Psychotherapy Integration via Theoretical Unification

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Abstract:

Meaningful psychotherapy integration requires theoretical unification because psychotherapists can only be expected to treat patients with the same diagnoses similarly if they understand these disorders similarly and if they agree on the mechanisms by which effective treatments work. Tryon (in press) has proposed a transtheoretic transdiagnostic psychotherapy based on an Applied Psychological Science (APS) clinical orientation, founded on a Bio↔Psychology Network explanatory system that provides sufficient theoretical unification to support meaningful psychotherapy integration. That proposal focused mainly on making a neuroscience argument. This article makes a different argument for theoretical unification and consequently psychotherapy integration. The strength of theories of psychotherapy, like all theory, is to focus on certain topics, goals, and methods. But this strength is also a weakness because it can blind one to alternative perspectives and thereby promote unnecessary competition among therapies. This article provides a broader perspective based on learning and memory that is consistent with the behavioral, cognitive, cognitive-behavioral, psychodynamic, pharmacologic, and Existential/Humanistic/Experiential clinical orientations. It thereby provides a basis for meaningful psychotherapy integration.

Key words: Clinical orientations; theoretical unification; psychotherapy integration

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A major strength/benefit of basing one's clinical practice on a particular psychological theory is that it focuses attention, investigation, and intervention onto specific topics, goals, and methods. This focus is also a major weakness because theory can blind one to alternative perspectives. For example, behavioral therapies such as applied behavior analysis focus on behavior change. Cognitive and cognitive-behavioral therapies focus on symptom reduction/removal. Psychodynamic therapies focus on narrative modification and insight via psychological mindedness. Psychopharmacological therapies focus on symptom reduction/management via neuroscience rather than psychology. These highly focused therapeutic approaches mostly compete rather than cooperate with each other because there is no broader perspective from which

they can be seen as special cases. In my view, the current horserace competition concerning which therapy is more effective is proxy for a battle among theories where the attempt to prove which theory is "right" is based on the false assumption that superior clinical success can prove which underlying theory is correct despite the possibility that one can be right for the wrong reasons. This competitive motivation promotes exclusivity and loyalty to a particular therapeutic approach. Take for example, Leahy's (2009) "Confessions of a Cognitive Therapist" where he admitted that in addition to being a cognitive therapist, he also sometimes uses behavioral and existential methods depending upon the presenting clinical issues. The term "confession" implies that previously hidden wrongdoing is now revealed and forgiveness is sought.

Psychologists have long desired psychotherapy integration but according to Rychlak (1981a, 1993) have not been able to obtain it due to what appear to be irreconcilable theoretical differences. Another major reason why substantive theoretical unification has eluded psychologists is that the claims made by various theorists are too numerous and conflicting to ever find a perspective from which all of them can be unified (Rychlak, 1981a, 1993), even if they were all empirically supported, which they are not (Tryon 2008). While it is desirable to find a unified position that retains all of the original features of all of the conflicting theories, including preserving the emphasis and priority associated with each of the concepts that characterize these conflicting theories, the degree of conflict involved has precluded achieving the required theoretical unification. The degree of conflict among theories of psychotherapy has also given rise to the view that psychotherapy integration based on theoretical unification is not possible (Castonguay, 2011; Goldfried, 1980).

A fresh approach that entails thinking outside of the box is required. Meaningful psychotherapy integration requires a theoretical orientation/perspective that is sufficiently general that it can span, incorporate, authorize, and justify behavior change, symptom reduction/removal, narrative modification, insight via psychological mindedness and be consistent with psychopharmacology. Undoubtedly, every client can benefit from treatments directed at all of these goals/approaches to some degree. This article provides the required general theoretical perspective needed to support effective psychotherapy integration. All psychology, including the proposed theoretical perspective, is based on learning and memory (Kalat, 2011). This broader theoretical foundation will enable clinicians to address the full scope of their client's needs using diverse methods. Stated otherwise, I am proposing psychotherapy integration at a *conceptual* rather than *methodological* level that authorizes clinicians to provide more comprehensive treatment.

Absent a unifying theory, some clinicians have favored an eclectic orientation where they attempt to borrow from and or switch among conflicting theoretical orientations. The lack of an integrative theory to support these efforts has led to criticism of this approach. Hence, the term eclectic has fallen from

favor. This article provides the required theoretical basis for the comprehensive treatment that these clinicians have sought. It complements and extends a related proposal made by Tryon (in press).

