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The Journal of Mind and Behavior (JMB) is dedicated to the interdisciplinary approach within psychology and related fields. Mind and behavior position, interact, and causally relate to each other in multidirectional ways; JMB urges the exploration of these interrelationships. The editors are particularly interested in scholarly work in the following areas: □ the psychology, philosophy, and sociology of experimentation and the scientific method □ the relationships among methodology, operationism, and theory construction □ the mind–body problem in the social sciences, psychiatry and the medical sciences, and the physical sciences □ philosophical impact of a mind–body epistemology upon psychology and its theories of consciousness □ critical examinations of the DSM–biopsychiatry–somatotherapy framework of thought and practice □ issues pertaining to the ethical study of cognition, self-awareness, and higher functions of consciousness in nonhuman animals □ phenomenological, teleological, existential, and introspective reports relevant to psychology, psychosocial methodology, and social philosophy □ historical perspectives on the course and nature of psychological science. We typically do not publish empirical research. The Journal also recognizes the work of independent scholars.

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Mentalism as a Radical Behaviorist Views It — Part 2

J. Moore

University of Wisconsin – Milwaukee

Part 1 of this review suggested that mentalism consists in explanations of behavior in terms of causal mental states and processes. These causal mental states and processes are inferred to reside in an unobservable dimension beyond that in which behavior occurs, and to function differently from environmental events, variables, and relations. One of those functions is inferred to be mediation, in which environmental events trigger a mediating state or process, which in turn triggers a response. For mentalism, an explanation should properly focus on specifying the causal role of the mediator, rather than talking about observable relations. Part 1 further suggested that mentalism is actually as integral to mediational neobehaviorism as it is to cognitive psychology, even though each claims to differ from the other. Part 2 continues the review of mentalism by addressing the relations among mentalism, operationism, and the meaning of scientific verbal behavior, especially when the verbal behavior involves private behavioral events. The review then considers some sources of mentalism, along with examples of how mentalism is supported in philosophy. Finally, the review summarizes the radical behaviorist opposition to mentalism. Overall, the review concludes that radical behaviorism differs from both cognitive psychology and mediational neobehaviorism, which radical behaviorism regards as comparably mentalistic.

Keywords: mediational neobehaviorism, mentalism, radical behaviorism

Part 1 of this review suggested that mentalism is an orientation to the explanation of behavior. According to this orientation, researchers and theorists should explain behavior by appealing to the causal capacities and architecture of states and processes in the mental dimension. The mental dimension is inferred to be an underlying, unobservable dimension beyond the dimension in which behavior occurs. The causal phenomena in this dimension are inferred to function differently from environmental events, variables, and relations, such as by actively mediating if not initiating our experience with the world at large.

The present article draws on themes in other work by the author, and includes revised portions of that work. Correspondence concerning this article should be addressed to J. Moore, Ph.D., Department of Psychology, University of Wisconsin – Milwaukee, Milwaukee, Wisconsin 53201. Email: jcm@uwm.edu

For mentalism, explanations in any form of behaviorism are inadequate because they are concerned with performance, and are expressed in terms of observable relations between behavior and environmental circumstances. Mentalists argue that behavior is far too rich and flexible for such behavioral accounts to constitute a meaningful explanation of behavior. Something beyond observable relations is needed.

Part 2 of the review continues to examine mentalism and addresses such questions as: (a) What are the relations among mentalism, operationism, and the meaning of scientific verbal behavior, especially when the verbal behavior involves private behavioral events? (b) How is mentalism supported in philosophy? (c) What are some sources of mentalism? (d) Why do radical behaviorists oppose mentalism?

Mentalism, Operationism, and the Meaning of Scientific Verbal Behavior

Radical behaviorism argues that much of the controversy between radical behaviorism, on the one hand, and both mentalism and neobehaviorism, on the other hand, turns on a symbolic, referential conception of verbal behavior. According to this conception, the meaning of any term is established by identifying the entity that is being symbolically represented and to which the term is assumed to refer. Radical behaviorism argues that both mentalism and neobehaviorism accept a symbolic, referential conception. In contrast, radical behaviorism rejects this conception as mischievous and deceptive, notwithstanding claims that operationism insulates the symbolic, referential conception of verbal behavior against any explanatory liabilities.

A symbolic, referential conception is longstanding in traditional psychology and philosophy. For example, Stevens (1939), an early advocate of a particular view of operationism in psychology, fully subscribed to this symbolic, referential conception of verbal behavior:

A sign has semantical significance when an organism will react to it as it would to the object which the sign supplants. The psychologist works out the laws under which different stimuli evoke equivalent reactions. Signs, as stimuli, can be combined and utilized extensively in the control and direction of behavior, both individual and social. The entire activity of the scientist as a sign-using organism constitutes, therefore, a type of behavior for which behavioristics seeks the laws. (p. 250)

A further example is Benjamin (1955):

What, then, gives such an operation cognitive significance? The answer is simple and clear-cut. The event which is produced by the operation must *refer* to that which was involved in its creation in that unique way which is characteristic of all *symbols*. Symbols are a special kind of *sign*. A sign is defined as that which has the property of referring to, or indicating, something else; this "meaning relationship" is probably unique and indefinable. (p. 97)

With respect to the modern era, radical behaviorism argues that both mentalism and neobehaviorism take psychological terms to symbolically represent or refer to mediators in a nonbehavioral dimension. For mentalism, the mediators are unselfconsciously asserted to be states and processes in a mental dimension. For neobehaviorism, at first glance the mediating organismic variables may not appear to reside in a mental dimension. However, closer analysis indicates the mediators are almost always surrogates or proxies for mental if not explicitly dualistic causes — Skinner called these and other such variables “explanatory fictions.” Regardless of debates about ontology, neobehaviorism remains mentalistic because of the way it conceives of the explanatory behavior of observing scientists on the basis of the foregoing symbolic, referential conception of verbal behavior. For example, a common locution is that once these mediators have been named, it is only “as if” they actually exist, according to an instrumentalist orientation to theorizing in science. The disingenuous assumption is that the scientist need take no position on their actual existence — it is enough to point to their role in promoting an explanation. The problem with this assumption is that in order to correctly explain behavior, researchers and theorists are assumed to construct these theoretical terms in their minds, and then couple the terms with aspects of experimental design and the hypothetico-deductive method. This position constitutes an “epistemological dualism.” Common indicators include appeals to constructs, models, theories, hypotheses, inferred structures and processes, again where psychological terms are assumed to symbolically represent mental phenomena that cause explanatory behavior on the part of the researcher or theorist to be correct. Thus, given their commitment to a symbolic, referential conception of verbal behavior, researchers and theorists are mentalistic about themselves, when they explain their own behavior of explaining, regardless of any attempts at instrumentalist justification.

Some Historical Context

A brief summary of the approach of the mediational neobehaviorist E.C. Tolman establishes some additional historical context for the present analysis. By the 1920s many psychologists had come to express the concepts in psychological theories and explanations in terms of observable stimuli and responses. One reason psychologists did so was to avoid the ambiguity and vagueness of appeals to mental processes supposedly revealed through introspection. Two relatively early examples are Meyer (1921) and Singer (1924). However, as was becoming apparent by the 1930s, many psychologists believed a vocabulary restricted to observable stimuli and responses had difficulty explaining the flexibility, richness, and apparent spontaneity of some forms of behavior.

Tolman was one of those who argued that behavior was not easily explained in a vocabulary that was restricted to observable stimuli and responses. Tolman

had traveled to Europe in 1912 and 1923. In 1931, Moritz Schlick, the leader of the Vienna Circle, went to University of California–Berkeley, Tolman’s university, as a visiting professor. Tolman then spent a sabbatical year in Vienna in 1933–1934. Presumably as a result of these contacts, Tolman became well acquainted with logical positivist thinking. Central in that thinking was how to respectably include terms ostensibly referring to unobservables in scientific theories and explanations. This thinking was attractive to Tolman in light of his desire to go beyond observable stimuli and responses. Tolman’s approach was to introduce what he called “intervening variables” into his theorizing. These variables were theoretical terms referring to unobservables that intervened and mediated the relation between observable stimuli and responses. [Readers should note that Tolman introduced his set of terms a decade before MacCorquodale and Meehl (1948) proposed a formal definition of theoretical terms using a related set of terms. Consequently, readers should not take the similarity of terms to indicate that Tolman’s approach in the 1930s was identical to that of MacCorquodale and Meehl (1948).] A series of passages from Tolman (1951) indicate this approach:

These demands, differentiations and hypotheses are all demonstrated and defined by objective experiments They are, in short but logical constructs. They are not relivings of immediate experience. Psychology like physics deserts immediate experience and leaves it for the philosopher, the poet, or the proponent of common sense. (p. 114)

The particular . . . predictions in which psychology is interested concerns the to-be-expected behavior of organisms — the behavior to be expected from other organisms, and the behavior to be expected from ourselves. And in these predictions, mental processes, whether they be those of another or of ourselves, will figure only in the guise of objectively definable intervening variables. Or (to borrow a phrase from William James) the sole “cash value” of mental processes lies, I shall assert, in this their character as a set of intermediating functional processes which interconnect between the initiating causes of behavior, on the one hand, and the final resulting behavior itself, on the other. (pp. 116–117)

Such an operational behaviorism . . . asserts that these intervening variables are to be defined wholly operationally — that is, in terms of the actual experimental operations whereby their presences or absences and their relations to the controlling independent variables and to the final dependent variable are determined I have denied that introspective behavior provides any *sui generis* type of information concerning the intervening variables. (p. 129)

The consequently evoked state or process — “intervening variable” — in the animal resulting from this presentation of the given environmental sequence is called a sign-gestalt expectation (p. 136)

A theory, as I shall conceive it, is a set of “intervening variables.” These to-be-inserted intervening variables are “constructs” which we, the theorists, evolve as a useful way of breaking down into more manageable form the original complete . . . function. (pp. 150–151)

Tolman's writing here is illustrative. The actual articles from which the passages above are taken were written during the 1930s. Tolman's intervening variables were the mediating organismic variables in the S-O-R model of mediational neobehaviorism, which many psychologists were beginning to embrace during this time. For Tolman, these intervening variables were aids, or to use Tolman's vocabulary, "sign-gestalts" that caused the psychologist to correctly explain the rat's behavior in running the maze, just as the various features of a maze were sign-gestalts that caused the rat to correctly follow the path that led to food in the goal box. As Smith (1986) noted, Tolman embraced an epistemological dualism, in which organisms responded to mediating representations of the world, rather than to the world directly. Operationism provided the means to avoid being accused of admitting mental concepts directly, in the fashion of classical introspection. Early in the development of his point of view, Tolman adhered to established operational practice, as represented in his statement above that his intervening variables were "defined wholly operationally," that is, exhaustively.

The difficulty for Tolman was that he considered his intervening variables to be entities that actually existed inside the organism, effectively on the independent variable side of things though not publicly observable. The organism was the scientist as well as the rat. If an intervening variable was something that actually existed in the scientist or rat, and not just as a logical construct without existential reality, then other criteria could be applied to its meaning or definition. This view created an inconsistency, as the construct could no longer be said to be exhaustively defined by one particular operation or observation. Along with many others, Tolman eventually came to realize the inconsistency. The result was that Tolman came to revise his stance, in light of the convention that MacCorquodale and Meehl (1948) proposed:

I am now convinced that "intervening variables" to which we attempt to give merely operational meaning by tying them through empirically grounded functions either to stimulus variables, on the one hand, or to response variables, on the other, really can give us no help unless we can also embed them in a model from whose attributed properties we can deduce new relationships to look for. That is, to use Meehl and MacCorquodale's distinction, I would abandon what they call pure "intervening variables" for what they call "hypothetical constructs," and insist that hypothetical constructs be parts of a more general hypothesized model or substrate. (Tolman, 1949, p. 49)

Thus, Tolman assumed that his intervening variables were states, processes, and the like that actually existed inside his rats when they ran the maze, and inside him when he explained their maze running. They functioned as variables that mediated behavior. The dimension of such variables was never resolved, other than Tolman's acknowledgment that although they were "mental," they were nevertheless revealed "objectively" through experimentation rather than through introspection, in keeping with the requirements of good science.

About these matters, Skinner (1989) stated

I had called the conditions of which reflex strength was a function “third variables,” but Tolman called them “intervening.” That may have been the point at which the experimental analysis of behavior parted company from what would become cognitive psychology. (p. 109)

Of course, Tolman wasn't the only theorist to take the mediational approach, as Smith (1986) shows in a comparable analysis of the mediational neobehaviorism of C.L. Hull and K.W. Spence. Indeed, MacCorquodale and Meehl (1948) also critically examined Hull–Spence constructs in an effort to clarify their usage. In a recent discussion of these same matters, Moore (2008, p. 347) suggested some might dismiss a claim that linked mentalism to the mediational neobehaviorism of Tolman and Hull–Spence as preposterous and uninformed. However, the link seems clear. The basis for the link follows from the mentalistic views that (a) words are things that symbolically refer to other things, and (b) to establish the meaning of those words individuals must divine what those other things are, the dimension in which they reside, and their causal properties.

The Meaning of Verbal Behavior in Radical Behaviorism

For radical behaviorism, the entire symbolic, referential view of verbal behavior held in mentalism and mediational neobehaviorism is faulty and causes difficulties. Verbal behavior does not at heart reflect some underlying, symbolic, referential process from a nonbehavioral dimension. Terms are not things that refer to or symbolically represent other things. The meaning of a term is not established by finding its referent. For Skinner (1945),

Attempts to derive a symbolic function from the principle of conditioning . . . have been characterized by a very superficial analysis . . . Modern logic, as a formalization of “real” languages, retains and extends this dualistic theory of meaning and can scarcely be appealed to by the psychologist who recognizes his own responsibility in giving an account of verbal behavior. (pp. 270–271)

Terms are instances of operant behavior, emitted under specific circumstances and having a certain function in the speaker's life. It makes no more sense to say that a term symbolically represents or refers to something else than it does to say that stepping on a car's accelerator at a traffic intersection symbolically represents or refers to a green light. In both cases, the meaning of the behavior is a function of the circumstances in which it is emitted. The meaning of stepping on a car's accelerator is the presence of a green light and being able to proceed through the intersection, given the presence of a green light. In the case of verbal behavior, the meaning of a term from a speaker's point of view is the antecedent circumstances that occasion it. The meaning of a term from a listener's point

of view lies in its discriminative function: How does contact with the term allow the listener to obtain certain consequences? Importantly, the antecedent circumstances for the speaker and discriminative function for the listener are not measures of meaning, where meaning should be construed as some causal entity in a different dimension. Rather, they are what meaning means.

It is perfectly reasonable to seek to establish the meaning of a psychological term, and hence its function in scientific inquiry. However, individuals need not assume that the term symbolically represents or refers to states and processes that literally exist in an extra-behavioral dimension and cause behavior. The mediational orientation in mentalism and neobehaviorism clearly does so assume. Thus, the basis for mentalism is the assumption of another dimension, with its collection of mental states and processes to which psychological terms are supposed to symbolically refer. However, the assumption goes, science needs public agreement, and the mental can't be publicly agreed upon because it is not directly, publicly accessible. Consequently, the mental must be dealt with indirectly and inferentially. For radical behaviorists, the assumption of a mental dimension in such an approach is attributable to a variety of extraneous considerations, rather than legitimate scientific practices. On the radical behaviorist view, verbal behavior may well be functionally related to important antecedent circumstances: (a) whatever scientific operations the researchers have conducted and (b) whatever contacts with data have resulted from such operations. However, readers may recall that Skinner (1945) also suggested the verbal behavior may be functionally related to incidental sources that are cherished for extraneous and irrelevant reasons. One of these sources is the aforementioned assumption of a mental dimension with its causal states and processes. This mentalistic assumption then plays out as a bias toward a general mentalistic if not dualistic explanatory orientation in the culture at large. The point here is that functional analysis and interpretation of the verbal behavior in question will clarify why scientists speak as they do.

Moore (2010) suggested that for radical behaviorism, terms from a nominally psychological or mental vocabulary often reflect several sources of control, either singly or in combination: (a) private behavioral events, (b) physiology, (c) dispositions, (d) behavioral relations, and (e) explanatory fictions. With respect to the first source, some so-called mental talk might be about private behavioral events. Private behavioral events are concerned with the influence of feelings, sensations, and covert operant behavior. The notion of private behavioral events allows radical behaviorists to understand how those events participate in contingencies controlling subsequent operant behavior, whether nonverbal or verbal. More is said about private behavioral events in a following section. With respect to the second source, some so-called mental talk might be about physiology. This talk engages the role of physiological structures and pathways that participate in any form of behavior. However, this talk runs the

risk of confounding causal and explanatory categories. Although an organism's physiology necessarily participates in its behavior, physiological events are not the same type as behavioral events, public or private. On this view, an organism's physiology is a material cause. To portray an organism's physiology as an autonomous, initiating, or efficient cause, as traditional psychology often does, creates a variety of explanatory problems (Moore, 2002). With respect to the third source, some so-called mental talk might be about dispositions, as was noted earlier in the present review. This talk does not reflect anything literally mental. Rather, dispositional talk reflects the probability of behavior engendered by contingencies. Dispositional talk is about effects, instead of causes or intervening variables as traditional psychology often portrays them. With respect to the fourth source, some mental terms may actually reflect behavioral relations. For example, the term attention may be understood as reflecting a controlling relation between behavior and some antecedent circumstance. Similarly, discrimination may be understood as reflecting the fact of different responding to different circumstances, typically brought about by different experiences. Generalization may be understood as reflecting the fact of similar responding to similar circumstances. Such terms need not be understood as referring to mediating mental processes. Finally, with respect to the fifth source, some so-called mental talk is little more than an appeal to fanciful explanatory fictions. This talk, common in traditional psychology, owes its strength to language patterns and the everyday social reinforcement inherent in "folk psychology." The talk surrenders to mentalism, notwithstanding any claims that it is "theoretical."

Radical Behaviorism and the First Type of Private Behavioral Event

We may now say more about the radical behaviorist conception of private behavioral events. Radical behaviorists conceive of two types of private behavioral events. In one type, radical behaviorists address the influence of private stimulation from internal conditions or states of the body, such as feelings and sensations. Of interest here are the processes by which this private stimulation occasions a speaker's verbal behavior. This is the traditional type of "verbal report" concerned with "the use of subjective terms." In another type, radical behaviorists address the functional role of private stimulation from an individual's own private verbal or nonverbal behavior. Of interest here are the processes by which this stimulation occasions the behavior that follows. These processes concern the traditional matter of "thinking." With regard to vocabulary, what follows occasionally uses the term overt as synonymous with public and the term covert as synonymous with private.

In typical circumstances, verbal behavior of any type develops when the verbal community differentially reinforces a response contingent on the presence of a discriminative stimulus. The differential reinforcement can range from the

approval inherent in ordinary discourse to actually receiving some tangible consequence, such as asking for and receiving the salt at the dinner table. Important in typically developing verbal behavior is that both speaker and verbal community are in contact with the same discriminative stimulus, so that (a) the verbal community can maintain the appropriate consistency in its reinforcing practices and (b) the discriminative stimulus can then become the appropriate occasion for the speaker's emitting the verbal behavior in question in the future.

However, the situation with verbal reports about private stimulation from internal conditions or states of the body — the various forms of so-called “subjective experiences” — is somewhat different. Here, the verbal community operates with a handicap when it comes to verbal behavior: only the speaker is in contact with this stimulation. How then does the verbal community differentially reinforce talk related to this stimulation, so that discriminative control by private stimulation develops and speakers are able to talk about it in a reasonably consistent fashion? In everyday language the verbal community doesn't know when the appropriate private stimulation is present or absent, so the verbal community doesn't know when to approve such talk. Skinner (1945) called this problem the “problem of privacy.” The verbal community obviously does solve the problem, given that individuals obviously do learn to talk about their aches and pains, or joys and sorrows, in ways that affect listeners.

The answer is that the verbal community can differentially reinforce responses based on public states of affairs. These public states of affairs are accessible to both speaker and verbal community, and are correlated with the private stimulation. Control develops in an original situation based on the public states of affairs, and then transfers to the correlated private stimulation, so that eventually some measure of control comes to reside with the private form. Of course, these processes vary a great deal across speakers. The result is that verbal reports of speakers about their covert world may vary a great deal.

To use pain talk as an example, three cases can be identified. The first is that the verbal community may initially reinforce pain talk when speakers put their hands to the area that is the source of the pain — a public collateral response that is correlated with the pain. The second is that the verbal community may initially reinforce pain talk when some object has visibly struck a speaker, resulting in observable inflammation or tissue damage — a public accompaniment that is correlated with the pain. The third is that if control by private stimulation related to bodily states or conditions has already developed, then that control may generalize from original to new forms of private stimulation, based on the similarity of new stimulation to the original. For example, in this third case, given that speakers have already learned to talk about a pain as sharp when they prick their finger with a pin, speakers are able to talk about a new pain in their stomachs as sharp when it is similar to the original pain. In sum, verbal behavior develops under the discriminative control of public circumstances

and then control transfers to private circumstances. The result is that speakers end up being able to talk under the discriminative control of internal conditions and states that are accessible to only themselves.

What then is the causal role of sensations and feelings? In what sense is it meaningful to say individuals take a pain reliever *because* they feel the pain of a toothache, they eat *because* they feel hungry, or they learn to repeat a response *because* it is followed by the pleasant feeling? For radical behaviorism, what individuals feel are conditions of their bodies that have been themselves caused by other circumstances or events. The condition felt as the pain of a toothache is presumably caused by an infection. The condition felt as hunger is presumably caused by food deprivation. The condition felt as pleasantness is presumably caused by a reinforcer. In such cases, it is those other circumstances or events that cause both the condition felt and any behavior to which they are related. When individuals with a toothache take a pain reliever, they terminate contact with the infection in a carious tooth. Thus, the infection causes both the pain and taking the pain reliever. An even better step would be to take an antibiotic, to terminate the infection in the first place. In any case, individuals ordinarily wouldn't take something that didn't have the consequence of terminating contact with the pain or terminating the infection. When individuals eat, they terminate the condition caused by food deprivation. Food deprivation causes both the feeling called hunger and the behavior called eating. Individuals ordinarily wouldn't eat something that didn't have the consequence of terminating food deprivation and their hunger. When an individual's behavior changes through reinforcement, the reinforcer causes both the pleasant feeling and the strengthening of the response. When Thorndike emphasized the effect of consequences on behavior, he attributed the effect to the feelings the consequences caused, such as satisfaction in the case of what would now be called positive reinforcers, and discomfort or annoyance in the case of what would now be called aversive stimuli. From the present point of view, Thorndike needed to back his analysis up one more step and attribute both (a) the feeling and (b) the behavioral effect to (c) the consequence.

Radical Behaviorism and the Second Type of Private Behavioral Event

At issue for the second type of private behavioral event is how private stimulation from one's own covert verbal or nonverbal operant behavior acquires discriminative control over the behavior that follows. An understanding of this type of private behavioral event begins with the recognition that operant behavior is usually acquired at the overt level. However, through the action of environmental variables and relations, the behavior may then recede to the covert level. Covert operant behavior is executed with the same organs as

overt operant behavior, but reduced in magnitude, perhaps even to incipient or inchoate levels.

The behavior becomes covert through the action of any of several factors (Skinner, 1957). One is that the overt form is punished. A second is that necessary environmental support is absent. A third is convenience or expedience: individuals may simply be able to respond faster covertly rather than overtly. If the overt form of the behavior was a link in a chain of responses that contributed to discriminative control over subsequent behavior, then presumably the covert form will function similarly.

Individuals make contact with their covert behavior through their interoceptive and proprioceptive systems. This private stimulation is also present in the original circumstances, when an individual behaves overtly. Consequently, the private stimulation will gain some measure of discriminative control in those circumstances. Once discriminative control is acquired, the control can occur in new circumstances, on the basis of induction related to coincident properties. Many usages of the term "thinking" reflect situations wherein the stimulation from one instance of behavior — and the behavior need not even be covert — affects subsequent behavior (Skinner, 1953, chapter 16; 1957, chapter 19). These processes vary a great deal across individuals.

For radical behaviorism, when a private behavioral event does contribute functionally to public behavior, some prior experiences are necessary for the private event to do so. Nevertheless, responding with respect to private or covert stimuli is lawful and alike in kind to responding with respect to public or overt stimuli. Private stimuli may be interpreted as simply additional independent variables in the same dimensional system as public stimuli. As Skinner (1974) put it,

Usually, however, the term [thinking] refers to completed behavior which occurs on a scale so small that it cannot be detected by others. Such behavior is called covert. The commonest examples are verbal, because verbal behavior required no environmental support and because, as both speaker and listener, a person can talk to himself effectively; but nonverbal behavior may also be covert. Thus, what a chess player has in mind may be other moves he has made as he has played the game covertly to test the consequences Covert behavior is almost always acquired in overt form and no one has ever shown that the covert form achieves anything which is out of reach of the overt. Covert behavior is also easily observed and by no means unimportant, and it was a mistake for methodological behaviorism and certain versions of logical positivism and structuralism to neglect it simply because it was not "objective." . . . It does not explain overt behavior: it is simply more behavior to be explained.

The present argument is this: mental life and the world in which it is lived are inventions. They have been invented on the analogy of external behavior occurring under external contingencies. Thinking is behaving. The mistake is in allocating the behavior to the mind. (pp. 106–107)

Private Behavioral Events vs The Mentalism of Traditional Psychology

There are at least four reasons why the concept of a private behavioral event is not itself mentalistic. First, a private behavioral event is in the same dimension as a public behavioral event, rather than a different dimension as in mentalism. When an event is accessible to others, it is a public event. When it is accessible only to the behaving individual, it is a private event. Nonetheless, the same principles and analytic concepts apply in both public and private cases.

Second, a private behavioral event is executed by the same response systems as public behavior, rather than nonbehavioral mechanisms as in mentalism. However, the behavior in question is reduced in magnitude. Again, the same principles and analytic concepts apply in both public and private cases.

Third, the provenance of a private behavioral event is functionally related to environmental circumstances. That is, the private behavioral event is not an independent contribution of the organism, and depends on the history of the behaving organism.

Fourth, the influence of a private behavioral event on subsequent behavior is functionally related to environmental circumstances — its influence is not inevitable. In other words, just as does its provenance, any influence it exerts depends on the history of the behaving organism. Skinner (1953) described this influence as follows:

The private event is at best no more than a link in a causal chain, and it is usually not even that. We may think before we act in the sense that we may behave covertly before we behave overtly, but our action is not an “expression” of the covert response or a consequence of it. The two are simply attributable to the same variables. (p. 279)

Thus, the influence of a private event is conditional, not necessarily mediational, as in one of the mental states or processes of traditional psychology. In particular, covert behavior does not explain overt behavior. Rather, it is simply more behavior to be explained.

As noted earlier in this review, much of the radical behaviorist approach is interpretive, in the sense that known scientific principles are used to talk about and explain facts, even though no formal experimental analysis has been or perhaps even can be conducted. According to Skinner (1974),

Obviously we cannot predict or control human behavior in daily life with the precision obtained in the laboratory, but we can nevertheless use results from the laboratory to interpret behavior elsewhere [A]ll sciences resort to something much like it [T]he principles of genetics are used to interpret the facts of evolution, as the behavior of substances under high pressures and temperatures are used to interpret geological events in the history of the earth. (pp. 228–229)

Thus, the theory of evolution uses the principles of variation, interaction, and differential replication, which have been studied in the laboratory under controlled conditions, to explain the evolution of species. Similarly, the theory of plate tectonics uses principles governing the behavior of material under high pressure and high temperature, which have been studied in the laboratory under controlled conditions, to explain the formation of surface features of the earth (e.g., Catania and Harnad, 1988, pp. 207–208). So also can we apply the principles of operant behavior and stimulus control to explain the provenance and influence of private behavioral events (Palmer, 2011).

