explain experience. Different interpretations of these points yield different versions of RM.

 For example, in Russellian panprotopsychism, quiddities are protoconscious—they aren’t conscious in themselves, but instead just collectively constitute consciousness (on analogy to how atoms can together form molecules with new properties). They’re often left uncharacterized, though they’re sometimes characterized in functional terms of their role in cognition.

 Panprotopsychism is often seen as including physicalist and neutral-monist versions of RM. In physicalist RM, these quiddities that constitute consciousness are construed as being physical (e.g., Montero, 2015; Alter & Coleman, 2020). In neutral-monist RM, both quiddities and physics’ structures are neutral entities that are neither mental nor physical but combine to form mental and physical entities (e.g., Stoljar, 2015). For example, in Russell (1921, 1927), neutrals are sense data that are arranged into sensations and physical entities by psychological and physical principles, respectively.

 In Russellian *panpsychism*, quiddities don’t come together to constitute experience, as above—instead, they are experience (e.g., Strawson, 2006b). Here, all (or most) things have a mind or a mind-like quality, such as sentience or experience (Skrbina, 2005). This differs from panprotopsychism, where experience can be either ubiquitious or merely confined to brains (Chalmers, 2013). Yet both panpsychism and panprotopsychism can hold that simple experiences at lower levels of organization combine to form complex experiences at higher levels.

 Panpsychism is often seen as including idealist and dualist versions of RM. In idealist RM, both quiddities and physics’ structural entities are mental—they belong to minds or subjects (this view arguably includes Bolender, 2001 and Schneider, 2018). In dualist RM, the structural can be treated as physical entities, and quiddities can be mental entities. Both are fundamental and distinct, unlike in panpsychism (as Chalmers, 2010 notes). But this dualism might not sit easily with RM’s monism and its aim of integrating mental and physical causation. This is just one illustration of the difficulties Alter and Pereboom faced in defining RM (more appear below).

 Strawson (2006a) argues that RM can avoid flaws in standard theories. For example, some dualists claim that experience emerges from matter’s organization in brains. In Strawson’s view, emergence can sometimes be intelligible, as when life forms emerge in virtue of molecules’ self-replicating powers. But this “in-virtue of” relation is lacking if experience pops into existence from what lacks experience (as with these dualists). So, this radical emergence is unintelligible magic where anything goes. In contrast, RM’s monism can avoid this dualist causality.

 Strawson (2006a) also says that RM avoids physicalism’s attempt to eliminate experience. His Cartesian reply to this attempt is that nothing is more certain than the existence of one’s own experience. It could be added that reductive physicalism—where experience exists but is fully explicable by physical science—also raises problems because experience differs so radically from observable brain events. In contrast, RM treats experiences as the underlying, intrinsic nature of physical events, so there’s no reduction to physical events. RM thus avoids physicalist issues.

 These arguments align with contentions in Stoljar (2001) and Chalmers (2002) that RM isn’t threatened by the anti-physicalist thrust of knowledge and conceivability arguments. Chalmers (1996, 2013) also argues—like Strawson above—that RM’s quiddities accommodate experience while integrating it into physical causation. In these ways, we might say that RM takes experience seriously, like dualism, but unlike traditional physicalism—while taking causation seriously, like physicalism, but unlike traditional dualism. Again, RM does all this while showing how physics’ structures can be grounded in something substantial.

 RM is thus often seen as an especially promising solution to the perennial mind-body problem of how minds and brains are related (e.g., Strawson, 2006a-b; Chalmers, 2013). So, mind-brain relations have arguably been problematic merely because RM’s intrinsic realm is ignored.

 In summary, RM typically treats experience (and protoexperience) as the intrinsic nature and substantial ground of physics’ abstract mathematical accounts of the world. It may ultimately offer a mind-body solution because it avoids the problems in traditional physicalism and dualism.

**2. Russellian Monism’s Problems**

One problem facing RM arises from its reply to structuralist claims that physics construes the world just in terms of abstract mathematical structures. RM replies that the structures must be grounded in concrete intrinsic entities, or they will remain abstract structures devoid of substance or qualities. Note that this grounding relation requires that both the abstract and concrete exist. For if there’s no abstract, then RM’s grounding relation is vacuous—there’s nothing to be grounded. And without this grounding, the resulting theory arguably wouldn’t be RM.

 The problem here concerns how abstractions—which differ from particular events and lack spatiotemporal existence and causal powers—can be grounded in concrete, particular things (Jones, 2010; Schneider, 2018). How do particular things give concrete existence to abstract ones? How are abstractions embodied in or present in particulars? All this is arguably no less mysterious than Plato’s doctrine that ideal forms are embodied in (present in) matter—or Pythagoras’ related doctrine that the observable universe is constructed out of numbers. RM’s grounding relation may thus involve an obscure abstract-concrete dualism.

 But this criticism may not apply to all forms of RM. For there’s disagreement over whether RM must adopt structuralism about physics, as Alter and Pereboom acknowledge. Not all forms of RM need to say that physics’ structures exist abstractly and become substantial by grounding. Structures may instead be (from the start) concrete, substantial arrangements of intrinsic conscious entities spread across neural networks, for example. Whether this is RM depends on whether grounding abstract structures is treated as strictly necessary—or just prevalent—features of RM.

 In addition to this general obscurity about how the abstract gets grounded in the concrete, specific versions of RM may have their own obscurities. In Chalmers’ (1996) “double aspect” theory, for example, “Experience is information from the inside; physics is information from the outside.” Treating experience as the intrinsic nature of information raises an abstraction issue like that above. Also, the aspect relation may be one of the most mysterious mind-body relations—it seems more like a metaphor than a clear relation (Shaffer, 1968). Various other obscure theories exist in RM, but instead of listing them, what follows will stick to RM’s two general forms.

 In panprotopsychist RM, quiddities aren’t conscious themselves, yet collectively constitute consciousness. But panprotopsychist entities are quite mysterious and ill-defined (like most third entities). They also raise the problem Strawson noted above: how can experience emerge from what lacks experience? Russell’s neutral monism is somewhat clearer than panprotopsychism, for his neutrals are specified as the sense data we experience. But this “neutral” monism is thus more of an experiential or “mental” monism (Stubenberg, 2015). This phenomenalism thus raises idealist issues concerning how bodies, which are figments of minds, depend on brains (see below). Finally, both panprotopsychism and neutral monism posit numerous entities and are exceedingly complex. For example, Russell (1921, 1927) says that neutral entities assemble into physical and mental manifestations in line with physical and mental principles, and they have extrinsic and intrinsic characters as bundles of perspectives. All the complexity and obscurity above may seem to critics like an elaborate “metaphysical magical mystery tour” (cf. Redden, 1999).

 Panpsychist RM (such as Strawson’s) avoids panprotopsychism’s obscure proto-entities and emergent consciousness. But both theories face the combination problem concerning how simple experiences at micro levels join to form macro-level experiences and overall minds. Arguably, this resurrects the same emergent experience that RM rebukes some dualists for having.

 Strawson replies (2006b) that although the emergence of minds from combinations of simple experiences hasn’t yet been explained, it’s not unintelligible—in contrast to the emergence of experience from what lacks experience. Yet critics can reply that it’s still unclear how the subjects of simple experiences can intelligibly join to form the familiar subjects in our minds.

 Chalmers (1996, p. 307) writes that the combination problem “is certainly the hardest problem for any sort of Russellian view.” But he adds (2013, §8) that, if it were solved, RM would “immediately become the most promising solution to the mind-body problem.”

 This list of RM’s problems isn’t exhaustive. But it shows why critics feel that RM fails to offer potential mind-body solutions—and just offers old obscurities in new structuralist garbs. Especially vexing are their obscurities above about how the concrete *grounds* the abstract, how proto-entities *constitute* the mental and physical, how experience *emerges* from what lacks experience, and how simple experiences *combine* to form complex experiences. Arguably, these obscurities aren’t as unintelligible as reductive physicalism, which paradoxically implies that the observable brain activities of neuroscience are identical to experiences not observable in brains. But RM’s obscurity may often seem just as obscure as, for example, dualist causality.

