

Intertheoretic Identification and Mind–Brain Reductionism

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A recurrent candidate for exemplification of intertheoretic reduction, put forward over past decades within philosophy of science, is the proposition “pitch is identical with sound-frequency.” Paul Churchland revives this nominal ontological reduction, placing it beside others as “lightning is an electrical discharge,” and “heat is high kinetic energy.” Yet no matter whether frequency is considered physically or merely semantically, there is no conceivable format in which such an identity is viable. An analysis of *objective qualia* said to represent the ground of such equations indicates their fictitious existence, save as misidentified percepts. The criterion of logical identity cannot bridge sensory and stimulus field divisions of perception, hence Churchland’s objective qualia, said to straddle both fields, cannot furnish an intelligible or sound basis for identification. Naive realism and its intellectualization as direct realism are shown to be at bottom of confoundment of these fields, generating pseudo-problems involving the putative nature and localization of qualia. These conclusions collectively would then disallow the usual attempts to extrapolate from such fictive identities to a further posing of mind–brain identity, by analogy therewith. It is suggested that the method employed in refutation of “pitch is frequency” may have a more general application. The misemployment of the concept and method of intertheoretical identification in connection with phenomenological experience and science of perception is made explicit.

“Roughly speaking, to say of *two* things that they are identical is nonsense, and to say of *one* thing that it is identical with itself is to say nothing at all.”

—Wittgenstein, *Tractatus Logico-Philosophicus*, 5.5303

A standard mode of argumentation designed to establish the plausibility of ontologically identifying mind and brain has been to employ analogical extrapolations from physics, chemistry, etc., to relations between neuroscience and psychology (folk- and scientific-) or phenomena of introspection

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(apperception). The purpose of these analogies is to bypass that age-old assumption of the (seeming) radical ontological disparity between mental phenomena and the world of physics and neurology, by making what seems to be an unobjectionable transition from ostensibly successful, prior theoretical reductions from the history of science, to an (eagerly) anticipated parallel “liquidation” of mind to the watery interior of neural tissue. To adequately access this attempt at reduction, it is prerequisite to examine the physics and physiology of perception with respect to an oversight traditionally called “naive realism” (properly terminologic, not pejorative). Once that misconception has been explicated, an exemplar of proffered intertheoretic identities, “pitch is frequency,” is analyzed in light of naive realism and shown to be an instance thereof. The generalization of this insight would then preclude this form of analogical argument from having licit application to questions of mind–brain theoretical- or ontological-reduction.

In standard texts on sensory psychology, one often finds oblique reference to the assumption that percepts as color are actually resident within the nervous system, and not really *out-there* (outside the physical body) as they seem to be to our naive phenomenology; this was recognized even in the time of Helmholtz.¹ Yet our modern textbook authors’ passing mentions tend to hurriedly move on to the nitty-gritty of psychophysics and the like, leaving these “metaphysical implications” of perception to the philosophers for untangling.² A very real problem arises with this casual delegation of duties, nevertheless, for a bald understanding of the facts of neuroscience without a proper perceptual paradigm within which to situate those facts has led to an implicit, untenable commitment to naive realism on the part of many modern philosophers.³ The disquisition itself, as to any internal coherence that might obtain between our everyday phenomenology and the constructs of sensory psychology, thus has been essentially avoided by psychology texts per se, to be passed like a hot potato to the philosophers of psychology. How this question of squaring science and phenomenology has fared in this terra incognita shall be shown below.

¹Indeed, it was fully comprehended even (or especially!) by Schopenhauer, in 1813; he remains one of the few major philosophers to have conceptually grasped this point at its core, in its proper light of neurophysiology, as primitive as this science was in his day (Schopenhauer, 1813/1974; also 1844/1966, pp. 19–25).

²Cf. Kalat, 1998, for his qualified endorsement of Daniel Dennett’s (1991) abolition of mind.

³By *facts* we mean such as the undue emphasis given to, for example, pathways of various cortical nuclei, lateral geniculate bodies, and C-fibers within a self-styled *neurophilosophy* (Churchland, 1986a); and thereby perhaps a missing of the forest for the trees.

Psychology and Naive Realism

Naive realism may be succinctly defined as the explicit or implicit confounding of sensory- and stimulus-fields of perception, whether this be in mundane perceiving or as intellectualized within the confines of a learned monograph on *objective qualia* (see *infra*). A constant, clear, and rigorous apprehension of that distinction between localizations of stimulus- and sensory-fields must be had, if we are to properly discern their confoundment in extant literature of philosophy of mind. With that exposure, a large class of generally accepted intertheoretic identities involving functions of the CNS can be demonstrated to be erroneous misconceptions; with that demonstration, any analogies from those misconceptions can be shown to have no applicability to the question of mind-brain relations.⁴

The following heuristic is designed to fill in, summarily, that cited gap in sensory psychology texts concerning the relation between our everyday phenomenology and the scientific account of perception; which, as it is usually passed over, facilitates the perpetuation of naive realism amongst lay and philosophers alike. The reasoning below may consist of elementary sensory psychology, yet the implication of its proper articulation for this question of intertheoretic reduction may be generally overlooked.⁵

Localization of Percipiense

Either draw, or simply follow mentally, the following descriptive diagram as indicated:

(a) A circle is drawn on paper, with a square not far from it. Rays leave the square and impinge on the circle. The circle represents one's *physical* head; the square denotes a distal stimulus (physicality), the rays of course the intervening proximal stimuli (here, light-rays).

(b) Now, *mentally step back* from your present visible surroundings, for example your desk, chair, visible body, etc (what might be termed positivism's *publicly observable physical objects*), and do not import them into the diagram; this is because if the diagram is pictured in terms of these, one will then suffer confusion as to the point being made. Instead, just consider yourself looking upon the circle (head), square (object), and rays (light) as from above, a *deus ex machina* of sorts. You have abstracted from your immediate environs for that bird's-eye view.

⁴That this entire problematic is not at all one of mere logomachy shall be indicated further on.

⁵See also Beloff (1964, pp. 56-92) for a concise overview of this problematic; also Smythies, 1954.

(c) Now the rays strike the retinae of the physical head; this photic energy is transduced and encoded within the peripheral- and central-nervous systems of that material observer busily perceiving that physical square object, into a (neurally-grounded) representation of the object.

(d) Note the neural processing (transduction and encoding) of that physical energy *ends* in the relevant sensory cortex (here, visual); vision does not, according to the physical and physiological actions involved in this perceptual scenario, *go back to the square. Thus all perception must be transpiring within the CNS, though what this perception is of is external objects.* No sense-mode has left the CNS to do any observing *out-there* (in physical space).

(e) Now "step back" into your immediate visual surroundings, the desk you see in front of you, that tree out the window etc. We have just seen through an examination of physics and physiology of perception that *we cannot actually see into physical space, or directly observe distal stimuli; yet we are immediately appearing to do so.* That is the paradox: we understand intellectually that such perception cannot physically go outside the CNS, yet in our everyday (naive) phenomenology, it seems to be the easiest thing in the world to do, indeed as effortless as simply looking about. *How do we resolve that paradox?*

(f) By the following reasoning. We note that that paradox arises *only if* it is presumed that the visible (also, tactual) body is none other than the physical body. In other words, if we assume the visible body is the physical body, we must then ask, If my perceptions consist only of *neural processing* of external physical energies *within and at the boundaries of my physical body*, then *how is it possible I am seeing outside my visible ("physical") body?* We should instead assume the unthinkable here, to resolve this paradox: *the visible (and tactual) bodies themselves are within the brain* (visual and somatosensory cortices). That means *everything* within that visual space, including our visible bodies, surrounding objects, and even visual space itself, are within visual cortex, within the occipital lobe. This supposition is otherwise bolstered and corroborated by another examination of that perceptual process cited above: consider that the square (physical object) is no longer independent of the observer, but instead we say now that it is the observer's physical foot. This makes no difference to that reasoning above: the light rays still must traverse the physical distance between physical foot and eyes, so that the *visible* (not physical) foot must too be within visual cortex; and of course this inference applies to the rest of the visible body also, besides just our feet at the bottom.