The remainder of this article is organized as follows. I distinguish clinical orientations from the underlying theories that authorize them and identify five of the most prominent clinical orientations. They are: 1) behavioral, 2) cognitive, 3) cognitive-behavioral, 4) psychodynamic, and 5) pharmacologic. I focus on the *least* by way of content that needs to be granted in order to achieve theoretical unification. I ask: what are the *critical core concepts* that *define* the *conceptual kernel* of each of the five identified clinical orientations. I distinguish *key concepts* from critical core concepts. Key concepts are those that are commonly associated with a clinical orientation, can be derived from critical core concepts, but are not critical to the clinical orientation. I recognize that a unified clinical orientation may alter the original emphasis placed on critical core and key concepts. Such conceptual modifications appear to be unavoidable. I focus on mechanisms because they are central to natural science explanations. Otherwise, we are left with interpretations that may be based on data but are still just personal opinions. I recognize that there is no evidence that a purely psychological substrate exists for putative psychological mechanisms to operate on. I focus on what all five identified clinical orientations share in common and note that all of them are already theoretically unified in that they all lack mechanisms that can explain how and why their psychotherapies work. I address the missing links represented by the hyphens in the terms psychobiology and biopsychology and note that neural network models provide important missing mechanism information. I refer to and briefly summarize previously identified (Tryon, in press; Tryon, Hoffman and McKay, 2016) neural network properties that have been formulated as psychological principles. These principles have already received extensive empirical support and are fully consistent with all five identified clinical orientations and with the Existential/Humanistic/Experiential clinical orientations. They authorize operating at an emergent psychological rather than a reductionist biological level. Collectively, this material provides a cognitive neuroscience foundation for all six clinical orientations that unifies them theoretically and supports meaningful psychotherapy integration.

Clinical Orientations

Clinical orientations are the broad conceptual bases that every psychotherapist uses to guide and structure their assessment and therapy sessions. Clinical orientations include the *explanatory narratives* that psychotherapists use to understand what troubles their patients and what can be done to help them. Tryon (in press) mentioned that clinical orientations have at least the following important properties that collectively cause them to differ from the underlying theories that authorize them: breadth, selectivity, and flexibility. Here I elaborate on these three properties.

Breadth

Clinical orientations are typically informed by the work of *multiple theorists*. Often this means that several theorists within the same clinical tradition contribute to a psychotherapist's clinical orientation. This is especially true of psychotherapists who claim to have an eclectic and/or integrative clinical orientation. The crucial points here are: a) multiple theorists contribute to every clinician's clinical orientation to some degree, and b) clinical orientations are considerably broader than any of the specific theories that support them.

Selectivity

Clinical orientations are *selective*. For example, one does not have to accept every cognitive-behavioral claim in order to have a cognitive-behavioral clinical orientation. Cognitive-behavioral psychotherapists hold diverse opinions regarding a broad spectrum of issues. Similarly, one does not have to accept every psychodynamic claim in order to have a psychodynamic clinical orientation. Psychodynamic psychotherapists also hold diverse opinions regarding a broad spectrum of issues. This diversity of clinical orientations is not new. Psychotherapists have always selectively endorsed parts, features, and aspects of the theories that underlie their clinical orientation and rejected others (Rychlak, 1981b).

The selectivity of clinical orientations is *diverse* in that clinicians who claim the same clinical orientation often hold different subsets of positions taken by supporting theories. These subsets can differ remarkably even to the point where some psychotherapists may question the identity of others who claim to have the same clinical orientation. This diversity augments the breadth of the clinical orientations mentioned above.

All of these selective subsets are sufficient to justify claiming to have a particular clinical orientation. This is because professional identification is a claim that individuals make for their own reasons. Their professional identification is legitimized by the professional organizations that they join and the journals and books that they choose to read. While professional organizations certify competencies, I do not believe that they certify clinical orientations.

Flexibility

Clinical orientations are *flexible* in that they allow for *developmental change* over time within practitioners. It has been my clinical experience over the past 45 years, and the clinical experiences of many of my colleagues, that the selections that constitute the clinical orientation of a psychotherapist when they first begin to practice are not necessarily the same as the selections they will make when they become a seasoned professional. What is incorporated and what is left out of a clinical orientation may well change over time despite the fact

that the clinician in question will claim to have the same clinical orientation. It has also been my clinical experience and that of my colleagues, that clinical orientations are dynamic rather than static and reflect professional growth and development over time.

The Big Five Clinical Orientations

Tryon (2014, in press) identified the following "Big Five" clinical orientations on the basis that they share a natural science orientation: 1) Behavioral clinical orientation as exemplified by applied behavior analysis (Martin & Pear, 2014); 2) Cognitive clinical orientation as exemplified by Leahy (2003); 3) Cognitive-Behavioral clinical orientation as exemplified by Beck (2011); 4) Psychodynamic clinical orientations – a) the narrative-based form exemplified by Angus and Greenberg (2011) and b) the emotion-focused form as exemplified by Greenberg (2002); 5) Pharmacologic clinical orientation as exemplified by Katzung and Trevor (2015). Tryon (2014) did not directly address the Existential/Humanistic/Experiential[1] (EHE) clinical orientation because it understands psychology as a human science whereas the previously mentioned five clinical orientations entirely or substantially identify with natural science (Rychlak, 1981a). The fundamental philosophical differences in values and methods between human and natural science have prevented finding any way to fully integrate them (Rychlak, 1981a). That said, I offer a rapprochement as part of my discussion below concerning narrative-based therapies.