 RM advocates may shrug and reply that all mind-body theories raise obscurity, often deep ones—so obscurity alone (without serious logical or empirical flaws) isn’t grounds for rejection. But arguably this “everyone does it” defense doesn’t really let deeply obscure theories off the hook, especially if other theories manage to avoid obscurities. The theory below will attempt to do this. It primarily deals with RM’s combination problems, but it initially deals with RM’s other issues, such as its protophenomenal entities, emergent consciousness, and grounded abstractions.

 To summarize, RM arguably raises several main problems. These are mainly its grounded abstractions, panprotopsychist-neutral entities, emergent consciousness, and combination problem.

**3. Avoiding Russellian Monism’s Initial Problems**

RM’s various obscurities might be avoided by stripping them into a clear, simple panpsychism partly akin to certain ideas from Russell and Strawson. I don’t claim that this is a real RM. In fact, I just call it “Neuroelectrical Pure Panpsychism” (NPP). For it says that all particles and fields are minimally conscious, and electrical activity unites them in brains to form fully conscious minds. More precisely put, NPP has both a metaphysical component and a testable empirical component: *(1) Consciousness is the real nature of all matter-energy beyond how it appears to the senses. (2) The brain’s electrical activity helps create the mind’s unified qualia, cognition, and subject*.

 Let’s start with (1). Russell (1927, pp. 197, 320) suggested that our experiences are hidden in our brain matter beyond how it appears to our sensory organs—and beyond how physical science describes it. Russell’s clear, simple claim here can be widened to cover all matter-energy. Light entering our instruments and eyes just indirectly shows us the external world (in contrast, we’re directly aware of our own experiences). So, the world’s real, underlying nature is hidden from science. It’s up for grabs. It could, for all we know, be experiential.

 In this NPP, experience is the universe’s *fundamental, underlying substance* (here, “substance” just means “the concrete, fundamental stuff comprising the universe”). Experience exists spatially, exerts forces, does work,[[2]](#footnote-2) and is the real nature of matter-energy[[3]](#footnote-3) beyond how it appears to our senses. If this claim sounds obscure, recall that physics says nothing about what particles of matter and fields of force are like in themselves, apart from their observable effects. It tells us only what they *do*, not what they *are*. So, they could be experience for all we know. They could occupy space, exert forces, and do work.

 So, everything is pure consciousness in NPP. While this pure panpsychism partly echoes ideas in Eddington (1928), Feigl (1958), Strawson (2016), etc., the aim is to define NPP in simple terms uncluttered by the complexities in other panpsychisms. For example, NPP makes no mention of RM’s claim that experience is the intrinsic nature and ground of physics’ abstract structures. This realm of abstractions doesn’t exist in NPP (except as mere theoretical constructs in our imaginations). Experience isn’t the ground of an abstract realm paralleling the experiential realm. Experience is just the concrete world’s real, underlying nature.

 In general, NPP tries to avoid RM’s contrasts between structural-intrinsic and abstract-concrete. NPP also tries to avoid positing obscure RM entities such as grounded abstractions, neutral entities, proto-experiences, and emergent consciousness. Nor does it have RM’s complexity. It instead sticks to the simple metaphysical claim in (1) above. NPP also tries to avoid physicalist, dualist, idealist, and neutral-monist versions of RM—and their obscurities.

 This may not be RM, for it lacks RM’s prevalent grounding relation. But it may be akin to RM, for experience underlies the world as observed and depicted by scientists (cf. Russell above).

 While NPP may avoid RM’s obscurities above, we might wonder whether it unwittingly smuggles in the problems facing standard theories such as physicalism, dualism, idealism, et cetera. Arguably, it doesn’t. Let’s turn to this now.

 Reductive physicalism identifies pains with certain observable events in neuroscience. This creates an explanatory gap between these radically different entities. But in NPP, pains are instead the underlying reality of these neural events beyond observations of them. There’s no explanatory gap here. This seems to explain what reductions don’t—how pains are hidden in brains.

 Nonreductive physicalism (NRP) treats pains as emergent, supervenient properties of cognitive functions that are realizable in multiple physical events. But it has fairly well-known problems. (a) NRP doesn’t explain how consciousness emerges from nonconscious brain circuits once they activate. (b) NRP’s functionalism fails to account for qualia in themselves, apart from their causal roles in cognition. (c) NRP isn’t clear about how abstract[[4]](#footnote-4) information-processing functions relate to the qualia we experience and our soggy neurons, neither of which are abstract. (d) Growing evidence now indicates that qualia aren’t based in multiple physical events but in unique sensory detectors, even in cases of neural plasticity (see below). NPP tries to avoid these four problems. (a) Consciousness is a fundamental substance, not an emergent property. (b) Qualia aren’t reducible to functions or anything else. (c) Just one entity exists, not three quite different entities with puzzling interrelations. (d) Qualia aren’t multiply realizable, they’re unique detectors.

 Idealism claims that bodies only exist in the form of perceptions in our minds. But if our bodies are just figments of our minds, why does damaging our brains cause damage to our minds? This damage makes sense if brains create our minds, but not if brains are figments of minds. In contrast, NPP doesn’t treat our bodies as mere perceptions in our minds, for bodies exist (as just subliminally conscious) whether or not we perceive them. In NPP, brain damage can cause mental damage because minds are the real nature of brains. Another way that NPP diverges from idealism is that only in NPP do experiences exist spatially and exert forces.

 Dualism traditionally posits two substances—physical bodies in space and nonphysical minds outside space—that can exist apart yet interact. But their radically differences render their interaction obscure. NPP avoids this dualism and its causal issues by positing a single substance.

 Dual-aspect theory attributes causality to a single underlying substance, which the mental and physical are aspects of. But this substance, its aspects, and its causality are deeply mysterious. NPP tries to avoid such mysteries by saying that only experience exists. Skeptics might reply that NPP still harbors a dualism of *accessible* and *hidden* aspects, for it says that I can directly access my own experiences, yet other people’s experiences are hidden (see Chalmers, 1996, p. 136). But these aspects aren’t radically different in NPP, so it avoids dualism. First, in NPP, my experiences are accessible to me simply due to my brain’s electrical circuits uniting my experiences. Second, other people’s experiences are hidden from me simply because there are no circuits between our brains to unify their experiences. So, the closest I can come to “accessing” their experience is just to see their brain activity via light reflecting off their brain into my eyes. The different aspects are thus based just on whether access is direct via electrical circuits or indirect via reflected light. There’s no mystery, for the only difference is that circuits unify experiences in each brain but not between brains, thus making experiences accessible within each brain but hidden between brains.

 To summarize, in NPP’s metaphysical component, all that exists is consciousness which exists spatially, exerts forces, and is the real nature of matter-energy beyond how it appears to the senses. This partly resembles Strawson’s pure panpsychism. While it lacks RM’s grounding claim, it may be akin to RM, for it says that experience underlies the world observed and described by scientists (cf. Russell 1927). NPP’s clear, simple monism arguably avoids the obscurities in RM, such as grounded abstractions and protoconscious entities. It may also diverge from other mind-body theories and their problems. Finally, it might avoid RM’s combination problem (but here NPP, like all neural theories, isn’t so simple). This is where NPP’s empirical component appears.

**4. Avoiding Russellian Monism’s Combination Problems**

Panpsychism’s combination problem concerns how simple experiences (microexperiences) in quarks, atoms, etc. combine to form larger experiences (macroexperiences) such as perceptions—and the subjects who apprehend them. Its component problems concern how the unity, qualities, structures, and subjects of experience arise. The basic problem is the unity problem: until we know what mechanism unites experiences and how it works, explaining how microexperiences produce macroexperiences can’t get off the ground. Yet all existing mechanisms are highly problematic.