(g) This *intellectual* recognition is admittedly not very easy to carry over into mundane experience, it is probably at least as difficult as visualizing four-dimensional space (see Harrison, 1989). So we should not worry if we cannot shake the feeling that visual space is physical space, or that visible trees *out-there* are *publicly observable* (in the positivist sense) to other

observers.⁶ We all have naive realism built into us, to enhance our adaptability to the physical world, else our visual spaces would not experientially correspond to physical space. As we are all neurophysiologically immured (*ex hypothesi*), how is it then that our mutual experiences qua observers tally so well with one another? A most plausible explanation is that there is a common physical world toward which we are all oriented in our perceptions, which would account for that consistency between our discrete observations thereof. This happy assumption would seem to belie any contention by direct realist philosophers that this (scientific) paradigm of perception necessarily leads to intractable solipsism (see *infra*).⁷

(h) Recapitulation. Three observers, one electrical storm: given a singular electrical discharge, how many visible flashes *out-there* to be counted amongst them? If less than three, observers must inexplicably be *sharing* visual spaces housed within their disjunct visual cortices.

Direct Realism and its Logical Objections

The usual responses given in face of this direct inference from the known nature of perception, is by some such retort as *physiological solipsism!*, or to characterize that inference as a *sense-datum theory that hypostasizes abstractions*.⁸ Notwithstanding, it is inescapably incumbent upon those who would *gain-say the immediate implications drawn here from sensory psychology, to demonstrate either (a) the coherence of their alternative perceptual theories therewith (especially direct realism's), or (b) to devise and expound that novel and revolutionary physics and physiology of perception that must be the concomitant of any such perceptual theory that contravenes, implicitly or explicitly, the presently accepted scientific account of percipience.*

⁶That physicality is observable to them, *but not in the same visual space that we each individually have.*

⁷We suggest that, far from affording arguments in favor of epistemological skepticism and solipsism, this scheme of perception that is implicate with that notion of an independently existent world seems the only possible means of explaining the manifest perceptual corroboration that obtains amongst observers, short of recourse to Berkeley's God or an unknown "sensory projection" (Smythies, 1954). This coherence of discrete perceptual observations of multiple percipients then would furnish an argument *against* solipsism, not in its favor, for contrariwise if that presumed external world independent of our perception did not exist, we should then have to posit an incredible concatenation of perpetual, coincidental coherencies between those discrete perceptions, which defies rational belief.

⁸The first phrase was typically leveled against early sense-datum theory (Joad, 1936); the second construction is attributable to D.M. Armstrong (communication), though apparently was originated by G.A. Paul (Smythies, 1965, p. 242). Strictly, to term such a direct inference from sensory psychology as to the localization of phenomenology a "hypostasizing of abstractions" is *petitio principii*; for whether the concrete, sensuous content of our everyday phenomenal experience is indeed an abstraction is what is in question.

A common *logical* (a priori) argument presented against the foregoing is that scientific (objective) knowledge itself would not be possible, if all that were accessible to a *knower* (perceiver or conceiver?) were sense-data (percepts), i.e., if physical objects and their properties were not "immediately" apprehended by a percipient (this is direct realism's position). We note that in all such reasoning, there seems never to be an attempt to deny the known physics and physiology of perception; instead it is simply stated (e.g., Armstrong, 1961), a priori, that objectivity or "knowledge" (perception or conception?) would be impossible if the implications of sensory psychology be admitted, yet no refutation is given of that sensory psychology on its own terms, i.e., on empirical grounds. Thus direct realist philosophers explicitly cite this scientific picture of perception (presumably because they are unable to legitimately ignore it), while concurrently relinquishing its direct implication as to the nature of our percipience (that we have not immediate apprehension of physicalities); all the while claiming their direct realism is absolutely coherent with, indeed intentionally founded upon, known science of perception! The right hand is thereby made ignorant of the left. Realist philosophers seem to believe that by juxtaposing psychophysiology cheek-by-jowl with their logical denials of it, no incongruities of interpretation result.⁹ We suggest that juxtaposition entails an outright contradiction, an inconsistency made comfortable by realists favorably disposed toward naive (*common sense*) phenomenology and its intellectualization, at any logical or empirical cost. This line of argumentation is charitably construed by its proponents as *logical*, versus empirical; speaking frankly rather than gilding the toad, we suggest that it is in actuality a series of arbitrary postulations designed to avoid the obvious and confutative implications that scientific psychology offers with regard to *our* (not just realists') natural, instinctive naive realism.

An exemplary case in point. In Armstrong's (1961, pp. 28–34) *Perception and the Physical World*, he devotes an entire chapter to refutation of the representative theory of perception (that philosophical interpretation that assumes our perception of the world is not direct, but re-presentational in regard to an indirectly apprehended externality, as mediated through the nervous system). After citing the empirical nature of perception, Armstrong then proceeds to adduce logical arguments against psychology's conclusion that realists' *immediate perception* is physically impossible (because proximal stimuli mediates between CNS and materiality). Now this is the fallacy (*ignoratio elenchi* or irrelevant conclusion) there committed by Armstrong: after citing the accepted physics and physiology of perception, *Armstrong*

⁹After citing those implications of psychology that unequivocally disqualify direct realism, those logical arguments are then said to dispose of those disqualifying implications; so does that mean that scientific psychology is overthrown by that logical argumentation?

then focuses his logical argumentation against the conclusion that immediately follows therefrom, viz that perception cannot apprehend physicalities immediately: but he attributes that conclusion, not to sensory psychology, but rather to representative theory. In other words, Armstrong has set up a straw man of representative theory to take the blame for a conclusion that follows from scientific psychology, not from representative theory as such. In fact, that conclusion does appear in representative theory, not as its conclusion, but rather as a premise taken from that psychology, as in a kind of sorites.¹⁰ As by a magician's sleight, direct realists admit the known facts of perception, then proceed to misdirect our attention to another venue, thrashing representative theories of perception in place of the real culprit, viz physiological psychology (presumably because they believe that psychology itself is above reproach).

We are instructed in elementary logic that if one accepts a given set of premises (physics and physiology of perception) as true, then one must necessarily accept any valid deductions (as impossibility of immediate perception) from those premises to be true also (by definition of validity). And if that conclusion be said not to follow validly or soundly, it is obligatory for direct realists to demonstrate the *empirical parameters* of their immediate perception that is implied by them to (inexplicably) transcend the known routes of transmission via proximal stimuli, etc. But the most straightforward means of disproving direct realism is by indirect proof: if direct realism's logical (not empirical) arguments *against* sensory psychology really hold, we have then a *reductio ad absurdum*, that the known physics and physiology of perception are thereby overthrown by a priori, *ad hoc* assumptions of realist philosophy.¹¹ This absurdity was always implicit from the start; the only reason it has not been recognized down to the present is that, again, representative theory was the chosen straw man to deflect attention from psychology proper, as the true author of that conclusion that there can be no immediate percipience (contrary to our inborn prepossession favoring naive phenomenology). We suggest rather that it is those logical counter-arguments that are unsound in some way, not known perception.¹²

¹⁰For representative theory attempts to construct an account of perception, cognition, etc in coherence with psychology's assumptions and findings.

¹¹Not specifically against representative theory, as shown above.

¹²Perhaps a good candidate for that hypothesized unsoundness might be that unquestioned presumption, without evident warrant, that objective understanding (conceptuality) as in science is not obtainable if our empirical data were got by an indirect means of perception (via proximal stimuli); why must we accept such an archaic and seemingly unintelligible supposition? It seems to be a leftover from logical positivism that nobody ever explicitly formulates, but many feel compelled to defend in earnest, not quite knowing its wherefore.

Besides this, the epistemological situation is not necessarily solipsistic in those implications from neuroscience; for at least one viable interpretation offers not an evasion of psychology but an incorporation of it into an epistemology that yet claims objective perception is possible, under those circumstances of our indirect perception of distal objects, by means of mediating proximal stimuli (Smythies, 1956, 1965, 1994a). However one may judge this or other attempts to reconcile psychology and the objectivity of science, it is clear that any past, present, or future endeavors to avoid sensory psychology's dictate as to the nature of perception, in construction of epistemologies, is doomed to obsolescence at its inception. What are generally proffered as a priori grounds against *physiological solipsism* (i.e., scientific psychology) are in fact anachronistic revivifications of positivistic (itself Aristotelian) epistemology: that objective knowledge is possible only given an unmediated apprehension of external objects (*incorrigible sense-data*: Armstrong, 1968; Hamlyn, 1961). This epistemological scheme antedates, in its earliest formulations, neuroscience and sensory psychology by several millennia, and hence could not have anticipated our modern understanding of the physical impossibility of direct realism's immediate perception. This should be construed as disaster only for outmoded epistemologies as realism's, and conversely as a clarion call for new, alternative, and supplanting epistemological paradigms unfettered by intellectual holdovers from ancient ignorance. Otherwise we are left in an untenable philosophic position of being at odds with modern science, which is in fact the ideal opposite from that stated by positivism itself — and all this to the end of upholding a programmatic commitment to naive realism and its intellectualization. Properly, “[our] aim is not to give any logical *justification* for beliefs, or statements, about perception. It is to describe fully the events that constitute perceptual processes” (Smythies, 1965, p. 251). Therefore we accept psychology's explanation of perception (or devise our own in place of it, and see if it merits acceptance), and construct epistemologies coherent therewith. Or we become as philosophic ostriches, and pretend to accept that psychology while ignoring its immediate implications (*immediate* to any rational being, let alone logician), all the while declaiming to the effect that “without unmediated perception, there could be no objective knowledge of objects.”