Radical Behaviorism and Dispositions

Historically, one approach to mental terms has been to treat them as dispositions. A disposition is some robustly high conditional probability that when a given set of publicly observable circumstances is implemented regarding some object, some publicly observable event will take place concerning that object. Presumably, the event takes place because of some physical property inherent in the object (e.g., Quine, 1974), but strictly speaking the property need not be specified. For example, to render the meaning of some mental talk in terms of dispositions, as when a person is said to be experiencing “pain,” the meaning of pain may be understood as simply the robust conditional probability that when the person steps on a tack and is said to be in pain, the person will moan and groan. The person does have relevant neural systems, but they need not be specified. Indeed, dispositional analyses of psychological terms are traditionally regarded as at the heart of “philosophical behaviorism,” for example, as represented in Ryle (1949) and Wittgenstein (1953/1973; see also Hocutt, 1985).

For radical behaviorism, the meaning of some ostensibly mental talk is in fact dispositional. Indeed, a dispositional approach works well with verbs and corresponding nouns related to propositional attitudes, such as “to believe” and “belief,” “to intend” and “intention,” and so on. For example, here is a relevant passage from Skinner (1957):

With respect to a particular speaker, the behavior of the listener is also a function of what is called “belief.” We may define this in terms of strength of response. Our belief that there is cheese in the icebox is a function of, or identical with, our tendency to go to the icebox when we are hungry for cheese, other things being equal. Our belief that there is a substantial table in front of us varies with our tendency to reach for it, place things upon it, and so on. If we have just spent some time in a house of mirrors in an amusement park, our belief in this simple fact may be shaken, just as our belief about the cheese may be quickly dispelled by an empty icebox. Our belief in what someone tells us is similarly a function of, or identical with, our tendency to act upon the verbal stimuli which he provides. If we have always been successful when responding with respect to his verbal behavior, our belief will be strong. If a given response is strictly under the control of stimuli with little or no metaphorical extension and no impurity in the tact relation, and if the speaker clearly indicates these conditions . . . , we will react in maximal strength. (pp. 159–160)

What then about such other verbs and corresponding nouns as “to think” and “thoughts”? Zuriff (1985, p. 59) has pointed out that given the traditional interpretation of operationism, all mental concepts are reduced to being dispositional. That is, on a dispositional view, the meaning of “to think about going to the market” is reflected in the probability of actually going to the market. Here is where radical behaviorism differs from the analytic philosophy of Ryle (1949) and Wittgenstein (1953/1973), as well as such other forms of philosophical behaviorism as Hocutt (1985). For radical behaviorism, thinking may be construed as a kind of occurrent activity that affects subsequent behavior through an operant process. In Skinner’s (1957) words,

There is no point at which it is profitable to draw a line distinguishing thinking from acting [on a continuum ranging from overt to covert forms of action] So far as we know, the events at the covert end have no special properties, observe no special laws, and can be credited with no special achievements A better case can be made for identifying thinking with behaving which automatically affects the behavior and is reinforcing because it does so. This can be either covert or overt. (p. 438)

Thus, although many instances of behavior are peripheral and publicly observable, not all are. Some instances of behavior entail activity within the skin and inaccessible to others, perhaps even central. For example, Skinner suggested “that the kind of thinking which seems to be merely covert behavior (‘truncated, unemitted, reduced, impotent behavioral acts’) may be so reduced that there is no muscular involvement to be sensed proprioceptively” (see Catania and Harnad, 1988, p. 331). Like other instances of behavior, these instances owe their occurrence to a particular set of circumstances, previously recounted. Another set of circumstances is responsible for the subsequent effects or functions of the behavior.

Worth repeating is that the functional analysis of verbal behavior, including that of the scientist, clarifies many of the concerns about establishing the meaning of psychological terms. Some psychological terms are indeed occasioned by dispositions to engage in observable behavior, but not all are. Even when a psychological term is dispositional, it is occasioned by aspects of the dependent variable, rather than by aspects of the independent variable. If the primary interest is in a causal account, the environmental circumstances that cause the disposition need to be specified. For operant behavior, those circumstances are specified in terms of contingencies of reinforcement. A disposition is not taken to be a mediating variable in a mental or conceptual dimension that itself causes behavior. Further, a disposition to engage in publicly observable behavior is not taken as evidence that operationally justifies talk of a mental or conceptual cause.

Tokens, Types, and Surplus Meaning

Discussions of meaning often involve several pairs of terms: tokens and types, exhaustive and partial operational definitions, intervening variables and hypothetical constructs, surplus and no surplus meaning. It is useful at this point in our review of mentalism to examine some relations among these pairs, from both a traditional point of view and a radical behaviorist point of view. We start with tokens and types.

Recall that according to contemporary mentalism, both logical positivists and neobehaviorists are committed to type physicalism. That is, mentalists say that for logical positivists and behaviorists, the defining properties of types of mental phenomena can be reduced to the types of their physical properties. Mentalists say a commitment to type physicalism on the part of logical positivists and behaviorists is dead wrong.

Contemporary mentalists argue that although token physicalism is a commendable commitment to materialism, type physicalism such as found in early logical positivism and operationism, and as applied in succeeding theoretical positions, goes too far. For example, consider one influential mind–body position: identity theory. According to identity theory, a mental or psychological state was identical to a brain state (e.g., Feigl, 1958; Place, 1956). This position had the apparent virtue of rendering talk about something unobservable — a mental state — in terms of something observable — a physiological state. At issue is whether being in the designated type of mental state is identical with being in the designated type of physiological state and nothing more. In other words, the type of mental state is reducible to the type of physiological state, without remainder, as an instance of type physicalism.

At issue here are whether definitions should be partial or exhaustive, whether surplus meaning is admitted, and whether theoretical terms should be interpreted as hypothetical constructs. Identity theory illustrates how these distinctions apply. Suppose type physicalism is accepted. If so, then types of mental states are exhaustively defined in terms of their types of physical, observable properties and measures. If so, then the meaning of the designated type of mental state is reducible to the designated type of physiological state, without remainder. However, philosophical functionalists do not accept type physicalism or an identity theory based on type physicalism. Functionalists therefore dispute exhaustive definitions with no surplus meaning because the meaning would have to reside without remainder in the physical, observable properties or measures said to define the state. In principle, however, functionalists would have no difficulty with partial definitions and surplus meaning, where the mental state is interpreted as a hypothetical construct, because the meaning is not limited to currently observable physical properties or measures. For example, the theoretical term referring to a mental state may be evidenced

by such common measures as percent correct in a judgment task, reaction time, or active pixels of fMRI, but its meaning is not limited by such an enumeration. Philosophical functionalists take the theoretical term to mean well more than these physical measures, in which case the mental state is interpreted as a hypothetical construct. The physical measures only partially define the mental state. They are evidence of the state, but the state is not exhaustively reducible to only those measures.

As relevant as such discussions appear to be to understanding talk of the mental, the relevance is only superficial. Indeed, from the perspective of the present review, they are all beside the point. Discussions of tokens versus types, exhaustive versus partial operational definitions, intervening variables versus hypothetical constructs, and surplus versus no surplus meaning, all concede the premise that verbal behavior is essentially a symbolic, referential process. They all assume the existence of an independent entity called a meaning, which lies in a nonbehavioral dimension. They all assume questions regarding the meaning of psychological terms can be resolved by dealing with the verbal behavior in mentalistic rather than behavioral terms.

In contrast, radical behaviorism distinguishes between meaning for speakers, in terms of what causes speakers to talk in the way that they do, and meaning for listeners, in terms of what the verbal behavior causes them to do. Radical behaviorism does not embrace the symbolic, referential conception of verbal behavior.

If meaning is to be framed in terms of denotation or connotation, there is similarly no problem. Denotation may be taken to imply some specification of what causes speakers to talk as they do, particularly concerning the class of antecedent conditions that occasions the verbal behavior in question. Connotation may be taken to imply some specification of what verbal behavior causes listeners to do, particularly concerning the class of antecedent circumstances into which the verbal behavior in question enters to occasion a listener's behavior. If speakers say they themselves are in pain (i.e., first-person usage), then they are presumably in contact with their own private stimulation, and some course of events has transpired to establish that talk. Moore (2008) described such a course of events, based on Skinner's (1945) account. If speakers say others are in pain (i.e., third-person usage), such talk may be occasioned by the activity of some neurons as measured by scientific instruments, or by the moaning and groaning of the observed others, more likely the moaning and groaning. If a listener hears a speaker say that another person is in pain, the listener typically responds to the other person in the same way as if the listener had observed the other person's neurological activity or the other person's moaning and groaning. The problem comes if denotation and connotation are taken to impart some logical status to meaning as an independent entity in a mental dimension, apart from any relation to the verbal and nonverbal behavior of speakers and listeners and the circum-

stances that occasion the verbal behavior in question. For radical behaviorists, a logical analysis reverts to the mentalism of a symbolic, referential conception of verbal behavior.

For radical behaviorism, type physicalism may be understood as a concern with the properties that determine class membership for the stimuli that occasion a verbal response. Class membership can be determined by any number of properties, sometimes even in combination, according to the conventional practices of the verbal community. Token physicalism recognizes that instances of the class are always going to have such physical properties as length or weight, although those properties do not necessarily determine class membership. For example, consider the definition of the type of stimulus called a “reinforcer.” Suppose something with sugar in it functions as a reinforcer. The features that determine class membership are functional: something is called a reinforcer because it maintains or increases the probability of the response, given that it is a consequence of the response. The features that determine class membership are not necessarily based on physical properties: something is not called a reinforcer because the instruments of physics detect sugar in it.

Sources of Mentalism

Mentalism consists in verbal behavior. For radical behaviorism, the meaning of verbal behavior is to be found in the sources of control over the verbal behavior in question. This section of the review examines sources of control over verbal behavior called mentalistic, particularly verbal behavior that appeals to fanciful explanatory fictions (Moore, 2001, 2010).

Source 1: Social–Cultural Tradition

The first source of control over mentalistic explanatory fictions is revealed in a critical examination of the history of psychology, or indeed, the history of Western culture. Radical behaviorists argue that mentalism began thousands of years ago, if not in the primitive animism of prehistoric cultures then certainly in the time of classic Greek culture. Mentalism and dualism were then institutionalized through cultural and religious conformity as Western civilization developed. The result is a cultural bias toward internal explanations maintained through social reinforcement.

In a large percent of cases, this cultural bias takes the form of “folk psychology.” Folk psychology is roughly the position of uncritically taking terms and concepts from everyday language and reifying them, so that they may be cited as causes of behavior. For instance, given the cultural bias toward internal explanations, such common terms as belief, desire, and intention are uncritically accepted as phenomena in a mental dimension that veridically reflect an

individual's psychological makeup. Such terms are then uncritically incorporated as mental causes in explanations of behavior. Indeed, Western culture virtually mandates doing so.

In other cases, the supposed mental phenomena are said to be biological, innate, or linked with evolution. An example is the following passage from Pinker (1997):

The mind is what the brain does; specifically, the brain processes information, and thinking is a kind of computation. The mind is organized into modules or mental organs, each with a specialized design that makes it an expert in one area of interaction with the world. The modules' basic logic is specified by our genetic program. The operation was shaped by natural selection to solve the problems of the hunting and gathering life led by our ancestors in most of our evolutionary history. (p. 21)

Explanations that incorporate neuroscience information about purported internal processes have come to be particularly favored in the culture. For example, Weisberg, Keil, Goodstein, Rawson, and Gray (2008) conducted experiments in which they gave subjects neuroscience information in an explanation of a "psychological" phenomenon. Subjects evaluated explanations with even logically irrelevant neuroscience information to be more satisfying than explanations without. Similarly, Beck (2010) reviewed recent data suggesting that people find explanations of psychological phenomena that include brain images, such as found in fMRI, and neuroscience language to be more convincing than explanations that do not refer to the brain.

For radical behaviorists, any problems associated with mentalism are not resolved by linking mentalism with physiology and Pinker's aforementioned honorific slogan that "The mind is what the brain does," or by claiming that physiologically laden language is only "theoretical." For example, citing physiological factors as causes can constitute mentalism, just as much as directly appealing to explicitly mental causes constitutes mentalism. Suppose a particular research project involving fMRI is claimed to elucidate the "neural correlates of cognitive processes." This language conveys a dualism of cognitive processes and physiology, which has historically often taken the form of parallelism. Worth mentioning is Bennett, Wolford, and Miller's (2009) not entirely whimsical report that they detected active fMRI readings in the brain of a dead salmon. To be sure, the authors immediately recognized the readings were artifacts and acknowledged them as such. Nevertheless, the authors suggested the results testify to problems that can arise when explanatory inferences from neuroimaging are unrestrained. Indeed, Natsoulas (1984) expertly analyzed the philosophical position of Gustav Bergmann. Bergmann was a logical positivist and methodological behaviorist of the first order. The common view of these positions is that they only allow talk of publicly observable variables and relations. Yet, Natsoulas (1984) pointed out that Bergmann unselfconsciously and explicitly adopted a

form of psychophysiological parallelism that entailed metaphysical mind–body dualism. The point here is that a position can still be mentalistic even though it appeals to physiological variables.

For behavior analysis, the trouble with traditional concepts is that they all too often conform to the categories of a dualistic metaphysics in folk psychology, rather than to the categories of natural science. The traditional approaches identify little that can be manipulated to produce effective action. To be sure, various parts of the brain do become active during various tasks, and this cortical activity may be detected by physiological measuring equipment, such as CAT scans, PET scans, or BOLD responses during fMRI. This activity does not explain behavior. Rather, it is itself part of the total response of the organism that is explained by relating it to other factors (Moore, 2002).

In sum, radical behaviorism argues that today, as a result of a lengthy cultural history, the mentalism that appeals to internal causes is strongly entrenched in various social institutions cherished in the Western world. Religious and judicial practices are but two examples of such institutions, although again these practices may have proved useful in Western culture for a different reason than that they accurately take the human condition into account. The result is that mentalism is the dominant, conventionally accepted viewpoint in virtually all of Western culture, and is taken for granted to accurately reflect the underlying psychological makeup of humans as behaving organisms. According to radical behaviorism, virtually all of contemporary psychology is mentalistic, regardless of whether it is cast as mediational neobehaviorism or cognitive psychology: “As the philosophy of a science of behavior, behaviorism calls for probably the most drastic change ever proposed in our thinking about man. It is almost literally a matter of turning the explanation of behavior inside out” (Skinner, 1974, p. 256).

Source 2: Linguistic Patterns and Practices

A second source of mentalistic explanatory fictions is the inherent nature of language. Adjectives and adverbs are converted to nouns, which are in turn interpreted as an actor’s mental states and processes. The nouns are then invoked as real phenomena that cause the behavior in question. For example, actors might be said to do something intelligently, where observers are describing how efficiently and effectively the actors accomplish some act. Actors might then be said to do something that shows intelligence, where “intelligently” has been linguistically converted from an adverb to a noun. Finally, actors might be said to do something because they have intelligence. Here intelligence has linguistically become converted to a possession that causes the behavior in question. Such terms as “nominalization,” “reification,” and “hypostatization” are commonly used in connection with this practice, although no description has ever actually created or even changed the event, variable, or relation that

actually occasions the description. The problem is that these causes from another dimension are uncritically accepted through the cultural influence of folk psychology. The variables and relations that are responsible in the first place for saying that someone does something intelligently are never examined. Ultimately, the problem lies in the conception of verbal behavior that gives rise to this sort of mistake. The hidden assumption is that if a term is used as a noun, then there must be something, somewhere that the noun symbolically represents or to which the noun refers. Skinner (1974) commented on this practice as follows, with due consideration given to social-cultural tradition at the end of the passage:

Turning from observed behavior to a fanciful inner world continues unabated. Sometimes it is little more than a linguistic practice. We tend to make nouns of adjectives and verbs and must then find a place for the things the nouns are said to represent. We say that a rope is strong, and before long we are speaking of its strength. We call a particular kind of strength tensile, and then explain that the rope is strong because it possesses tensile strength. The mistake is less obvious but more troublesome when matters are more complex. There is no harm in saying that a fluid possesses viscosity, or in measuring and comparing different fluids or the same fluid at different temperatures on some convenient scale. But what does viscosity mean? A sticky stuff prepared to trap birds was once made from viscus, Latin for mistletoe. The term came to mean "having a ropy or glutinous consistency," and viscosity "the state or quality of being ropy or glutinous." The term is useful in referring to a characteristic of a fluid, but it is nevertheless a mistake to say that a fluid flows slowly because it is viscous or possesses a high viscosity. A state or quality inferred from the behavior of a fluid begins to be taken as a cause.

Consider now a behavioral parallel. When a person has been subjected to mildly punishing consequences in walking on a slippery surface, he may walk in a manner we describe as cautious. It is then easy to say that he walks with caution or that he shows caution. There is no harm in this until we begin to say that the walks carefully because of his caution

The extraordinary appeal of inner causes and the accompanying neglect of environmental histories and current setting must be due to more than a linguistic practice. I suggest that it has the appeal of the arcane, the occult, the hermitic, the magical — those mysteries which have held so important a position in the history of human thought. It is the appeal of an apparently inexplicable power, in a world which seems to lie beyond the senses and the reach of reason

There are, of course, reasons why a fluid flows slowly, and a molecular explanation of viscosity is a step forward. There are physiological reasons why a person behaves in a manner we call cautious, and the physiologist, will, we assume, eventually tell us what they are. (pp. 165–166, 169)

Source 3: Inappropriate Metaphors

A third source of mentalistic explanatory fictions, following from the second, is inappropriate metaphors. To be sure, it may well be useful to compare something familiar to something unfamiliar when trying to understand the latter. In so doing, various similarities are noted, however abstract those similarities are. The difficulty is that doing so can sometimes cause problems. An example is

the storage and retrieval metaphor for memory, perhaps as derived from the overall computer metaphor described earlier. To be sure, a reminder can be written down on a piece of paper, put it in one's pocket, and pulled out at a later date. However, if the concern is to understand how a response can be reinstated after the passage of time, at issue is the metaphorical language of saying an actor cognitively creates a mental representation of an event, stores it in some memory location using a certain memory process, then retrieves it at some later date. Radical behaviorism says this approach to memory misrepresents the facts to be accounted for. Consequently, this approach does not provide a useful framework for understanding what the term "memory" means. What needs to be taken into account is who is "remembering" what and under what circumstances. If the computer metaphor of information processing appeals to the software of a computer operating system or program that stores input, the important question is: Who has written the code?

Mentalism in Philosophy

In brief, many cognitively oriented philosophers dispute philosophical behaviorism by arguing that a psychological explanation can't legitimately appeal to factor X to explain behavior, where X is a mental state, if X is then to be defined in behavioral terms — as a disposition. For example, in Part 1 we noted that according to Sober (1983),

[M]ental states are inner. They are the causes of behavior and are therefore not identical with behavior Besides claiming that mental states cause behavior, mentalism goes on to say how these mental states manage to do so. (p. 113)

Thus, the argument is that mental states should not be defined in behavioral terms. At issue is how to do so. The solution is to identify their causal contribution. On these grounds, philosophical functionalism has become the dominant philosophy of mind in contemporary philosophy. Functionalism views itself as just as physical and material as any other orientation, again by recognizing that instances or tokens of mental states are physical and material, but disputing that types of mental states can be defined with reference to their physical properties. Rather, what distinguishes types of mental states is their causal contribution.

In a representative treatment, Fodor (1968) formally distinguishes between explanations in behaviorism and explanations subscribing to the mentalism of cognitive psychology. The basis of Fodor's distinction is whether mental concepts are defined in terms of publicly observable behavior:

To qualify as a behaviorist in the broad sense of that term that I shall employ, one need only believe that the following proposition expresses a necessary truth: For each mental predicate that can be employed in a psychological explanation, there must be at least one

description of [publicly observable] behavior to which it bears a logical connection. I shall henceforth refer to this proposition as P (p. 51)

A mentalist is, then, simply someone who denies 'necessarily P' The distinction between mentalism and behaviorism is both exclusive and exhaustive. (p. 55)

Interestingly, Kitchener (1999, p. 401) specifically identifies as Fodor's (1968) targets such nominally behaviorist positions as Ryle (1949) and Wittgenstein (1953/1973), who are often cast as philosophical behaviorists by virtue of their linking mental terms to publicly observable behavior and dispositions.

In these passages, Fodor (1968) seems to be responding to a view of behaviorism wherein mental terms are exhaustively defined in a physical-thing language, both token and type physicalism are accepted, and surplus meaning is not admitted. For example, elsewhere Fodor acknowledges that one interpretation of "logical connection" is that "theoretical terms in psychological explanations must, in principle, be eliminable in favor of (definable by) terms that designate observables" (p. 51). Worth noting, however, is that the majority of mediational neobehaviorists (as well as any surviving logical empiricists and conventional operationists, for that matter) no longer embrace the exhaustive interpretation of mental terms that Fodor assumes. Rather, they embrace an interpretation wherein mental terms are viewed as hypothetical constructs and are partially rather than exhaustively defined, token but not type physicalism is accepted, and surplus meaning is admitted. Thus, Fodor and others who follow in the same tradition object to a position that is no longer widely held (see also Moore, 2012).

Nevertheless, the cognitive criticisms still miss the point. To adopt the argument of the present review, if a mental state is exhaustively defined in terms of physiological brain state or behavior, then there is a problem with circularity, as correctly and routinely noted in the literature of philosophical functionalism. At the very least, one does not know what circumstances have caused the supposed mental state in the first place. If a mental state is partially defined in terms of physiological brain state or behavior, such that the definition allows surplus meaning, then there is a problem of admitting mentalism, even if not in its dualistic form. Of course, the cognitively oriented philosophers and psychologists don't see this as a problem — they see admitting mentalism, if not dualism, as a virtue and the way to demonstrate the inadequacy of behaviorism. Radical behaviorists see it as a problem in the pragmatic sense because the formulation does not identify what actions of the scientist will bring about a desired end.

Again, the problem ultimately turns on the conception of verbal behavior. With specific regard to a speaker's verbal behavior, mentalists take for granted that words are things that symbolically represent or refer to other things, and to determine the meaning the things that are symbolically represented in lan-

guage need to be identified. Mentalists take for granted that the meaning of words or terms is an independent entity, stored in the brain in some sense, to be retrieved when speakers decide to “use” the word to express themselves. For radical behaviorism, discussions of meaning that follow from this mentalistic conception of verbal behavior are all beside the point.

The majority of mentalists profess a materialist rather than dualist metaphysics. However, in the final analysis the putative materialists say the same things as dualists. If they say the same things, then their explanatory verbal behavior incurs the same liabilities. Descartes explained voluntary behavior by appealing to the immaterial Soul that impinged on the pineal gland, which in turn activated animal spirits in the nervous system and caused muscles to move. How different is a contemporary mentalist appeal to modular and unique Executive Processes, perhaps located in the prefrontal cortex, which supposedly regulate personality expression, decision making, morally correct behavior in social settings, and other forms of so-called higher order cognitive functioning? Radical behaviorists argue not very.

Again, for radical behaviorism, verbal behavior is operant behavior. If researchers and theorists want to identify innate contributions to verbal behavior, they can point to the emergence of operant control over verbal processes, presumably through changes in brain structures, in the evolutionary history of the human species. If researchers and theorists want to identify genetic contributions to verbal behavior, they can acknowledge the role of such genes as *FOXP-2*, which regulate the development of structures that make possible the essential continuity in the sequencing of the minimal units of verbal operants. But this viewpoint is considerably different from a mentalistic viewpoint in traditional psychology that endows mental states and processes with efficient power to cause behavior.

Why Do Radical Behaviorists Oppose Mentalism?

To be sure, it is useful to assess what mental terms mean. If there is no extra-behavioral dimension, then mental terms aren't literally concerned with some state or process in that dimension. Rather, it is useful to assess what if any events, variables, and relations in the behavioral dimension occasion the use of the mental terms, as instances of a speaker's verbal behavior. If behavioral events, variables, and relations do occasion the mental terms, then those events, variables, and relations may be usefully clarified. For Skinner,

We may quarrel with any analysis which appeals to . . . an inner determiner of action, but the facts which have been represented with such devices cannot be ignored. (1953, p. 284)

And again,

No entity or process which has any useful explanatory force is to be rejected on the ground that it is subjective or mental. The data which have made it important must, however, be studied and formulated in effective ways. We may quarrel with any analysis which appeals to . . . an inner determiner of action, but the facts which have been represented with such devices cannot be ignored. (1964, p. 96)

If no behavioral events, variables, and relations occasion the use of the terms, or if they do so only to a very limited extent, then the terms can be safely discarded, as they are exclusively or largely occasioned by incidental factors, cherished for irrelevant and extraneous reasons. This analytic approach is at the heart of what Skinner (1945) meant by the “operational analysis of psychological terms.”

Thus, radical behaviorists oppose mentalism on pragmatic, rather than ontological grounds, notwithstanding expressed concerns about the mental as fictitious and an invention. From Skinner’s (1969) point of view,

The basic issue is not the nature of the stuff of which the world is made or whether it is made of one stuff or two but rather the dimensions of the things studied by psychology and the methods relevant to them The objection is not that these things are mental but that they offer no real explanation and stand in the way of a more effective analysis. (pp. 221–222)

Elsewhere, Skinner put it as follows: “What is wrong with cognitive science is not dualism but the internalization of initiating causes which lie in the environment and should remain there” (see Catania and Harnad, 1988, p. 73). Radical behaviorists argue that a critical examination of mentalism reveals it is based on an entire series of mischievous assumptions about the nature of verbal behavior generally and scientific verbal behavior particularly. In turn, these mischievous assumptions lead to a faulty conception of knowledge and explanation. The result is that people accept ineffective mentalistic answers to questions about the causes of behavior. Day (1969) commented on the characteristics of these supposed mental processes when he stated that “Ontological properties are attributed not only to theory, presumably as distinguished from description, but also to such entities as logical reasoning and extrapolation, possibly taken either as mental processes or as *a priori* forms of knowing” (p. 504). In a similar vein, Skinner (see Catania and Harnad, 1988) stated that

Unlike direct observation and description, the construction of a hypothesis suggests mysterious intellectual activities. Like those who are said to be capable of extrasensory perception, the hypothesis makers seem to display knowledge which they cannot have acquired through ordinary channels. That is not actually the case, but the resulting prestige is real enough, and it has had unfortunate consequences Like those body builders who flex their muscles in setting-up exercises or handstands on the beach, hypothesis makers are

admired even though their hypotheses are useless, just as extrasensory perceivers are admired even though they never make practical predictions of the movements of armies or fluctuation in the stock market The hypothetico-deductive method and the mystery which surrounds it have perhaps been most harmful in misrepresenting the ways in which people think. (p. 102)

Readers may note especially that radical behaviorism does not oppose mentalism because radical behaviorism assumes (a) science should only include phenomena that are publicly observable in its theories and explanations, and (b) mentalism violates this principle by seeking to include — even indirectly — phenomena that are unobservable. Some other forms of psychology do assume that science should only include phenomena that are publicly observable in its theories and explanations. These other forms of psychology assume that it is necessary to “translate” or “reduce” terms from a mental language to a behavioral language, in order to secure agreement and respectably meet the requirements of good science. These other forms further assume that psychology can circumvent a restriction against phenomena that aren’t publicly observable and legitimately appeal to mental causes by interpreting them as mediating “theoretical terms” in the previously discussed S–O–R model. The mediating terms may then be operationally defined, if only partially as hypothetical constructs, by referring to publicly observable behavior in order to gain agreement.