**4.1 Unity problems**

Panpsychism’s unity problem concerns what mechanism(s) causes micro-experiences to unite into larger forms. It’s tied to neuroscience’s *binding* problem concerning how separate, dispersed brain circuits unite to form unified, conscious objects such as enjoying a cappuccino with its colors, odors, tastes, etc. (Singer, 2007). RM’s panpsychist accounts of mental unity often draw on scientific accounts of how brains bind various qualia into a unified form. But science hasn’t actually found a viable binding-unity mechanism.

 Yet growing evidence now supports the testable theory that the binding-unity mechanism is neuroelectrical. This approach implies that minds are specific neuroelectrical substances, not multiply realized or grounded functions. So, while NPP uses this neuroelectrical approach below, this option may not be fully open to RM due to its widespread functionalist adherences. Below, the binding-unity problems are described, NPP’s neuroelectrical approach to them is sketched, then this approach is further applied to the remaining quality, structure, and subject components of the combination problem.

*4.1.1 Neuroscience’s Binding Problems*

To explain how unified qualia arise, neuroscience addresses two issues: (a) how our various qualia arise and (b) how they unite to form overall perceptions, memories, et cetera.

 (a) Explanations of how various sensory qualia arise traditionally involve labeled lines, such as for the three primary colors, and cross-line comparisons of their firing rates, with both working together to determine which wavelengths are actually present. The problem is that these mechanisms are so similar across the color, taste, odor, and other sense modes—that it’s hard to see how they can account for all our starkly different qualia (e.g., Adrian, 1928). Nor have newer approaches fared well. For example, Integrated Information Theory (Tononi, 2008) assigns different qualia to unique qualia spaces of varying shapes. But their neural correlates aren’t specified. Their codes are too complex to spell out, let alone test.

 (b) Explanations of how these qualia unite to form overall perceptions have centered on neural circuitries firing in synchronized lockstep together—and on systematic synaptic connections within circuitries (either ascending or descending). The problem is that there’s insufficient evidence to back these explanations up (e.g., Koch et al.; 2016, Jones, 2017). This threatens many theories of consciousness. For example, Global Neural Workspace Theory (Dehanene et al., 2011) attributes conscious, globally accessible information to synchronized firing between coalitions of neural hubs. While such hubs do help unify lower circuits, there’s no evidence of synchrony between all hubs, nor of a single area where all hubs synaptically converge.

*4.1.2 Panpsychism’s Unity Problems*

Panpsychism’s unity problem concerns how microexperiences unite into larger forms. Its main cause has been the lack of a viable binding mechanism.

 One example comes from panpsychists such as Seager (2010) and Lewtas (2017). They explain how microexperiences unite in terms of the outdated synchrony mechanism above.

 Alternatively, Coleman (2014) suggests that high-order thought (HOT) integrates information processing within cognitive systems. HOT focuses on certain qualia, thus making us conscious of them as an integrated whole. But this conflicts with evidence that most qualia exist at preattentive levels outside the focus of attention—and beyond HOT (e.g., Fei-Fei et al., 2007; Lamme, 2020). Even ordinary experience shows that we aren’t unaware of surrounding people while we focus attention on a friend. Further, lesion studies and intracranial electrical stimulation experiments show that frontal activity (including HOT) has little effect on perceptual awareness (Raccah et al., 2021). Lamme (2020) gives evidence that frontal activity doesn’t explain the unity, integration, or awareness of perception. (Coleman also faces here the problems above concerning grounding abstractions and panprotopsychism.)

 Coleman (2016) and others propose that quantum entanglement is a unifying-binding mechanism. But how does binding actually work in sensory circuits? Quantum-binding theory uses synchronic and synaptic activity to explain why only certain neural assemblies support minds (e.g., Georgeiv, 2007; da Rocha, 2001). But, once again, there’s little evidence that these two activities unify experience. Also, entanglement is broken by human observations of it, which raises issues for ascribing our mental unity to it. Finally, we might wonder whether entangled particles—which are no longer separate entities described independently—can explain all the different colored shapes in images.

 Another proposed binding mechanism is the electromagnetic (EM) field in neuroelectric activity. While neurons don’t fully synchronize their firings (as already noted), their EM fields can fully synchronize. This binding mechanism appears in various different theories (e.g., Jones, 2013; Keppler & Shani, 2020; Ward & Guevara, 2022). NPP uses it below.

*4.1.3 Avoiding Unity and Binding Problems*

NPP’s neuroelectrical approach to all these binding-unity problems is reflected in its empirical component above, which says that “the brain’s electrical activity helps create the mind’s unified qualia, cognition, and subject.” (This is why I call my view “Neuroelectrical Pure Panpsychism.”)The binding-unity problems NPP addresses are those already noted above: (a) how our various qualia arise; (b) how qualia unite to form perceptions, memories, et cetera.

 (a) Concerning how our various qualia arise, there’s growing evidence that they correlate with different highly electrified substances in the membranes of sensory and emotional circuits. For example, different temperatures correlate with different TRP ion channels, different colors correlate with different OPN1 GPCRs, and some different tastes correlate with different T1R and T2R GPCRs. Similarly, receptor proteins such as those for testosterone, oxytocin, endorphin, and adrenaline correlate respectively with lust, love, euphoria, and vigilance (Jones & Hunt, 2023, §2.5). These membrane proteins actually trigger electrical impulses in sensory and emotional circuits. Each of these proteins has its own distinct mass (m) and rest energy (mc2)—which correlates qualia with narrow bands of rest energies in electrically bound masses. In fact, the whole range of qualia seems to reside like a rainbow in the range of protein masses (Ibid., fig. 2). (This qualia rainbow may repeat itself across nature.) Qualia are thus *fundamental* *substances*, not multiply grounded functions. Neural plasticity doesn’t threaten this view.[[5]](#footnote-5) Strong fields unify these receptor proteins in qualia circuits to create overall perceptions.

 (b) Concerning how qualia in proteins unite to form overall perceptions, neuroelectrical activities along resting neurons are weak, so their consciousness remains separate. But as brain circuits fire, their EM activity generates a *continuous oscillating EM wave* between separate neurons that unites (pools) their separate, atomized consciousness. These strong fields are localized right around ion currents that run (as EEGs show) along neuronal circuits. These fields are especially strong among well-aligned cells (such as in cortical modules). They’re strongest where their frequencies nest together in phase (i.e., coherently), even when their underlying circuits by themselves don’t fully synchronize their firings at a single frequency (Hunt & Jones, 2023). Yet, consciousness isn’t unified where fields are weak in brains—or between brains. Much of the brain’s experience is thus subliminal, for example, visual circuitry for color constancy, depth perception, and binocular rivalry work largely behind the scenes to shape our images.

 NPP’s claims above about how different qualia arise and unite are testable. (a) The claim that different qualia are different proteins is testable through a continuing series of experiments that determine whether the proteins and qualia appear together in evolutionarily conserved ways—and whether the qualia are reflected in behavior when the proteins are deactivated in, or added to, neurons. The more these correlations hold up, the more NPP would be confirmed. (b) NPP’s claim that strong fields unify receptor proteins in qualia circuits to create perceptions is also testable. This involves refining an experiment in Libet (1993) to see whether blocking fields in visual cortex affects images. If a mouse is trained to respond to three blue spots in a row, it should continue responding if a cortical slab corresponding to one of the spots is sliced out—until the slice becomes 400 microns thick and the field wanes.[[6]](#footnote-6) For details on these tests, see Jones (2024).