Objective Qualia

The point made above regarding photic energy and our transduction thereof may be applied to all forms of proximal stimuli, including mechanical radiant energy that is the material cause of our perception of sound. As a preliminary approach to intertheoretic identification, we below apply that analysis to a passage from Paul Churchland (1985) on putative phenomena he

counterposes as *objective- versus subjective-qualia*. By way of introduction, Churchland clarifies his own view by contrasting it with one nominally opposed to his mind-brain reductionism, as voiced by Thomas Nagel:

It is impossible to exclude the phenomenological features of experience from a reduction, in the same way that one [properly] excludes the phenomenal features of an ordinary substance from a physical or chemical reduction of it — namely, by explaining them as effects on the minds [brains!] of observers. (Nagel quoted in Churchland, 1985, p. 17)

Note this account of *secondary qualities* clearly assigns localization of “phenomenal features” of subjective experience to the whereabouts of distal stimuli (“ordinary substance”); which phenomenology is yet said to exist as “effects on minds” by those physicalities. This account of (ap-)perception is internally incoherent insofar as phenomenological experience of percepts is localized in both externality and within the observer (incoherent indeed unless one adheres to a quasi-Hegelian position in which mind-stuff constitutes the whole of reality). We suggest that confoundment of stimulus- and sensory-fields is responsible for that confusion within Nagel’s passage. In this sense, there is a kind of reductionist loyal opposition of Nagel, Frank Jackson and others ostensibly opposed to that brand of mind-brain reductionism proffered by Churchland and his colleagues: both factions accept unquestioningly the notion of that objective qualia whose localization straddles both interior- and exterior-CNS. Nothing but philosophical conundrums can result from that collective confusion.

This is an extraordinary concept that has obtained currency in philosophy of mind, which seems to have no homologue in accepted scientific psychology: *objective qualia*. That is the term used by Churchland in the excerpt immediately below, and by whatever name it goes, the concept itself is explicitly assumed in many philosophical accounts of perception (e.g., Armstrong, 1968; Churchland, 1986a; Dennett, 1991; Jackson, 1977; Place, 1956; Smart, 1959). It is a key concept that, if properly exposed, paves the way for recognition of the inhering unsoundness of that class of intertheoretic identities that mis-identifies functions of the CNS with its stimulus field; and hence for the elimination of possibility of using such mis-identifications for analogy to a possible mind-brain reduction. Here is Churchland’s formulation:

[T]he standard perceptual properties are not “secondary” properties at all, in the standard sense which implies that they have no real existence save *inside* the minds of human observers. On the contrary, they are as objective as you please, with a wide variety of objective causal properties. Moreover, it would be a mistake even to try to “kick the phenomenal properties inwards,” since that would only postpone the problem of reckoning their place in nature. We would only confront them again later, as we address the place in nature of mental phenomena The objective qualia (redness, warmth,

etc.) should never have been “kicked inwards to the minds [brains?] of observers” in the first place. They should be confronted squarely, and they should be reduced where they stand: *outside* the human observer [!]. As we saw, this can and has in fact been done. If objective phenomenal properties are so treated, then *subjective* qualia can be reduced where *they* stand: *inside* the human observer. So far then, the external and the internal case are not different: they are parallel after all. (1985, pp. 18–19)

When discussing transduction and encoding of proximal stimuli within the CNS, as Churchland does here and elsewhere, it seems inappropriate to call this a function of “mind” rather than of “brain”: for *we*, qua minds, certainly do not initiate, experience, or perpetuate these processes as such. And if it be rejoined that, *ex hypothesi*, mind is brain, this is question-begging.¹³ Further, the views of Nagel and Churchland are incoherent with psychology’s on at least two counts: (a) in the localization of colors, warmth, etc, which they claim is within the stimulus field, as over against consensus as to their loci within sensory-fields, themselves within CNS; and (b) precisely what is *cause* and what *effect* in perception. In Nagel’s phraseology and conception (taken over by Churchland), an *objective quale* lies within an observer’s stimulus field, and this quale (by unexplained means) exerts *effects on minds* of observers. This vague terminology and explicans bears no semblance to the perfectly clear and precise terms and concepts employed within psychology, which identifies their objective qualia as percepts, not *out-there* but *in-here*.¹⁴ Thus percepts are not construed by psychology as exerting *effects on minds from within the stimulus field*, but rather percepts are interpreted as *effects themselves*, functions of dynamic interactions of CNS(s) and proximal stimuli, of transduction and encoding, and localized within their relevant sensory cortices.¹⁵ While their account of perception is irreconcilable with the scientific one, it is nonetheless intelligible as to its etiology: it has inadvertently spliced naive phenomenology (*sensory field out-there*) with sensory psychology proper (*physics of perception in stimulus field*). Thus in reading texts on the physics of perception, they have introjected their experiential sensory field *out-there* into their intellectual understanding of the stimulus field as described in those texts, thereby

¹³Notice that such imprecise and deliberate equivocation between these terms (and signified functions) lends itself to an unjustified and unjustifiable, merely verbal suggestion (and consequent tacit presumption) of mind’s and brain’s ontological equivalence; as epitomized by neurophilosophy’s watchword “mind/brain.”

¹⁴In other words, percepts are not within visible and tactual bodies, which are themselves within the brain, but within the observer’s physical body; though those percepts (“objective qualia”) *are* outside our visible and tactual bodies in the sensory field as such.

¹⁵We might allow the suitability of terminology that states that these percepts in occipital lobe and elsewhere *then* induce *effects on minds*, spurring further behavioral designs in face of that empirical information, etc; but this is not what Nagel and Churchland have in mind, as they localize their objective quale in stimulus-space.

mistakenly presuming *identity* between the two fields. It then appears perfectly natural to confabulate upon philosophical pseudo-problems as to the differential localizations of so-called *objective-* (*visual and auditory*) *vs. subjective-* (*somaesthetic and apperceptive*) *qualia*. Thereby, sensory- and stimulus-fields become indistinguishable in that account.¹⁶

Contrary to Churchland's emphatic avowal above, it would appear that his objective qualia have never been localized (scientifically or otherwise) outside the CNS; indeed, it may be stated unequivocally that even their real existence, let alone localization, has not been recognized by any save Churchland and his co-thinkers. Sensory psychology proper, inasmuch as it might be applied to this question at all, emphatically would deny that redness's and warmth's loci might be found outside the CNS, spatiotemporally continuous or somehow ontologically identifiable with, distal- or proximal-stimuli, which are but the (collective) objective cause of those percepts.¹⁷ *Objective- and subjective-qualia* are simply highfalutin names given to psychology's percepts, which has no such distinction between its percepts as to differential localization within and without the CNS. *That* confabulation and consequent pseudo-problem has been reserved for philosophy of mind proper (not psychology), as afflicted by a recrudescence of naive realism. That distinction between objective- and subjective-qualia represents a misunderstanding of the science of perception, an expression of confounding sensory- and stimulus-fields; with a resultant confabulation that is conducive to philosophical confusion, certainly not mind-brain identification.

This intellectual battle between Churchland and Nagel then seems to be a kind of philosophic shadow-boxing. It was indicated above that there is no known physiological function by means of which sense modes might *leave* (project from) CNSs to perceive these objective qualia on the surfaces of distal objects; rather we have not direct access even to the proximal stimuli jounced off or radiated from those surfaces, for that physical energy itself is transduced into nervous energy long before we apprehend its final representation in sensory cortex. So again we might insist that any account of perception as theirs, which inescapably posits this novel and unknown form of percipience, is properly required to delineate the physical and neurophysiological means whereby that unique perceptual apprehension occurs.¹⁸

¹⁶For color percepts' veridical localization, any text on physiology of color-vision will suffice; e.g., Hochberg, 1964; Kalat, 1998; Ludel, 1978; Thompson, 1967. Rhetorically, does optic nerve project back to visual cortex or instead to physical surfaces outside the material observer's body?