An important feature of these other approaches involves what is meant by such terms as “translate” or “reduce.” Does the use of such terms imply that some state or process does literally exist in another dimension, but science can’t deal with it because it is not publicly observable? Does the use imply that the term from the other dimension must be symbolically represented by publicly observable behavior, so that science can legitimately engage it in its theories and explanations? Radical behaviorists argue against this orientation to doing science. This orientation is called methodological behaviorism, and is extensively discussed elsewhere (Day, 1983; Moore, 2008, chapter 17; 2012).

Summary and Conclusions

For radical behaviorism, mentalism consists in explaining behavior by attributing its cause to phenomena from a dimension beyond the one in which behavior takes place. Mentalism exists in mediational neobehaviorism as well as in more explicitly cognitive orientations. A representative term for the extra-behavioral dimension is mental — the dimension of “mind.” Representative terms for the causal phenomena are states and processes. These mental phenomena are held to be inside the behaving organism in some sense, as independent contributions of the organism that underlie its behavior. The causal status of these phenomena ranges from initiating to mediating. Initiating causes are common in traditional dualism, whereas mediating causes are common in contemporary neobehaviorism

and cognitive psychology. Claims to materialism ring hollow when supposed materialist explanations invoke causal states and processes that are of the same type as dualistic causes, indicating a common source of control arising from verbal practices, rather than observation. Much of the talk of these phenomena and their causal status has its source in the everyday mentalistic language of Western culture (i.e., folk psychology), rather than the observational and empirical data base ordinarily associated with a natural science. In some instances, an uncritical and mischievous use of physiological concepts can also evidence mentalism. In contrast to mentalism, radical behaviorism is a thoroughgoing behaviorism. Events inside the skin, though not accessible to others, may be interpreted as behavioral in character. These events arise because of certain relations in the environment, and in turn may influence behavior that follows, regardless of whether that behavior is accessible to others. The interactions occur in the one, behavioral dimension.

Importantly, just saying seemingly “mental” words is not by itself mentalistic. First, an approach becomes mentalistic when the terms are assumed to refer to states and processes from a nonbehavioral dimension, and the terms are then cited as causes in an explanation, at the expense of terms from the behavioral dimension. Second, some seemingly “mental” terms may actually have partial relevance to an understanding of behavior. However, the relevance is actually that the terms implicitly take events, variables, and relations from the behavioral dimension into account, rather than that the terms identify literally mental causes. Further analysis is necessary to clarify and refine the nature of the behavioral relevance of this sort of talk.

Ultimately, radical behaviorists argue that distinctions as traditionally conceived between observational and theoretical terms, exhaustive and partial definitions, token and type physicalism, and so on are based principally on a mentalistic, symbolic–referential conception of verbal behavior. More specifically, radical behaviorists argue that such concerns obscure and indeed actively impede the search for important details about the genuinely relevant relations between behavior and environment, they allay curiosity by inducing individuals to accept fanciful “explanatory fictions” as causes, they misrepresent the facts to be accounted for, and they give false assurances about the state of scientific knowledge. Moreover, they lead to the continued reliance on scientific techniques that should be used more judiciously, for example, hypothetico-deductive practices, because they have such great potential to spur wasteful searches for explanatory fictions. Consequently, mentalism interferes with the effective prediction, control, and explanation of behavior.

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The Neurobiology of Transference

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Understanding transference in terms of neurobiological mechanisms has been an area of interest throughout the last decade. The newly developed methods of neuroscience, such as neuroimaging and molecular neurobiology, help explain a neurobiological base for biological correlates of the mental process described in psychoanalytic theory. In this review, we present an hypothesis about neurobiology of transference, with the help of other previously proposed mechanisms such as neurobiology of attachment, pattern completion, memory systems, repetition compulsion, and neurobiology of psychotherapy.

Keywords: transference, neurobiology, neuropsychanalysis

In basic terms, transference is defined as the redirection of feelings and desires and especially of those unconsciously retained from childhood toward a new object. These mostly include unresolved or conflictual feelings and desires. The new object in psychoanalysis is usually the analyst. Thus, in transference, the patient redirects his unresolved or conflictual desires and feelings to the analyst in order to resolve them.

In the case of any particular conflict around sexual or aggressive impulses, the conflict is embedded in an internalized object relation, i.e., in a repressed or dissociated representation of the self (self representation) linked with a particular representation of another who is a significant object of desire or avoidance (object representation). These internalized object relations are activated in the transference with an alternating role distribution. The patient enacts a self representation while projecting the corresponding object representation onto the

analyst at times. At other times the patient projects his representation onto the analyst and identifies with the corresponding object representation (Kernberg, 2000).

During the past decade, an effort has been made both by psychoanalysts and neuroscientists to identify the underlying neuroanatomical, neurophysiological, and molecular underpinnings of psychoanalytical concepts under the name of neuropsychanalysis. This effort has helped us to fill the gap between mind and brain, and to gain a better understanding of effects of every mental action on underlying neural systems, and vice versa. And this does not only apply for conscious mental actions, but also to unconscious mental acts, which form the very basics of psychoanalytic theory. Repression is one of these acts, and we have previously tried to explain repression in terms of neuroscience (Ceylan and Sayin, 2012). In this review, we aim to find a neurobiological explanation for transference. Toward this aim, we will first briefly summarize explanations proposed by others, such as neurobiology of attachment, pattern completion, memory systems, repetition compulsion, and neurobiology of psychotherapy. Then, we will briefly describe our hypothesis about externalization, libidinal gratification, and object relational gratification. In the final part of this article, we will present our interpretation of the neurobiology of transference.

Recollecting the Past in the Present: Involvement of Different Memory Systems in Transference

A discussion about neurobiology of transference would be inadequate without discussing the involvement of memory systems. Internalized object relations are encoded in memory and emerge in the mode of relatedness that the analyst brings to the analysis (Gabbard, 1997).

One of fundamental goals of psychoanalysis is to make the unconscious conscious. From a neuroscientific perspective, this can be described as rebuilding the brain; increasing the interconnection and integration of neural networks dedicated to unconscious and conscious memory. Thus, we need to look at different memory systems and how they relate to unconscious and conscious parts of the psychic apparatus.

Different Types of Memory Systems

Long-term memory systems are usually classified into two categories according to the type of information encoded, namely declarative and non-declarative memory (Squire and Zola, 1996). Declarative memory requires conscious recall; a conscious process must bring up the information. This is sometimes called explicit memory, since it consists of information that is explicitly stored and retrieved.

Declarative memory can be further sub-divided into things that we recall about our own lives (episodic memory) and general world knowledge (semantic memory) that does not relate to events in our lives. Examples of episodic memory include events in our personal history, such as our graduation party. Semantic memory reflects knowing general facts about the world, such as how to tell time (Gazzaniga, Ivry, and Mangun, 2002). The main brain areas involved in declarative memory are the medial temporal lobes (especially the hippocampus) and the diencephalon (McDonald and White, 1993).

In contrast, non-declarative memory (or implicit memory) is not based on the conscious recall of information, but on implicit learning. Implicit (unconscious) memory is observable in behavior but is not part of conscious awareness. Procedural memory is one form of implicit memory and involves the learning of a variety of motor (e.g., knowledge about how to drive) and cognitive skills (e.g., the acquisition of reading skills). A second form of implicit memory is associative memory, which is based on classical conditioning. Classical conditioning occurs when a conditioned stimulus (an otherwise neutral stimulus to the organism) is paired with an unconditioned stimulus (one that elicits some response from the organism). A person may instantly feel sad whenever he listens to a song by a particular singer. The sadness may, for instance, emerge based upon a past experience when he heard of the death of his mother while a song by the same singer was playing. This connection or association, however, is not available to conscious awareness. A third form of implicit memory is non-associative learning, which involves simple learning such as habituation (the decrease in the response with repeated presentations of the stimulus) and sensitization (the increase in response with repeated presentations of the stimulus) [Gazzaniga, Ivry, and Mangun, 2002]. The main brain areas that are involved in non-declarative memory are the basal ganglia, the striatum, and the cerebellum (McDonald and White, 1993).

Neurodevelopment of Different Memory Systems

Looking back at the evolutionary development of neomammalian brain can help us to find which structures are more related to these two different memory systems. In triune brain (Baars and Gage, 2010), each tier is involved with different aspects of memory functioning. The reptilian brain contains instinctual memories, the lessons of past generations (genetic memory) that control reflexes, and inner bodily functions. The paleomammalian brain (limbic system) contributes to emotional memory and conditioned learning — a mixture of primitive impulses and survival programs sculpted by experiences. These two systems are nonverbal and comprise aspects of the Freudian unconscious. The neomammalian brain, although largely unconscious in its processing, contains networks responsible for explicit verbal memory biased toward the left hemisphere (Cozolino, 2010).

As we all know, neurodevelopment of different brain structures happens at different times during intrauterine life and infancy. At birth, most parts of the so-called reptilian and paleomammalian brain are mostly developed. These structures, including brain stem, amygdala, thalamus, and middle portions of the frontal cortex, are responsible for formation of primitive reflexes which are basically used for survival. These kinds of learning through these more primitive structures form sensory, motor, and emotional networks of implicit memory.

The development of explicit memory parallels the maturation of hippocampus and higher cortical structures over the first years of life (Jacobs, van Praag, and Gage, 2000; McCarthy, 1995). This also explains the phenomena of childhood amnesia or the absence of explicit memory from early life; the maturational delay of these structures is responsible for this lack of explicit memory during first years of life. Neural networks in hippocampus and cortex provide for conscious, contextualized learning and memory that becomes more consistent and stable over time.

Psychotherapy often involves the retrieval of emotional memories. Formation of emotional memories is highly dependent on subcortical structures such as amygdala and hippocampus.

Emotional Memory: The Interaction between Amygdala and Hippocampus

Sensory inputs to the amygdala come from two different networks (LeDoux, 1994). The first one comes directly from the thalamus and serves rapid responses during survival decisions based on minimum information. Amygdala's output goes directly to the hypothalamus, limbic-motor circuits, and many brainstem nuclei and causes a rapid survival response. These are the kinds of circuits which cause us to run away quickly when we see a snake during our walk in the woods. Second sensory input first loops through the cortex and hippocampus before reaching the amygdala, and thus adds cortical processing (context and inhibition) to appraise ongoing perceptions and behaviors. When we see the same snake in a cage at the zoo, these circuits inhibit the fear response of the amygdala.

The emotional value to the object based on both instincts and learning history is connected by the amygdala, in association with medial areas of the frontal cortex (Davis, 1992; LeDoux, 1986). The amygdala associates conscious and unconscious indications of danger with preparation for a survival response (Ohman, Carlsson, Lundqvist, and Ingvar, 2007). The amygdala's major role related to psychotherapy is that it creates an emotional bias in conscious processing; that is what makes us see the glass as half empty or full (Kukulja et al., 2008).

The amygdala is one of the key components of affective memory (Chavez, McGaugh, and Weinberger, 2009). In an adult brain, the amygdala also enhances hippocampal processing of emotional memory by stimulating the release of norepinephrine and glucocorticoids via other brain structures (McGaugh, 2004).

Through these chemical messages, the hippocampus is alerted to the importance of remembering what is being experienced, a key component of learning. The activation of the sympathetic nervous system alters the chemical environment within and between neurons, enhancing long term potentiation and neural plasticity.

The hippocampus is the essential structure for the encoding and storage of explicit memory and learning (Zola-Morgan and Squire, 1990). It also participates in our ability to compare different autobiographical memories and make inferences from previous learning in new situations (Eichenbaum, 1992).

The reciprocal relationship between amygdala and hippocampus is an interesting area for understanding neuroscience of psychotherapy. The amygdala and hippocampus have different contributions to formation of memories. The amygdala is involved with generalization, while the hippocampus is involved with discrimination (Sherry and Schacter, 1987). The amygdala has a central role in the emotional and somatic organization of experience, while the hippocampus is vital for conscious, logical, and cooperative social functioning (Tsory et al., 2008). Their relationship will impact affect regulation, reality testing, resting states of arousal and anxiety, and our ability to learn emotional and more neutral information (Cozolino, 2010).

Involvement of Different Types of Memory Systems in Transference

Both explicit and implicit memory may be involved in the transference process, and may influence each other. For instance, work on implicit memories can make it easier for fantasies and recollections to surface from explicit memory. At the same time reconstructions of events through autobiographic memory can help retrieve patients' early experiences, along with related fantasies and defenses. All these associations may emerge from implicit memory in transference and in dreams (Mancia, 2006). Gabbard (2006) suggested that both procedural and declarative memory systems can be assumed to be involved in the development of transference. He stated that both procedural and declarative memory have implicit and explicit aspects. Implicit procedural memory involves automatic stereotyped behavior tied up with long-standing characteristic patterns of unconscious defenses and unconscious internal object relations. Implicit declarative memory involves repressed and preconscious expectations, fantasies, and fears about how the analyst may react. Explicit declarative memory, especially autobiographical memory, can also be extraordinarily important, as the patient consciously recognizes symbols and problematic patterns along with their antecedents. Through the reconstruction of one's life narrative and working through problematic patterns in the present are recognized as present-day repetitions of early childhood patterns.

According to the connectionist model of cognitive neuroscience, transference reaction can be seen as a collaborative and a parallel activation of different neural networks in which different parts of the same representation are encoded (Westen and Gabbard, 2002). From this point of view transference reaction is formed by the activation of different neural networks at the same time: (1) the networks for the implicit declarative memories for that particular relational pattern, (2) the networks for the affective responses linked with that particular relational pattern, and (3) the networks for the implicit procedural memories which include defenses associated with the regulation of that particular affect that transference reaction activates. With the help of psychoanalysis, links between neural networks that have been activated together for years or decades are weakened and new associative linkages are created, or previously weak linkages can be strengthened.

Involvement of different memory systems in transference formation is shown in a case report of a male patient with a profound anterograde episodic memory loss caused by anoxic hippocampal damage. Despite his amnesia, he was able to develop a transference relationship with his analyst. The patient did not have an episodic memory recall of the analyst and the previous sessions, but as the therapy progressed, he reported to be "very much at ease at the moment, and he felt comfortable with the analyst, in that one-to-one relationship." The authors think that this report emphasizes the fact that the interpersonal properties of the transference relationship are mediated emotion-based nonepisodic memory systems, rather than conscious episodic recall (Turnbull, Zois, Kaplan-Solms, and Solms, 2006).

Memory as a Re-categorization

The old theory of memory was based on a static memory perspective (Aschraft, 1994; Baddeley, 1997). According to this theory, memory was perceived as a place in the brain where information was stored. In this sense, memory was a constant structure, resistant to change, and was retrieved exactly as it was stored.

A more recent view of memory is based on a dynamic memory perspective. According to this view, memory is not to be conceived of as stored structures (the computer metaphor) but as a function of the whole organism, as a complex, dynamic, recategorizing, and interactive process. In this sense, memory is a theoretical construct that connects the state of the individual in the past and the influence the event had on the individual to the behavior in the current situation (Leuzinger-Bohleber and Pfeifer, 2006). This new view of memory can explain how memory systems are involved in transference reaction: memory is always based on new and idiosyncratic narratives taking place in current interactional situations but at the same time contain traces of the historical truth.

According to Edelman (1987), memory is defined as the ability of the whole organism to re-categorize, a capacity which always stems from sensory-motor coordination processes and value systems. Categorization occurs by sampling of the environment by multiple sensory maps within the same modality and between different modalities, and which one of these patterns of correlations is chosen or selected in the categorization is modulated by a value system. Value systems are basic evolutionary adaptations that define broad behavioral goals of the organism. In this way the organism is capable of generating categories on its own as it interacts with the environment. Since there is no limit to the patterns of sensory stimulation, new perceptual categories can be formed if they have distinct behavioral consequences. Edelman speaks of a never-ending process of re-categorization, which allows the organism to adapt constantly to new situations by applying knowledge gained in past experiences.

Similar to Edelman's theory about memory as a re-categorization, Modell (1990) defines memory as a re-transcription. According to Modell, the memories of affective experiences are organized into categories (affective categories) as an attempt to find a perceptual unity between the past and the present. Affect categories concerning the self, or the self in relation to objects, can be observed most clearly in the process of projective identification. The refinding and redefining of archaic affect categories in present time through projective identification and transference reaction is seen as re-transcription of memory.

We think that these ideas of dynamic memory can offer us a neurobiological base to understand how working through of transference relationship in psychoanalytic therapy forms new memories. Memories of relationship patterns of an early childhood with significant others become activated in the psychoanalytic setting. Sensory-motor perceptions are categorized according to past value systems of the analysand and transference occurs. By the working through of this transference and with the help of corrective emotional experience in relationship with the analyst during therapy, new value systems are formed by these new inputs to the memory and re-categorization or re-transcription occur.

The Intrusion of Early Implicit Memory into Adult Consciousness

Early memories mainly include emotions and our attachment schema (a key form of implicit memory, which we will describe more broadly in the following section), which are in the form of preverbal, sensory, motor, and affective information. These early emotional memories include two closely related concepts to transference and therapeutic change, namely, emotional awareness and emotional change.

Emotional awareness is described as an individual's ability to recognize and describe emotion in oneself and others (Lane and Schwartz, 1987). Five levels of emotional awareness in ascending order are: (1) awareness of physical sensa-

tions, (2) action tendencies, (3) single emotions, (4) blends of emotions, and (5) blends of blends of emotional experience (the capacity to appreciate complexity in the experience of self and other). The first two levels are implicit aspects of emotional awareness, which are developed first chronologically, and their neural substrates are more the reflexive and primitive parts of the brain, such as brainstem and diencephalon, respectively. Experience, as well as realities and demands of the outside world add to and modulate these levels and the later three levels of emotional awareness develop. These higher levels work explicitly and their neuroanatomical correlates are limbic and paralimbic areas, and prefrontal cortex, respectively. Lane and Garfield (2005) have proposed that transition from implicit to explicit processing of emotion is the core process associated with clinical change in psychotherapy.

Emotional procedures organize how we interpret situations and how we react to them across the life span. Infants and young children can decipher the rules by which families operate and develop strategies for meeting their needs within their families. These emotional procedures are guided by procedurally encoded heuristics which are initially adaptive but later lead to systematic distortions in the processing of information and experience. Transference is the enactment of the emotional procedures learned in childhood (Clyman, 1991).

Transition from implicit emotional procedures and emotional awareness levels into explicit processing of emotions by working through transference reaction in psychoanalysis is the core process associated with change. By transference reaction, the networks of these implicit social memories are activated and this preverbal implicit memory is verbally and behaviorally brought into the consulting room. Psychoanalytic psychotherapy allows long silences between the therapist and analysand and this silence also activates these preverbal implicit memories. Revisiting and evaluating these memories from an adult perspective by interpretation of transference reaction during psychotherapy often lead to rewriting the history in a creative and positive way. The introduction of new information or scenarios to past experiences can alter the nature of memories and modify affective reactions by formation of new synapses. The construction and reconstruction of autobiographical narratives require that the semantic processing of the left hemisphere integrates with the emotional networks in the right.

Cozolino (2010) gives a very good example of how we may grow and move on to new lives, yet our implicit memory systems retain old fears. He tells us a story in the early 1960s. During World War II, the Japanese navy left soldiers on many islands throughout Pacific but never retrieved them at the end of the war. Decades later, some tourists would innocently land on these islands and they were attacked by soldiers who thought the war was still being fought. They had dutifully kept guns oiled and remained vigilant for decades in anticipation of an American attack. They had spent years fighting a war that no longer existed. Cozolino (2010, p. 92) says: "While remaining vigilant for signs of attack

for early attachment pain, approaching intimacy can set off all the danger signals. Therapists are trained to be amygdala whisperers who land on these beaches, attempting to convince the loyal soldiers with implicit systems of memory that the war is over.”

Development of the Social Brain: Formation of Attachment Schemas

The term attachment is used to describe early caretaker–infant relationships as well as the psychological proximity that binds interpersonal relationships. Bowlby (1969) suggested that early interactions create attachment schemas that predict subsequent reactions to others. Schemas are implicit memories that organize within networks of the social brain, and are based on experiences of safety and danger with caretakers during early sensitive periods. A secure attachment schema enhances the formation of a biochemical environment in the brain which facilitates regulation, growth, and optimal immunological functioning. Insecure and disorganized attachment schemas have the opposite effect, and correlate with higher frequencies of physical and emotional illness. These schemas are a summation of thousands of experiences with caretakers that become unconscious, reflexive predictions of the behaviors of others. They become activated in subsequent relationships and lead us to either seek or avoid proximity. They also determine whether we can utilize intimate relationships for physiological and emotional homeostasis. These implicit memories are obligatory; that is, they are automatically activated even before we become conscious of the people with whom we are about to interact. They shape our first impressions, our reaction to physical intimacy, and whether we feel relationships are worth having. They trigger rapid and unconscious moment-to-moment approach–avoid decisions in interpersonal situations. Attachment schemas are especially apparent under stress because of their central role in affect regulation. Attachment is mediated by the regulation of the autonomic nervous system by the social brain, and a cascade of biochemical processes that create approach and avoid reactions and create positive and negative emotions. Schemas shape our conscious experience of others by activating rapid and autonomic evaluations hundreds of milliseconds before our perceptions of others reach consciousness.

It has been postulated that the social motivational system is modulated by many neurochemicals (Nelson and Panksepp, 1998). Some of these neurochemicals are oxytocins, vasopressin, peptides, androgens, and estrogens. The social motivational system extends into the amygdala, anterior cingulate, and orbito-medial prefrontal cortex. These circuits and neurochemicals are thought to regulate attachment, pain bonding, empathy, and altruistic behavior (Decety and Lamm, 2006; Seitz, Nickel, and Azari, 2006). In addition, the dopamine reward system of the brain, namely the circuits between ventral striatum and nucleus accumbens, is thought to be involved with more complex analysis of

reward and social motivation (Kampe, Frith, Dolan, and Frith, 2001; Pagnoni, Zink, Montague, and Berns, 2002).

Expansion of the cortex in primates correlates with increasingly large social groups. Experience-dependent plasticity has been found in many areas of the brain, predominantly the prefrontal cortex and hippocampus (Kolb and Whishaw 1998; Maletic-Savatic, Malinow, and Svoboda, 1999). These structures are central to learning and memory, and they are also keys in shaping our attachment schemas. We know that our social environment has a major impact on neurodevelopment of our brain. The changes in our attachment schemas may also change our brain. Research has shown that in the transition from dating to marriage, there is a broad tendency to move from insecure and disorganized attachment schemas to increasingly secure patterns (Crowell, Treboux, and Waters, 2002). On the other hand, we also know that social support, compassion, and kindness result in positive neural growth, while social stress inhibits cell proliferation and neural plasticity (Czeh et al., 2007; Davidson, Jackson, and Kalin, 2000).

Psychotherapy can be seen as a kind of re-parenting. The therapist's attention, care, and nurturance may change the structure of the brain by promoting neuroplasticity. We will point out how psychotherapy affects the brain, in the following sections. But at this point, we may say that parts of the brain which are closely connected to formation of attachment schemas would be the best candidates to change, if we are talking about transference-based psychotherapies, such as psychoanalysis. It has been proposed that cortical areas such as the orbitomedial prefrontal cortex, insula, cingulate cortex, and somatosensory cortex, as well as subcortical structures such as the amygdala, hippocampus, and hypothalamus are the major areas in the human social brain (Cozolino, 2010). It has been shown that the orbitomedial prefrontal cortex inhibits the amygdala, based on conscious awareness and feedback from the environment (Beer, Heerey, Keltner, Scabini, and Knight, 2003). Reciprocally, the amygdala inhibits the orbitomedial prefrontal cortex when we are frightened and this is why we have a difficult time being rational, logical, and in control of our thoughts when we are frightened. Since the networks connecting our orbitomedial prefrontal cortex and the amygdala are shaped by experience, our learning history of what is safe and dangerous, including our attachment schema, is thought to be encoded within this system.

Transference in Terms of Affective and Conceptual Pattern Completion

Pattern completion is a neurological function involved in memory retrieval. It facilitates the retrieval of a complete pattern from a perceived, incomplete pattern (Samurai and Hattori, 2005). When the mind encounters a vague and incomplete visual or auditory stimulus, it refers to its previously memorized visual or auditory patterns to match the new stimulus with the complete pattern

most closely correlated with it. Then that pattern is locked, and the person will perceive the vague pattern as the originally locked complete pattern (Javanbakht and Ragan, 2008). In the terms of object relations theory, objects and their patterns of relatedness already exist in our memory systems, and we use this information for pattern completion of ambiguous perceptions and situations. For example, the image of an unknown angry man with a cigarette may trigger a childhood memory of one's father, who also smoked and who used to get angry very quickly and behave badly. Through pattern completion, a person may unconsciously perceive the unknown man as his father and feel anxiety when he sees him (transference). Thus, pattern completion in transference occurs not only in terms of object recognition, but also in terms of one's relationship with that object.

A relationship with an analyst provides a perfect opportunity for ambiguity. The analyst–analysand relationship is not simply neutral; in fact an analyst strives to be free of emotional expression. The ambiguity of the environment is also intensified during the free association process. Furthermore, an analyst naturally represents a parental figure during the process of psychodynamic therapy, since he is the “authority” in this relationship. Thus, unknown aspects of the analyst's character and behavior can easily be substituted with the qualities of the analysand's parents. These patterns have been strongly encoded in the auto-associative networks in the analysand's memory systems. Pattern completion occurs both in psychodynamic and neurobiological terms, and transference occurs.

Pattern Completion, Repetition Compulsion and Projective/Introjective Identification

Freud, in his work “Beyond the Pleasure Principle” (1920, p. 18), explains repetition compulsion this way “. . . the patient is obliged to repeat the repressed material as contemporary experience instead of remembering it as something belonging to the past.” Researchers have tried to give different psychological and biological explanations for repetition compulsion. Javanbakht and Ragan (2008) have proposed pattern completion as the underlying neurobiological mechanism of repetition compulsion and projective/introjective identification. They argue that projective and introjective identification form the primitive, or trauma-based, maturing psychological imprints or templates for the phenomena of transference and counter transference.

In every significant relationship, many aspects of the other person are vague to the perceiver. Subsequently, the mind, through the neuropsychological mechanism of pattern completion, attempts to relate these vague aspects to an archaic template. The perceiver will complete related patterns, such as behaviors, emotions, facial expressions, tone of voice, based on her reservoir of templates from past experiences, especially those with the most similar and significant

emotional relevance. When a trained auto-associative network receives ambiguous inputs, it not only completes the incomplete or vague parts of those inputs, but it also eliminates those parts it perceives as irrelevant. In transference, this explains the way that patients appear to “ignore” realistic differences between their relationship with the analyst and some significant other. Thus, the patient begins to repeat patterns of behavior from the past with the analyst, and expects a familiar response from the analyst as remembered from relating to a significant other.

The reaction of the therapist to this transference reaction may also depend on the therapist’s own pattern completion. Depending on his own encoded patterns, he does or does not become “hooked.” If the projected behavioral pattern is not encoded in his neural networks, he may easily realize that this is a transference reaction from the patient. These recognized patterns can be used as information for the sake of the patient’s psychological growth. But if the analyst’s maladaptive pattern has a counterpart in the therapist’s pattern reservoir, through pattern completion, the analyst may begin to react the way that the patient expects him to behave.