 Even now, prior to the tests, there’s considerable evidence for NPP’s claim that binding requires EM. (a) No other mechanisms explain the mind’s unity, as already noted. (b) Koch et al. (2016) argue that EEGs track conscious perceptions across brains better than neuronal synchrony and other events. This correlates unified perceptions with local neuroelectrical fields, which aligns with NPP. (c) EM fields alone (not particles or synapses) propagate signals across slices in hippocampal tissue (Chiang et al., 2019)—so it’s the fields that unify this activity. (d) There’s growing evidence (see below) that oscillating fields enable attention to control cognition. This aligns with NPP’s view that consciousness exerts EM forces in unified ways across the brain.

 So, in NPP, our unified qualia are neuroelectrical substances. For example, visual images are spread across neural maps as the underlying substance of their electrical activity beyond what EEGs show of it. Interestingly, EM fields resemble these images. Both arise from discrete, grainy neurons and reach across space in continuous, unified, incorporeal forms.

 This account of images contrasts with RM’s. First, in treating images as neuroelectrical substances, NPP gives no role to RM’s abstract structures. This avoids RM’s problem above with grounded abstractions (i.e., how the abstract gets grounded in the concrete). Second, NPP’s electrical approach diverges in testable ways from RM’s widespread adherence to functionalism and multiple realization. In NPP, redness is a specific electrified protein, not an abstract function somehow grounded in multiple hardware circuitries. Third, while NPP tries to explain how images get their pictorial form, functionalism hasn’t spelt out what the codes for images are, nor how to get from these coded nonpictorial images to the pictorial images we experience. The shortcomings in standard binding-unity mechanisms, such as synapses and synchrony, raise problems here.[[7]](#footnote-7)

 What if the two tests above eventually indicate (respectively) that all qualia correlate with electrified detector proteins and that EM fields propagate signals along these detector circuits? Given the problems in other qualia and binding mechanisms, this would indicate that when we see a tiny point of color, it consists of dozens of detector cells unified by their strong EM field. The clearest, simplest interpretation would apparently be that this colored point is the hidden nature of this electrical activity beyond what EEGs show of it—in line with NPP’s panpsychist thesis that qualia exist at micro-levels and its empirical thesis that qualia unite electrically.

 NPP thus deals with the unity-binding problems by offering testable neuroelectrical accounts of how different qualia arise and bind to form overall perceptions. This may help NPP address below how unified cognition and unified subjects arise. It may help support NPP’s claim that “the brain’s electrical activity helps create the mind’s unified qualia, cognition, and subject.”

*4.1.4 Boundary Problems*

The unity problem also involves the boundary problem of how and where binding mechanisms corral microexperiences into units such as images. The problems that the RM panpsychists above face in finding mechanisms for mental unity may hamper their accounts of the mind’s boundaries. For example, in Coleman’s (2014) account of binding, HOT unifies information into conscious forms within different cognitive systems, thus establishing boundaries between minds. However, these boundaries are undermined by the difficulties in explaining unified consciousness via HOT.

 To avoid such problems, NPP tries to specify the neural substrates of unified experiences, then use this unifying mechanism to explain their boundaries. Our minds are separate because the unified electromagnetic field between our brains is too weak to unify experience. Also, the images arising from vision and touch are experienced separately due to their different circuits.

 NPP’s account of boundaries also helps explain the mind’s privacy. First, as just noted, EM fields are too weak between brains to unify their consciousness, so minds are inaccessible to each other. Minds are thus private. Second, in NPP, we’re directly aware of our own experiences. But others observe our experiences only quite indirectly as grey matter via reflected light and visual systems. So, our minds are inaccessible to each other. Again, they’re private. In NPP, this first kind of privacy is just contingently true (versus Coleman, 2014). Yet the second is necessarily true. These privacy boundaries help shape the mind’s subjective point of view. Viable accounts of unity and privacy are inseparable, but they’re rarely based on viable binding mechanisms.

*4.1.5 Summary*

RM panpsychist accounts of unity-binding mechanisms in terms of entanglement, synchrony, synapses, etc. are often problematic and not well-founded in recent neuroscience. This can weaken their accounts of mental unity and mental combination generally (which includes the mind’s structures and subject below). NPP tries to avoid these problems with a binding mechanism based on experimental evidence and described in testable form. Here, the brain’s continuous EM field combines microexperiences in separate neurons to form unified macroexperiences.

**4.2. Subject Problems**

Subject problems concern how “microsubjects combine to yield macrosubjects . . . such as ourselves” (Chalmers, 2016, §3). I’ll start with how this formulation of the problem may threaten to destroy panpsychism, for arguably subjects (thinking, conscious beings) can’t combine—so panpsychism isn’t capable of explaining the existence of macrosubjects (e.g., Coleman, 2014).

 I’ll then turn to a more benign formulation of the subject problem which may preserve panpsychism. In this formulation, it’s microexperiences instead of microsubjects that combine to yield macrosubjects (partly like Coleman, 2016). Here, NPP’s neuroelectrical approach to mental unity uses empirical evidence to argue that whether or not microexperiences have microsubjects, they can combine neuroelectrically to form macrosubjects in a panpsychist manner.

*4.2.1 Can Microsubjects Create Macrosubjects?*

Coleman (2014) says that “panpsychists ascribe subjectivity to fundamental material entities in order to account for macro-consciousness.” He adds that “subjects cannot combine,” so “the panpsychist explanatory project is derailed by the insistence that the world’s ultimate material constituents are subjects of experience” (cf. Goff, 2009).

 Such sentiments hark back to James (1890, pp. 145-160). He argued that “a statue is an aggregation of atoms” with no collective unity except in the eyes of observers. Similarly, experiences are “shut in their own skin, windowless,” and ignorant of other experiences. Experiences keep their identities and can’t fuse together into a collective identity any more than “private minds” can “agglomerate into a higher compound mind.” So, experiences can’t combine any more than “a dozen minds, each thinking a different word, can together form a sentence.” Simply put, material objects, experiences, and minds are mere aggregates, lacking inherent unity.

 Shani (2010) replies to James that even hydrogen and oxygen atoms unite (via their electrical field) to form water molecules with new identities, including polarities that dissolve salts. So, counter to James, a similar mental chemistry might be possible. Seager (2010) adds that a novel entity can emerge from its parts in intelligible ways that absorb and supersede them.

 Coleman (2014) largely accepts these replies to James when they’re applied to matter. For example, “atoms continue to exist . . . [t]heir union modifies them, but they survive in the whole.” Similarly, experiences can combine—colors can blend together, and red wine can interpenetrate roast beef with taste (Coleman, 2012). As with atoms, these qualia persist “via the ongoing contribution they make to the new quality” in that if we take the blueness away from the purple paint-dab, we are left with red, altering the quality of the whole.

 This sounds sensible. But Coleman (2014) adds that microsubjects can’t combine like this. Each subject has its own distinct point of view acquired over a lifetime, which is “private” and not “accessible” to other subjects. Thus, “points of view cannot combine.” This supports common claims that the emergence of macrosubjects from microsubjects in panpsychism is as magical as the emergence of consciousness from nonconsciousness in some forms of dualism. Panpsychism thus fails to offer an alternative to the latter—it just resurrects magical emergence in a new guise.

 But Coleman’s purely metaphysical argument that subjects can’t combine is open to empirical objections. To start with, severing connections between cerebral hemispheres evidently breaks the mind’s unified subject into two separate subjects. These two subjects often clash. For example, they simultaneously try to put on and take off a shirt. Whether these subjects combine or split depends on the state of their electrical interconnections (i.e., the EM field running along these interconnections—§4.1.3). Similarly, there’s evidence that neuroelectrical circuits enable conjoined twins to share experiences. Tatiana and Krista Hogan are connected at their skull and reportedly have a rare bridge between their thalami that allows them to sense each other’s feelings and see through each other’s eyes.[[8]](#footnote-8)

 Evidence such as this suggests that, in the future, connections between brains might allow two subjects to become directly aware of each other’s thoughts to a degree and thus make joint decisions to a degree. Further in the future, one subject might even access and control other subjects’ memories, attitudes, et cetera. Subjects might thus fuse to varying degrees and in different ways, resulting in mutually conscious, yet differently configured, corporate subjects.