¹⁷Else we would need sense modes that inexplicably *project* out to that stimuli, before we could perceive anything; cf. Smythies, 1954.

¹⁸*Theirs* because despite their superficial disagreement on other matters, both accept without question these objective qualia.

We affirm indeed that there are no actual existents as objective qualia, as an examination of elementary psychology shows; or rather, there *are* percepts that have been mistakenly localized outside the CNS and taken for other than what they actually are, viz objective qualia (shades of the Morning Star's seeming independent existence from the Evening Star). Thus functions of the nervous system are misunderstood to be objective properties of physical objects because of that confoundment of localizations of stimulus- and sensory-fields; a confounding defined above to constitute the essence of naive realism. We suggest further that a programmatic agenda greased the skids for these realists' and reductionists' oversight: by committing themselves to *denial of subjectivity of objective-phenomenological properties* (?), it was perfectly natural to shift the localization of functions of the CNS (percepts) into physical space, where they are somehow "passively viewed" in their pristine independence of "subjective" percipience, or generally experienced outside the physical body.¹⁹ Percepts (mind-stuff) are thereby smuggled out of existence, ontologically transmuted by their identification with surface properties of physical objects. By this means, there is no problem as to how to square realists' objective qualia with brain tissue: brain and quale have different localizations, so accordingly there is no need to explain the relation of such mental phenomena with brain functions and properties, as Churchland candidly reveals in the excerpt immediately above (*we would only postpone the problem of reckoning the place of objective qualia in nature, if they were to be localized with mind or brain and not with distal stimuli*). We respectfully suggest that determination of such questions as localization of perceptual phenomena is properly a function of scientific endeavor and consensus, not idiosyncratic or programmatic purport.

How much more wondrous is the real picture obtained from neuroscience! The true epiphany of mind-brain relations is induced by recognition that, from their common localization, all that we experience in colorful sight, raucous sound, pungent smells, and from our other multitudinous and coordinated sense-modes (*Gibsonian perceptual-systems* [Gibson, 1966]), as a child experiences running from one booth to another on a summer's fairground, are somehow manifest with, or from, three pounds of neural tissue inside our heads. And that mystery is simply (too) conveniently explained-away by these (mis-) accounts of the nature of perception, which naively localize sensory phenomena away from that CNS to distal- or proximal-stimuli, *qua objective qualia*, which are themselves identified with those "material natures," i.e., objective causation of our perception.

¹⁹In other words, perceived in the absence of perception. This does not make even verbal sense, let alone possess psychological or ontological meaning. The stark contradiction is my expression, but the construct is theirs (cf. Armstrong, 1968, p. 285, on absolute objectivity of color vision).

Besides, “objective qualia” is an oxymoron: for “quale” is routinely defined (e.g., Honderich, 1995, p. 736) as a subjective, *je ne sais quois* experiential quality of an observer’s (ap-)perceptions, presumably localized within one’s mental or physical boundaries; so how did these qualia get outside that observer to be somehow experienced in physical space? That implicit paradox has been unrecognized to the precise extent that most accounts of perception within philosophy of mind have been of direct realist stripe.

“Pitch is Identical with Frequency”

We now turn to a concrete application of this incommensurateness of percepts and their material causality, by examining an alleged identity of pitch and frequency. In *Matter and Consciousness* (1984), Churchland makes this statement:

Consider sound. We now know that sound is just a train of compression waves traveling through the air, and that the property of being high pitched is identical with the property of having a high oscillatory frequency. (p. 26)

Let us consider, in particular, the second clause of that proposition. The term “pitch” is reserved in perceptual psychology exclusively for a qualitative property of heard sound, in contradistinction to its objective cause, viz mechanical radiant energy, of which frequency of sound waves is the physical dimension corresponding to perceived pitch. Analogously, “loudness” denotes an audited quality of experienced sound, while amplitude of the objectively causal wave-train is its corresponding physical property (Kalat, 1998; Thompson, 1967).

On this account, it is physically impossible that pitch might be ontologically identical with its corresponding frequencies. Pitch is localized within the central nervous system of a percipient who is doing the listening, while wave-frequency is the objective dimension of the proximal stimulus that is the material correspondent of that sub-modality of auditory perception. Perceived pitch is the outcome of the transduction and encoding of that proximal stimulus, and hence is a function of the CNS, while wave-trains themselves are resident always only outside that nervous system. Frequency and pitch are thus ontologically incompatible on at least four accounts: (a) their respective localizations, namely without the nervous system and within it; (b) their respective forms of energy, viz mechanical radiant and nervous; (c) the respective media of their propagation, viz the atmosphere and nervous tissue; and (d) their temporal positions in perception, namely before-and-after transduction.

Yet perhaps that posited identity between them may expect a more favorable validation by a consideration of semantics as such; perhaps it is a question of *definientia*, more so than of ontology. In other words, perhaps that

identity is true by definition, by definitions not so strict as that within scientific psychology.

The Question of Semantics

To preclude possibly obscuring our argument by lack of proper and relevant semantical analysis, we should examine these terms with sufficient niceness. In the *New Oxford Shorter English Dictionary* (1993), "pitch" is defined as follows:

The quality of the sound of a musical instrument or voice which is governed by the rate of the vibrations producing it; the degree of highness or lowness of tone. (p. 2226)

"Tone" is then further defined:

A characteristic sound made by a voice, instrument, etc. (with reference to its aurally perceived qualities). [p. 3334]

Evidently on this summary analysis, the proposition that "pitch = frequency" is untenable. Yet "tone" has also the following, secondary definition:

Physics a sound produced by a regular vibration, esp. (more fully *pure tone*) a simple sinusoidal waveform of specific frequency. (p. 3334)

Contrariwise then it is possible to salvage that claim of identification, by citing such a secondary definition. It should be noted, though, that this renders that sought-for identity as merely trivially true, i.e., true by ostensive fiat. Yet even this does not help Churchland's alleged identity, because he makes known (1984, pp. 30–31) that his identification is to be of an ontological character, in which scientific advance invents not simply new definitions and terms for old concepts, but rather demonstrates ontological reductions through the medium of progressive neuroscience (for example). We should thus examine these further claims of reductionism.²⁰

²⁰But even if they [ascriptions of semantical properties to brain states] still struck all of us as semantically confused, this would carry little weight The *meaning analysis* here invoked might well have been correct, but all that would have meant is that the speaker should have set about changing his meanings The 'abuse' of accepted modes of speech is often an essential feature of real scientific progress!" (Churchland, 1984, pp. 30–31). By his own reasoning, then, definitions are properly determined by ontology — itself determined by science — not vice-versa, so that an appeal to semantics to bolster the identity "pitch is frequency" must "carry little weight." Accordingly if science *in actuality* says that pitch cannot be numerically identical with frequency, no word-finagling would then save that identity statement.

Ontology vs Semantics

After citing a number of physical identities said to have been demonstrated through scientific progress, Churchland writes this:

These illustrative parallels are all cases of successful *inter-theoretic reduction*. That is, they are all cases where a new and very powerful theory turns out to entail a set of propositions and principles that mirror perfectly (or almost perfectly) the propositions and principles of some older theory or conceptual framework. The relevant principles entailed by the new theory have the same structure as the corresponding principles of the old framework, and they apply in exactly the same cases. (1984, p. 26)

It was shown above that the identity "pitch is frequency" is trivially true at most, by definition. But perhaps our refutation here is itself a mere play-*on-words*, for it does seem intuitively plausible that somehow sound in general, and pitch in particular, are "reducible" to material compression waves. If there really is an intertheoretic identity to be found here, it is, according to Churchland, of such an ontologic nature. If we put aside involved semantics momentarily, and examine only what physics and physiology of perception would say as to the veridical scheme, it is readily shown there can be nothing identifiable in the deeper, ontological sense that Churchland et al. are after. Mechanical radiant energy is reflected or emitted from distal stimuli (physical objects or events); that proximal stimulus (sound wave) with its various dimensions (frequency and amplitude) strikes a percipient's ear-drums, energy then transduced and encoded within a CNS until the experience of pitch and loudness transpires to consciousness. Every one of these events and structures are physically discrete, with their own unique spatial and temporal localizations within that entire process of perception; and hence are not identifiable with one another, in any meaningful or non-trivial sense of the term (Lovejoy, 1929; Smythies, 1956).²¹ Or as trenchantly expressed by E.G. Boring, "[M]ost text-books of physics identify pitch with frequency; yet if that be true, what was it that Galileo discovered?" (quoted in Beloff, 1964, p. 87). What Galileo discovered was that there is a psychophysical correspondence between an objective character of the material cause of our perception, i.e., frequency of sound waves, and our subsequent experience thereof, namely pitch; not that there is an ontological identity between them. To confound the physics and physiology of perception seems not a legitimate sort of intertheoretic reductionism.