Projective identification can also be seen as an involuntary “mirroring action,” in which the therapist’s associations about the patient are creating an approximation of his feelings and thoughts. In projective identification, spontaneous matching of emotional states between the patient and therapist can occur via activation of mirror neurons (Greatrex, 2002). Discovery of mirror neurons have provided us neuropsychological and neuroanatomical evidence that the other can direct the thoughts and feelings we create at unconscious levels within ourselves.

Thus, from a “pattern completion” point of view, repetition compulsion can be seen as mastery over the unknown in the present, instead of mastery over the past. The patient escapes the unknown through completing unknown patterns with imprinted patterns from relationships to significant others. Although this process may cause a patient to suffer familiar pain, a feeling of mastery over the unknown can override his desire for pleasure (Javanbakht and Ragan, 2008).

Psychotherapy as a Neurobiological Treatment

We have previously stated that psychotherapy is a kind of re-parenting and being so, is also a kind of learning: the individual re-categorizes or re-transcripts the memory and discovers and hopefully changes the old maladaptive attachment schemas with the newly learned information about him and other people. We already know that learning, in neurobiological terms, means formation of new synapses (Kandel, 1999). There are many researchers who have shown that psychotherapy changes metabolism, activation, and neuroplasticity of many brain areas (see Liggan and Kay, 1999 for a review). Different types of psychotherapies

may affect different parts of the brain. To give an example, cognitive behavioral psychotherapy which focuses on specific patterns of thinking and predicts the kinds of thinking patterns may cause changes in brain areas mostly related to information processing, such as prefrontal cortex. But what about psychoanalysis? In psychoanalysis, transference-based interventions are one of the main tools of healing. Thus, brain areas mostly involved with transference formation would be the best candidate for change during psychoanalysis. As discussed above, those areas would include the ones related to emotion, memory, and attachment schemas formation. We have already discussed that those areas include cortical structures such as the orbitomedial prefrontal cortex, cingulate cortex, somatosensory cortex, and insula, as well as subcortical structures such as the amygdala, hippocampus, hypothalamus, thalamus, some other areas of limbic system and brainstem. Pattern completion may happen in networks related to the rapid survival response between amygdala and hypothalamus, limbic-motor circuits, and brainstem nuclei. Learning processes during psychotherapy can enhance the top-down inhibitory synapses between cortex-hippocampus and amygdala; thus emotional bias caused by the amygdala via pattern completion does not occur. Think of a patient with borderline personality disorder, with early childhood trauma related to abandonment. The amygdaloid memory system will react to the perception of abandonment as a transference reaction, when little or none exists in reality. Therapy with such a patient would utilize the higher brain systems, such as hippocampus and cortex to test the reality of these amygdala-produced cues for abandonment and inhibit inappropriate reactions. This reality testing provided by the hippocampus and cortex will help to distinguish real abandonment from innocent triggers.

Libidinal Gratification/Object Relational Gratification

In his well-known drive theory, Freud describes the libido or the sexual drive as having an origin in the erotogenic nature of the bodily zones; an impulse expressing the quantitative intensity of the drive; an aim reflected in the particular act of concrete gratification of the drive; and an object consisting of the displacements from the dominant parental objects of desire. Under the dominance of the drives and guided by the primary process, the id exerts an ongoing pressure towards gratification, operating in accordance with the pleasure principle. Freud regarded all libidinous drives as fundamentally sexual and suggested that ego libido (libido directed inwards to the self) cannot always be clearly distinguished from object libido (libido directed to persons or objects outside oneself) [Freud, 1920].

One of the authors of this article has previously proposed a concept he calls externalization (Ceylan, 2010). Externalization basically means releasing yourself to the outside in parts, during which an internal part is reserved for yourself

to return to, like a rear front at any time. This internal part is used as a safe harbor (regression) in case of any failure by the individual to compete with object frustrations (like psychosis). The externalization process includes establishing a relationship with an object in order to take pleasure from and possession of that object. In this manner, externalization is closely linked to Freud's concepts of primary and secondary narcissism. We are born with a source of psychic energy (the id). This energy-loaded aspect of our internal structure (the material carried and revealed by our phylogenetic and species past in order to establish the ego) has to externalize in order to reduce its load.

Externalizing is in fact the sum of any actions undertaken by the "self" in order to achieve a stable balanced position in the world of objects. During the first months of life, the new-born sees the world and objects around himself as belonging to or as a part of his self. His psychic energy seeks pleasure through libido cathexis (libidinal gratification). As he grows, he begins to differentiate between self and objects. By object cathexis the child learns to use his psychic energy to get pleasure from these objects (object relational gratification). Freud implies that the psychic energy objectifies specific aspects prepared by the psychic apparatus of the organism (delay of transformation, deposition, and discharge) by using them (taking the cathexis from the ego, transferring it to objects, and thus making the objects, which provide energy for, a part of the ego).

We can say that externalization is actually the process of using energy to acquire information about an object, and maintaining homeostasis through this information. A human being naturally experiences the danger of losing homeostasis after being born into a foreign world. A baby has great energy and a weak body structure that cannot manage all this energy. So, he unwillingly distributes this energy onto objects, and by acquiring information on how to use those objects makes them carry his energy. He then uses his energy through those objects. Incomplete externalization on a group of objects is the most common cause of an inadequate sense of self. This triggers a pathological presentation leading to feelings of inadequacy as expressed for example in personality disorders.

By libidinal gratification, we refer to the most immature and infantile type of gratification. In this kind of gratification, libidinal drives still need gratification from the sources of early-stage psychosexual development. In this case, there are no adequately internalized object representations to fulfill the needs of libidinal drives. If a person has achieved an optimum level of mature and healthy internal object representations, his libidinal drives will seek gratification through object relations, and this is what we will refer to as object relational gratification. If libidinal drives cannot be directed into object relations, if libidinal gratification is so intense that it creates dependence, or if object relational gratification is not enough to give pleasure, a person will continue to seek libidinal gratification. Thus, he will try to get libidinal gratification from every situation and/or object that has the potential to fulfill that need. A relationship with an analyst is not

an exception; the analysand forms a transference relationship based on libido gratification that is more intense and immature than a transference relationship based on object relational gratification.

Neuroscientific Base for Libidinal/Object Relational Gratification: Development of Self

We believe that Panksepp's core-self (Panksepp and Biven, 2012) and Damasio's (2010) three-staged self concepts provide a neuroscientific base for Freud's drive theory, as well as externalization. As discussed above, externalization process parallels the development of self in stages. Panksepp (Panksepp and Biven, 2012) and Damasio (2010) also describe a hierarchical development of self, as we will try to summarize below, before we move on to our interpretation concerning neurobiology of transference.

Panksepp describes SELF (Simple Ego-type Life Form) as "a coherent center of gravity for international organismic visceral-affective and external sensory-motor representations" (Panksepp and Biven, 2012, p. 390). He proposed that different kinds of SELF develop at different stages. The more primitive one is called the core-SELF, which is a primordial representation of the body, especially the visceral body, within the brain, which is foundational for affective being and the emergence of the higher mental apparatus. Core-SELF is related to primary-process emotional and other affective processes, and includes the most primitive emotions, such as seeking, rage, fear, lust, care, grief, and play (Panksepp, 1998). These emotions are universal, quite similar for all mammals, closely related to survival functions, such as the need to keep homeostatic balance and avoid bodily destructions. Thus, we may assume that core-SELF is more related to libidinal gratification.

According to Panksepp, a part of core-SELF begins to differentiate by experience, and emerges during the life span through the unique experiential landscape of each person or animal. This part of self is called the "idiographic SELF" (Panksepp and Biven, 2012). It develops as behaving under the control of primitive emotions causes a frustration because of the demands and rules of the social world. This development is parallel to the development of neocortex and cognitive capacities such as executive functions and memory. It is closely related to higher-order emotions, such as shame, guilt, jealousy, compassion and empathy (Panksepp, 1998). In this sense, the idiographic self is more related to object relational gratification.

Current evidence indicates that raw affective experiences, at their most primitive level, emanate from subcortical midline systems that are located in the upper brain stem and that connect heavily with more rostral higher cortical midline structures (Panksepp and Biven, 2012). Subcortical midline structures include peri-aqueductal gray, ascending reticular activating system, and mesencephalic

locomotor region. Cortical midline structures include medial cingulate, insular cortex, frontal cortex, and orbitofrontal cortex. The primary-process emotional networks of the subcortical midline structures/cortical midline structures continuum form the neural substrate of the core-SELF. They are ancient, located in the ancestral medial regions of the brain, especially rich in visceral body representations, value the states of the body and world, and they become aroused during primary-process affective states. Functional MRI studies have shown that this system is more active when people are doing nothing (typically lying quietly with eyes closed or fixating on a cross), self-reflecting and/or ruminating; and becomes deactivated during goal-directed cognition (Raichle et al., 2001). These regions are called default mode network, and they include the medial prefrontal cortex, the posterior cingulate cortex, the inferior parietal lobule, the lateral and inferior temporal cortex, and the medial temporal lobes (Buckner, Andrews-Hanna, and Schacter, 2008; Fransson and Marrelec, 2008). As can be seen, the structures involved in neural substrates of the core-SELF and default mode network are similar, which means that the midline system of the brain mediates self-related processes, and subcortical/cortical midline structures become active only by internally generated materials. The inability of the neocortex to inhibit this network causes affect dysregulation seen in severe personality disorders (Schorr, 1994).

Development and functioning of consciousness is highly related to the reciprocal relationships between default mode network and the so-called task positive networks (since they tend to activate during cognitively demanding tasks and deactivate at rest), namely the salience network and central executive network (Allen and Williams, 2011). The central executive network refers to the top-down dorsal attention network associated with the online control of behavior, and includes dorsolateral prefrontal cortex, frontal eye fields, dorsomedial prefrontal cortex, intraparietal sulcus, and superior parietal lobule. The salience network refers to a more ventral network of regions involved in the automatic detection of error, somatosensory awareness, and the detection of salient non-target stimulus and includes dorsal anterior cingulate cortex, frontoinsula cortices, amygdala, and ventral midbrain. This provides us neuroscientific evidence that areas related to core-SELF that seek libidinal gratification are epigenetically earlier-developed and exist in many mammalian species, and are inhibited by later-developed brain areas, which have higher-order cognitive functions and are more related to the idiographic SELF which seeks more object relational gratification.

Damasio's concept of self and the related neuroscientific base are similar to Panksepp's theory. According to Damasio (2010), self is built in stages. The simplest stage is called the protoself which consists of a neural description of relatively stable aspects of the organism and produces the spontaneous feelings of the living body (primordial feelings). This is closely related to the part of self

which seeks libidinal gratification. The second stage of self is called the core self, which results from establishing a relationship between the protosef and an object. The images of objects are formed and modified in the brain and these images and the organism are linked in a coherent pattern. In our terms, the core self seeks object relational gratification. Damasio calls the third stage of self as autobiographical self, which allows multiple objects, previously recorded as lived experience or as anticipated future, to interact with the protosef and generate pulses of the core self. According to Damasio, the main neural components of the protosef include the brain areas responsible for interoceptive integration (such as nucleus tractus solitaries, peri-aqueductal gray, parabrachial nucleus, area postrema, and hypothalamus at brain stem level and insular cortex and anterior cingulate cortex at cerebral cortex level) and external sensory portals (frontal eye fields and somatosensory cortices). These brain stem nuclei are called homeostatic nuclei and they generate the feelings of the knowing component of the core self. They project to other brain stem nuclei (nuclei of reticular formation, the monoaminergic nuclei, and the cholinergic nuclei), and these projections generate the object saliency of the core self. In addition to these areas, the autobiographical self includes brain areas related to coordination of information (such as memory), and which Damasio calls convergence–divergence regions. These are the polar and medial temporal cortices, the medial prefrontal cortices, the temporoparietal junctions, and the posteromedial cortices. Most of these areas, especially the posteromedial cortices, are a part of default mode network.

Thus both Panksepp's core self and Damasio's autobiographic self are highly related to the so-called default mode network of the brain. When a person is not performing any kind of motor or cognitive task, he is engaged with self-reflective thoughts. These thoughts include placing oneself in past, present, and future as a physical, emotional, cognitive, and mental being. This may be the reason for activation of brain areas which are related to self.

Transference as a Need for Gratification

If we speak in terms of neuroscience, according to Hebbian theory, “any two cells or systems of cells that are repeatedly active at the same time will tend to become associated, so that activity in one facilitates activity in the other” (Hebb, 1949, p. 50). Thus, if libidinal gratification is sought very frequently, the synaptic connections representing this pattern will also be strengthened. To express this more simply, we can call the neural networks representing libidinal gratification A , and the strength of synaptic connections cA . As a newborn baby begins to grow, it forms new object relations and different object relational gratifications may also form. We will call the neural networks representing these object relational gratifications B, C, D, \dots, N , and the strength of these

connections $cB, cC, cD \dots cN$. Using this notation, the amount of $cB, cC, cD \dots cN$ can be expected to increase in an individual who forms healthy and mature object relations.

There will come a time when one, more than one, or all the connections $cB, cC, cD \dots cN$ will be stronger than cA . Then, we can say that this individual prefers object relational gratification over libidinal gratification. Let us assume that for person Y , the amount of each of three connections (cB, cC, cD) equals more than cA , while for person X , only the amount cB is greater than cA . According to our formula, it can be expected that person X will seek more libidinal gratification and less object relational gratification, and thus will have a more neurotic personality than person Y throughout his life.

For every person, it is possible to calculate the mean strength of synaptic connections representing object relations:

$$c(\text{Mean}) = \frac{cB + cC + cD + \dots cN}{N}$$

In this case, $c(\text{Mean})$ is a direct way of showing the amount of object relational gratification (objects other than mother or primary care giver, who can be a source of libidinal gratification), and an indirect way of indicating how much libidinal gratification has been given up. When for person X , $c(\text{Mean}) - cA$ is low, the person is more prone to libidinal gratification, while for person Y , because $c(\text{Mean}) - cA$ is high, he will tend toward more object relational gratification.

Let us assume that persons X and Y present for psychoanalysis one day. Person X will show a more intense and immature transference reaction because of low $c(\text{Mean}) - cA$, parallel to his need for libidinal gratification, while person Y will show a less intense and more mature transference reaction. We can say that where the $c(\text{Mean})$ is lower than cA , we can expect to find libidinal transference with strong pre-genital properties.

A Neurobiological Interpretation of the Relationship between Libidinal Gratification and Transference

If we try to locate the A network, symbolizing the synapses related to libidinal gratification, the best candidate would be the neural circuits between brain stem nuclei, limbic-paralimbic structures, thalamus, and hypothalamus (see Figure 1). We have some reasons to say this. First, as discussed above, those structures are involved in the human social brain, especially important for formation of attachment schemas and emotional memory (Cozolino, 2010). Second, when we look at the evolutionary development of the triune brain,

these structures, being the parts of reptilian and paleomammalian brains, are the first ones to develop and already exist at birth (Baars and Gage, 2010). Besides, they contain nonverbal, instinctual memories, primitive impulses, and they control reflexes and inner bodily functions. Those mental events are closely related to libidinal gratification. Third, these neural circuits are part of the network responsible for rapid survival response (LeDoux, 1994). In this rapid survival response, the amygdala receives input directly from the thalamus (without reaching cortex), and sends outputs to the hypothalamus, limbic-motor circuits, and brainstem nuclei, in order to give a rapid response during survival decisions based on minimum information. Libidinal gratification is closely linked to survival: the mother's breast is the first object of libidinal gratification, and if the baby is not fed, it would die. Fourth, since we are talking about libidinal gratification, it is reasonable to think that the reward system of the brain is also involved. This system has its roots in the ventral tegmental area, which is also a part of the reticular activating system and rich with dopaminergic neurons. This system involves the synaptic connections with limbic structures, mainly with the nucleus accumbens. The reward system of

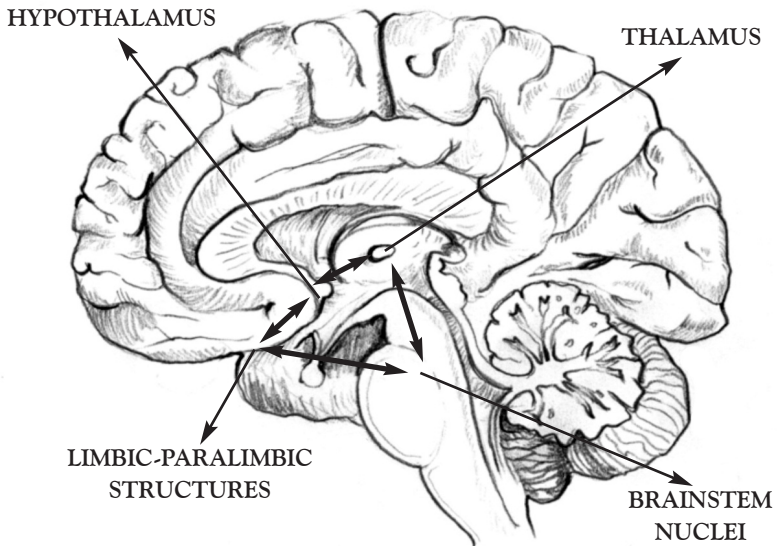


Figure 1: A schematic representation of A network, symbolizing the synapses related to libidinal gratification. A more “immature” transference occurs by pattern completion of attachment schemas coded in this network.¹

¹We thank Dicle Kaya for both figures.

the brain acts according to the pleasure principle, as in libidinal gratification, and seeks pleasure or removal of distress, without regard for any possible negative consequences (as we can see in individuals with substance abuse and dependence).

Our theory is in concordance with two theories which have tried to find neuroanatomical and neurobiological correlates of Freudian concepts. The first is Kaplan–Solms and Solms's (2002) theory about neuroanatomy of the Freudian mental apparatus. According to Kaplan–Solms and Solms, the ascending activating system, together with its limbic connections, are the anatomical and physiological correlates of the mental agency that in psychoanalysis is described as the id. Kaplan–Solms and Solms view the cortical arousal processes, which have their basis in the ascending activating system, as the physiological correlates of those mental processes that are conceptualized in psychoanalysis as *psychical energy*. Therefore, the ascending activating system can be seen as the great reservoir of *libido*. This *psychic energy* is the single driving force of the mental apparatus. The connections between these deep brain systems and the cortex provide the anatomical and physiological basis for primary process *psychic functioning*. The second is Carhart–Harris and Friston's (2010) theory about neuroanatomy of primary- and secondary-process thinking. According to these authors, primary-process thinking is governed by limbic and paralimbic structures, mainly by medial temporal lobes, as well as the hippocampus, amygdala, parahippocampal gyrus, and entorhinal cortex. They argue that Freud's description of the primary process is consistent with the phenomenology and neurophysiology of rapid eye movement sleep, the early and acute psychotic state, the aura of temporal lobe epilepsy, and hallucinogenic drug states.

So, we believe that these connections, summarized in Figure 1, represent the most likely equivalents for our neural network *A*, which is responsible for the libidinal gratification of person *X*. Recall that we hypothesized that person *X* would seek libidinal gratification using mechanisms such as the repetition compulsion all his life. By using pattern completion, person *X* might complete the part-objects of perceived others to a whole object which is suitable for libidinal gratification. In the transference relationship with an analyst, person *X* perceives the object (the analyst) as a source of libidinal gratification, and forms an infantile transference reaction. We hypothesize that pattern completion, in this case, would occur in the circuits between the amygdala, thalamus, hypothalamus, other limbic areas and brainstem nuclei.

A Neurobiological Interpretation of the Relationship between Object Relational Gratification and Transference

If we try to locate *B, C, D N* networks, representing the synapses related to object relational gratification, the best candidate would be the projec-

tions from the areas related to libidinal gratification to hippocampus and cortex (mainly prefrontal cortex, cingulate cortex, somatosensory cortex, and insula), as shown in Figure 2. This hypothesis is based on four reasons. First, the hippocampus and cortex are parts of neomammalian brain, which is the last developed part of the brain in terms of evolution (Baars and Gage, 2010). They are not fully developed at birth, and their maturational delay is responsible for the lack of explicit memory (childhood amnesia) during the first years of life (Jacobs, van Praag and Gage, 2000; McCarthy, 1995). In parallel to this neurodevelopment, libidinal gratification is present at birth but object relational gratification develops later, as the infant learns to differentiate between self and objects. Second, the discussed networks are parts of our social brain, responsible for shaping our attachment schemas with the help of learning and memory (Nelson and Panksepp, 1998). Libidinal gratification is not learned; it is primitive and reflexive. Object relational gratification is shaped by learning through the interaction with the environment (or the objects). Third, these cortical structures (mainly the prefrontal cortex) and hippocampus have an inhibitory effect over amygdala outputs (LeDoux, 1994). These circuits add cortical processing to sensory input, thus helping us to behave and to think more logically,

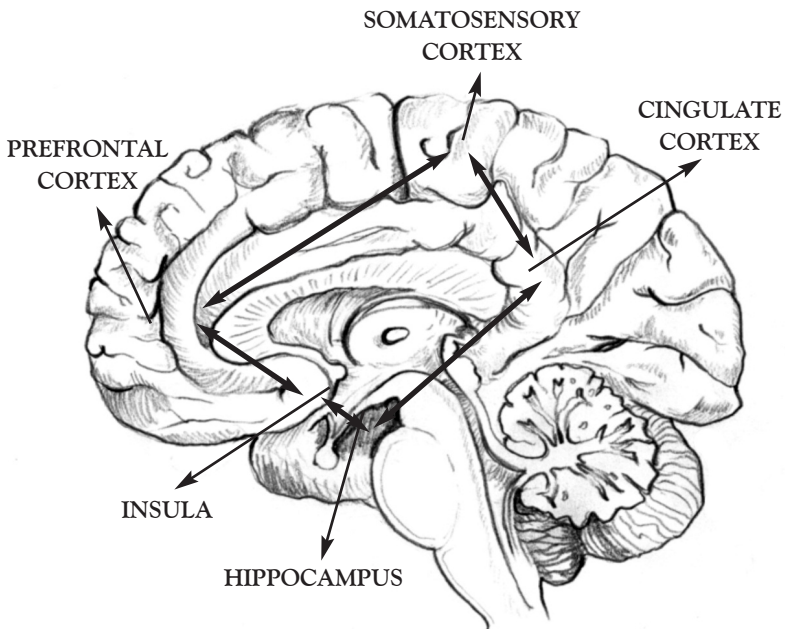


Figure 2: A schematic representation of *B, C, D N* networks, symbolizing the synapses related to object relational gratification. A more "mature" transference occurs by pattern completion of attachment schemas coded in these networks.

rather than instinctively. A transference reaction based on object relational gratification is more mature (thus, reasonable) than a transference reaction based on libidinal gratification, which is rather immature (thus, instinctive). Fourth, as previously discussed as externalization, orienting toward objects while seeking satisfaction and pleasure is, of course, a task for affect, but decision making determines which objects will be the basis for externalization (Ceylan, 2010). The life-long process of externalization is based upon orienting to objects through affect, and then making selections of objects through decision making. It is well-known that the prefrontal cortex is involved in both affect regulation and decision making.

Kaplan–Solms and Solms (2002) have proposed that the frontal cortex, especially its prefrontal region responsible for the executive and inhibitory functions of the brain, is closely related to the ego of the Freudian mental apparatus. And we already know that one of the main functions of ego is object relations. Carhart–Harris and Friston (2010) have proposed that Freud’s description of the ego is consistent with the functions of the default mode network and its reciprocal exchanges with the subordinate brain systems. Regions specifically implicated in the default mode network include the medial prefrontal cortex, the posterior cingulate cortex, the inferior parietal lobule, the lateral and inferior temporal cortex, and the medial temporal lobes (Buckner, Andrews–Hanna and Schacter, 2008; Fransson and Marrelec, 2008). Neural circuits in these areas are responsible for secondary process thinking, which is a function of ego. Besides, the default mode network, especially the medial prefrontal cortex, is responsible for suppression of activity in limbic–paralimbic areas, which are thought to be involved in primary process thinking (Carhart–Harris and Friston, 2010).

Based upon all of this, we hypothesize that these neuroanatomical regions closely related to the concept of ego should play a role in object relational gratification. The synaptic connections representing object relational gratification ($B, C, D N$) are probably located in the projections from the previously discussed areas to prefrontal cortex, hippocampus, somatosensory cortex, cingulate cortex, and insula (Figure 2), and pattern completion in transference relationships occurs in these circuits. If the mean strength of synaptic connections in these networks ($cB, cC, cD cN$) is greater than cA in the mesolimbic region, object relational gratification will be preferred over libidinal gratification. Therefore, person Y will prefer a pattern of object relational gratification rather than libidinal gratification throughout his life. Pattern completion in the $B, C, D N$ neural networks will cause person Y to perceive part-objects as whole objects suitable for object relational gratification. In his transference relationship with his analyst, the object (analyst) will be perceived as an object for object relational gratification, so that person will develop a more mature/healthy transference relationship with his therapist than person X will.

Conclusion

In this review, we have summarized previously proposed neurobiological mechanisms for transference and connected some of these views with our own interpretation of the neurobiology of transference. While doing this, we reviewed parts of many theories, such as cognitive neuroscience, attachment theory, drive theory, neurobiology of psychotherapy, neurobiology of self, philosophy of mind etc. This multidisciplinary approach was needed, since we were trying to build a bridge between two remote disciplines, namely psychoanalysis and neuroscience.

When explaining the fundamentals of psychoanalytic theory with the findings of neuroscience, there is always a risk of over-simplification, over-generalization, and eliminative reductionism. Yet we took this risk, since we think that both psychoanalytic theory and neuroscientific view have things to learn from each other. The dialogue between psychoanalysis and neuroscience can be fascinating, innovative, fruitful, and interesting, but also challenging and complicated for both sides. These two fields often do not speak the same language, and apply different concepts even when they are using analogous terms. Thanks to an increasing number of fascinating empirical and experimental studies in the areas of psychotherapy research, developmental psychology, dream research, cognitive and affective neuroscience, there is an undeniable amount of neuroscientific evidence to support the basic psychoanalytic theory.

Freud lived in a time when existing technology could not explain the biological correlates of the mental processes he described in psychoanalytic theory. Advances in neuroscience made during the last decade help us to build a bridge between the mind and the brain. We believe that theoretical explanations in this area will encourage new neuroscience studies, which will provide a scientific proof for psychoanalytical concepts such as transference.

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Psi and the Problem of Consciousness

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In this paper, I consider what the growing evidence in parapsychology can tell us about the nature of consciousness. Parapsychology remains controversial because it implies deviations from the understanding that many scientists and philosophers hold about the nature of reality. However, given the difficulties in explaining consciousness, a growing number of philosophers have called for new, possibly radical, explanations, which include versions of dualism or panpsychism. In this spirit, I briefly review the evidence on psi to see what explanation of consciousness might best be supported. After a brief survey of the evidence, I conclude that the best explanation would probably be neutral monism. I then explore a framework for neutral monism, using well-known features of quantum mechanics, to develop a ground or bridge between consciousness and matter. This framework, which I believe helps explain the psi evidence, suggests that a non-local proto-conscious field of potential or seed stuff underlies both matter and consciousness.

Keywords: parapsychology, consciousness, psi, neutral monism

As many theorists have noted, consciousness, while both familiar and intimate, remains deeply mysterious. The problem of explaining consciousness persists despite all attempts from the pre-Socratic Greeks to modern day philosophers at illuminating this perplexing subject. Throughout history many great thinkers supported the notion that consciousness or some sort of spiritual reality is distinct from matter, and indeed might be the fundamental source of all reality. However, the dominant view in the twentieth century settled on a more materialistic argument: consciousness most likely emerges from complex biological processes, which in turn are based ultimately on complex interactions between subatomic particles.