 All this indicates that the privacy of points of view can be a contingent matter that depends on electrical connections (in accordance with NPP’s EM binding mechanism)—rather than a purely necessary matter dictated by the “metaphysical logic of points of view” (ibid.). More generally, speculations about the privacy and boundaries of subjects might be more fruitfully based on the neuroscience of binding mechanisms than purely on metaphysical deductions.

*4.2.2 Do Microsubjects Exist?*

So, subjects might combine. But whether *microsubjects* can combine to form macrosubjects is a separate issue. Microsubjects, like other ideas in RM, can be obscure. It’s hard to know what they are, how they combine into complex macroexperiences, and whether they even exist.

 Many philosophers feel strongly that all experiences (microexperiences included) must have subjects that apprehend or own them. But Coleman (2012) replies that it’s hard to find supporting arguments for such claims. They may just be hasty generalizations from human experience. He adds that many philosophers reject that experiences require subjects, including Humeans, Buddhists, and some neutral monists.

 Coleman might have added that not only is it possible to conceive of experiences without subjects, but there’s also evidence that we actually have such experiences. For example, when fatigue involves stupor, attention and thought are turned off, and objects are just blankly stared at. Experience of colored shapes still vividly exists, for consciousness is not lost altogether. But there is no actual evidence here for a subject who apprehends these experiences. Considerable evidence now exists for this preattentive level of perception (e.g., Tsuchiya & Koch, 2008; Lamme, 2020).

 Be that as it may, even if microsubjects do exist, questions might remain about how they would create complex thinking subjects. Fundamental particles are simple, structureless, and indivisible, so what would their microsubjects amount to? Unsurprisingly, Strawson (2006b, p. 247) treats microsubjects as “thin”—nothing more than their microexperiences. In general, it’s very hard to see what exact roles microsubjects would have in constructing thinking subjects.

 Coleman (2016) thus says that microsubjects do no explanatory work and are “at best an idle wheel in the explanation of macrosubjects.” So, in his view, if RM’s fate rests on overcoming its combination problem by means of microsubjects, then it hardly poses much of a threat to competing theories of mind. For this reason, Coleman (2016) tries to explain how macrosubjects arise in terms of combining microexperiences (microqualia) instead of microsubjects.

 While NPP sidesteps such debates about microsubjects, it will follow Coleman’s approach to explaining macrosubjects in terms of *microexperiences* instead of microsubjects. But NPP won’t follow Coleman’s panprotopsychist account of macrosubjects in terms of entanglement and HOT. Moreover, NPP tries to minimize speculative metaphysics and rely more on empirical evidence. It tries to steer clear of what might be called RM’s potential metaphysical “quicksands” of microsubjects, emergent experience, proto-consciousness, grounded abstractions, et cetera.

*4.2.3 Can Microexperiences Create Macrosubjects?*

While it’s difficult to see how microsubjects might combine to form thinking macrosubjects such as ourselves, it’s not difficult to see the broad outlines of how microexperiences could combine to form macrosubjects. NPP’s neuroelectrical account below of how thinking subjects emerge has no role for microsubjects (whether or not they exist). Nor does it try to metaphysically demonstrate anything about subjects. It simply uses recent neuroscience to briefly sketch several key steps in the evolution of subjects from their roots in perception, emotion, memory, attention, imagination, et cetera. More steps could be added, but the ones below are likely sufficient for indicating how subjects can plausibly evolve via neuroelectrical mechanisms, as NPP contends.

 To start with, the neuroelectrical bases of perception and emotion were already sketched above in terms of highly electrified membrane proteins unified by their EM fields. Together, they helped provide the simplest basis of subjects—conflicting desires and options (cf. Lorenz, 1977).

 Another step toward subjects came from various forms of memory. For example, working memory consciously unites different items together. It’s based partly in subliminal circuits that work behind the scenes, but its consciousness is arguably based in the electrical activity of different neurons keeping different items alive, like tuning forks sustaining pitches together (Lisman et al., 2013). Their shared theta frequencies seem to allow for alternative scenarios to remain separate in imagination while electrically binding them into the same decision process. These scenarios involve strong electrical activity in map-like arrays of grid and place neurons that depict spatial scenes, conceptual dimensions, social situations, et cetera. (Kay et al., 2020).

 A further step toward subjects came from attention mechanisms. They involve coherent electrical activity (i.e., oscillating in phase) in thalamocortical feedback loops guided by higher cognition (e.g., Tononi & Edelman, 2000). Here, descending beta-frequency activity inhibits ascending gamma activity from sensory circuits. Cognition thereby shifts its focus and sculpts the sensory content of working memory. This electrical activity helps guide brain operations and consciously control behavior in voluntary ways (Bastos et al., 2018). There’s abundant evidence that this control is exerted electrically by oscillating EM fields triggering oscillating firing in neural circuits (e.g., Fiebelkorn et al., 2018; Siebenhuhner et al., 2020). Again, these conscious electrical activities accompany myriad subliminal circuits working behind the scenes.

 The final step toward subjects also relies on neuroelectrical activity. There’s no evidence of a *single, unified cortical area* where all conscious circuitries converge (Zeki, 2003). So, the most likely basis for the unifying, controlling self is the brain’s *single, unified EM field* (which arises in this unified form along even indirect interconnections between circuitries). In NPP, the subject is this unified conscious field where perception, emotion, memory, and thought converge. As the hidden nature of the field’s EM forces, it can electrically manipulate cognitive machinery, shift attention, explore options, and qualitatively weigh them. Its decisions yield plans, priorities, and values that forge self-identity. The subject is simply all these processes—emotion, perception, memory, and thought—unified together in this EM field for solving problems.

*4.2.4 Summary*

The subject problem arises primarily from perennial assumptions that micro*subjects* combine to create macrosubjects. Trying to explain how thinking subjects arise from microsubjects may be like stepping into quicksand. Yet it isn’t hard to envision how micro*experiences* can bind together electrically and work along with subliminal processing circuits behind the scenes to form unified emotions, perceptions, memories, and thoughts. Thinking subjects can arguably emerge from this unified electrical activity to reflect on and control complex and often disparate mental operations.

 This theory is speculative, like all accounts of subjects, yet it’s based on familiar neural and psychological mechanisms. It also draws on substantial experimental evidence that neural electrical activity creates qualia, binds them into unified experiences, and helps attentively control brain activity. NPP’s most basic claims here are testable. Someday, various empirical theories may help shift combination issues away from intractable metaphysics toward experimental resolutions.

**4.3 Quality Problems**

*4.3.1 Palettes*

The quality problem concerns how microqualia in quarks, atoms, etc. create our familiar sensory and emotional macroqualia. These qualia include primary qualia (e.g., red and blue) that in turn blend to produce secondary and tertiary qualia (e.g., purple).

 Lewtas (2017) starts with a big microqualia palette of all our primary qualia. He attributes multiple qualia to each fundamental particle. Synchronized firing by cells at different frequencies selects from these qualia and binds them to form macroqualia such as visual images. This is ingenious, but it doesn’t fully explain how overall pictorial images arise, so it’s hard to evaluate. Also, many synchronized frequencies don’t yield sensory experience, and neuronal synchrony as a whole is outdated as a binding mechanism. Finally, growing evidence indicates that our familiar qualia may correlate with protein masses versus subatomic entities. These issues show the risks of speculating about qualia in isolation from the current neuroscience of overall sensory processes.

 Large palettes such as Lewtas’ are seen as uneconomical by advocates of small palettes. The latter start with very few microqualia so as not to overload quarks with them. But so many primary qualia exist (especially olfactory ones) that it’s hard to avoid positing a small number of even more primitive, inscrutable qualia that somehow join to make our familiar primary qualia.