Concerning scientific progress, we should summarily explicate a further verbal equivocation of which the proponents of intertheoretic identification

²¹It appears that it is through an unrecognized verbal equivocation that a modality of sensory experience that is localized within the CNS might be thus misidentified with its objective causation. For example, "sound" denotes either *heard* sound or its *material cause*.

seem to be unaware in their reasoning. The infinitive “to identify” might mean in these contexts either (a) theoretical (with presumed consequential ontological) *reductionism*, or (b) scientific *discovery*. While it is perfectly allowable and veracious to say that science has *discovered* (“identified”) the objective cause of the auditory phenomena of pitch and loudness, it is quite another statement (a brazen falsehood, in fact) to maintain that science has *reduced* (“identified”) the physiologically-based phenomenon of pitch to an ontological identity with its material cause *outside* that CNS-based sensory phenomenology. We suggest that that naive realism, indicated supra, has slipped in unawares in materialist reductionist arguments, and found a ready vehicle for expressed misconception in this verbal equivocation provided by “to identify.” This implicit and natural verbal equivocation might well be the origin of any residual adherence (“intuitive plausibility”) the reader might have regarding a “self-evidence” of these so-called intertheoretic identities.

Acoustics and Neurophysiology

Next comes Churchland’s transitional gambit that sets up the analogy from intertheoretic identities ostensibly from the history of science, to a millenarian *final reduction* of mind to brain:

If the new framework is far better than the old at explaining and predicting phenomena, then we have excellent reason for believing that the theoretical terms of the *new* framework are the terms that describe reality correctly. But if the old framework worked adequately, so far as it went, and if it parallels a portion of the new theory in the systematic way described, then we may properly conclude that the old terms and the new terms refer to the very same things, or express the very same properties. We conclude that we have apprehended the very same reality that is incompletely described by the old framework, but with a new and penetrating conceptual framework. (1984, p. 27)

That “old framework” within which the auditory phenomenon of pitch resides, is an auditory *sensory field* housed within the central nervous system.²² Churchland’s contrasting “new framework,” nominally of more comprehensive theoretical explanation and reduction, is a *conceptual construct* that is descriptive of the world of physics, specifically the science of acoustics. The science of psychophysics has indeed determined that there is a “parallel” between these two domains, but that parallel is not logically or empirically equivalent to an ontological identity between those domains; rather, there is

²²Even if it be argued that the percept of pitch is “theory-laden” with common sense assumptions (as Churchland maintains), this does not transform that percept (per se) into a concept; for the clinical phenomena of blindsight, blindness denial, and associative agnosia demonstrate that perception and conception can be entirely dissociated, hence that while conception may indeed be a cognitive elaboration of perceptual content (cf. Schopenhauer, 1844/1966), it cannot be identical therewith (cf. Smythies, 1994a).

functional correspondence only. The one domain is the world of inanimate physics, in which mechanical radiant energy constitutes the objective cause of the generation of a sound percept within the CNS, that is the perceiver's experience of pitch and loudness. Not until the sciences of acoustics and neurophysiology will have been inter-theoretically reduced can the claim be plausibly made that pitch is materially identifiable with frequency of sound waves. Churchland has here illicitly conflated mutually incommensurate sensory phenomena, physiological events, and physical energies through his misconception of the nature of audited sound and its objectively causal parameters.

The claim that the two frameworks' terms refer to the very same entities or properties is thus false, for psychophysics construes material cause as temporally prior to transduced stimuli, outside the CNS, etc. Physiological science and acoustics map entirely disparate domains of reality, and hence it is not possible to use one to explanatorily subsume the other beneath it.²³ And if rude empirical observation may be allowed to intrude upon abstract philosophical dialectics into ethereal qualia, we note that if psychophysical functions represented ontological or theoretic identifications of delivered proximal-stimuli and our experience thereof ("objective qualia"), then there would presumably be a linear equation ($x = y$) between such as pitch and frequency; whereas they are in fact related by an (approximate) logarithmic function (Thompson, 1967, p. 260). "Pitch compresses frequency — for example, a tone twice as high as another in frequency sounds less than twice as high" (Thompson, 1976, p. 601). Accordingly, acoustics is not then a more profound or inclusive scientific explanation of neurophysiology or phenomenological experience.²⁴

Logical Identity

An alluring means of possible egress from this reasoning is to aver that what is meant by "pitch" is a *definite description* (Copi, 1954, pp. 148–157) of "objective sound," this latter then interpreted as the *intended referent* of folk or scientific conceptualization, much as the Morning and Evening Stars are identical in reference (qua differing *senses* of Venus). Then, as the phenomenal experience of pitch is "now known" to be ontologically identical with

²³For example, in psychophysical experimentation, there is often no absolute predictive correlation possible between given proximal stimuli and what is phenomenally experienced consequently. See Vernon, 1962.

²⁴We are here assuming, with material neuroscience, that percepts are ontologically identical with brain states or processes; but not, with philosophical identity theory and eliminativism, that percepts are identical with their objective causes.

those waves' dimension of frequency, this scientific description of "publicly observable sound" has superceded our "folk theory of sound *out there*" so that we may regard the relation between those folk and scientific descriptions as that of (logical) *identity*.²⁵

We observe that this argument hinges upon the proposition that *it is now known that pitch is ontologically no other than sound waves' frequencies*; and this is a question to be determined by historical enquiry as to what psychophysics *inter alia* has determined to be the actual relation between pitch and frequency. If the terms in psychophysical correspondence are necessarily spatiotemporally discontinuous then that argument must be *unsound* (i.e., one or more of its premises is false).

If it now be agreed that by analysis of perception there are no actual publicly observable objects (denizens of a "shared" sensory space common to all percipients) or objective qualia, then the analogical proportion stated to hold between (say) Morning and Evening Stars with respect to Venus, and pitch and frequency with respect to "public sound," must be less than an improbable inductive inference. For such reductionist extrapolations are not (properly) analogical at all: while Venus is an actual planetary existent, there is no corresponding publicly observable sound (only sound waves outside CNS and auditory percepts within it) and so there can be no definite descriptions that answer to an ostensible identical referent of sound *out there*. This conclusion must hold whenever any terms of psychophysical correspondence are brought into putative equation for the end of furnishing yet another analogical instance for plausibly projecting mind-brain reduction.

It is not (of course) the logical criterion of identity that is thus being brought in question; it is rather the inappropriate application of that criterion to the contents of stimulus and sensory fields, confounded through an intellectualized naïve realism, for the purpose of philosophical programme. For the sake of completeness, we should ascertain whether logical identity is in any sense applicable to possible intertheoretic identities.

There are now only *two* terms involved that are candidates for reduction, viz. percepts and their objective causation — as a presumed *third* term (public sound) that straddles observer and observed has mere fictitious existence by our method of perceptual eliminativism. There are two possibilities of relation between pitch and frequency: (a) they are the same being with two distinct definite descriptions or (b) they are ontologically discontinuous and thus have distinct conceptualizations *for that very reason*.²⁶ The first possibility has

²⁵Smart (1959) gives a parallel account of logical identity between (*visible*) lightning and electrical discharges.

²⁶In other words, they are not conceptually distinct merely because of our ignorance, because "we did not know they were numerically identical until science demonstrated this fact to us."

been ruled out by analysis of perception. This leaves only the possibility that they individually have unique ontological and theoretical existence, in other words they have not logically or empirically *identical being*, their relation obtains only as psychophysical correspondence. We conclude that analogical arguments, based upon a logical criterion of identity, have no applicability to these nominal theoretical identifications, particularly "pitch is frequency."