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This view remains unsatisfactory for some philosophers of mind. While advances in neuroscience have led to improvements in our understanding of how processes within the brain work, we still are no closer to understanding experience at the most basic level. This is what Chalmers (1995) has termed the “hard problem” of consciousness. According to Chalmers, materialistic explanations of consciousness would be consistent with a world populated by zombies acting like people in the world, yet devoid of interior experience. Tackling the hard problem of consciousness, Chalmers argues, likely requires abandoning a purely materialistic view of consciousness.

The various theories of consciousness can arguably be grouped into five categories: materialism, dualism, panpsychism, neutral monism, and idealism. As noted above, the current mainstream view looks for materialistic explanations. This typically takes the form of arguing that consciousness must be a higher level activity that has emerged from lower level processes, such as complex biological processes. Another view, associated with Dennett (1991), is that explanations toward the “what is it like” aspect of consciousness are inherently misguided; hence, emergence explanations are unnecessary. Critics of this view insist that qualia and inherently subjective experiences are necessary data that require explanation.

Dualism has historically been the most important alternative to materialism, at least since Descartes. Material dualism holds that matter and consciousness are two substances that differ fundamentally in a number of ways.¹ This and other differences lead to the perhaps unsolvable problem of how such fundamentally different substances can interact. Historically, support for dualism fits well with such religious notions as the soul or supernatural agency. Dualism has attracted fewer adherents, however, as philosophy gravitated toward more naturalistic explanations.

Two closely related alternatives are panpsychism and neutral monism. Panpsychism holds that matter and mind are joined as one. The usual view of panpsychism holds that all matter, even electrons, has some aspect of mind, albeit at a rudimentary level. While panpsychism has relatively few adherents today, this class of explanations has had a long history in philosophy, being a close relative to animism that was common in early cultures (Skrbina, 2007). Neutral monism holds that matter and consciousness are aspects of some more neutral and fundamental reality. The two primary objections for these two categories of explanations are (1) the unappealing implication that non-biological objects such as rocks possess some level of “what it is like to be” and (2) the perplexing question of how small units of consciousness might combine to create richer, unified conscious experiences.

¹Property dualism is another form of dualism, where mind and matter are two distinct categories of a single underlying substance of the physical type. Thus property dualism can be considered another version of materialism.

One last alternative is idealism, which holds that the physical universe is composed of mind. The Berkeleyan version of idealism is that the foundation of physical reality requires an observing agent. The existence of galaxies far beyond our perception would require something like a god. Theist philosophers or ancient believers in a pantheon were drawn to some version of idealism. Of all the alternatives, idealism is viewed as the least compatible with naturalistic explanations and hence has few proponents today.

While a majority of scientists and philosophers currently favor materialism, most who study this problem acknowledge the great difficulty in attempting to understand how non-conscious particles of matter can somehow lead to subjective experience. Searle (1992) provides a critical review of various versions of materialism which evolved over the course of the twentieth century. These include logical behaviorism, type identity theory, token identity theory, functionalism, strong AI, and eliminative materialism. Searle (1992, p. 53) argues that none of these explanations has anything to say about the subjective experience of mind. He argues in favor of a theory of biological naturalism, where consciousness is a natural product of complex biological processes. While he admits that we do not know how consciousness could have emerged this way, he argues that such an explanation must exist and we must therefore persevere until we have it.

While many probably share Searle's view, his metaphysical assumption that consciousness must be based solely from biological processes is not sufficient given the profound depth of the explanatory gap. Chalmers (1995) has argued that a naturalistic version of substance dualism is a possible candidate for making progress on the hard problem. McGinn (1991) presents a more pessimistic argument that the human mind is likely to be innately unable to understand the origins of its own subjective experience. Griffin (1998), Strawson (2006), and Nagel (2012) have argued that the emergence explanations will not succeed, given the inherent differences between matter and consciousness, and therefore more radical explanations are required.²

Nevertheless, most scientists and philosophers are understandably reluctant to give up on materialistic explanations, given its overall success throughout the physical sciences. Further, technologies and empirical methods are continuing to advance in neuroscience, which should provide important revelations for our understanding of consciousness. Indeed, the history of philosophy and science has been unequivocal on one central point: the crucial role that empirical methods must play in advancing our understanding of the world. However, there is one especially relevant category of empirical investigation that has played virtually no role in mainstream debate on consciousness: psi phenomena.

²Griffin (1998) and Strawson (2006) both favor panpsychic explanations. Nagel (2012) argues in favor of neutral monism.

It is curious that those debating the nature of consciousness rarely consider the evidence on psi. Such evidence is surely relevant on the question of whether reality is best described by materialism, dualism, or something else. Of course, evidence on the existence of psi remains controversial, especially among academic psychologists. Despite the substantial empirical studies investigating psychic phenomena, serious discussion of parapsychology remains taboo among many circles of philosophers, scientists, and psychologists. Although the reasons are not clear, perhaps it's likely that many critics of psi are strong believers in a materialistic worldview and tend to believe that research findings consistent with psi must therefore be invalid (Alcock 2010; Hyman 2010). Many of the most hostile critics are firm believers in a materialistic worldview and understandably expend great effort to undermine, if not ridicule, those who advocate that psi is real.

However, those who are genuinely interested in comparing the arguments for different views on consciousness and are not too invested in materialistic explanations may wish to consider the evidence for psi and what this evidence might imply for the discussion on the nature of consciousness. If we accept the difficulty of the problem at hand, we could conceivably benefit from research that does not more or less assume from the outset that physical particles and processes must account for all reality. I will provide a summary of some of the psi evidence below. This is followed by a discussion of the current debate on the nature of consciousness. I then consider what light might be shed from this evidence.

The Evidence on Psi

I attempt here only a brief survey of the psi literature.³ My assessment relies heavily on meta-analysis, which allows effects and statistical importance to be gauged across numerous relevant studies. Utts (1991) argues that much of the early literature on psi paid little attention to statistical power, which has in turn contributed some confusion regarding replicability. The available meta-analyses strengthen the power of the data at hand for a number of categories of psi. Further, I include here only studies that rely on statistical and quantitative methods, and thus I exclude methodologies that rely on anecdotes and interviews.⁴

Laboratory investigations of telepathy began with J.B. Rhine with his specially designed ESP cards, and eventually evolved into the ganzfeld method. The ganzfeld method involved quieting the senses of sight and hearing in the recip-

³See Radin (1997, 2006) for a broader presentation from an advocate of the evidence of psi within the laboratory. Also see Utts (1991), especially for a discussion on the evolution of criteria for evaluating psi. Krippner and Friedman (2010) provide arguments from both skeptics and advocates on the current state of psi.

⁴Many interesting studies rely heavily on interviews and anecdotes, and it may well be that such methods are a necessary part of what is needed to understand this phenomena. However, for purposes of this brief survey, I include only methods that utilize statistical testing.

ient; cut ping-pong balls are placed over the eyes and light static noise fills the ears. Bem and Honorton (1994) conducted a meta-analysis of ganzfeld studies and found overall a hit rate of 32.2%, significantly above the 25% expected by chance, with a p value of 0.002. Utts (1996) reported replications for Bem and Honorton from sessions conducted at three separate laboratories, each finding comparable hit rates. Milton and Wiseman (1999) challenged the results of Bem and Honorton with a follow up meta-analysis of 30 more recent ganzfeld studies and concluded that these studies did not provide significant effects. Bem, Palmer, and Broughton (2001) then found that when ten new studies were added to the database, the overall test results were significant, although with a lower average effect size than their original meta-analysis.⁵ But Bem et al also found that the lowering of the effect size could be accounted for by the degree to which ganzfeld studies followed the protocol stated in their original meta-study.

Most recently, Tressoldi, Storm, and Radin (2010) examined all the ganzfeld evidence reported in 108 publications, conducted from 1974 through 2008 by laboratories in six countries. Subsets of this evidence have been analyzed in six meta-studies, including the skeptics Milton and Wiseman (1999). Hit rates that exceed chance with statistical significance were found in each study. The overall hit rate across all of the data was 31.5%, above chance expectation of 25%, and z statistic produces a p value of 1.0×10^{-11} . Tressoldi, Storm, and Radin report that the “overall results now provide unambiguous evidence for an independently repeatable ESP effect” (p. 581). Overall, the ganzfeld results demonstrate consistent support for the telepathy hypothesis, albeit at hit rates of a modest degree above chance.

A parallel investigation explored telepathy in dreams. The methodology for dream telepathy was established and refined by psychiatrist Montague Ullman and psychologist Stanley Krippner. The procedure employed two participants, a sender and a receiver (the dreamer), the experimenter, and judges. The experimenter monitored the EEG of the receiver, and when he judged him to be in the dream state, he would notify the sender. The sender would at that time open a sealed envelope, which contained a target picture (which had been randomly selected and was unknown to the experimenter and judges) and began “sending” the image to the participant in the dream state.

From 1966 to 1972, Ullman and Krippner conducted a total of 450 dream-telepathy sessions at the Maimonides Medical Center in Brooklyn (Krippner, 1991, 1993; Ullman et al., 1989). Meta-analysis of these studies has found an overall success rate at 63%, substantially above the hit rate that chance alone predicts (50%). Radin calculated the odds that such a high hit rate for the

⁵Milton and Wiseman (1999) actually find statistically significant results once one corrects a mistake in their calculation (Radin, 2006, p. 118).

combined results could be attributable to chance to be 1 in 75 million (1997, pp. 71–72). Sherwood and Roe (2003) examined 21 dream-telepathy studies published between 1977 and 2002 and compared them with the Maimonides studies. They found significant results overall, however with smaller effect sizes, which they attributed to slightly different methods and protocols. These differences included using homes rather than a facility such as Maimonides and eschewing EEG monitoring. Overall, the authors concluded that a small or modest dream-telepathy effect appears to be robust across a wide range of laboratories and variations in methods.

Meta-analysis also appears to support remote-viewing, a form of psi that falls in the category of clairvoyance. Utts (1996) surveyed the evidence on remote viewing for the American Institutes for Research. Analyzing the results of Stanford Research Institute from 1973 to 1988, she reported the statistical effects were so overwhelming that the probability that chance alone could account for the effects was 10^{-20} . Utts concluded:

... remote viewing has been conceptually replicated across a number of laboratories by various experimenters and in different cultures. This is a robust effect that, were it not in such an unusual domain, would no longer be questioned by science as a real phenomenon. It is unlikely that methodological problems could account for the remarkable consistency of results (p. 22)

Another interesting literature has emerged on precognition and presentiment. Honorton and Ferrari (1989) report a meta-analysis of forced-choice precognition experiments between 1935 and 1987. The authors found, across 309 studies and 62 investigators, a small, but highly significant effect ($p = 6.3 \times 10^{-25}$). They also found that although the research designs improved with time, the effect size remained stable. Presentiment studies focus on physiological effects indicating emotional arousal as participants view pictures on a computer screen. These also suggest sensitivity of future events. In addition to the expected strong emotional arousal resulting when highly arousing negative or erotic images appear on the screen, some studies have shown increased arousal shortly before the picture to be displayed is even selected. There has not yet been a formal meta-analysis of presentiment studies; however, in his literature review, Bem (2011) reports that out of 24 studies conducted before 2009, nineteen were in the predicted direction and about half were statistically significant. Bem himself conducted nine precognition experiments, which essentially “time-reversed” well-known psychological effects so that the individual’s response was obtained before the casual stimulus occurred. He reported that all but one of the experiments yielded statistically significant results, and the corresponding statistic across all of the experiments was $p = 1.34 \times 10^{-11}$.⁶ More recently,

⁶Efforts are underway to replicate Bem’s results.

Mossbridge, Tressoldi, and Utts (2012) conducted a meta-analysis of reports published between 1978 and 2010 and found evidence of shifts in physiological activity prior to stimulus, indicating an “unexplained anticipatory effect.”

The evidence for telekinesis or mind–matter interaction is substantial, yet more mixed than the previous categories discussed above. These include dice tossing experiments, tests on the effects of intentions on random number generator devices, and tests on double slit diffraction. Radin and Ferrari (1991) conducted a meta-analysis on all random dice tossing experiments to investigate the question of whether human intention can influence movement of macroscopic objects in our world. The authors combined the results from 73 publications representing 52 investigators from 1935 to 1989. Overall, they found small but statistically significant results; the odds that chance alone could produce the results were 1 in 10^{-96} . The results remained significant when the authors altered the analysis by selecting subsets of investigators, discarding studies with unusually strong effects, and compensated for possible file-drawer omissions.

Important innovations in mind–matter interactions were led by the Princeton Engineering Anomalies Research Laboratory (PEAR) in the late 1990s. Experiments there were designed to test the mental influence on devices which produce streams of random 1s and 0s, generated by quantum processes.⁷ Robert Jahn and colleagues published a review of 12 years of experiments of attempts to mentally influence these random number generators. Although the effect size was small (one bit out of 10,000 being shifted away from chance expectation), the *p* value for the composite effect across the databases over a 12-year investigation was reported to be approximately 6.99×10^{-5} (Jahn, Dunne, Nelson, Dobyms, and Bradish, 1997, p. 349). However, a joint effort by three labs (including PEAR) at replication using similar design and equipment failed to find significant results (Jahn et al., 2000).

Other attempts to explore mind–matter interactions have incorporated beams of light aimed at a double-slit apparatus. The double-slit experiment is one of the cornerstone investigations that have led to our understanding of quantum mechanics. Some arguments for mind–matter effects have invoked the “consciousness collapses the waveform” explanation from quantum mechanics; thus the double-slit experiment arguably provides an especially interesting arena for testing. Ibsison and Jeffers (1998) investigated the effects of participants’ attempts to influence through intention the interference pattern within Young’s double-slit experiment. Ibsison and Jeffers conducted the experiment at York University, while Jahn and his colleagues used the same setup at

⁷This random number generating process is based on a microelectronic diode creating noise signals, which in turn are processed into random 1s and 0s. The quantum nature of the circuit is responsible for the true randomness of the output. I will discuss quantum mechanics in more detail in a later section of the paper.

Princeton. Ibson and Jeffers reported the results from both laboratories. The interference fringe pattern observed at York University was statistically indistinguishable from typical interference patterns, while the results at the Pear lab showed a marginally significant deviation (p value of 0.05). Recently, Radin et al (2012) conducted another version of the double-slit interference pattern; their results were strongly significant with a p value of 6×10^{-6} .

This brief survey suggests that while some evidence supports mind–matter interaction, there is a replication issue. Advocates of psi have argued that experimenter effects, such as the beliefs and expectations of the researchers, as well as those of the participants, must be assessed. Indeed, a casual reading of the studies presented here reveals that researchers (in most cases) made little effort to maintain consistency of training and general atmosphere with participants in their experiments.

Rosenthal's (1976) review of "experimenter effects" across a wide range of experimental psychology and clinical research has demonstrated that experimenter's expectations and attitudes can affect the outcome of experiments. Research into experimenter effects has revealed a number of interesting patterns through which experimenters may communicate with participants in ways that influence their behavior. The possibility for some psi mechanism to be the result of artifacts is certainly consistent with Rosenthal's findings, although these effects have seldom been explored.

However, the examinations Wiseman and Schlitz (1997, 1999) and Schlitz et al. (2006) have been an exception. In these studies, Wiseman (a skeptic) and Schlitz (a psi advocate) collaborated, using identical procedures and participants, to test whether simply observing participants without their knowledge could induce a physiological response. The participants' galvanic skin response was electronically recorded while being watched by either Wiseman or Schlitz from a separate room linked by closed-circuit television. Schlitz obtained results significantly different from normal readings in two of the three experiments; however Wiseman found no differences in any experiments.

Smith (2003) explored the likelihood of the experimenter effect in the psi literature. He found that explanations such as errors or fraud could not explain the existing data. Smith also reported studies of successful attempts to increase psi performance through affecting the expectations of the participants (Parker 1975; Taddonio 1976). In a study where experimenters were guided to be "friendly" and "supportive" or "unfriendly" and "abrupt," participants in the former scored significantly better in ESP tasks than in the latter condition (Honorton et al., 1975). Overall, Smith argued that psi mechanisms may account for some experimenter effects and that the matter requires more investigation.

However there is another class of mind–matter experiments that merits attention. Roger Nelson and his colleagues have expanded mind–matter research to investigate the effects of shared emotions of groups on random number generating

devices (Nelson and Bancel, 2008; Nelson et al., 1996, 1998). While these experiments differ in a number of ways from Jahn's investigations, they use the same technology. Nelson's field experiments using random number generating devices might arguably be interpreted as an extension of Jahn and Dunne's mind-matter experiments. An interesting distinction, however, is that the hypothesis explores the link between shared emotion or coherent attention among groups of participants, rather than the intentions of individuals, with the output of these devices.

In a number of field studies, groups of various kinds, including meditation and sacred ceremonies, have registered small but significant shifts in the random output of these devices. Radin (2006, p. 183) notes that over 100 field-consciousness experiments have been reported in the United States, Europe, and Japan, strongly suggesting that "coherent group activity is associated with unusual moments of order in RNG output." In one particularly comprehensive study, Nelson et al. (1998) conducted field tests using a variety of groups and venues, including group rituals, healing sessions, sacred sites, and theater. The authors report results that yield a composite probability against chance for p values of 2.2×10^{-6} (p. 435). In another field study involving a large number of participants practicing transcendental meditation, the cumulated output of a random number generating device for over 94 hours was examined for possible effects. The reported deviations showed significant non-randomness with $p < 0.00001$ (Mason, Patterson, and Radin 2007, p. 295).

Nelson and others have expanded this research to a global scale through the Global Consciousness Project. Over the past ten years a network of random number generating devices have been implemented across the globe to measure deviations from chance in response to collective emotions or attention triggered by important world events. While the global design of Nelson's vast network of random number generators may not eliminate experimenter effects, its large scale most likely reduces the overall influence that any single experimenter might have. Not only does the global scale of the experiment prevent Nelson or any of his assistants from excessively influencing participants, the populations presumably affecting the devices had no knowledge they were participants.⁸

Nelson and Bancel (2008) reported the results of the Global Coherence Project, recording random streams generated during 256 events in its first nine years of operation. The results strongly support the hypothesis of coherent attention or emotional response corresponding to deviations in network output; the combined

⁸May and Spottiswood (2011) challenge the claim that the experimenter effect can play only a small role in explaining the Global Coherence Project result. They argue the case where the experimenter (Nelson, for example) unconsciously uses precognition to select events that are found to be significant. Nelson (2011) and Bancel (2011) responded that the data demonstrate real effects within the random number generating network that cannot be accounted for by fortuitous selections of events.

statistic exceeds what chance would predict by 4.5 standard deviations, with a corresponding p value of 3×10^{-6} . While the event effect size is small (0.3) and broadly distributed, the large number of observations from the global network provide sufficient statistical power to confirm the overall effect. Nelson and Bancel also report that the effect is due almost entirely to variation between random number generating devices, rather than to the individual devices themselves.

Thus the data from the field studies and the Global Coherence Project support the hypothesis that shared emotions do affect to a small degree the physical processes underlying the random number generating devices. This in turn appears to support the claim that, with the experimenter effect playing a smaller role due to the project design, consciousness can have influence on such devices. The field experiments have some additional interesting characteristics that I will explore later. However, the important point here is that the weight of the data appears to support mind–matter interactions. This class of psi experiments, however, still requires more investigation with serious attempts to incorporate the experimenter effect.

Psi and Theories of Consciousness

The evidence yielded by telepathy and clairvoyance research casts doubt against purely materialistic explanations of consciousness. Telepathy experiments have generally been designed to rule out any known sort of transmission of information, including electromagnetic radiation. In most ganzfeld experiments, for example, the shielding around the receiver blocks electromagnetic transmission. Yet the overall evidence on telepathy indicates that some sort of congruence between minds does occur, albeit at modest rates above chance. Further, the remote-viewing experiments suggest that minds have access to knowledge of the physical world that is equally anomalous. Perhaps consciousness might have field properties. However, the strength of physical fields, such as electromagnetic and gravitational fields, diminishes with distance. Yet distances appear to have no effect on the results reported in telepathy and remote viewing experiments. Taking seriously the cumulative evidence on telepathy and clairvoyance means exploring unconventional means through which are our minds are connected.

However, it is doubtful that telepathy and clairvoyance can help us choose the best alternative between dualism, panpsychism, neutral monism, or idealism. Tart (2009) and Carter (2012) have argued that the psi evidence on telepathy best supports some sort of view of dualism. Stapp (1993) incorporates the evidence from quantum mechanics (not psi) to also advance an argument for dualism. However, these authors do not consider alternatives such as panpsychism or neutral monism. According to Griffin (1997), the psi evidence does indeed favor panpsychism over dualism. Perhaps most importantly, the unsettled issues regarding how mind and matter interact under dualism make attempts to either accept the interaction or reject it problematic, given the psi evidence.

Let us consider again the random number generator field experiments, as well as the Global Coherence Project pioneered by Nelson and his colleagues. Recall that the evidence from the Project supports the hypothesis that shared emotions, triggered by important world-wide events, significantly affect the output of a global network of random number generating devices. I have already noted a number of interesting features that distinguished this class of experiments from other psi experiments. First, the scale of the Global Coherence Project experiments suggests that any possible experimenter effect plays a considerably smaller role. Second, participants (that is, the general population) are completely unaware of the experiment. Third, the experiments are designed to gauge the effects of emotions (or coherent attention) rather than intentions on physical random processes. The devices produce a stream of random output based on quantum noise. This implies a link between emotions, which are relatively unconscious states, and physical processes at the quantum level.

An important additional difference from other psi categories is revealed as the nature of these experiments is examined more deeply. The fact that conscious intention is absent calls into question what sort of information transfer (if any) is involved in the random number generator field experiments. As discussed above, most psi phenomenon can be understood as a process of anomalous information transfer. The ganzfeld studies, for example, attempt to test whether a receiver in a slightly altered state of consciousness can accurately receive images from a sender. Yet the underlying random number generator field experiments seem to imply a different underlying process. In these cases, shifts in shared emotion or meditative states are affecting physical random processes at subatomic levels. With conscious intention uninvolved, the effect appears to be a byproduct of shared emotional states by groups of people.

Note that this effect does not hinge on a particular technology or physical process. Deviations from randomness due to healing attention have been reported with random number generators using Geiger counters as well as astrocyte brain cells (Radin, Taft, and Young, 2004). Of course, there is no conventional theory why shifts in the emotional states of large numbers of people should have any effect on such random physical processes. And there is no reason to believe that the probability distributions governing these random processes used in the experiments are the only thing being affected. Such shifts in probability distributions are likely indicative of effects on a wide range of physical processes at the subatomic level. Thus these detections of deviations in probability distributions across a widely scattered network of devices imply that shifts in shared emotional and attentive states are likely affecting far more: the probability distributions governing the behavior of subatomic particles for (perhaps all) the physical matter in the area of influence, albeit by a tiny degree. Thus it appears that groups of people sharing a kind of experience are, without intending to, somehow shifting the probabilities in the world around us.

By affirming a link between the underlying processes of matter and emotion (rather than conscious intention or thought), the random number generator field effect suggests a remarkably intimate relationship between mind and matter. This demonstrates a more unified view of reality than other mind–matter experiments (as well as the rest of psi) suggest. Thus, overall the scales appear to tip in favor of panpsychism or neutral monism. In addition, these experimental results damage the case for idealism, or at least those versions where the physical world is supported by conscious attention. Below I will develop a model of neutral monism that I believe is most consistent with these results.

Neutral Monism and Quantum Mechanics

One of the most influential works advancing the argument for neutral monism is Bertrand Russell's (1927) *The Analysis of Matter*. Russell positioned his argument by noting that a growing gap has emerged between our most direct sense experiences (which he referred to as “percepts”) and our understanding of the world based on physics, comprised of abstract formulas and equations. In his words: “Physics, in itself, is exceedingly abstract, and reveals only certain mathematical characteristics of the material with which it deals. It does not tell us anything as to the intrinsic character of this material” (Russell, 1927, p.10). Russell also argued that knowledge of objects such as subatomic particles is characterized by their relations to other physical entities or dispositional roles. Thus while this relational and dispositional view of physics provides an elegant understanding, it is silent on the essential stuff that comprises matter.

Russell disagreed with those who claimed that the phenomenal and the physical world must be distinct:

To assert that the material must be very different from percepts is to assume that we know a great deal more than we do in fact know of the intrinsic character of physical events The gulf between percepts and physics is not a gulf as regards intrinsic quality, for we know nothing of the intrinsic quality of the physical world, and therefore do not know whether it is, or is not, very different from that of percepts. The gulf is as to what we know about the two realms. We know the quality of percepts, but we do not know their laws so well as we could wish. We know the laws of the physical world, in so far as these are mathematical, pretty well, but we know nothing else about it. If there is any intellectual difficulty in supposing that the physical world is intrinsically quite unlike that of percepts, this is a reason for supposing that there is not this complete unlikeness. And there is a certain ground for such a view, in the fact that percepts are part of the physical world, and are the only part that we can know without the help of rather elaborate and difficult inferences. (pp. 263–264).

Thus Russell argued that sense experience and matter are closely related. He argued that the phenomenal, or something close to it, is likely the intrinsic aspect of the physical world missing from our understanding from physics, based

on relational and dispositional frameworks. Thus matter and awareness are perhaps intermixed on the most basic levels of reality. Taking one step more, both matter and mind are aspects of some neutral substance. Our best route to understanding this foundational stratum underlying both mind and matter are to consider current theories of the subatomic realm, which is addressed by quantum mechanics.

Currently no clear consensus exists among physicists for a satisfactory explanation of quantum mechanics. While quantum theory possesses features that still puzzle us, copious experiments have confirmed the validity of its mathematical rules. The conventional or Copenhagen interpretation, due largely to Neils Bohr, frames a given quantum system as a wave function that represents a superposition of possible vector states of the system. Unlike classical systems, quantum systems are essentially probabilistic, with no way to predict which possible state will eventually manifest. According to this conventional interpretation, the wave function evolves smoothly in time until a measurement occurs. At this point the wave function instantaneously collapses into the state that is observed.

While the standard interpretation has been very successful in capturing the quantum behavior of subatomic particles, it remains unpalatable in a number of respects. The superposition of vector states suggests an ontology very different from our ordinary world. Schrödinger famously captured the awkwardness of the theory with his thought experiment of an unfortunate feline existing in a state of being both alive and dead. Putnam (2005, p. 624) describes Einstein's discomfort with this and reports that Einstein remarked to him on a visit: "Look, I don't believe that when I am not in my bedroom my bed spreads out all over the room, and whenever I open the door and come in it jumps into a corner."

Another problem is that in this interpretation, a measurement changes the state of a system in a way that cannot itself be described by the theory itself. Because whatever measuring apparatus we choose is also composed of particles like those within the system under investigation, there is nothing to suggest how a physical measuring apparatus can somehow instigate a collapse of the wave function. However, the special role that measurement plays in quantum theory has opened the door to an interesting, albeit controversial possibility: that the consciousness of the observer plays a role in the collapse. Von Neumann (1932) first suggested that the observer's consciousness is involved in the collapse, and Wigner (1967) expanded on this. Stapp (1993) has recently promoted this view, building on Von Neumann's framework. While this view currently attracts few physicists, it may yet provide some utility given the difficulties with alternative explanations, as well as the data I have reviewed that supports mind-matter interaction.