 Roelofs (2015) argues here that since we don’t encounter these inscrutable qualia in isolation, we can’t imagine what they’re like, so their existence can’t be dismissed. But Turausky (unpublished) posits one quality that contains all others. He says that just as visual qualia merge into whiteness, so all sensory qualia could merge into a neutral whiteout. Separate qualities differentiate out like a synthesizer filters an electric buzz to produce brass or string melodies. Turausky’s brilliant analogies are intriguing but difficult to specify neurally, especially given that a viable theory of qualities must also explain their structures and unity in images.

 NPP tries to avoid small palettes, which struggle to derive all primary qualia from a few inscrutable qualia. It also tries to avoid large palettes, which struggle to crowd primary qualia into ubiquitous fermions and bosons that somehow give their qualia only to special brain structures. NPP instead attributes all our familiar primary qualia to known detector proteins in testable ways. As in these other views, qualia are fundamental instead of emergent in NPP (Jones & Hunt, 2023, §2.5 & fig. 2). They’re fundamental because different qualia are the different proteins’ fundamental, underlying substances—their rest energies (mc2).

 In summary, NPP tries to avoid the problems in both big and small palette accounts of our different qualia. It instead attributes qualia to detector proteins which differ in fundamental ways.

*4.3.2 Blending*

How do the primary qualia covered above blend to form secondary qualia? Qualia might blend holistically by infusing and altering each other to form a new irreducible whole, as when red and blue form purple (Coleman 2016). Yet we needn’t go so far as to say a coffee in Naples actually tastes different than one in Edinburgh since the cities’ milieux infuse the tastes (Basile, 2010).

 “Atomistic” critics see this as magic, for lower-level qualia disappear as they create a new qualitative whole. Red and blue vanish, and purple appears in their place from what was not purple (ibid.). Arguably, such analyses show that panpsychism has a form of emergence just as radical and magical as that in the nonreductive physicalism which panpsychism competes with.

 But is mixing red and blue to form purple really a magical emergence? Consider pointillist effects. As we recede from Luce’s *Morning Interior*, spots of red and blue in our images grow smaller and actually merge to form purple. This isn’t explicable if colors are like atoms that don’t change while combining. It’s explicable only if we adopt a form of emergence. But in reply to the atomists above, this emergence must be explicable—it must avoid anything like consciousness emerging from nonconsciousness, which is magic where “anything goes” (Strawson, 2006a).

 To start with, there are key differences between consciousness popping into existence from what lacks consciousness and secondary colors emerging from primary ones. In the latter, color emerges from color—not from what lacks color altogether. So, the purple doesn’t magically pop into existence. Nor do the red and blue really vanish, for if we remove the red from the purple, we’re left with blue, not purple (Coleman, 2016). Purple doesn’t magically replace red and blue.

 Nor is this magical in the sense that if consciousness can emerge from nonconsciousness, then “anything goes.” For colors blend in very specific ways due to how color circuits connect. For example, green and red can’t blend, for color-opposition cells inhibit activity in one of the two circuits while enhancing activity in the other. But red and blue can blend as their circuits converge (within dendritic trees) on the way from cones to retinal ganglion cells and beyond. Further, colors and pains fail to blend in part due to the lack of systematic connections between their circuits. Blending is thus built into sensory systems in ordered ways—it’s not “anything-goes” magic.

 NPP tries to explain this blending in greater detail neuroelectrically. To deal with the issue of how quite similar labeled lines yield quite different qualia, NPP refers to the recent evidence above that the cones which trigger the three labeled color lines contain three distinctive opsin proteins. The three primary colors are attributed to these opsins in NPP. The cones’ conscious colors thus “illuminate” (so to speak) the lines as their electrical activity ascends from cell to cell. (This resembles a plastic fiber glowing inside with color, except that the cells’ colors are hidden beyond observable neural activity.) Purple is experienced when blue and red cones trigger bipolar, ganglion, and higher cells. Their electrical connections blend the cones’ colors into various shades of purple, depending on the relative intensities of the cones’ blue and red colors.[[9]](#footnote-9)

 In summary, qualia can blend without magic in NPP. For example, purple doesn’t emerge from nothing, but from mixing red and blue. Nor do the latter vanish, for they persist in the purple. In NPP, purple arises as unified electrical connections blend the red and blue originating in cones.

**4.4 Structure problems**

The structure problem concerns how structures of microexperiences in, say, visual circuitries combine to yield macroexperiental structures, such as visual images. The basic issue is the structural-mismatch problem—these visual circuits and visual images presumably don’t align. For example, thalamic and cortical maps are presumably distorted spatially relative to visual images.

 Chalmers (2016) thus instead matches experiential structure to informational structure. The latter encodes structures in nonpictorial form, so distortions in neural maps become irrelevant. But his approach faces problems in specifying exactly how brains encode pictorial images, and how to get from abstract codes to concrete images spread pictorially across space (§4.1.3 above)**.**

 NPP doesn’t rely on these coded structures for images. Instead, it points out that, counter to Chalmer’s assumptions, some neural maps—such as in retinas and entorhinal cortex—aren’t distorted relative to images. In NPP, all electrically active maps are conscious to varying degrees. So, visual and mental images can get their undistorted form from all these maps systematically connecting into these undistorted maps. Images are the hidden, underlying nature of the maps’ strong electrical activity. Again, both images and EM fields seem to arise from discrete, grainy neurons and reach across space in continuous, incorporeal, unified forms. In NPP, images are pictorial electrical substances. It has no role for abstract coded images.

 A specific mismatch problem is the grain problem of how grainy tissues comprised of discrete cells can create the continuous, smooth images we experience (Maxwell, 1978). NPP can explain here how myriad cortical columns connect tightly together via electrical circuits to the center of retinas. This tight packing makes the center of images detailed and smooth. Far fewer columns connect into the retina’s periphery, leaving peripheral images coarse and grainy. The retina’s field reaches across its array of detectors, uniting them into colored shapes.

 In summary, NPP may avoid structural mismatches. For example, visual images arise in neural maps with pictorial forms—not from nonpictorial coded images, as in, e.g., Chalmers’ RM. The latter hasn’t specified these codes nor explained how they yield actual pictorial images. NPP also offers accounts for how the colors and unity of images arise, while RM hasn’t done so.

**4.5 Summary**

Panpsychism’s combination problem concerns how simple experiences yield complex ones. Issues here include binding mechanisms, qualia palettes, image coding, and combining microsubjects—not to mention obscure grounded abstractions, protophenomenal emergence, et cetera.

 NPP tries to avoid such issues by turning to growing evidence that neuroelectrical activity creates unified minds, qualia, cognition, and subjects. Our different qualia arise in the electrically active proteins that trigger sensory and emotional circuits. Their EM fields unite their microqualia. Images arise from neural maps with pictorial forms. All these conscious circuitries work with subliminal cognitive circuits to form memories and thoughts, which in turn unite within the brain’s field to help form the mind’s controlling subject. These claims about unity and qualia are testable.

**5. Conclusions**

Russellian monism (RM) typically treats experience (or protoexperience) as the intrinsic nature and substantial ground of physics’ abstract mathematical accounts of the world. But it may be too problematic to become a promising mind-body solution. It’s arguably full of deeply obscure ideas such as protophenomenal entities, emergent experience, mental combination, and grounded abstractions. In the latter case, for example, the abstract mathematical structures of physics get substantial spatio-temporal existence by being grounded in concrete, particular entities. This grounding seems just as deeply mysterious now as in Plato’s day. These various ideas are arguably no less obscure than dualist ideas of causality or physicalist ideas of emergence.

 The obscurities in RM and other standard theories might be avoided by Neuroelectrical Pure Panpsychism (NPP)—a relatively clear, simple theory akin to Strawson’s panpsychism. NPP has two components: (1) a metaphysical panpsychism and (2) a neuroelectrical account of minds.