If that analogical proportion were truly fit, then a percept as audited pitch (*common sense observable* as termed by Churchland; see *infra*) should be ontologically indissociable from its proximal stimulus (as frequency of sound waves); which assuredly it is not, for as the solution to the pedestrian puzzler goes, A tree falling (sound waves) in the forest with no one around to hear it (CNS *in absentia*) makes no sound (auditory percept).²⁷

Any postulation of an alleged identical ontological referent of percepts and their objective causation, could be made only by one who confounded stimulus- and sensory-fields; in other words, by a naive realist. A percept as pitch, supposedly conceptualized within a "folk theory of perception," is emphatically not merely a definite description of its causative proximal and distal stimuli: these are incompatible existents, wholly independent in their theorizations, localizations, functions, and ontological being.

The Analogy to Mind and Brain

Here is the final step made by Churchland in his analogical equation, toward his end of effecting the plausibility of ridding mind of independent existence or identity from brain:

[These inter-theoretic identities] are all cases where the things or properties on the receiving end of the reduction are *observable* things and properties [objective qualia] within our *common-sense* conceptual framework [folk theories of qualia]. They show that intertheoretic reduction occurs not only between conceptual frameworks in the theoretical stratosphere: common-sense observables [conceptualized objective qualia] can also be reduced. There would therefore be nothing particularly surprising about a reduction of our familiar introspectible mental states [subjective qualia] to physical states of the brain. All that would be required would be that an explanatorily successful neuroscience develop to the point where it entails a suitable "mirror image" of the assumptions and principles that constitute our common-sense conceptual framework for mental states, an image where brain-state terms occupy the positions held by mental-state terms in the assumptions and principles of common-sense. (1984, p. 27)

Churchland's common-sense observables would then include the auditory phenomenon of pitch, shown above to be a percept that is ontologically incompatible with its objective cause, a sound wave's frequency. In this pas-

²⁷If Churchland and other reductionists were to maintain here that, "By *common sense observable* we absolutely do not mean *percept*," that would be *petitio principii*; for what their *observables* as pitch *actually are*, is precisely what is in question.

sage he extrapolates from such nominal identities to the question of mind and brain, by making an analogy between those two scenarios. As pitch has intertheoretically reduced to frequency, so shall mental phenomena in general be eventually given a reduction to the more comprehensively explanatory neurosciences.²⁸ The fly-in-Churchland's ointment here is that (a) pitch is not identifiable in any way with frequency, they correspond only psychophysically; and (b) any analogy to mind and brain from such a mis-identification would hence be less than analogical, as that former "identity" is based upon a confoundment of irreconcilable (hence irreducible) physicalities and neurologically-based sensory phenomena.²⁹

It might be thought contrariwise that it is only that instance of misidentification of pitch that is at fault, that this objection will not generalize to others more stout in their resistance, that others may be yet salvaged. Nonetheless, it is probable that the above reasoning on pitch and frequency may be similarly applied, *mutatis mutandis*, to other nominal intertheoretic identities mentioned by Churchland in his texts, and by other authorities, to effect that same conclusion as to their presumed soundness. For they all share the same structural formula, of which *pitch is frequency* may be taken as the prototype. The method we employ here is to use *pitch is frequency* as template into which to insert the various terms of the other claimed identities: thus, *heat is high kinetic energy* is broken down into its components "heat" and "KE"; then heat (*common sense observable*) is shown to be a (somaesthetic) percept localized within somatosensory cortex, while KE is its material cause outside the organism, etc. *Lightning is an electrical discharge* is resolved into a percept of visible light (*visible flash out-there*) while transfer of atmospheric electricity between clouds and the earth (for example) is shown to be its distal stimulus. *Light is electromagnetic radiation* should be transparent after these examples (see addendum). And on and on, till no identities that smuggle functions of the CNS into their equations are left standing. The ground of refutation in all such instances, is that we discern a fallacy of equivocation that pivots upon an ambiguous term ("warmth," "color," "sound," "lightning") that signifies either (a) percept or (b) its objective cause; thus is such verbal equivocation mutually supportive of the naive realism that psychologically underpins it.

Now the fulsome meaning of Wittgenstein's prescient quote that serves as the epigraph to this paper should be clear. *To say of two things that they are identical is nonsense: a percept (publicly observable physical object) has not spatiotemporal continuity with its objective cause (contra Smart, 1959). To*

²⁸In other words, *proven* to be so ontologically identical, rather than simply *assumed* as in extant neuroscience.

²⁹Leaving aside the inherent infirmity of analogies as such, which are of course the weakest form of induction.

say of one thing that it is identical with itself is to say nothing at all: in such propositions as "lightning is an electrical discharge," "lightning" must signify either percept (visible flash) or object (discharge); if the former, that proposition is an instance of rationalized naive realism; if the latter, a meaningless tautology ensues, which "is to say nothing at all." We say *must signify* only those two, not in the sense that the necessity for only two unique referents derives from mere arbitrary definition, but rather from the perceptual scenario itself, as this is conceived by scientific psychology. (Thus ontology properly determines semantics, not vice-versa.) For to aver that "lightning" might also signify a so-called *publicly observable physical object* or *common sense observable* and that this is what reductionists mean by such as "lightning," "heat," "color," "pitch," "light," is, again, question-begging. For that is an enthymeme whose unspoken premise is that, inexplicably to accepted neurophysiology, our individual sense-modes have left our discretely localized CNSs and we are enabled thereby to "collectively observe" (visually, auditorily) an event within a "shared" or public sensory space, sensory spaces actually wholly confined within ineradicably discrete CNSs of those material observers. *There exist only the physical object and its percept(s), there can be no publicly observable object superadded to their existential monopoly; this public object is an intellectualized phantasm of naive phenomenology.*³⁰

It may well be the upshot of this generalized refutation that that Morning Star/Evening Star duality is one of the few intertheoretic identities reclaimable; and this identity was intended merely heuristically by reductionists to indicate the feasibility of other identifications; but that road of analogy is closed to phenomenological data, as sense/reference distinctions (logical identity) have been shown to have no application to percepts and their stimuli (misidentified as objective qualia and their material natures, respectively). The foregoing arguments do not address the remaining possibility of empirical identifications to be found in non-phenomenological domains; yet even if these be indeed discovered ("identified") or reaffirmed, the resultant irony manifest here is striking enough: experiential percepts (*mental stuff upon which our dreams are made*) would then be the one category of existents not amenable to physicalist reductionism, and that reduction was and is of course a prime goal of all such programmes and reductionist argumentation as intertheoretic identification.³¹

³⁰We note that such a proposition as "lightning is an electric discharge" is nowise objectionable insofar as naive realism is not implicated therein; which idiom is in keeping with common or even technical usage. In this context, see above also, for scientific discoveries construed as "identifications."

³¹This *dream stuff* represents an allusion to the common neural substrate of imagery and veridical perception, as disclosed by neuroscientific experimentation; see Farah, 1988.

The importance ascribed to these ostensible identities is summed up by one of its most vigorous proponents, Patricia Churchland (1986b), written in defense of her own text on neurophilosophy:

The fundamental question motivating the book was this: how can we get a unified account of mind-brain function that will achieve an explanatory integration of the various levels of organization of nervous systems, and what will that account look like? The philosophic framework is naturalistic: I argue for physicalism, for intertheoretic identities . . . , and for revisability of theory at every level (eliminative materialism). (pp. 241–242)

So intertheoretic identification is averred to have a programmatic function in her philosophy, and perhaps in extant physicalist reductionism generally; and yet the prospects for that particular plank have been shown to be perhaps untenable. We recognize, nevertheless, that it is not intertheoretic identification as such that has been questioned by the above reasoning, but only its misapplication to phenomenological data. For in the traditional conception and usage of identification (e.g., Nagel, 1961), there seems to have been no attempt (at least *systematically*) to theoretically reduce the phenomena of perception to their objective causes. Rather, that earlier conception of identification focused the continuity (or otherwise) of physical *concepts* as mass, energy, and gravitation as these evolved in physics; which usage seems legitimate in that restricted sphere, and presumably productive therein. The controversy really begins when that method of identification is wrenched from that proper context and misconstrued as furnishing a schematic basis for elimination of mind, by attempting to force-fit phenomenological experience or percepts into a procrustean bed of neuroscience. *This* employment of intertheoretic identification seems to be the forte of the Churchlands (though with ample precedent in that direction); which usage, again, seems to have a programmatic bent to it, a *bent* that seems to have *warped* the original schematic framework. Accordingly, the foregoing arguments in this paper are not to be viewed as challenging the method of intertheoretic identification as used hitherto in philosophy of science, only as it has been misused in philosophy of mind, by an illegitimate extrapolation from its original and proper application.