Einstein, Podolsky, and Rosen (1935) argued that quantum mechanics could not be complete because the theory implied nonlocal behavior among particles within a quantum system. Einstein et al. argued that quantum theory implied

that measurement of a particle that shared a quantum system with another particle would lead to the collapse of states for both particles, even if the two had moved some distance apart. This behavior, according to Einstein, would imply an instantaneous exchange of information between the particles in a way that violates special relativity. However, the work of Bell (1964) showed that particles within a quantum system are indeed entangled as quantum mechanics predicts.⁹

Naturally, attempts have been made to find a more attractive approach. One relatively prominent alternative is Everett's (1957) interpretation, which dispenses altogether with the wave function collapse due to measurement. That is, Everett proposed that Schrödinger's wave function provides a complete description of the physical state of the world. However, the implication this raises is that the world is in a superposed state, even at the macroscopic level. Thus Everett's many worlds proposal postulates that the world is in a superposition of states that are continuously evolving in different ways. While invoking multiple worlds to explain quantum mechanics may seem to be an extreme violation of Occam's razor, Everett's approach offers a simpler theoretical framework that is in some respects more congruent with aspects of classical physics than is the Copenhagen interpretation.

David Bohm (1952) provided another theory to avoid the collapse of the wave function by invoking hidden variables. This work led him to invoke a quantum potential function that governed quantum events deterministically; quantum uncertainty was rooted in the uncertainty of the particle's position. Despite its attractive features, Bohm's hidden variables features has not attracted a strong following, possibly because Bell (1964) showed that such frameworks still retained nonlocal features.

However, Bohm (1980, 1987) and Bohm and Hiley (1993) later expanded on this work in a way that is consistent with the neutral monism framework I wish to consider. Bohm and Hiley utilized the notion of wholeness within quantum systems to describe an "implicate order," the enfolded organizing source through which the physical world emerges. The implicate order contains "active information" that governs the quantum potential function and provides a bridge between mind and matter. Thus Bohm and Hiley (1993) concluded that mind and matter were two sides of one overall process. In their words:

Active information can serve as a kind of bridge between these two sides. These latter are however inseparable, in the sense, for example, that information contained in thought, which we feel to be on the mental side, is at the same time a related neurophysiological, chemical, and physical activity . . . (p. 384)

⁹However, nonlocality of entangled particles does not imply the possibility of transmission of information in a way that would violate relativity.

Aspects of this later work retain a deterministic flavor through Bohm's choice of metaphors to describe the implicate order.¹⁰ However, he later clarified that the implicate order was a realm of possibility: "we are saying that the implicate order will have to contain within itself all possible features of the explicate order as potentialities, along with the principles determining which of these features will become actual" (Bohm, 1987, p. 41).

Stapp (1993) also explored a framework that supports an interaction between potential and actual aspects of reality. Building on interpretations of quantum mechanics that consciousness plays a role in the collapse or reduction of the waveform, Stapp developed a quantum mechanical theory of consciousness, which he associates with dualism. However, in a later work, Stapp explored a model that might be closer to the neutral monism described here.¹¹ To do this Stapp incorporated some aspects of Whitehead's process philosophy that he believed meshed with the relativistic quantum field theory. Stapp notes that Whitehead's ontology draws a distinction between "continuous potentialities" versus "atomic actualities," and the interaction of these two provides the foundation for the evolution of events. In Stapp's words: "This basic autogenetic process creates the new actual entity which, upon the completion of its creation, contributes to the potentialities for the succeeding actual entities" (Stapp, 2007, p. 90).

Bohm and Stapp each explore frameworks, grounded in quantum theory, which possess a stratum consisting of potentialities serving as a foundation for our familiar physical world. In both frameworks, this foundation possesses conscious or proto-conscious aspects and transcends the spatial dimension. Hameroff and Penrose (1996) developed another view of neutral monism, drawing on quantum mechanics. They describe a psycho-physical bridge as the quantum space-time geometry at the Plank scale, the ground state of all configurations of matter and energy. According to their model, conscious experience emerges from a sort of quantum computing within the brain's microtubules. Tegmark (2000) has argued that the brain's warm temperatures do not allow a sustained quantum collapse for the duration of time required for neural processing. However Hagan, Hameroff, and Tuszyński (2002) have replied that under reasonable conditions, the superposition within microtubules might be isolated from the brain. I will argue however that the sketches or proposals by Bohm and Stapp are

¹⁰For example, Bohm (1980) and Bohm and Hiley (1993) describe drops of color embedded in a fluid contained in a cylinder. The drops are invisible until the cylinder is rotated sufficiently to reveal the drops. Another metaphor Bohm uses is the holographic plate that can be used to construct a three dimensional object. The metaphors are interesting and illuminating but do not suggest an inherently probabilistic reality.

¹¹Stapp (2007, p. 83) relates his correspondence with Heisenberg who encouraged him to pursue something similar to Platonic idealism, which might support ideas existing outside the human mind.

similar to the simple framework I've sketched above, and may be more useful than the model proposed by Hameroff and Penrose in explaining psi.

Toward building a serviceable model of neutral monism, a number of features of quantum mechanics suggest characteristics that a neutral ground underlying mind and matter might have. First, I will speculate that the probabilities described in the standard framework of quantum mechanics (which all corresponding theories must account for) must reside at this more fundamental level of reality. Like Bohm and Hiley suggest, this stratum can be seen as pure potentia, the seed stuff for reality itself, which in turn requires an information-rich domain that supports these probabilities and hence the possibilities of physical reality. While such a realm may possess randomness, especially within the framework of experiments, the phrase creative unpredictability might be a better description. In addition, this ground would exhibit the non-local features observed in quantum mechanical experiments. The relationship between information residing within this field and objects of the physical world would transcend space as we experience it.¹² Also, and this is crucial for our purpose here, this neutral stratum in some sense possesses mind-like attributes.

The question arises whether this neutral bridge itself is in some sense conscious. Or alternatively, since I am conjecturing potential matter stuff, the question might be whether this neutral stratum is potentially conscious (and thus not quite conscious). Those that have considered neutral monism have not suggested a clear path forward. Rather, they have typically acknowledged the possibility that something like consciousness resides within this foundational stratum or elements exist which combine to produce conscious states. As Chalmers simply puts it when describing the implications of Russell's monism, "On this view, phenomenal or protophenomenal properties are located at the fundamental level of physical reality and in a certain sense, underlie physical reality itself . . ." (2003, pp. 129–130). Hammeroff and Powell (2009) use nearly the same language: "Consciousness or its 'proto-conscious' precursors are . . . somehow built into the structure of the universe . . ." (p. 109).

Williams James, a proponent of neutral monism, used language suggestive of something conscious. James used the phrase "pure experience" to describe the state that is prior to any categorization, neither mental nor physical. As James describes, "The instant field of the present is at all times what I call the 'pure' experience. It is only virtually or potentially either object or subject as yet. For the time being, it is plain, unqualified actuality, or existence, a simple that" (James, 1904, p. 23).

From his studies of anomalies in consciousness and psychological case studies, F.W.H. Myers developed a framework that handled the question of conscious

¹²With respect to the neutral ground, I use the word "field" differently from its conventional use, which conveys a physical quantity with definite mathematical properties extending throughout space. In this case, I am using the word to describe the non-locality of the proposed ground.

or unconscious with respect to deeper levels of reality, in an innovative way. While it's unclear whether Myers embraced neutral monism as did James — his contemporary — nevertheless his approach isn't inconsistent with James's in many respects. Myers argued that the brain functions as a filtering mechanism for a "a more comprehensive consciousness, a profounder faculty, which for the most part remains potential only . . ." (Myers, 1903, p. 12). However, Myers preferred to avoid such terms such as "unconscious" or "subconscious" when referring to this more comprehensive level. Believing such words to be inadequate, he proposed the term "subliminal" to distinguish those portions of consciousness not identifiable with ordinary awareness. Thus Myers' provocative ideas suggest we are connected to something conscious that is nevertheless inaccessible to our ordinary consciousness.¹³

A key problem in making progress with this question is the fact that we simply do not perceive consciousness outside our own experience. Philosophers of mind cannot deduce where to draw the line between conscious and non-conscious within the animal and plant kingdom.¹⁴ Thus discussions on the phenomenal or proto-phenomenal properties remain abstract speculation. However, the framework I am outlining does suggest a possible way forward. The neutral bridge, the foundation of both mind and matter, is by definition in direct contact with our own consciousness. Thus, first person inquiries or phenomenological approaches might yield insights about this most basic stratum that elude more objective, scientific methods. Subjective techniques to directly inquire into the nature of this stratum might include meditation or entheogens. While such approaches may be unconventional with respect to conventional methodologies, they should not be dismissed lightly if this monism framework should prove useful in other respects. Nevertheless, this opens up many questions and issues that deserve careful consideration in a separate piece. For purposes here, I will follow Chalmers and Hammeroff and use the term proto-conscious to convey the precursors of conscious experience, while also acknowledging that such precursors might also be conscious in some sense.

Neutral Monism and Psi

Here I wish to examine how a version of monism based in a non-local proto-conscious field of potential can aid us in understanding the random number generator field effect and other categories of psi. With this view, the underlying stratum of potentia contains both the quantum mechanical probabilities governing subatomic particles, as well as the non-local relationships among them. This field

¹³Kelly et al. (2009) have reviewed and summarized the work of Myers and present considerable evidence, not available in his time, that support much of his framework.

¹⁴Additionally, panpsychists might suppose that minerals possess rudimentary levels of awareness.

of proto-consciousness is also the basis for various sorts of conscious experiences. This is not an atomistic view of panpsychism advocated by Griffin (1998), where complex aggregates of consciousness emerge from smaller units. Rather, I am suggesting that the spectrum of different states of experience or consciousness emerge as various biological structures engage with this proto-conscious field.

This nonlocal, field-like, version of neutral monism provides to us a means to capture the nonlocal features of psi. That is, the proto-consciousness through which the consciousness of individuals operate, presumably allows telepathy and other psi-related transfer of information. Of course it has already been suggested that the non-local features of quantum mechanics might hold important clues toward understanding psi. However, we have to be careful with such explanations. Quantum entanglement does imply a faster than light action between particles; however, entanglement cannot be used to send messages between physical particles. But this neutral foundation I am proposing need not be subject to this constraint. Minds rooted in this base stratum need not either.

Another important feature is that this framework allows us to sidestep the combination problem, a serious obstacle facing more atomistic versions of panpsychism. Instead of having to explain how aggregates of psycho-matter units lead to various rich, unified states of consciousness, the proposal here is that such experiences are produced by this non-local stratum of proto-consciousness, functioning through organic structures.¹⁵ In addition, we avoid the implication that inorganic materials such as rocks must have some experiential component. The proto-conscious field aspect of our framework gives us some flexibility that allows us to avoid such counterintuitive possibilities.

Discussions about the nature of consciousness generally focus on the lived experience of the individual (human or animal). The evidence on psi suggests an aspect of our consciousness that is shared. In the case of the random number generator field experiments, shared emotions across a population have an effect on material processes at the quantum level. The deviations from chance observed across the network of devices are correlated with events that trigger an unusual amount of shared emotion. How and why emotion plays such a key role is important to understand. Emotion is arguably that part of our experience that is most closely connected to our bodies, and this is of interest because our exercise here has been something of an exploration of the junction between matter and consciousness. In addition, a much wider spectrum of living organisms experience emotion rather than cognition, which only we experience. Emotion is also undeniably rooted in our more unconscious processes. Finally, emotion is part of our being through which we appear to experience events such as football games, weddings, and inspirational speeches, collectively with others. Through

¹⁵Such organic structures, of course, in this framework are rooted or emerge from the underlying protoconsciousness through some means which we do not here specify.

emotion we not only have experiences, we share experiences. Taking all this together suggests that emotion encapsulates that portion of mental life that is primitive, basic, and rooted in a deeper part of ourselves. The proto-conscious field must be intimately linked with emotion.

An increase in the coherence of a particular emotion across a population might naturally result in a shift or disturbance being applied across this proto-conscious field, given its non-local ontological status and its close relationship with emotion. This shift at this neutral foundation of mind and matter, which according to our reasoning also sustains the mechanisms described by quantum physics, could thus impact the probabilities governing the behavior of subatomic particles, and therefore all matter. Thus shared emotion within a framework of neutral monism could conceivably affect outcomes of probability processes at the root of the physical systems within the vicinity of the disturbance. And these shifts would be detected by a network of devices producing streams of random numbers through quantum processes, such as the Global Coherence Project.

An appealing feature of this model is its simplicity. My explanation of the random number generator field effect is essentially driven by a view of consciousness that at some level is unified with the probabilities underlying matter itself. Thus any shifts or disturbances in the underlying proto-conscious foundation as proposed also affect the probabilities underlying matter. Of course this rather simple model may eventually require additional structure and refinement. However, simplicity is an important virtue, and we should take stock of what this simple model can help us understand before going further. Helping to conceptualize a link between shared emotion and quantum probabilities is a good first step.

Two categories of psi that have provoked the strongest opposition are mind-matter interaction and precognition (or presentiment). The problem with the former is the claim that actions at a distance can occur that appear to be completely at odds with our experience and the laws of physics as we currently understand them. The problem with the latter is even more serious, suggesting that information of future events can somehow travel backward in time to the present. Such a finding could lead to problems and paradoxes with notions of causality.

This framework suggests that mind-matter interactions can be explained by exploiting the intimate relationship between conscious experience and a non-local proto-conscious field containing the probabilities underlying physical systems. The framework suggests that intention can affect those probabilities. Indeed, Jahn and Dunne (2011) explored various experiments that demonstrate such a link between intention and random processes rooted in quantum mechanics. Other random experiments, such as throwing dice, might be explained through intrinsic randomness that is nevertheless involved. Essentially, an individual's intention must be linked with the underlying probabilities residing within the proposed proto-conscious field that are associated with the event. This interpretation linking conscious intention with the probabilistic world of quantum

mechanics may help place testable restrictions on observations for future mind–matter experiments.

The model also suggests a more palatable interpretation of the precognition and presentiment experiments than one arguing that we can perceive future events; rather, this framework suggests we can perceive current probabilities of future events. This interpretation should be more palatable (although still controversial) because quantum mechanics already puts on the table the idea that probabilities underlie the most foundational aspects of matter. Precognition and presentiment may reflect an ability to perceive such probabilities residing within a non-local field of awareness.

This version of neutral monism, depicting the foundation of reality as potential mind–matter stuff, also helps us understand telepathy and clairvoyance. Relevant probabilities for future events must contain accurate information of the world as it is. Thus there is nothing about the experimental results regarding telepathy and clairvoyance that runs counter to this notion of monism. In fact, probabilities are inextricably linked with all of the psi data obtained through laboratory research. This is usually understood as an inevitable result of extracting information from a noisy process. The present framework suggests another interpretation: probabilities, as quantum mechanics suggests, may be intrinsic to the underlying reality that binds us together.

This interpretation is congruent with Carpenter's (2012) comprehensive psychological theory of psi. Carpenter uses the extant psi evidence to present a model of the mind where unconscious mechanisms evaluate and weigh various streams of information at stages as they rise in our consciousness. Processing information through psi occurs at an early stage in Carpenter's framework. As he describes, "The initial psi stage of the process involves an access to potential knowledge that is indefinite in extent. We cannot know its boundaries, or anything else about it, since it is thoroughly unconscious" (2012, p. 116).

Implications for Quantum Mechanics

Recall that while both versions of neutral monism via Bohm and Hameroff were rooted in quantum mechanics, neither was developed with the intention of explaining psi phenomena. Further, it isn't clear that the Hameroff and Penrose theory can be expanded to allow for the kind of mind–matter interaction I reviewed earlier. Hameroff and Penrose describe objective reduction as a process originating from the Plank scale within the brain's microtubules that creates the experience of consciousness. With causality running this direction, it is not clear how conscious intention might affect the probabilities residing within the neutral stratum underling mind and matter.

On the other hand, the frameworks of Bohm and Stapp appear flexible enough to accommodate psi experiments. Those sympathetic to a view of reality

that supports mind–matter interactions often invoke the conventional theory of quantum mechanics, which invokes the waveform collapse. However, as I have noted, Bohm's later work describes an implicate order as a foundation of wholeness embracing both mind and matter. While he does not invoke the waveform collapse, the underlying unity between mind and matter within his framework nevertheless supports psi phenomena. In fact, Bohm (1990) himself has speculated how his notion of the implicate order could be used to understand the psychokinesis data.

It is less clear how this model fits with the conventional waveform collapse descriptions of quantum mechanics. Like the proposed framework, waveform collapse models see indeterminism as an inherent aspect of reality. There are different mechanisms of collapse, however. Wigner (1967) and Stapp (1993) have argued that the consciousness of the observer plays an essential role in the collapse of the waveform. As noted, this interpretation has natural appeal for a theory of psi. However, the theory does not just imply that consciousness affects matter or provides a mechanism for information transfer; the theory implies that the stable feature of matter that we experience requires the consciousness of the observer. However, the random number generator field effects suggest that collective or shared emotions (which might be unconscious) may affect quantum mechanical probabilities. Thus the role that consciousness plays in psi may not be congruent with the waveform collapse theories favored by Wigner and Stapp.

The interpretation proposed here is likely most problematic to the Everett or many-worlds explanation of quantum mechanics. Recall for this theory that the probabilistic feature of quantum mechanics implies multiple worlds or universes; every possible state described by the quantum mechanical equations exists. This interpretation clashes with the view developed here (based on psi evidence) that groups sharing emotions can affect quantum probabilities. Thus it appears (perhaps ironically) that taking the psi evidence seriously leads us toward accepting a more common sense view of reality.

Conclusion

The intractable nature of the explanatory gap between subjective experience and everything we know about matter will likely remain until more radical views on matter are considered. I argue here that the literature on psi helps to provide some useful direction for this problem. While serious discussion of psi remains taboo in many quarters of academia, the cumulated evidence does confirm significant effects (albeit small or modest). Thus a strong attachment to purely materialistic explanations of consciousness appears unwarranted. Including the results from random number field experiments field experiments and the Global Coherence Project, we must confront a view where the most subtle processes of matter are deeply intertwined with consciousness.

Skeptics of psi have often argued that accepting such evidence requires a revision of everything we know. Such arguments assume, however, that more orthodox theories completely and satisfactorily explain our world. This is of course not the case for two areas of interest most closely related to psi: consciousness and quantum mechanics. As I have attempted to show, an examination of psi will likely help shed light on the mysteries in those areas as well. We must consider the possibility that the mysterious natures of each of these are rooted in a common source.

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Critical Notices
Book Reviews
Book Notes

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Butterfly in the Typewriter: The Tragic Life of John Kennedy Toole and the Remarkable Story of *A Confederacy of Dunces*. Cory MacLauchlin. Boston and New York: Da Capo Press, 2012, 319 pages, \$26.00 hardcover.

Reviewed by Leslie Marsh, University of British Columbia

The book is not autobiography; neither is it altogether invention. While the plot is manipulation and juxtaposition of characters, with one or two exceptions the people and places in the book are drawn from observation and experience. I am not in the book; I've never pretended to be. But I am writing about things that I know, and in recounting these, it's difficult not to feel them.

No doubt this is why there's so much of [Ignatius] and why his verbosity becomes tiring. It's really not his verbosity but mine. And the book, begun one Sunday afternoon, became a way of life. With Ignatius as an agent, my New Orleans experiences began to fit in, one after the other, and then I was simply observing and not inventing

John Kennedy Toole [pp. 178–179]¹

Where does the boundary between the protagonist George Arthur Rose (*Hadrian the Seventh*, 1904) and his creator Frederick Rolfe (a.k.a. Baron Corvo) lie? The same question can be asked of a handful of other twentieth-century literary titans, including Franz Kafka, Robert Musil, and Yukio Mishima. Joseph K. has been taken to be Kafka's alter ego in *Der Prozess* (*The Trial*, 1925), as has Ulrich in Musil's *Der Mann ohne Eigenschaften* (*The Man Without Qualities*, 1930–1942), and Kochan for Mishima in *Kamen no Kokuhaku* (*Confessions of a Mask*, 1949). To this very select group one

The discussion here has benefited from the generous comments made by Cory MacLauchlin, Aaron Mishara, Jane Bethune and especially Corey Abel and, as ever, David Hardwick, my University of British Columbia colleague. Last, but by no means least, Raymond Russ the editor of *The Journal of Mind and Behavior*, who so meticulously engaged with me over the course of nine months on both substantive and stylist aspects. The usual disclaimers apply. Correspondence concerning this article should be addressed to Leslie Marsh, Office of the Special Advisor for Planning, Dean's Office, Medical School, University of British Columbia, 317–2194 Health Sciences Mall, Vancouver, British Columbia, Canada V6T 1Z3. Email: leslie.marsh@ubc.ca

¹All page numbers that appear in brackets refer to MacLauchlin, 2012.

must add John Kennedy Toole and his creation Ignatius Reilly in *A Confederacy of Dunces* (1981).²

One cannot help but feel that one is communing directly with Toole when Ignatius opens up his feverish letters with “Dear Reader,” a style of writing that displays a conceptual precision and biting observation that is more plausibly Toole than the whimsy of Ignatius. This autoscopic³ phenomenon had particularly deep implications for Toole, clearly exacerbated by a prevailing cultural antipathy to an autotelic⁴ conception of aesthetic experience. This Gordian knot of the autoscopic and the autotelic presents a philosophical minefield for any would-be biographer.

With this in mind, Cory MacLauchlin’s new biography judiciously and deftly fills the lacuna between the low-grade psychological speculation that marred an earlier biographical work (René Pol Nevel and Deborah George Hardy’s *Ignatius Rising*, 2001)⁵ and the unabashedly affectionate but still informed memoir by Joel Fletcher entitled *Ken and Thelma: The Story of A Confederacy of Dunces* (2005). The former, an exercise in “farthing” journalism, shamelessly rides on the coattails of *Confederacy*. The latter was issued as a promissory note, awaiting someone with the right motivation and finesse to come along: MacLauchlin’s book fulfils this promise.

The discussion that follows is very much in keeping with MacLauchlin’s own methodological stance, sidestepping the hackneyed trope of the troubled artist: “I neither aimed to diagnose him, nor cast him in the mold of the tortured artist” [pp. xiv, 216]. The body of discussion falls broadly into two sections. In the next section I discuss the notion of autoscopia as it relates to literature, discussing the “blurred” sense of self between the author and his creation. The section that follows focuses on the notion of autotelic art, the idea that art should *not* answer to any extrinsic considerations, political, economic, or scientific. This scaffolds the publishing backstory to *Confederacy* and the role of the didactically inclined editor — Robert Gottlieb — the then head (1957) of Simon and Schuster. The closing section offers a few concluding remarks.

The Autoscopic Author

A small but growing empirically orientated academic literature on autoscopic phenomena exists (Aglioti and Candidi, 2011; Anzellotti, Onofri, Maruotti, Ricciardi, Franciotti, Bonanni, Thomas, and Onofri, 2011; Dieguez, 2013; Garry, 2012; Occhionero and Cicogna, 2011; Sacks, 2012; Sforza and Blanke, 2012). It is a phenomenon that has implications not only for clinical psychology but also for philosophers of mind and identity theorists (Mishara, 2009).

²All references refer to the 1981 UK edition, first published in the United States by Louisiana State University Press in 1980.

³“Autoscopic”: from the Greek *autos* (self) and *skopeo* (looking at). A dream-like apprehension of a duplicate self. Other literary names that are invoked in connection with autoscopic phenomena include Dostoevsky, Goethe, Hoffmann, de Maupast, de Musset, Nabokov, Poe, Richter, Shelley, and Stevenson (Mishara, 2010b; Sforza and Blanke, 2012).

⁴“Autotelic”: Greek *autos* (self) and *telos* (end). A self-complete artifact that doesn’t depend on any extrinsic considerations.

⁵As MacLauchlin summarizes it: “[T]hey also depict Toole as a man suffering from an Oedipal complex, suppressed homosexuality, alcoholism, madness, and an appetite for promiscuity” [pp. xiii–xiv, 214–216]. But even a clinical psychologist such as Mishara resists the idea of diagnosing Kafka’s supposed schizophrenia on the basis of his literary work (Mishara, 2010a, p. 24).

That Toole's family had a history of mental disorder is beyond doubt: Toole's father exhibited severe bouts of ever-deepening paranoia, his great uncle committed suicide before Toole was born and his uncle George on his mother's side, was deemed to be profoundly mentally ill [pp. 28–29, 75, 189–199, 205–206, 222–223]. Of course, this alone didn't necessitate Toole's eventual mental decline but it certainly suggests that he was predisposed, a disposition that must surely have been activated by the protracted dealings with Robert Gottlieb.⁶ As already indicated the discussion that follows is not an assessment or diagnosis of Toole's descent into mental illness per se but in his total psychological (autoscopic) investment or immersion in his work, a phenomenon that is not necessarily indicative of any mental illness.⁷ It behooves one to explain in what sense we will be discussing autoscopic phenomena, a notion that has profound implications for philosophical conceptions of the self.⁸

A leading autoscopic theorist is Aaron Mishara: Mishara will be my primary guide on the grounds that: (a) he not only happens to have a deep interest in autoscopic phenomena in a literary context, most notably in the work of Franz Kafka (Mishara, 2010a); (b) Mishara also understands that the phenomenon can only really be approached from a phenomenological perspective and; (c) he retains a contextual awareness of the differing levels of description that any discussion of the self involves. In a nutshell, Mishara's project takes literature as a document and as a record of "cognitive and neural processes of self with an intimacy that is otherwise unavailable to neuroscience" (Mishara, 2010a, p. 3). The discussion on offer here is suggestive, it is a first pass for a larger project, and in no way approximates Mishara's close-grained study of Kafka.⁹

In very generic terms, autoscopia connotes a cluster of experiences whereby a "double," external to one's perceptual (visual or somatosensory) apparatus, is discernible. Medically speaking, the etiologies of autoscopic phenomena are many and not necessarily related: the range includes epilepsy, brain tumors, labyrinthine vertigo, schizophrenia, depression, drug intoxication, trauma-related dissociative experiences, the hypnagogic/hypnopompic hallucinations associated with sleep paralysis, and in individuals with high fantasy proneness (Mishara, 2010b, p. 592). Mishara proposes a fourfold idealized taxonomy, of course more holistic as a phenomenological experience (Mishara, 2007, 2010b, pp. 593–606).¹⁰

⁶"He had suffered a nervous breakdown in the offices of Simon and Schuster" [p. 177].

⁷"The lifetime prevalence of autoscopic phenomena is approximately 10 per cent. The phenomena are not necessarily pathological and can occur in the healthy population, for example when drifting into or out of sleep. However, the phenomenon can also be a manifestation of a neurological or psychiatric disorder" (Garry, 2012, p. 17). Furthermore, "Irrespective of aetiology, the clinician must be mindful that autoscopic phenomena are associated with an increased risk of suicide" (Garry, 2012, p. 21).

⁸Phelan (2003, p. 132) talks of a multileveled rhetorical doubling in Nabokov's *Lolita* involving author and audience on the one hand and narrator and audience on the other hand.

⁹Mishara brings a fascinating fact to our attention. He writes: "Kafka was familiar with the phenomenological movement or at least some of its principles. Nevertheless, he was skeptical about any effort to observe and put subjective experience into words: 'There is no such thing as observation of the inner world, as there is of the outer world The inner world can only be experienced, not described'" (Mishara, 2010a, p. 13).

¹⁰From the first-person point of view (i.e., phenomenology) the structure of consciousness is experienced as a holistic experience, whatever the modular architecture of the mind that may be posited.