 (1) NPP’s metaphysical claim is that *experience is the real nature of all matter-energy beyond how it appears to the senses*. This tries to avoid RM’s protoexperiential entities, grounded abstractions, et cetera. While it lacks RM’s grounding claim, it may be akin to RM. For it says that experience underlies the world that science observes and describes (cf. Russell 1927).

 NPP also tries to avoid the issues in older theories of mind. Instead of reducing qualia to neuroscience’s observable events, qualia are treated as the underlying, hidden reality of these observables. Since just one entity (experience) exists, NPP avoids dualism’s obscure interaction of different substances and dual-aspect theory’s mysterious third entity. NPP’s monism also avoids nonreductive physicalism’s three quite different entities—soggy brains, abstract information, and consciousness—with their confusing relations of emergence, realization, et cetera. NPP avoids idealist claims that bodies are figments of minds that depend (inexplicably) on brains, for even if minds suddenly disappeared, bodies would continue existing. NPP also avoids popular claims that qualia are multiply realized abstract functions. Instead, they’re specific concrete substances. So, images aren’t abstract codes. They’re electrical activity spread pictorially across neural maps.

 (2) NPP approaches panpsychism’s combination problem through its testable empirical claim that *the brain’s electrical activity helps create the mind’s unified qualia, cognition, and subject*. NPP draws on experimental evidence that perceptions, emotions, memories, etc. arise neurally from micro levels and unite electrically to form the mind’s controlling subject. Subjects thus arise from microexperiences—not the questionable microsubjects that RM often focuses on.

 Arguably, NPP’s virtues are its metaphysical clarity and simplicity, its empirical support, its testable claims, and its avoidance of the issues in other theories. If verified, it might point to a mind-body solution. Be that as it may, empirical approaches may someday help shift combination issues away from RM’s intractable metaphysical debates toward experimental resolutions.

**References**

Adrian, E. (1928). *The basis of sensation*. W W Norton & Co.

Alter, T. & Pereboom, D. (2019) Russellian Monism, *The Stanford Encyclopedia of Philosophy*,

 Edward N. Zalta (ed).

Alter, T. and Coleman, S, (2020) Russellian Physicalism and Protophenomenal Properties,

 Analysis, 80(3): 409–417.

Bastos, A., Loonisa, R., Kornblitha, S., Lundqvista, M., Miller, E. (2018) Laminar recordings in

 frontal cortex suggest distinct layers for maintenance and control of working memory. *PNAS* (115) 5:1117-1122.

Basile, P. (2010) It Must be True – But How Can it Be? Some Remarks on Panpsychism and

 Mental Composition, Royal Institute of Philosophy Supplement 67

Bolender, J. (2001) An Argument for Idealism. *Journal of Consciousness Studies,* 8(4)37-61.

Chalmers, D. (1996) *The Conscious Mind*, Oxford: Oxford University Press.

Chalmers, D. (2002) Does Conceivability Entail Possibility? In T. Gendler & J. Hawthorne (eds.)

 *Conceivability and Possibility*, Oxford University Press, pp.145-200.

Chalmers D. (2010) *The Character of Consciousness*, New York: Oxford University Press.

Chalmers D. (2013) “Panpsychism and Panprotopsychism”, Amherst Lecture in Philosophy 8.

Chalmers, D. (2016) The Combination Problem for Panpsychism. In G. Brüntrup & L. Jaskolla

 (eds.) *Panpsychism*. Oxford University Press.

Chiang, C., Shivacharan, R., X. Wei, L. Gonzalez–Reyes, D. Durand. (2019) Slow periodic

 activity in the longitudinal hippocampal slice can self–propagate non-synaptically by a

 mechanism consistent with ephaptic coupling. *J Physiol* (597).

Coleman, S. (2012) Mental chemistry: combination for panpsychists. Dialectica, 66: 137–166.

Coleman, S. (2014) The Real combination problem: panpsychism, micro-subjects, and

 emergence, Erkenntnis, 79, pp. 19- 44.

Coleman, S. (2016) Panpsychism and Neutral Monism: How to Make Up One’s Mind, in

 Bruntrup, G. and Jaskolla, L. (eds) Panpsychism: Contemporary Perspectives, Oxford

 Scholarship Online.

da Rocha, F., Pereira Jr, A., Coutinho, B. (2001) N-methyl-D-aspartate Channel and

 Consciousness: From Signal Coincidence Detection to Quantum Computing, Prog

Dehaene S., Changeux J., Naccache L. (2011) The Global Neuronal Workspace Model of

 Conscious Access: From Neuronal Architectures to Clinical Applications. In Dehaene S.,

Eddington, A. (1928) *The Nature of the Physical World*. Cambridge: Cambridge University Press.

Fiebelkorn, C., Pinsk, M., and Kastner, S. (2018). A dynamic interplay within the frontoparietal

 network underlies rhythmic spatial attention. Neuron 99, 842–853.e8. doi: 10.1016/j.neuron.2018.07.038

Feigl, H. (1958) The ‘Mental’ and the ‘Physical.’ *Minnesota Studies in the Philosophy of Science*

II pp.370-497.

Fei-Fei, L.; Iyer, A.; Koch, C.; Perona P. (2007), “What do we perceive in a glance of a real-world

 scene?” Journal of Vision, 7 (1) 10: pp. 1-29.

Goff, P. (2009). Why panpsychism doesn’t help to explain consciousness. *Dialectica*, 63,289-311.

Georgiev, D., Papaioanou, S., Glazebrook, J. (2007) Solitonic effects of the local

 electromagnetic field on neuronal microtubules, NeuroQuantology, 5 (3), pp. 276-291.

Hunt T. & Jones, M. (2023) Electromagnetic-field theories of qualia: can they improve upon

 standard neuroscience? Front Psychol. 2023 Jun 1:14:1015967. doi:

 10.3389/fpsyg.2023.1015967. eCollection 2023.

James, W. (1890) The Principles of Psychology, vol. 1, NY: Dover.

Jones, M. (2010) How To Make Mind-Brain Relations Clear, Journal of Consciousness Studies 17

 (5-6): 135-160.

Jones (2013) Electromagnetic-Field Theories of Mind. *Journal of Consciousness Studies*

20(11-12)124-149.

Jones, M. (2017) Mounting Evidence that Minds Are Neural EM Fields Interacting with Brains,

 Journal of Consciousness Studies 24 (1-2): 159-183.

Jones (2024) A simple, testable mind-body solution? Journal of Consciousness Studies, 31:1-2.

Jones M and Hunt T (2023) Electromagnetic- field theories of qualia: can they improve upon

 standard neuroscience? Front. Psychol. 14:1015967. doi: 10.3389/fpsyg.2023.1015967

Kay, K., Chung, J., Sosa, M., Schor, J., Karlsson, M., Larkin, M., Liu, D., Frank, L. (2020)

 Constant Sub-second Cycling between Representations of Possible Futures in the

 Hippocampus, *Cell*, 180(3):552-567.

Keppler, J., and Shani, I. (2020). Cosmopsychism and consciousness research: a fresh view on the

 causal mechanisms underlying phenomenal states. Front. Psychol. 11:371.

Koch, C.; Massimini, M.; Boly, M.; Tononi, G. (2016) Neural correlates of consciousness:

 progress and problems. *Nature Reviews Neuroscience*, 17(5)307-21.

Kosslyn, S. (1994) *Image and brain*. Cambridge: MIT Press.

Lamme, V. (2020) Visual Functions Generating Conscious Seeing. Frontiers in Psychology.

 Vol11 (83). doi: 10.3389/fpsyg.2020.00083

Libet, B. (1993) Neurophysiology of Consciousness, Boston, MA: Birkhauser.

Lisman, J. and Jensen, O. (2013) The Theta-Gamma Neural Code, *Neuron*, 77(6)1002–1016.

Lewtas, P. (2017) Building minds: solving the combination problem, Inquiry, 60 (7), pp. 742-

 781.