Finally, we should deal with an implicit paradox in our reasoning that readers may have discerned above. By *assuming* (with present neuroscience) that percepts are identical with brain tissue, we have seemingly *proven* the conclusion that it is not possible to identify objective qualia (percepts) with brain tissue! Yet paradoxes are only *apparent* contradictions, not real ones; and the reason behind this one is manifest with a bit of thought. This argument, which disallows an analogical extrapolation from ostensible *empirical identities* (ontological reductions) from the history of science, to a presump-

tive parallel reduction of mind to brain, applies only to Churchland et al.'s particular analogy. In other words, there may well be other, more viable argument candidates that would establish, empirically or a priori, the thesis that mental phenomena are numerically identical with brain processes; so that we have not deduced a *general* proof against that thesis, only against that proffered analogy. If instead such a generalized result had been entailed (viz, that by assuming percepts are identical with brain, we prove that percepts cannot be identical with brain, no matter what the argument given), it might then be properly rejoined that we had generated an insoluble contradiction, which would show that our argument must be invalid or somehow unsound. Or perhaps not; for it might be interpreted rather that the very positing of such a mind-brain identification had led inexorably to that *reductio ad absurdum*.

Addendum on Theory-to-Theory Reduction

Above we canvassed a number of connotations and criteria of "identity": sense/reference, ontological reduction, spatiotemporal continuity, scientific discovery. In Patricia Churchland's *Neurophilosophy*, there are emphasized *theoretical* identities (literally, identification of theories):

[R]eduction is a relation between theories, and one phenomenon is said to reduce to another in virtue of the reduction of the relevant theories. For example, the claim that light has been reduced to electromagnetic radiation means (a) that the theory of optics has been reduced to the theory of electromagnetic radiation and (b) that the theory of optics is reduced in such a way that it is appropriate to identify light with electromagnetic radiation Hence, when we raise the question of whether mental states are reducible to brain states, this question must be posed first in terms of whether some theory concerning the nature of mental states is reducible to a theory describing how neuronal ensembles work, and second in terms of whether it reduces in such a way that the mental states of [the reduced theory] can be identified with the neuronal states of [the reducing theory]

A consequence of intertheoretic reduction is explanatory unification If one theory can be explained by another and thus reduced to it, then our understanding of the phenomena described by the theory is greatly enhanced. For example, as a result of the reduction of the theory of optics to the theory of electromagnetism we came to understand why the laws of optics are as they are, and to this extent our understanding of how light behaves and what it is was enhanced.

Another important consequence of intertheoretic reduction is ontological simplification. Ontology pertains to what entities and properties exist, and in the event of intertheoretic reduction it may turn out that where we had thought there existed *two* different kinds of phenomena characterized by the laws of two different theories, there is in fact but *one* kind of phenomenon that is described by both theories.

For instance, in the mid-nineteenth century it was widely supposed that light was one sort of phenomenon, and electromagnetic effects quite another. By the turn of the century the laws of optics had been reduced to the laws of electromagnetic theory, and we understood that light *is* electromagnetic radiation. We understood what light is for the very first time, in the sense that we understood why the laws of optics are as they are. (1986a, pp. 279–280)

We have quoted this particular passage at length for several reasons. There is much that it has in common with Paul Churchland's expressions excerpted above, yet it seems also to resemble more the standard interpretation of intertheoretic identification from philosophy of science, rather than so much the application thereof to reductionist philosophy of mind.³² What we wish to suggest in this context is that her two forms of reduction, that of theories and that of things, are logically dissociable, having none but a contingent connection; and that it is desirable that we should thus cleave them, for a more coherent understanding of the nature of intertheoretic reductionism. In other words, there may be theoretical reductions in the strict sense, with no ontological identifications as hitherto conceived concomitant therewith.³³

Readers who have come this far may be surprised to learn that this author believes that, after all, that reasoning from philosophy of science offers the prospect of at least intelligible and coherent, if not particularly promising, forms of eliminativism and identity theory. But first there must be a shearing from such reasoning of implicit or explicit naive realism; we will use Churchland's passage to illustrate one possible means of construction.

Her formulation contains reference to two forms of reduction, that of theory, and consequentially that of ontology. The first type of reduction, exemplified by "light," pertains to an historical episode in physical science, viz the reduction of optics to electromagnetism, which this author is not competent to judge and hence will readily allow in his present ignorance. It is that second reduction that is being called into question, and which does not depend upon historical or scientific knowledge so much as logical analysis. For in every instance of citation above, the term "light" is not specified as to its referent. When it is said "we now know what the nature of light really is, thanks to science," note first that this "identification" of light's nature pertains to a scientific discovery, not necessarily ontological reduction; this point of verbal equivocation was covered in the paper above. Next notice that by so leaving that referent unstated (as though "light's" referent were obvious), the way is cleared for those fallacies of equivocation that Paul Churchland et al. have generated. Once again, we should carefully examine exactly what referents are implied or are possible in this context.

Churchland's account states that *pari passu* with reduction of the *theory* of optics to the *theory* of electromagnetism, there is corresponding ontological

³²Though of course she brings in the whole discussion to the end of making such a mind-brain reduction plausible.

³³This assumption leaves untouched the logical criterion of identity, viz sense/reference distinctions. We challenge only those "empirical identities" claiming to be instances of sense/reference identification.

reduction of these theorizations' parallel "entities and properties"; here, *light* is now recognized by us to be *radiation*. But what does she mean by *light*? "Light" might signify (a) percept, (b) objective cause of visual perception, i.e., "visible" radiation, (c) "common sense observable," "publicly observable physical object," "objective quale," etc.³⁴ Above it was argued that this third class is empirically non-existent and has only fictitious existence as a phantasm of reductionist "confabulation." This leaves a percept of light or its objective cause as possible referents in that claimed identity; and therefore again we are confronted with the results of the ontological reduction of "light" to radiation as being either an empty tautology or unwitting naive realism. Simply put, that aspect of reductionist philosophy that claims ontological identification of the entities of reduced theories to the entities of the reducing theories, must be unsound. How about the first type of reduction, that of theory to theory?³⁵

Conceptual reduction seems to be a tenable programme, and perhaps was the original focus of philosophy of science. We suggest that identity theory and eliminativism might become viable hypotheses *in that context* (theory to theory reduction) if they were overhauled as to their present constitution, jettisoning the ballast of naive realism that has crept into their intellectual formulae, and avoid that whole mess of analogizing from erroneous ontological identifications. A reconstituted identity theory, for example, that focused theoretical identities, may well argue analogically from such past reductions as optics to electromagnetism. In this revised argument (which Patricia Churchland spells out well), there is analogical proportion: as optics has reduced theoretically to electromagnetic theory, so will (folk- or scientific-) psychology eventually reduce to a "perfected" neuroscience.³⁶ *This seems to be the workable part of neurophilosophy and its reductionist analogues.*

Now comes the bad news for any reconstructed identity theory and eliminativism. We must examine exactly what kind of "identity" might be signified by this conception in philosophy of science; we will find that it grants not much leeway to mind-brain reductionism. Above we gave a number of connotations of "identification" (e.g., scientific discovery and ontological reduction); another now follows, and it is deliberate overstatement: *the concept of intertheoretic reduction in philosophy of science properly signifies a taxonomic ordering of physical phenomena obtained through progressive scientific*

³⁴These terms are taken as essentially synonymous here.

³⁵We presume there is no logical necessity conjoining the two types of reduction (ontological and theoretical), only contingency by dint of quirky intellectual history.