- (1) Type I: Visual hallucinatory autoscopia
 - I is mirrored by a me (body or self as object)
- (2) Type II: Delusional (dream-like) autoscopia (usually called heautoscopia)
 - I becomes a me, i.e., the mirror image (ironically) of the other I who usurps the feeling of being a self
- (3) Out of body experience
 - The I separates from the physical body and views it from an elevated position: I (body as subject) and me (body as object) are experienced as separate
- (4) Feeling of a shadowy presence
 - Another I is sensed but not seen

Based upon MacLauchlin's excellent reconstruction of Toole's writing process (and shadowed by some excerpts from *Confederacy*), Toole falls more or less into Type II. Type II autoscopic "doubles" are accessible to all perceptual modalities. I put the term "double" in scare quotes because it gives the impression of a mirror-like exactitude. It should be noted that the double need not resemble the subject's outward appearance — the sartorially dapper Toole [p. 167] is very much at the opposite end of the spectrum to his alter ego Ignatius Reilly's gait and presentation.¹¹ Furthermore, age and gender are not material to the double. What of course matters is that the double's personality and worldview are more or less aligned. In short, autoscopic experience does not depend on *the phenomenological characteristics of the spectre but on how the subject constitutes the experience* (Mishara, 2010b, p. 597, emphasis in original). This form of autoscopic experience has more in common with a dreamlike state, feeding off the actual state of consciousness of the ontologically real persona.

Three aspects of Kafka's writing *modus operandi* as presented by Mishara strongly resonate with Toole's:

1. Kafka deliberately scheduled his writing during the night in a sleep-deprived state; deprivation may serve as a non-drug "psychotomimetic" model.
 - a. Toole: "and now it had unleashed with consuming urgency . . . could hear the clacking of the typewriter at all hours of the day and night . . ." [p. 151].
 - b. Toole: "Writing feverishly, I have completed three chapters . . ." [p. 152].
 - c. Toole: "The 'creative writing' to which I turned about three months ago in an attempt to seek some perspective upon the situation has turned out to have been more than simple psychic therapy" [p. 155].
 - d. Toole: "Russy noticed that there was a 'remoteness' about him . . . for a moment she thought he might be depressed. What she previously identified as depression, she now recognized as an astoundingly deep immersion in his manuscript. She noticed that Toole acted as if his mind was split between reality

¹¹Bobby Byrne (a teaching colleague of Toole's) and Maurice Duquesne, a professor of English at the University of Southwestern Louisiana, were both credible candidates for aspects of Ignatius to have been based upon [pp. 10, 48, 151, 166, 173]. In much the same way, there is the temptation to definitively pry apart the Wittgenstein–Oakeshott amalgam that supposedly inspired the character Hugo Belfounder in Iris Murdoch's picaresque novel *Under the Net* (1954).

and his book, not as if he couldn't distinguish between the two, but because he had poured his soul into the novel. "The center of his existence had become his book," she observed. "When he walked on campus, he looked straight forward, not making eye contact, and every once in a while he would kind of chuckle to himself as if something just struck him as absurd" [pp. 168–169].

2. Kafka is avoidant of unnecessary stimulation; the avoidance or withdrawal from photic and social stimulation; for Kafka, a prerequisite for the self-induction of hypnagogic-like trances.
 - a. Toole: "It is rolling along smoothly and is giving me a maximum of detachment and release from a routine which had long ago become a somewhat stale second nature" [p. 152].
 - b. Toole: "In the unreality of my Puerto Rican experience, this book became more real to me than what was happening around me; I was beginning to talk and act like Ignatius" [p. 155].
 - c. Thelma "noticed something different about him. He seemed quieter, as if completely absorbed by his book" [p. 165].
 - d. "While Toole's writing had provided him relief, it also caused him to retreat . . . he became further detached from everything and everybody" [p. 156].
3. Kafka marveled at the automaticity of his own writing.
 - a. Toole: "I am writing with great regularity. It seems to be the only thing that keeps my mind occupied; I have never found writing to be so relaxing or so tranquilizing . . ." [p. 152].
 - b. "The language started to pour out. Pent up energies of a decade flowed, filling page after page . . ." [pp. 2, 182].

In Kafka's work, the writer's self is doubled in the protagonist in different ways. The narrator's and protagonist's perspectives collapse into one another; the protagonist stands in for the author as a double, but takes on a life of his own (Mishara, 2010a, p. 28). Again, consider Toole and others' thoughts on the matter:

- c. Toole: "Whenever I attempt to talk in connection with *Confederacy of Dunces* I become anxious and inarticulate. I feel very paternal about the book; the feeling is actually androgynous because I feel as if I gave birth to it" [pp. 177, 219].
- d. MacLaughlin: "In a twist of roles, Toole, who had spent so much time observing people around him, had placed himself into his character he created to re-envision his world" [p. 179].
- e. Toole: ". . . but since something like 50 percent of my soul is in the thing" [p. 180].
- f. "And at times he could take on that supercilious tone so evident in Ignatius Reilly" [pp. 167, 154–155].
- g. "Seemingly at a loss as to how to edit his novel without destroying it, unable to spill the blood of his creation, his master plan now lay unraveled in his hands" [p. 187].
- h. "He was not egotistical, but it was something deeper. He believed in the exceptionalism of the book, but he had anxiety about it. It had very much to do with his identity and profound sense of self. It seemed he had given himself over to his creation, as if the actual people surrounding him were shadows

and the truth lie in the pages that he continued to edit. It was not a task to display his literary prowess. He had created something far more alive than an academic argument" [p. 169].

- i. "In 1980 in the *Bloomsbury Review*, Michael O'Connell merges the author and protagonist into a single entity, claiming, "Toole-Ignatius despises living in the world, inveighs and scolds; Ignatius in his Big Chief diary and Toole in his fiction'" [p. 234].

Artistically speaking, autoscopic phenomenon is not confined to the literary realm. In much the same way as Toole became so closely identified with Ignatius, so too did David Bowie with his fictional rock star Ziggy Stardust. The best example from the realm of cinema is that of Klaus Kinski with his deep association with a screen character (*Aguirre, der Zorn Gottes* among others), further complicated by Kinski being Werner Herzog's alter ego, starkly set out in the documentary *My Best Fiend* (see Atkinson, 2006, p. 16).¹²

Autotelic Art

Robert Gottlieb, the then rather young editor at Simon and Schuster who registered appreciation of *Confederacy* but who made such heavy weather of dealing with Toole's manuscript, is the most troublesome part of the tripartite of the major personalities — i.e., John Kennedy, his mother Thelma, and Gottlieb.¹³ MacLauchlin's advocacy on behalf of Gottlieb, trying to give a fair and balanced account of his role, is most admirable, but ultimately it doesn't ameliorate Gottlieb's failings. John Fletcher (Toole's chum) makes the point in Sanford's documentary on Toole that in all probability it wasn't Gottlieb's decision alone, but a committee decision to pass on *Confederacy*. There is much to commend this view were it the current state of affairs but I think that it is undermined by Gottlieb's then status. Furthermore, the nature of the correspondence shows him for the most part to be representing himself.¹⁴ Gottlieb's faltering ruminations on *Confederacy* range from the obscure to the banal interspersed with blatant arrogance. Gottlieb's dilly dallying was a function of his calcified urbane smugness. Despite his ostensible sophistication, he was philosophically ill-suited to be arbiter of *both* literary merit and marketability — therein lies the rub. Had he definitively chosen one or other as the imperative rather than make each of these domains somehow conversable or "reconcilable," then Gottlieb would pretty much be absolved of professional ineptitude. Had he not been beset by philosophical confusion he'd have made *qualitative* considerations the *only* imperative. *Confederacy* may have sold in respectable quantities; it might have been a "sleeper"; or it might have fallen, as Hume famously said of his *Treatise*, "dead-born from the press." But

¹²As Atkinson says "... maybe Kinski knew Herzog well enough to see within his friend dynamics and impulses that matched his own, even if Herzog was able to contain and channel his impulses effectively" (2006, p. 16). Herzog admits as much in the documentary.

¹³I have nothing to add to MacLauchlin's excellent characterization of the familial dissonance that Toole was subject to: "he had mired under the binds of filial duty" [p. 219].

¹⁴These days, decisions clearly are committee decisions, few (if any) editors or agents having the power that Gottlieb could wield.

unless it *was* on the market there would be *no way* to gauge its commercial possibilities.¹⁵ MacLauchlin comments that “Gottlieb must have become fatigued with the indulgences writers afforded themselves as they operated in a creative pursuit initially outside the marketplace” [p. 180]. Tiresome as *primo uomo* behavior is, Gottlieb mistook Toole’s comportment for self-indulgence; he was uncomfortable with Toole’s existential investment in the work and tacitly found *Confederacy’s* philosophical orientation falling foul of the prevailing progressivism zeitgeist. (Ignatius’ scheme “to save the world are more about legitimizing [his] own place in society, rather than a sincere attempt at social reform” [pp. 200–201].¹⁶ Even if driven purely by marketocratic considerations, Gottlieb should still have *required the book to be published*. Gottlieb’s problem was that he never dispensed with the masquerade of qualitative considerations, “a midwife to the creative process” [p. 170]. No-one, and especially Gottlieb, could have foreseen the number of copies *Catch-22* sold.¹⁷ The veneer of artistic nurturing is as disingenuous as Metro–Goldwyn–Mayer’s motto *ars gratia artis*.

MacLauchlin is well aware of the bind that an editor of Gottlieb’s standing must have felt — that is, negotiating the conflicting teleology of art and commerce [pp. 171, 176, 202, 214, 235]. MacLauchlin provides an eminently fair assessment of Gottlieb’s social role and to an extent sketches Gottlieb the man, but in my view, MacLauchlin is way too magnanimous. MacLauchlin’s magnanimity is, I surmise, informed by the fact that Gottlieb: (a) is still alive and active; (b) has ostensibly cogitated over this story now for most of his life; and (c) has generously not only granted permission to publish portions of his Toole correspondence¹⁸ but entered into correspondence with MacLauchlin, no doubt not an easy psychological place to revisit after some 40 years.

Bereft of any sound artistic or commercial rationale from Gottlieb, Toole himself “confesses that he felt ‘somewhat like a bouncing ball,’ never finding a clear path to gain Gottlieb’s approval” [p. 180].¹⁹ Toole was *never* going to secure that approval: Gottlieb himself was conceptually stuck and ultimately compromised any ethical high ground he might have claimed by resorting to the feeblest of reasons for not getting the book into print. As Michael Oakeshott writes:

¹⁵“The sale of my writings may bring some profit” (Toole, 1981, p. 195). “Oh, of course. There are all of my notes and jottings. We must never let them fall into the hands of my mother. She may make a fortune from them. It would be too ironic” (p. 333). “What had once been dedicated to the soul was now dedicated to the sale” (p. 25). “I would like very much to know what the Founding Fathers would say if they could see these children being debauched to further the cause of Clearasil” (p. 37). “Ain’t he writing something?” “Some foolishness nobody never gonna feel like reading” (p. 174).

¹⁶This liberal doxy must be impaled upon the member of a particularly large stallion” (Toole, 1981, p. 185). This perceived anti-progressivist or, perhaps more accurately, anti-consumerist stance (Leighton, 2012; McCluskey, 2009) has commonalities with a mélange of social satire: Chappism, Dadaism, The Goon Show, Monty Pythonism, Peter Cook, and Wodehousianism.

¹⁷Heller lost out to Walker Percy’s *The Moviegoer* (1961) for the National Book Award. Indeed *Catch-22* never entered the *New York Times* Bestseller List and didn’t become a best seller until it appeared as a paperback (Daugherty, 2011). It was, of course Percy, who championed *Confederacy* and who eventually wrote the forward to the first edition. Irony upon irony.

¹⁸Unlike Neil and Hardy who did not [p. xiii, 260].

¹⁹“Gottlieb’s fluctuations between praise and critique drove Toole’s mother wild” [p. 176].

The changes poets are apt to make in their work are not, strictly speaking, “corrections.” That is to say, attempts to improve the “expression” of an already clear mental image; they are attempts to imagine more clearly and to delight more deeply (1991, p. 525, note 24).

This is echoed by noted Toole scholar Jane Bethune:

He [Gottlieb] just said, it needs more work, it needs more work. And as an artist I don't think that Toole was ready to do that. Nor should he have because what he had was a gem, a masterpiece. And he knew it. But the authority figure didn't know it and asked him to do something else with it – which would have destroyed it.²⁰

It was of course Gottlieb's prerogative to pass on *Confederacy* and, had he done so, his reputation would have been only slightly dented since all top-tier editors have passed over a work that has gone on to be either a critical or commercial success under the aegis of another editor and publisher. But instead Gottlieb opted for what would be the most inappropriate course of action: that is, suspending *Confederacy* (and Toole) in a slowly suffocating limbo.²¹ Gottlieb's attempt to assuage Toole rings hollow: “We can't abandon it or you (I will never abandon Mr. Micawber)”²² [pp. 174, 242]. Gottlieb in one short comment reveals his arrogance, certainly not tempered by a passive-aggressive “compliment”: “Not that I'm not good at my job, because I am and no one is better; but that I'm just someone, and a great deal less talented than you” [p. 181]. It really is beside the point that “. . . while Gottlieb has long been vilified as the one that ruined Toole, there was no way for him to understand the pressure building inside the Toole home” [p. 186]. Gottlieb's stance is a good example of what Sartre termed as *mauvaise foi* or “bad faith.” Gottlieb's supposedly having “taste and decency” failed Toole as an editor and as a man.

From the perspective of a profoundly injured mother with a provincial sensibility, Gottlieb — the literary establishment's top gatekeeper — was bound to be a convenient focal point of frustration and demonization, even though she herself wanted her son

²⁰Bethune speaking in Joe Sanford's documentary *John Kennedy Toole: The Omega Point*: <http://jktoole.com/johnkennedytoolehome.html>. Oakeshort reminds us of Orbaneja the painter's dictum in *Don Quixote* “whatever it turns out to be” (1991, p. 527). “Thou art right, Sancho,” said Don Quixote, “for this painter is like Orbaneja, a painter there was at Ubeda, who when they asked him what he was painting, used to say, ‘Whatever it may turn out; and if he chanced to paint a cock he would write under it, ‘This is a cock,’ for fear they might think it was a fox. The painter or writer, for it's all the same, who published the history of this new Don Quixote that has come out, must have been one of this sort I think, Sancho, for he painted or wrote ‘whatever it might turn out’ . . . (Cervantes' *Don Quixote*, chapter LXXI). This also brings to mind Magritte's painting “The Two Mysteries” (1966) whereby an image of a pipe and the words “Ceci n'est pas une pipe” on a stretched canvas resting on an easel (referencing an earlier painting by Magritte) together with, as part of the larger canvas that we are contemplating, a significantly larger pipe. I note that Hofstadter (1979, p. 701) and Mishara (2010a, p. 35) also find this painting referentially intriguing.

²¹ “. . . I am apparently trapped in a limbo of lost souls. However, the simple fact that they have been resounding failures in our century does give them a certain spiritual quality” (Toole, 1981, p. 195). “My psyche would crumble in that atmosphere” (p. 181).

²²Gottlieb's condescension is palpable in his self-cast allusion to Dickens' Mrs. Micawber: “I will never abandon Mr. Micawber!” [p. 181].

to capitulate to Gottlieb's editorial demands with the hope that would get the book into print. MacLauchlin is absolutely right to give short shrift to the idea that there was a single direct causal link between Gottlieb's rejection of *Confederacy* and Toole's tragic demise [pp. 213–214, 235, 241–242]. But while Gottlieb rightly should be absolved of being the single sufficient determinate to Toole's demise, it was a demise that in all likelihood was overdetermined: there was more than one antecedent event, any of which would have been a sufficient condition for his early death.

Gottlieb commits an *ignoratio elenchi*, the problem of irrelevance, a notion that Michael Oakeshott had in mind in his defense of art from the debasing tendencies of those who'd make art answerable to politics or commerce. In his essay "The Voice of Poetry in the Conversation of Mankind,"²³ Oakeshott sets out the philosophical confusions, that arbiters and doorkeepers such as Gottlieb (and these days "literary" agents) are prone to (Oakeshott, 1991, pp. 488–541).²⁴

First, aesthetic experience is essentially a contemplative attitude of "delight." As such, if art is to maintain its authenticity, it should not be subject to propositional incursions from the scientific, historical or the practical (political or economic).²⁵

Second, as an experience of delight it does not involve the bifurcation of first the experience and contemplation thereof, followed by a rendering (expressed, conveyed, mimicked, copied, reproduced, exhibited): there is no undifferentiated poetic imagination, never mere entertainment nor merely the conveyor of wisdom.

This threefold outlook protects the independence and as a consequence the authenticity of the aesthetic, even "radical" imaginings, for if we really did already know the nature of things through other forms of experience, there would be no space at all for the aesthetic vision (Oakeshott, 1991, p. 523). This is what is meant by autotelic art or more familiarly the sloganized *l'art pour l'art*.²⁶

With this let us examine the main lines of criticism Gottlieb leveled at *Confederacy*. I deal with them in order. First, the book's length; second, Ignatius; third, the Jewish characters; fourth, the picaresque plotting; and fifth, the lack of meaning.

That the length of the book [p. 174] was even considered an issue, smacks of insincerity, an excuse that has little or no substantive validity to the execution of *Confederacy*. What is the metric? The 1994 edition of *Catch-22*, running to 519 pages, exceeds the length of *Confederacy*.

Regarding the character of Ignatius, Gottlieb writes: "He is not as good as you think he is. There is too much of him" [p. 174]. Where shouldn't Ignatius be? This

²³Originally published as a self-standing monograph in 1959, latter collected in the volume that made Oakeshott (1962).

²⁴For a fine-grained explication of Oakeshott's aesthetics see Abel, 2012.

²⁵Though Oakeshott did not dwell on the commercialization of art, he would accept, for example, that a gallery owner must face the problem of how to sell and market art, even art that understands itself and is understood as non-practical.

²⁶This notion has provenance in Edgar Allan Poe (2009), *The Poetic Principle*. Reprinted in *Edgar Allan Poe: Critical Theory, the Major Documents*, Stuart Levine and Susan Levine, Eds. Chicago: University of Illinois Press, pp. 175–211; Walter Pater (1980), *The Renaissance: Studies in Art and Poetry*, Donald L. Hill, Ed. Berkeley and Los Angeles: University of California Press, p. 190; James A. McNeill Whistler (1967), *The Gentle Art of Making Enemies*. Mineola: Dover; and T.S. Eliot in R. Badenhausen (2005), *T.S. Eliot and the Art of Collaboration*. Cambridge: Cambridge University Press.

just doesn't make any sense if one grasps the autoscopic nature of the work as set out in the previous section.

This thread-bare rationale gives some credence to Toole entertaining the impression that Gottlieb was harboring a sub-text motivating his disapproval, namely "that Gottlieb never accepted the novel on the basis of its representation of Jews, particularly Myrna Minkoff and the Levys" [pp. 241–242].

Gottlieb never provided any rationale for the ambivalence he had about these characters, which only succeeded in sowing seeds of self-doubt in an already fragile Toole. It is fair to surmise that Gottlieb's response was at base a conditioned, synthetic hypersensitivity to anything that might vaguely have a whiff of anti-Semitism, a phenomenon that Toole sensed while teaching at Hunter College.

Minkoff is a social type: she is brazen, brassy and belligerent. She is *equally* bright and amusing. Despite Gottlieb's ambivalence it is *Myma* who comes to Ignatius' rescue from the mental asylum horrors that are about to befall him.²⁷ Mrs. Levy, arguably the most obnoxious of *Confederacy's* characters, has a gauche though well-meaning obsession for the well-being of Miss Trixie, the senile octogenarian assistant accountant. And it is through Gus Levy that Burma Jones, no more than "worm sweat" on the New Orleans "social totem pole," at last receives a deserved hand up. As with *all* of the characters, they are shot through with unremitting frustrations, rich instantiations of the crooked timber that is humanity.

It is astounding that Gottlieb and colleagues failed to contextualize *Confederacy* within the highly distinguished tradition of the picaresque novel. *Confederacy* is about everything — and nothing. The almost cartoonish carnival of characters are different lenses through which to delight in this kaleidoscopic parade called humanity harking back to Don Quixote [pp. 162, 233, 256]; (see also Percy in Toole, 1981, p. vi; Leighton, 2011, 2012). "From this vast parade, Toole selected, merged, refined, and wove characters together with all the absurdities that form the human condition" [p. 151]. Toole "developed a sensitive ear and a sharp eye for the subtle quirks in a personality, even in a city brimming with eccentrics" [pp. 2, 227].

Gottlieb was flummoxed by the book's ostensible lack of meaning, a not dissimilar scenario to the *Seinfeld* episode wherein Jerry and George pitch a show "about nothing" to NBC executives.²⁸ "There must be a point to everything you have in the book, a real point, not just amusingness forced to figure itself out," writes Gottlieb [p. 172, my emphasis]. Had Gottlieb grasped the notion of the picaresque, the vulgar demand for meaning would be redundant. It is no wonder that "Gottlieb seems at a loss as to how to direct Toole" [p. 174]. Perhaps a "moral" of the story is "that striving was meaningless" (Toole, 1981, pp. 106, 255, 203) and that life so portrayed is a process, not a destination.

²⁷A novel contemporaneous with *Confederacy* was *One Flew Over the Cuckoo's Nest*, the protagonist, McMurphy, reflecting much of Ignatius' imaginings. "They would try to make me into a moron who liked television and new cars and frozen food. Don't you understand? Psychiatry is worse than communism" (Toole, 1981, p. 263). "Once your case was in the psychiatric journals, they'd be inviting him to Vienna to speak" (p. 306). "It was just like her, with the very best of intentions, to have her child harnessed by a straightjacket and electrocuted by shock treatments" (p. 329). "A hose would be turned on him. Some cretin psychoanalyst would attempt to comprehend the singularity of his worldview." "In a mental ward they tampered with your soul and worldview and mind" (p. 330). "Every asylum in this nation is filled with poor souls who simply cannot stand lanonlin, cellophane, plastic, television, and subdivisions" (p. 263).

²⁸"The Pitch," the third episode of the fourth season.

Be this as it may, “meaning” is not “something expressed” or “something derived” from aesthetic experience — a conception that wouldn’t have satisfied Gottlieb’s didactic impulse. This might explain why under Gottlieb, George Deaux’s *Superworm* (1968) saw the light of day *Confederacy* did not. MacLaughlin summarizes the contrast as follows: in *Superworm*, the plot drives the characters whereas in *Confederacy* the plot is the medium — requiring time, space, patience and a willingness to enter into sympathetic alliance with the characters [p. 201]. Had Toole assimilated all of Gottlieb’s suggestions, *Confederacy* would be a very different book and, as has already been said, the worse for it.

In language and tone Toole would have relished, the most scathing characterization of traditional editorship (and now their outsourced acolytes, literary agents) comes from the great Latinist A.E. Housman:

An editor of no judgment, perpetually confronted with a couple of MSS. to choose from, cannot but feel in every fibre of his being that he is a donkey between two bundles of hay. What shall I do now? Leave criticism to the critics, you might say, and betake himself to any honest trade for which he is less unfit. But he prefers a more flattering solution: he confusedly imagines that if one bundle of hay is removed he will cease to be a donkey.

So he removes it. Are the two MSS. equal and do they bewilder him with their rival merit and extract from him at every other moment the novel and distressing effort of using his brains? Then he pretends that they are not equal: he calls one of them “the best MS.,” and to this he resigns the editorial functions which he is himself unable to discharge. He adopts its readings when they are better than its fellow’s, adopts them when they are no better, adopts them when they are worse: only when they are impossible, or rather when he perceives their impossibility, is he dislodged from his refuge and driven by stress of weather to the other port.

This method answers the purpose for which it was devised: it saves lazy editors from working and stupid editors from thinking. But someone has to pay for these luxuries, and that someone is the author; since it must follow, as the night the day, that this method should falsify his text. Suppose, if you will, that the editor’s “best MS.” is in truth the best: his way of using it is nonetheless ridiculous. To believe that wherever a best MS. gives possible readings gives true readings, and that only where it gives impossible readings does it give false readings, is to believe that an incompetent editor is the darling of Providence, which has given its angels charge over him lest at any time his sloth and folly should produce their natural results and incur their appropriate penalty. Chance and the common course of nature will not bring it to pass that the readings of a MS. are right wherever they are possible and impossible wherever they are wrong: that need divine intervention; and when one considers the history of man and the spectacle of the universe I hope one may say without impiety that divine intervention might have been employed better elsewhere. How the world is managed, and why it was created, I cannot tell; but it is no feather-bed for the repose of sluggards.

Apart from its damage to the author, it might perhaps be thought that this way of editing would bring open scorn upon the editors, and that the whole reading public would rise up and tax them, as I tax them now, with ignorance of their trade and dereliction of their duty. But the public is soon disarmed. This planet is largely inhabited by parrots, and it is easy to disguise folly by giving it a fine name. (1961, pp. 35–37)

Thelma Toole was very much more laconic. “When asked why she thought so many publishers rejected *Confederacy*, she answered, ‘Stupidity!’” [p. 225], no doubt Gottlieb being the preeminent instantiation of . . . a dunce. One would have thought that the intervening years had given Gottlieb some wisdom as opposed to a false modesty. In an interview from 1994 Gottlieb says of himself:

I used to feel I was a fraud because I had had so much success and done so little to deserve it. And then I realized, you don't have to be a genius to be an editor. You don't have to have a great inspirational talent to be a publisher. You just have to be capable, hard-working, energetic, sensible, and full of goodwill. Those shouldn't be rare qualities, and they don't deserve a lot of credit, because you're either born with them or you're not. It's luck. And that's why you can be as good an editor your first day on the job as on your last; you're not developing some unique and profound gift.²⁹

What is one to make of this? By his own admission, superficially Gottlieb is deep; deep down he's superficial: picking books as bestsellers might just as well be akin to a chimp picking "hit" television shows.³⁰ Whatever achievements Gottlieb can legitimately claim, the irony is that Toole and he are welded together, a relationship that will forever color Gottlieb's legacy (*Catch-22* notwithstanding) — all because of a book he *didn't publish!*³¹

Concluding Thoughts

The phenomena of the autoscopic and the autotelic was perhaps too rich a mix for Gottlieb, a rarified psychological state that is incongruent with the neat and tidy categories that the *business* of publishing demands. Exceptional writers need exceptional editors: how different would the world's intellectual landscape have been were it not for the insight and foresight of Max Brod, Kafka's literary executor?³² Whatever the flaws of *Confederacy* they do not detract from the palpable quality of the writing, the authenticity of the voice and the sheer delight millions of readers from many countries and all walks of life, have derived from reading it. *Confederacy* was a promissory note for greatness that came perilously close to oblivion.

Given his elusive quarry and the complex issue of Thelma Toole's highly modulated interpolation, MacLauchlin has offered up a meticulously researched and elegantly written biography, an exemplar of good taste and connoisseurship. Perhaps one of the best compliments one could pay MacLauchlin is because of his very Oakeshottian assessment of Toole's distinctiveness:

His predecessors, such as William Faulkner and Tennessee Williams, had missed the greatest lesson of New Orleans: that its texture does not come from its gritty underbelly but rather from its centuries-long ability to enfold new voices, while never losing track of its elaborate roots, a cultural value that comes from living on the edge of existence. [p. 163]

²⁹<http://www.theparisreview.org/interviews/1760/the-art-of-editing-no-1-robert-gottlieb>

³⁰I refer to the Disney film *The Barefoot Executive* (1971).