Lorenz, K. (1977) Behind the Mirror. Harcourt Brace Jovanovich.

Maxwell, G. (1978) Rigid designators and mind–brain identity, in Savage, C. (ed.) Minnesota

 Studies in the Philosophy of Science, vol. 9, Minneapolis, MN: Univ. of Minnesota Press.

Montero, B. (2015) “Russellian Physicalism”, in Alter and Nagasawa 2015: pp. 209–223.

Redden, G. (1999) Magic happens: A new age metaphysical mystery tour. *Journal of Australian*

 *Studies*, 23(62).

Raccah, O; Block, N.; Fox, K. (2021) Does the Prefrontal Cortex Play an Essential Role in

 Consciousness? Insights from Intracranial Electrical Stimulation of the Human Brain. J.

 Neuroscience, 41(10)2076-2087.

Roelofs, L. (2015) Combining Minds: A Defence of the Possibility of Experiential

 Combination, PhD dissertation, University of Toronto.

Russell, B. (1921) *The Analysis of Mind*. London: Routledge.

Russell, B. (1927) *The Analysis of Matter* Internet Archive <http://www.archive.org/details/texts>

 (NB: use “advanced search;” page numbers don’t match paper edition.)

Russell, B. (1951/1995) *My Philosophical Development*, London: Routledge, 1995 edition.

Schneider, S. (2018) Idealism, or Something Near Enough. In *Idealism: New Essays in*

 *Metaphysics*, T. Goldschmidt & K. Pearce (eds.) Oxford: Oxford University Press.

Seager, W. (2010) Panpsychism, Aggregation and Combinatorial Infusion, Mind & Matter

 8;2,167-184.

Shaffer, J. (1968) Philosophy of Mind, Engle Woods Cliff NJ: Prentice-Hall.

Shani, I. (2010) “Mind Stuffed with Red Herrings,” Acta Analytica 25:4,413-434.

Siebenhuhner, F., Wang, S., Arnulfo, G., Lampinen, A., Nobili, L., Palva, J., et al. (2020).

 Genuine cross-frequency coupling networks in human resting-state electrophysiological

 recordings. PLoS Biol. 18:e3000685. doi: 10.1371/journal.pbio.3000685

Singer, W. (2007), “Binding by synchrony”, Scholarpedia 2(12):1657.

Skrbina, D. 2005. Panpsychism in the West. MIT Press.

Stoljar, D. (2001) Two Conceptions of the Physical, Phil. and Phenom. Res., 62(2):253–281.

Stoljar, D. (2015) Russellian Monism or Nagelian Monism? In T. Alter & Y. Nagasawa,

 *Consciousness in the Physical World*, pp.324–345.

Strawson, G. (2006a) Realistic Monism. In *Consciousness and Its Place in Nature,* A. Freeman

 Exeter: Imprint Academic.

Strawson, G. (2006b) Panpsychism? In *Consciousness and Its Place in Nature,* A. Freeman (ed.),

 Exeter: Imprint Academic, 200

Strawson, G. (2016) Mind and being: the primacy of panpsychism, in Bruntrup, G. and

 Jaskolla, L. (eds), Panpsychism: Philosophical Essays, Oxford: Oxford University Press.

Stubenberg, L. (2015) "Russell, Russellian Monism, and Panpsychism" in *Consciousness in the*

 *Physical World* (ed) T. Alter & Y. Nagasawa (Oxford: Oxford University Press).

Su A, et al. (2004) A gene atlas of the mouse and human protein-encoding transcriptomes.

 *Proc. Natl. Acad. Sci. U.S.A*. 101(16): 6062–7.

Turausky (unpublished manuscript)

Tononi, G. and Edelman, G. (2000), A Universe of Consciousness (NY: Basic Books).

Tononi, G. (2008) Consciousness as Integrated Information: a Provisional Manifesto. *Biol. Bull*.

 215:216-42.

Tsuchiya, N.; Koch, C. (2008) Attention and Consciousness, Scholarpedia, 3 (5) 4173.

Ward, L., and Guevara, R. (2022). Qualia and phenomenal consciousness Arise from the

 information structure of an electromagnetic field in the brain. Front. Hum. Neurosci.

 16:874241. doi: 10.3389/fnhum.2022.874241

Zeki, S. (2003) The Disunity of Consciousness. *Trends in Cognitive Sciences*, 7:214–18.

1. Many thanks to Tam Hunt and Galen Strawson for reading parts of this paper. [↑](#footnote-ref-1)
2. For example, our minds consist of complex experiences that intentionally exert forces (as when we move furniture). In contrast, electrons consist of simple, minimal experiences that exert forces without intentions. [↑](#footnote-ref-2)
3. Strawson (2006b, p. 260) would add “and space-time” after this mention of “mass-energy.” [↑](#footnote-ref-3)
4. NRP could avoid positing these abstract functions by nonreductively identifying qualia with some physical event or another, whether neural or nonneural (so-called “token” identity). But this identity creates an intelligibility gap between the mental and physical. [↑](#footnote-ref-4)
5. It may seem that neuroplasticity threatens this account of qualia. For example, if visual cortex is recruited for somatosensory processing by blind subjects, and these cortical detectors are stimulated, then subjects report somatic qualia. This familiar point arguably threatens NPP’s claim that visual-detector proteins correlate with visual qualia. But NPP isn’t threatened if neurogenesis and plasticity yield not only new detector synapses, but also new detector GPCRs and channels. Many somatosensory GPCRs and channels actually already exist in occipital and parietal lobes (Su et al., 2004), so neurogenesis of more of them would hardly be surprising. [↑](#footnote-ref-5)
6. Chiang et al. (2019) discovered that EM fields—not synapses or gap junctions—propagate signals across sliced rat hippocampus tissue up to 400 microns. So, my prediction is that the mouse’s visual image would be unaffected by the slices until the slices reached 400 microns thick, where the field’s strength (and unified consciousness) wanes. [↑](#footnote-ref-6)
7. Coleman (2016) exemplifies these problems with images—as well as other problems involving his interesting uses of panprotopsychism, entanglement, and HOT. Such problems arguably make it hard to construe functionalist and cognitivist accounts of images literally. They might instead be seen as intriguing analogies between integrated information and unified images (compare Turausky’s analogies about qualia palettes). In contrast, NPP attempts to spell out in literal terms how images arise. A unified image is literally the real, underlying nature of the *continuous EM wave* reaching across detector arrays in visual maps, pooling their myriad colors and shapes together point by point into a single pictorial form. [↑](#footnote-ref-7)
8. <https://researchnow-admin.flinders.edu.au/ws/files/34428370/Cochrane_Case_AM2020.pdf> [↑](#footnote-ref-8)
9. Returning to the pointillism above. NPP *might* explain the red and blue spots blending into purple via two steps. (a) In NPP, the subject isn’t separate from thought, perception, etc.—it’s all of them working as a whole in the brain’s conscious EM field. By directing this field and the firing of its underlying circuitries, the subject refines, inspects, and interprets images, using feedback circuits for focal attention, visual scanning, memory, etc. (b) Now, in pointillist effects, tiny spots of paint tend to blend into intermediate colors when seen at a distance. If the subject’s electrical locus in brains were 104 times smaller, it could inspect proteins’ separate microqualia of blue and red. But the reason these microqualia actually aren’t discernable may be that the subject actually inspects images at a far larger scale. So, the subject is aware of the intermediate color—purple. (Similarly, the subject is aware of varying protein densities as varying color intensities.) There’s no mystery here. The purple really exists in the overall image the subject discerns. It’s not an illusion. And the blue and red still exist in the proteins, yet undiscerned by the subject. They don’t vanish. They just exist below the smallest noticeable size that the subject can focus on as it attends to the image (cf. Roelofs, 2015). Here, pointillism shows that subjects and their thoughtful perceptions are aware of macro, not micro, levels. [↑](#footnote-ref-9)