³⁶Assuming there might ever be such a thing; what other science is "finished"?

discovery, not those ontological identifications of extant reductionism. Let us unpack the manifold meaning of this hyperbole.³⁷

When Maxwell et al. discovered the nature of “(visible) light” and thus “identified” it as a form of electromagnetic radiation (i.e., as a range within its spectrum), what thus suffered unification with radiation?³⁸ Certainly not our visual experience of light; again, this is a percept within the CNS, etc. An “objective quale” of light simply does not exist, and to say that “visible light qua radiation” was identified with radiation is tautologically meaningless. Where do we go from here? Clearly there is *some* sense in saying that physical theory has undergone generalization with its explanatory advance. *But we say that there is no ontological reduction of things to things in this progression, only greater explanatory generalization that encompasses more physical phenomena.* For example, historically the percept of light was not ontologically identified with visible radiation, nor was any fictitious objective quale; what was “identified” (discovered through creative insight) was the objective cause of our visual perception of light (visible range of electromagnetic spectrum), as being taxonomically subsumed as species to the genus of the electromagnetic spectrum. And this “identification” consisted of scientific discovery qua explanatory generalization, as the intellectual subsumption of species of physical phenomena to their respective genera. In the example from optics, visible light is placed beside its conspecifics as infrared- and ultraviolet-ranges, all conceived in this taxonomic ordering as forms of the genus electromagnetic radiation (species varying along the dimension of wavelength). Note there is no need or possibility in this scheme for “reductive ontological identification” of any of the physical phenomena involved; for this proper “identity” consists of a *logical ordering*, a physical inventory and taxonomy, an intelligible construct, a truly *theoretical* reduction of one scientific scheme to another of greater generality: the “identity” of a species of theoretical construct *within* its inclusive theoretical genus, and the parallel “identity” (*taxonomic* identity) of the referenced species of physical phenomenon within its more generic physical form. If we are still tempted to assume that there has been some kind of ontological identification (things to things) consequential upon this theoretical one (concepts to concepts),

³⁷This is hyperbole because one could not hope to canvass the many conceptions within philosophy of science within the confines of one statement, obviously; and because one idiosyncratic viewpoint about science could not claim to be authoritative in that field.

³⁸“Unification” is virtually synonymous with “identification”; and thus there is room for more verbal equivocation, for instance with the statement “science has unified light with radiation,” which may well have been misunderstood as signifying ontological reduction of “publicly observable light” with radiation. This “unification” in fact means nothing more than a physical taxonomy as described here.

we would need to show that, for example, visible radiation is spatiotemporally continuous with "generic" radiation of all wavelengths; and this is unintelligible. This would be to confuse the meaning of "identification" as it is properly employed in describing the theoretical advances of physical science, and its progressive taxonomic orderings of more encompassing generality of explanation, with the sense-reference connotation of the infinitive "to identify." We don't need any more of that verbal equivocation.³⁹

Next we should examine what would be the prospects of a possible reconstructed identity theory and eliminativism in light of this analysis of "scientific identification" qua physical taxonomy. By analogy, as optics reduced theoretically to the more inclusive electromagnetic theory, so then will (say) scientific psychology "fall to" or even be eliminated altogether by the reducing theoretical neurosciences. This is an intelligible proposition so far as it goes; it is required only to extend the analogy to understand what it implies for mind-brain theoretical relations under this coming novel dispensation, and to see what obstacles it would face.

First, though this new identity theory would evade the charge of naive realism, it still has the formidable task of answering the neurological and psychophysical evidence marshaled against it by (for one) Smythies (e.g., 1994a, 1994b, 1994c); or the philosophical arguments by (for another) Beloff (1964); or those from psychology made by Alan Gauld (1989). For these men, not being naive realists, are not encumbered by an intellectual confoundment of stimulus- and sensory-fields that bedevils most philosophical reductionist literature down to the present time; and this means that they have understood all along what a properly configured identity theory would entail, viz that percepts and phenomenal spaces would have to be shown to be numerically identical with brain states or processes.⁴⁰ Thus they have had the jump on reductionist philosophers by a time span of decades in assessing the true merits of an identity theory that is at least coherent in its logical and

³⁹Readers inclined to take exception to this homely and threadbare epistemology should understand that it is not meant as an end in itself, merely to suggest the direction which any revised philosophy of science would have to take if indeed ontological identities as hitherto conceived are physically impossible or otherwise unintelligible. For clearly there is scientific progress; yet if there be nothing ontologically reduced in that progression, a revamped epistemology is requisite to determine exactly what it is that is being thus "unified," and in what way, etc. We need to "save the appearances" of scientific progress, in this presumed altered geometry of philosophy of science. See appendix to Bohm (1965, pp. 185-230) for a similar view of scientific method and progress, which consists in successive orders of *higher-level abstractions*. Bohm would construe optics as a *limiting case* of electromagnetic theory.

⁴⁰Rather than that "corrupt" or ersatz identity theory that seeks to transmogrify percepts into properties of distal- or proximal-stimuli, and then argue analogically from these non-identities to a parallel brain and mind identity.

empirical expression, if not terribly promising in its reductionist prospects.⁴¹ At present their arguments seem not to have been fully comprehended by their philosophical colleagues, let alone answered properly.

Now I would like to express two arguments that are implicate with the above analysis, and which I believe demonstrate that even a reconstructed identity theory that skirts naive realism is still either, at best, implausible or at worst, unintelligible. We will need to flesh out the analogy from optics and electromagnetism to psychology and neuroscience, first by showing that the theoretical unification exhibited by the case of optics, such as it is, offers not much hope for reductionists seeking to “unify” mind and brain. For when we examine the reduction of optical theory to Maxwell’s equations, we find a monumental *scientific discovery* (“identification”), while yet the *ontological unification* (“identification”) is a minuscule pipsqueak. In other words, it was a superlative intellectual accomplishment, while the physical furniture thus unified conceptually turns out to be mere “wrinkles” of one and the same physical phenomenon (radiation) varying along only one dimension, viz wavelength.⁴² So there is one physicality, radiant energy, that is differentiated into ranges of various wavelengths; this is the sum total of ontological unification flowing from that theoretical reduction of optical theory. Accordingly, if this is to be the basis for an analogical extrapolation to mind and brain, then a finished neuroscience’s reduction of psychology would presumably show that mind (qua apperception or sensory phenomena) is “really” just a quantitative range of variation along one dimension of brain function, say, a series of spiking frequencies of projections through the reticular formation. This seems extraordinarily implausible, for how could one such range of variable account for the “phenomenal” complexity of our sensory fields, to name but one conscious experience. Yet this implausibility falls directly out of the analogy to reduction of optical theory. We suggest that the ontological chasm separating mind from brain is far wider than that between ranges of inorganic phenomena varying along merely one or two dimensions.

Finally, an argument as to the unintelligibility of this reworked identity theory. The programmatic rationale for a presumption of eventual reduction of mind to brain rested mightily upon the concept of ontological identification. Yet it has been shown that these are spurious identities, and that it is not possible to obtain spatiotemporal overlap between a percept (“heat,” “light,” “sound,”) with its material cause, consequently there can be no ontological equation between non-existent common sense observables etc and their

⁴¹Even an identity theory that eschewed naive realism would have to “square” our phenomenal sensory experience with its alleged neural opposite-number, if only in principle: good hunting on that one! See Smythies (1994a).

⁴²For simplicity of exposition we neglect the dimension of amplitude, etc.

“material natures.” In a nutshell, this class of ontological identities is an empty set. It has been hitherto presumed that these “empirical identities” fell under the sense/reference criterion of (logical) identity, and that these identities actually obtain, but this is due to naive realism as reinforced by its epiphenomenal verbal equivocations.⁴³ So it would seem that the very concept of ontological reduction becomes meaningless, if there is indeed no real empirical example to furnish for it, none that is legitimate; it cannot then lay the ground for a prospective analogy to mind and brain. The kinds of “identifications” obtained in science are not of things to things, but of theories to theories. The “identification” of visible light with radiant energy is an *order* of physical phenomena, of species to genus (ranges within a spectrum), of taxonomic identity and not of discrete entities (“objective quale of light” and radiation) said to have been logically identified through their theorizations having been discovered to have the same ontological reference. *By analogy then, even if the laws of psychology reduced theoretically to neuroscience, the “identification” obtained would not be one of things to things (minds to brains), but of the species (range) of mind to its genus (spectrum) brain.* I submit that this is an unintelligible proposition, for recall that the ontological reduction of visible light to electromagnetism was along one dimension of the same physical substrate, whereas this anticipated reduction of mind to brain would be not merely quantitative, but of qualitative order; a reduction of *unique types*, not of ranges within a *continuous grade*. *Mutatis mutandis*, that reductionist proposition is meaningful respecting classification of ranges of electromagnetic wavelengths, but what makes sense in terms of theorization of physical phenomena seems to disintegrate into conceptual incoherence when applied to the domain of mental phenomena.

⁴³Thus visible lightning seems to be external to the “physical” observer in an intellectualized naive realism, the flash thereby mistakenly presumed coterminous with its material cause of electrical discharge in the stimulus field, that field being misidentified with the visual space of consciousness.

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