³¹Even after *Confederacy* saw the light of day, the rather awkward comments by luminaries such as Andrew Sinclair, Christopher Wordsworth, Harold Beaver, and Anthony Burgess gracing the cover of the Penguin edition of *Confederacy* suggest that they (and Penguin) never properly understood the novel and/or its creator either.

³²See: http://www.nytimes.com/2010/09/26/magazine/26kafka-t.html?ref=magazine&_r=0 and the follow up story: <http://www.nytimes.com/2012/10/15/world/middleeast/woman-must-relinquish-kafka-papers-judge-says.html>

Unlike many, MacLauchlin rejects the idea that ascriptions of genius cannot be based upon one novel: "And if we base our measure on quality, then the prolific writer has no more value within the literary canon than the individual who composes a single masterpiece" [p. xii–xiii]. Maybe Gottlieb has come round to this view.

While MacLauchlin's *Butterfly* is a very different creature from A.J.A. Symons' classic biography of Rolfe (*The Quest for Corvo: An Experiment in Biography*, 1934), MacLauchlin is more than adept at wonderful turns of phrase. MacLauchlin's book should be a standardly prescribed text for any writing or literature course: it works as a biography but perhaps more importantly as a compelling account of the sociology of the publishing industry. Would-be writers should be skeptical of literati dedicated to promoting the insipid, the earnest, the theory-laden, and the overly detailed. As Housman asserts, since editors set themselves up as sophisticates, their intellectual vulgarities are heightened.

Walker Percy and Thelma Toole would be gratified to know that Toole's life has at last received some deserved coherence: a sensitive, balanced, though not uncritical assessment of the brightest of shooting stars.³³ Toole would be right at home with the Scriblerians, friends that included Swift and Pope. Swift, of course, provided the title to *Confederacy*. Pope's phrase "Who breaks a butterfly upon a wheel?," finds resonance in Toole's own prescient words: "Crushing a butterfly with a typewriter key."³⁴

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³³MacLauchlin rightly gives credit to the women in the Thelma–John Toole orbit for recognizing the virtues of *Confederacy*, most notably Bunt Percy who on Walker's insistence read it first and recommended it to him [pp. 227–232]. Elizabeth Corey, a well-known Oakeshott scholar and native Louisianian, identifies Percy as being a thoroughly Oakeshottian writer (Corey, 2006, p. 1). Perhaps that is why, unlike Gottlieb, he could recognize the virtues of *Confederacy*.

³⁴MacLauchlin has been instrumental in coproducing a documentary film on Toole, freely available to view at: <http://jkttoole.com/viewthefilm.html>.

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How Things Shape the Mind: A Theory of Material Engagement. Lambros Malafouris. Cambridge, Massachusetts: MIT Press, 2013, 305 pages, \$ 40.00 hardcover.

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How Things Shape the Mind: A Theory of Material Engagement represents a synthesis of the positions that the author, Lambros Malafouris, has developed over the course of his career, supplemented by the addition of new explanatory examples and unpublished chapters. The main objective of the book is to provide a unitary account of material engagement theory, the actual keystone that binds the multiple streams of argument presented by the author in his previous works. The book is organized in three main sections, which respectively take into account epistemological aspects, theoretical tenets, and empirical applications of material engagement theory.

A large part of the *pars destruens* within the book is dedicated to undermining the foundations of a mentalistic and internalist perspective in both cognitive archaeology and philosophical anthropology. Section I (chapters 2 and 3) offers a synthesis of the theoretical problems that plague these traditional approaches. At the same time, this section illustrates how material engagement theory allows us to rethink the archaeology of mind by overcoming the drawbacks with the standard proposals.

Malafouris argues against the coalescence of mutational enhancement¹ (Klein, 2008, 2009) and classic forms of evolutionary psychology (Barkow, Cosmides and Tooby, 1992) in explaining the aetiology of human cognitive becoming. He criticizes the idea that the human mind ought to be conceived as a combination of native functional modules, shaped by natural selection (e.g., Mithen, 1996). According to this perspective, the incurrence of a mutation in a hard-wired module can provide humans with appropriate representational substrates, which are then used to solve

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¹Mutational enhancement implies that human cognitive abilities can be augmented by means of selective mutations in the underlying neural architecture. Such biological alterations produce enhanced humans that are provided with a more adaptive cognitive system. This allows enhanced humans to replace the unenhanced phenotypes on the long-term evolutionary scale.

adaptive problems within the environment. The emergence of cave art in the European Upper Palaeolithic might be thus considered as the result of a passive Darwinian mechanism. Art is selected as a sophisticated behaviour that is needed to solve specific social problems, such as, for example, providing emotional stability, maximizing interpersonal bonding, or providing a non-violent context for mate-selection (Dissanayake, 2009). To these purposes humans evolve appropriate neural substrates and cognitive abilities that make them “born to artify” (Dissanayake, 1992). Equipped with such representational substrates, agents first become capable of representing an animal in memory space. That is, human agents could now be aware of the existence of a particular animal representation in their minds. Then, they could contrast the properties of pigments with those of the cave wall and infer that colours could be used to copy a representation of an animal they held in mind. In this way, humans impose an *a priori* envisaged mental image to matter.

In contrast, Malafouris proposes a theory of the engagement of humans and artefacts that combines elements of classic embodiment/extended mind with more radical aspects that aim to minimize the necessity of mental representations and computations in favour of dynamic human-artefact systems. In the three chapters that compose section II, Malafouris defines the core tenets of material engagement theory. His approach consists in providing multiple lines of argument to defend the central thesis that human minds, bodies, and artefacts are inextricably linked by a constitutive relationship. In the first place (chapter 4), Malafouris discusses the boundaries of the mind under the perspective offered by extended mind theories (e.g., Clark, 2008). He focuses on the hybridization between human bodies, minds, and artefacts to reject the idea that the mind is only limited within the head and is brain-bound. At the same time, Malafouris argues that formulating a proper theory of extended mind requires abandoning anthropocentric theories of intentionality and agency. According to these approaches, a theory of extended mind would imply that artefacts are passive items that are simply integrated within the cognitive system of the human agent, who imposes decisions onto them. In contrast, Malafouris redefines a theory of agency (chapter 6) by focusing on the active role that artefacts hold in shaping human mind and behaviour. Artefacts are thus intended to actively participate in the cognitive processes by deeply altering the dynamics of human action and perception. For instance, the clay manipulated at the potter wheel (chapter 9) does not limit itself to passively accommodating the potter’s decisions and actions. Through its properties, the clay acts upon the potter, constraining the artisan’s decision-making process and the unfolding of actions.

On these grounds, Malafouris develops the core argument that the enactive engagement with artefacts leads to the emergence of new cognitive and behavioural possibilities for human agents. The main theoretical aspects of this position are illustrated in chapter 5 and supported by means of empirical applications across section III (chapters 7–9). For example, the curved line that is painted on a cave wall during the Upper Palaeolithic brings forth to consciousness the representation of the back of an animal and enables humans to perceive a new reality, which consists of pictorial images. The image and its meaning emerge therefore as a result of human action over matter and through matter itself. This enactive approach allows humans to mentally manipulate the process of production of the same image and to start thinking about what other people think of the images. Therefore, material engagement becomes a necessary condition for the acquisition of new cognitive processes.

The entire book concerns the idea that a slow transformation of the mind, driven by material engagement, represents the engine of human cognitive evolution and leads

to the emergence of new technologies in the archaeological record. Symbolism, for example, does not result from a discrete mutational event, which provides humans with symbolic capabilities. Conversely, symbolism must be enacted through a prior stage of engagement with non-symbolic artefacts, which scaffold a gradual metamorphosis of meaning (see chapters 5 and 8 for details). Referring more broadly to the aetiology of the Middle-to-Upper Palaeolithic transition, Malafouris rules out the possibility that discrete mutations could be considered as sufficient conditions for the emergence of cognitive abilities and hard-wired adaptive behaviours that culminated in the ill-famed concept of “behavioural modernity” (chapter 10).

However, limiting the focus on the enactive signification and emergence of cognitive capabilities might lead to the opposite problem of neglecting the role that biology can play in human cognitive evolution. If biology is only one part of the story (Read and van der Leeuw, 2008), then what exactly is its role? The aim of this review is primarily to take into account the problem of biological enhancement in relation to Malafouris’ material engagement theory.

Cognitive Equivalence and Material Engagement Theory

The opposite theoretical extreme to the mutational enhancement approach in cognitive archaeology is represented by the cognitive equivalence model (e.g., Henshilwood and Dubreuil, 2011; McBrearty and Brooks, 2000). Proponents of this theory argue that artefacts commonly associated with the European Upper Palaeolithic appear in various African sites earlier in time. In particular, the gradual emergence in the African Middle Stone Age of body ornaments and patterns of marking, which have been considered symbolic, has strengthened the conviction that no form of cognitive enhancement was necessary to explain the Upper Palaeolithic technological explosion. In contrast, scholars refer to a variation in demographic dynamics (Powell, Shennan, and Thomas, 2009; Shennan, 2001) to argue that technological innovations could have been linked to social, if not simply numeric, reasons. Rather than to cognitive limitations, the limited emergence of innovations during the Middle Stone Age has been ascribed to the fact that innovators were not capable of effectively transmitting new technologies to their conspecifics. Success in technological propagation has been associated with the “learning population” size (but see Read, 2012, for a counterargument). The recent ascription of body ornaments to Late Neanderthal populations in Europe (Caron, d’Errico, Del Moral, Santos, and Zilhão, 2011; Zilhao et al., 2010) has led to further radicalize the cognitive equivalence approach. According to this perspective, known as the “cultural school,” Neanderthals also could have created “behaviourally modern” artefacts, prior to the interaction with modern humans. Such an idea was used to conclude that the fundamental bricks of modern human cognition were already present in human populations since the Middle Pleistocene (d’Errico and Stringer, 2011; Zilhao, 2011a, 2011b). I assume that the various cognitive equivalence positions share the basic conviction that a mental architecture typical of Upper Palaeolithic populations was already present in more primitive humans. At the same time, these positions differ on whether this mental architecture also applied to archaic lineages like Neanderthals.

However, cognitive equivalence proposals tend to neglect specific analyses of the mapping between mental architectures and the archaeological record (Garofoli and Haidle, 2014). While they assume that cultural, social, or demographic mechanisms are able to replace the need for mutational enhancement, they do not provide any cognitive and neurological mechanism that explains the rise of technological innovations.

The limited attention provided to what happens within the “black box” risks reducing cognitive equivalence proposals to behaviourist theories. Indeed, it might be argued that demographic/environmental variations altered human dispositions for behaviour, which in turn affected the behavioural outcomes, leading to a consequent raise in technological sophistication.

The cognitive equivalence agenda can attempt to fill this lacuna about the mechanism of cognitive evolution by focusing on the concept of metaplasticity. This notion is central to Malafouris’ book (see pp. 45–47) and stands at the crux of the neuro-archaeological approach (Malafouris, 2009, 2010a). It entails that the enactive cognitive transformation (introduced above) is supported by phenomena of neural plasticity induced by experience. These in turn lead to restructuring of both the structural and the functional brain architecture. As a result, new possibilities of technological development emerge, which produce further neural alterations, thus creating a snow-ball feedback of mutual interactions between these levels. Such a plasticity process does not simply imply a passive accommodation of the neural system to the requirements imposed by the new tasks. Most importantly, it is argued that the engagement with tools might lead to the enactive emergence of new cognitive abilities.

Malafouris gives substance to this point by referring to a body of evidence in comparative primatology (pp. 164–167). In particular, macaques have been shown to be able to embody a tool and to perceive new affordances for action that the tool provides (Iriki and Sakura, 2008). In a first experimental stage, macaques took two weeks to learn that a rake could be used to retrieve food from a location that lies beyond the reach of their arm. After this long-term engagement with the tool, however, macaques became capable of perceiving what the rake affords to do. Without any form of specific training, the monkeys immediately recognized that a rake affords taking another longer one, which in turn could be used to reach the food. This process was coupled with a functional restructuring in the connectivity of the parietal cortex. In a similar fashion, human cognitive evolution might be explained as a gradual process of plastic rearrangement of the neuro-cognitive system.

In consequence, it might be argued that the environmental and demographic variations advocated by proponents of cognitive equivalence created the appropriate conditions that led human agents to engage with some material scaffolds in the African Middle Stone Age. Innovations emerged as a result of this preliminary engagement and were coupled to the metaplastic rearrangement of neural substrates. This combination of cultural school aspects with the mechanism of plasticity suggested by Malafouris appears *prima facie* capable of explaining the technological explosion registered in the Middle-to-Upper Palaeolithic transition. In sum, the same neural architecture, shared by different human species since the Middle Pleistocene, might have gradually transformed itself by remodelling its structure through metaplastic mechanisms. This would rule out the idea that mutational enhancements of any kind are necessary for justifying the emergence of Upper Palaeolithic material culture.

However, this solution leaves room for several drawbacks. In fact, the idea that plasticity mechanisms could be advocated to reject mutational enhancements originates from a theoretical misunderstanding of some of the material engagement theory premises. It is therefore necessary to clarify this point in order to avoid confusion. In the next section, I will attempt to demonstrate that material engagement theory, and in particular the notion of metaplasticity, are orthogonal to the problem of mutational/biological enhancement and cannot be used in principle to support the existence of a mere culturally driven mechanism.

The “*Limitless Plasticity*” Fallacy

Material engagement theory adopts neuroconstructivism (Mareschal et al., 2007; Westermann et al., 2007) as a background theory for cognitive development. The main idea at the basis of this theory is that the human mind is not constituted by native modules, which are hardwired within the neural system by natural selection. In contrast, modules are *acquired* along a process of multilevel interactions, which range from the cellular level to the cultural one. Native properties of interacting neural cells, layers, cerebral regions, body systems, etc. have the role of constraining the culturally situated process of cognitive development. These biological constraints alter the probabilities that the interaction with the environment will lead to the emergence of a specific cognitive function (Gottlieb, 2007). Neuroplasticity, in turn, warrants the very existence of potentially different functional states within the same structural levels. By the lights of material engagement theory, the embodiment of artefacts in the human cognitive system represents an additional level within this intricate constructivist process.

However, a clarification needs to be provided when dealing with the neuroconstructivist account. As discussed above, this theory entails that phenomena of neural plasticity are limited by native constraints. By neglecting this critical aspect, we would be led to conclude that neuroplasticity is limitless. In this way, any structural architecture and cognitive function can be in principle constructed, if the proper conditions of human–environment interaction are provided. Such conception implies that constraints to plasticity are not native, but also acquired. Since native constraints are to be intended as physical properties and relationships between neurobiological units, we are left with the idea that some environmental interactions can upset these deep properties and adapt them to the context.

The flaw lies here in conflating the concept of “constructing” with that of “creating.” Referring to the hypothesis of neuronal recycling (Dehaene and Cohen, 2007), as Malafouris (2010a) does in one of his previous works, it is possible to have a clearer view of the problem. The very notion of recycling entails that some neural regions previously dedicated to some tasks are readapted to cope with new ones. Spelled out in neuroconstructivist terms, this implies that the interacting biological levels (cells, layers, gross architecture, etc.) warrant sufficient degrees of freedom to host a different function.

The most problematic distortion that can be made of material engagement theory lies in combining this theory with a limitless plasticity mechanism of the kind described above. In this way, material engagement would not simply elicit a recycling process, which modulates the functional relations among elements within the human brain. It would foster instead the addition of entirely new pieces of neural architecture, provided with a new set of properties and constraints. Cognitive functions that are impossible to be implemented within a specific neural architecture become possible if the proper form of engagement with artefacts is provided.

Let us consider for clarity the example of arithmetic acquisition in children. Malafouris (2012) has recently proposed that arithmetic emerges in development as a consequence of material engagement with non-symbolic tokens. Visual icons, in the form of items or even fingers, are considered to gradually bring forth to consciousness the existence of numeric symbols. Such enactive signification resonates with the hypothesis of neural recycling. Indeed, Dehaene and Cohen (2007) argued that regions in the human intraparietal sulcus are precursors to processing symbolic numerocities both at the phylogenetic and ontogenetic level. In particular, they claimed

that morphogenetic constraints within the architecture of these regions might have made them particularly suitable to host arithmetic functions. Contextualizing to material engagement theory, the regions within the intraparietal sulcus are plastically rearranged to support the enactive emergence of numbers.

Now consider the case of a human species that presents an intraparietal sulcus with a different set of morphogenetic constraints. Unlike the standard intraparietal sulcus, this region (henceforth referred to as “pseudo-intraparietal sulcus”) cannot be recycled to host symbolic numbers. Even though engaging with non-symbolic artefacts, humans provided with a pseudo-intraparietal sulcus cannot ever shift to the symbolic level, for plasticity is limited by native constraints acting on pseudo-intraparietal sulcus.

The only way to acquire symbols for these humans is to introduce the aforementioned mechanism of limitless plasticity. In this way, provided the right conditions of material engagement with non-symbolic artefacts, limitless plasticity can flank the native constraints of pseudo-intraparietal sulcus by replacing this region with a standard-intraparietal sulcus. The acquisition of symbolic numerocities becomes now possible due to the substitution of one piece of neural architecture with a more advanced one.

This mechanism of plasticity is deeply problematic, for it implies that new pieces of our brain derive from experience. Therefore no mere cultural dynamic is, in principle, sufficient to overcome the problem of biological limits to cognitive properties.

The example Malafouris provides about tool embodiment in macaques is particularly relevant to show the process of enactive signification and acquisition of new cognitive abilities. But how far can this enactive engagement augment the monkeys' cognitive systems? The crucial question lies here in individuating the architectural constraints that limit the further enaction of the macaque cognitive system. There is clearly no doubt that even the most enculturated primates cannot overcome these native limits.

A relevant example from comparative primatology can clarify the problem with the limits of enaction and plasticity. Monkeys have long been considered to be incapable of solving analogical reasoning tasks, in contrast with great apes, who instead solve these problems in a reliable way. The matter is still controversial, provided the emergence of new evidence (e.g., Kennedy and Frigaszy, 2008) that argues against the hypothesis of the “paleological monkey” (Thompson and Oden, 2000) and in contrast to theoretical responses that tend to explain this evidence away (Penn, Holyoak, and Povinelli, 2008). Truppa, Piano Mortari, Garofoli, Privitera, and Visalberghi (2011), in particular, investigated analogical abilities in capuchin monkeys held in captivity. In this study, the monkeys were first trained to solve matching-to-sample tasks of the “ $A=A$ and not B ” kind. Then, they were presented with relational matching-to-sample tasks of the kind “ $A-A$ analogous to $B-B$ and different from $C-D$.” The capuchins repeatedly engaged with a touch-screen system where the stimuli were presented and they solved the initial matching-to-sample task only after several thousands of trials. In contrast, the acquisition of matching rules never allowed them to solve the relational reasoning task, except for one subject. In this way, some critical arguments (Chemero, 2009; Penn et al., 2008) supported the idea that the cognitive limits were flanked by adopting alternative strategies, like the direct perception of figure entropy. This study provides a set of important insights. First, it shows that engagement with the experimental apparatus can lead the capuchins to acquiring at least a novel concept of “matching.” Second, it shows that native constraints in the monkeys' neural architecture, presumably related to working memory functions, impeded a straightforward acquisition of analogical reasoning. Third, it shows that the monkeys' cognitive system plastically adapted to solve the task by developing a completely new strategy. If the entropy pro-

posal is valid, monkeys might have recycled the standard matching-to-sample procedure, combining it with the perception of a new invariant element, namely the degree of order perceived within the presented stimuli.

The cases discussed with non-human primates about the limits of enaction raise similar questions when applied to the cognitive archaeology domain. Contextualizing to the example of early modern humans and ochre markings (p. 184), we might wonder whether, from an initial non-symbolic stage of engagement, these populations could acquire an understanding of true symbols without requiring any structural alteration in their brains. A similar issue emerges when taking into account Malafouris' Figure 7.4 (p. 175). In this picture, the author illustrates the enactive emergence of new cognitive abilities during the process of stone tool-knapping, arguing that:

the knapper first think through, with and about the stone (as in the case of Oldowan tool-making) before developing a meta-perspective that enables thinking about thinking (as evidenced in the case of elaborate late Acheulean technologies and the manufacture of composite tools).

This line of reasoning fosters the idea that the engagement with Oldowan stone tools gradually led to acquiring a meta-perspective, educating the attention of the human agent to shift from the stone tool as a perceptual target to the stone tool as an object of thought. However, whether this shift in perspective is possible or not, it is ultimately a matter of the architectural constraints that regulate that very transition. In this way, there is the possibility that mutational enhancement still represents a necessary condition for acquiring a meta-perspective, even though not a sufficient one, as in the old evolutionary psychology model.

On similar grounds, Malafouris' attempt to eliminate the notion of "cognitive modernity" from the cognitive archaeology vocabulary (p. 242) might be premature. No doubt that the human functional cognitive architecture could be reliably considered as the result of a slow transformative process, which argues in favour of abandoning a nativist conception of cognitive modernity. However, this dynamic variability does not apply also to the structural components of the human mind. Neuroconstructivism allows one to reject the idea that "cognitive modernity" lies in a native asset of "domain-specific" modules, which automatically give rise to a repertoire of modern-like behaviours. However, modernity of a cognitive architecture might still lie in the qualitative properties of some "domain-relevant" regions. Domain-relevant properties are to be conceived in terms of functional flexibility and species-specific constraints on such flexibility. For example, according to the "language as a cultural tool" hypothesis (Everett, 2012), linguistic capabilities are culturally constructed by tapping into regions that have sufficient flexibility to host these abilities. In consequence, it is possible that only a modern "domain-relevant asset" is sufficiently flexible to allow the acquisition of language. Conversely, primitive mental architectures might have insufficient degrees of freedom to support linguistic capabilities, if not subject to a release in their native constraints.

By these lights, technological innovations in human evolution might still require a modern domain-relevant architecture to be developed, which in turn implies natural selection to be obtained. In this way, it appears that the metaplasticity mechanism proposed by Malafouris is orthogonal to the problem of mutational enhancement as a necessary condition to human cognitive evolution.

Future Directions

Malafouris' material engagement theory has two important implications. From one side, it provides persuasive arguments to reject the ill-famed idea of the "magic mutation," as well as neuroreductionist and determinist positions in the anthropological domain (Tallis, 2011). From the other, Malafouris' proposal does not provide an argument for the cognitive equivalence thesis, because it does not necessarily replace the need for mutational enhancement with a mere mechanism of neural plasticity. In fact, the notion of metaplasticity is compatible with the idea that material engagement actively created selective pressures for releasing biological constraints in the brain of extinct hominids. The resulting neural architectures might have offered the proper substrates for the enaction of more sophisticated cognitive processes (see also Hutchins, 2008, p. 2018, for a similar conception of biological fine-tuning). Therefore, a neural system such conceived ought to be sufficiently plastic to accommodate a required alteration at the structural level. In consequence, the addition of new biological properties must occur within the pre-existing structure of a system, without compromising the system's integrity. This adds to the metaplasticity notion a dimension of structural plasticity that speaks in favour of replacing the former term with that of "hyperplasticity." Such a conception maintains the cultural aspects of material engagement while doing justice to the role of biology and natural selection in human cognitive evolution.

A potential opposition between these two conceptions appear evident when applying material engagement theory to the archaeology of the modern human Middle-to-Upper Palaeolithic transitions. In this case, material engagement theory leaves us with two concurrent hypotheses. According to the first, it might be argued that an original domain-relevant modern human cognitive architecture was gradually enacted until it reached the functional aspect shared by most contemporary populations. In this way, body ornaments, ochre markings, bone tools, snaring technologies, etc. in the African Middle Stone Age represent a series of brain-artefact interfaces (Malafouris, 2010b), which restructured the mental architecture in a progressively more advanced way (i.e., metaplasticity). These new substrates led, for example, to the acquisition of symbolic thinking. On the other side, material engagement theory might be compatible also with the idea that the enactive engagement with material culture actively created adaptive pressures that allowed natural selection to gradually transform a primitive mental system into a qualitatively modern one (i.e., hyperplasticity).

The problem of how to select between these contrasting explanations might appear as particularly overwhelming. Indeed, if the two hypotheses are equally constrained by the artefactual evidence and compatible with it, selecting them for their plausibility (Garofoli and Haidle, 2014) could be quite problematic. Eliminative selection can act, however, at a more theoretical level. For example, I venture that plasticity-driven cognitive evolution might be questioned in terms of whether domain-relevant elements are plausibly constrained by the archaeological evidence, prior to their enactive remodelling. In contrast, mutational enhancement proposals might be questioned about the chronology of replacement of unenhanced humans with enhanced ones. In this case, however, enhancement ought to be intended as the trajectory of material engagement that fosters the selection of more advanced mental-architectures.

Concerning the theme of Neanderthal cognitive equivalence, which lies at the heart of the cultural school proposal, the situation might be less problematic. Neanderthal cultural capacity, indeed, cannot be assumed to be identical to those of modern humans by comparing specific instances of their respective cultural performance. The

same level of cultural performance in both modern humans and Neanderthals does not allow one to claim that the two species also share the same cultural capacity (Haidle and Conard, 2011). If the use of early body ornaments and bark-pitch hafting (Zilhao, 2011a) does not necessarily entail the presence of a modern mental architecture, then it would be possible to conceive human cognitive evolution under a pluralist perspective. In the context of material engagement theory, this would imply that different cognitive architectures, structured in a different domain-relevant asset, could have engaged with artefacts along alternative trajectories. If so, it is possible that both Neanderthals and modern humans produced early body ornaments, but only the latter ones had sufficient degrees of freedom to transform them into actual symbols. In contrast with the cognitive equivalence agenda, material engagement theory therefore introduces an unprecedented argument. It brings to attention the idea that primitive mental systems also could transform themselves by means of material engagement, reaching a high level of behavioural sophistication.

Conclusions

Material engagement theory represents a groundbreaking approach in cognitive archaeology, since it offers an effective counterargument to several fallacies that currently plague this domain. While it motivates scholars to abandon elements of neurodeterminism and internalism that come with the ordinary accounts, Malafouris' proposal candidates itself to lead a "conservative revolution." Indeed, material engagement theory provides a thoroughly new perspective on "how" cognitive evolution has happened, but at the same time it does not upset some of the fundamental questions concerned with the "what." As I have argued in this review, material engagement theory appears thus to be orthogonal to the problem of mutational enhancement. In consequence, it does not offer support to some extreme cognitive equivalence approaches, for it is compatible also with cognitive pluralism. New opportunities and challenges emerge with material engagement theory, for this proposal allows us to see classic problems in cognitive archaeology under a radically different perspective.

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Rubix Ruckus Reubenstein Takes Himself On A Hike

Author: Jennifer Nitz

Illustrator: Fernando Molinari



This children's story was inspired by my dog while he was adopting me. I knew his past of not being taken on walks for 2 ½ years, or out to socialize, so I took him on “get to know me” hikes through the surrounding forest of his West Yellowstone home. I have always had an interest in all animals and a curiosity about their behavior resulting in my studies in Zoology with an emphasis on Animal Behavior, and moving west to follow-up with Wildlife Biology. I combined these studies with observations of my hiking companion exploring the forest and observing wildlife. His name and this story unfolded in my mind, then onto paper. The photographs I took on those hikes combined with illustrations is how I believe his ultimate fantasy dream hike would come to life. Please join Rubix Ruckus Reubenstein in the world of his dreams.

Visit <http://rubixruckus.wix.com/rubix> and Rubix Ruckus Reubenstein on facebook to see and learn more, and for ordering and contact information.

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