Tryon (2014, in press) provided a unifying Applied Psychological Science (APS) clinical orientation. It is based on an integrative Bio↔Psychology Network explanatory system that consists of a dozen properties of parallel-distributed processing connectionist neural network brain-like models (O'Reilly & Munakata, 2000) formulated as psychological principles (Tryon, in press; Tryon, Hoffman and McKay, 2016). These principles explain a wide variety of psychological phenomena including learning and memory. All normal, abnormal, and therapeutic psychological phenomena involve learning and memory, which means that the APS clinical orientation is consistent with all clinical orientations. Specifically, the APS clinical orientation is consistent with core and key concepts associated with the Big Five clinical orientations. I show below that it is also consistent with the Existential/Humanistic/Experiential orientation. This article applies the APS clinical orientation to psychotherapy integration.

Critical Core Concepts of the Big Five Clinical Orientations

The breadth, selectivity, and flexibility properties of clinical orientations described above makes them easier to unify than the underlying theories that authorize them but obstacles remain. These obstacles are minimized, by asking what is the *least* that must be granted and still have a particular clinical

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[1] Identifying one approach as humanistic unfortunately pejoratively implies that at all other approaches are not humanistic.

orientation. What are the *critical core concepts* that *define* the *conceptual kernel* of each of the five identified clinical orientations?

A core concept is *foundational* when other concepts and constructs are based upon and can be *derived* from them. Core concepts function like assumptions in that arguments and explanations begin with them. A core concept is *critical* to a clinical orientation when one cannot have that clinical orientation without accepting the concept in question. For example, one cannot have a psychodynamic clinical orientation without accepting unconscious processing.

Behavioral Clinical Orientation

The behavioral clinical orientation presently comes primarily in two main forms. The applied behavior analysis (ABA) form appears to be the most popular behavioral orientation that is currently practiced (Martin & Pear, 2014). It is based on the experimental analysis of behavior developed by Skinner and his associates (e.g., Martin & Pear, 2014). The critical core concept of the ABA form of behaviorism is the *operant*. The operant defines each behavior as a class of actions characterized by *variation* and whose components are subject to *selection* (reinforcement). For example, a rat can press a bar in a Skinner box in many different ways involving various degrees of effort but all of these variations define the operant "bar press". Operants can be shaped by selectively reinforcing one or more of their components. For example, bar presses that requires more than a certain force can be shaped by programming the apparatus to provide access to food only if this force requirement is gradually satisfied. All other phenomena discovered through the experimental analysis of behavior, such as the matching law and schedules of reinforcement, derive from, can be explained by, the critical core concept of the operant; i.e., by variation and selection. One cannot have an ABA clinical orientation without endorsing the critical core concept of the operant and its ontogenetic evolution via variation and selection.

The Applied Psychological Science clinical orientation is consistent with this behavioral clinical orientation because it is founded on neural network models that must be trained because they cannot be programmed. Their functional characteristics, like those of operant conditioning, are heavily dependent upon their learning history. This property of the Applied Psychological Science clinical orientation is fully consistent with the ABA form of the behavioral clinical orientation.

There are, and have been, other forms of the behavioral clinical orientation such as the orientation that Wolpe (1958) used. His clinical method of systematic desensitization, and its contemporary variants known as exposure and response prevention, are based on the critical core concepts of *learning* via *memory* formation. All assessments and therapies that derive from the generic behavioral clinical orientation are grounded in learning and memory. One cannot

have this form of the behavioral clinical orientation without an explanatory narrative that is based on learning and memory.

The APS clinical orientation is consistent with this form of the behavioral orientation because it is based on natural science experience-dependent plasticity (Bear, Connors, & Paradiso, 2007) mechanisms that explain learning as the result of memory formation (Carlson, 2010). These mechanisms also explain why reinforcers strengthen behavior and how and why shaping via variation and selection works. The APS clinical orientation is therefore fully consistent with these alternative forms of the behavioral clinical orientation.

Cognitive Clinical Orientation

The cognitive clinical orientation developed in reaction to the behavioral clinical orientation (Dember, 1974; Gardner, 1985; Mahoney, 1974). It emerged as part of the general cognitive revolution within psychology that rebelled against what was perceived to be the *black box of behaviorism* where stimuli went in and responses came out without any explanation as to what happened inside the box which was metaphor for the brain. The cognitive clinical orientation is based on the single critical core concept that cognitions cause emotions and behaviors. Hence, the entire focus of therapy is on correcting cognitions. Leahy's (2003) practitioner guide to cognitive therapy techniques is a good example of the cognitive clinical orientation. My colleagues, including a past president of the Association for Cognitive and Behavioral Therapies, and I realize that it is increasingly rare to find clinicians who practice exclusively from this clinical orientation given the rapprochement that has taken place between the cognitive and behavioral clinical orientations.

The APS clinical orientation is cognitive because the neural network models upon which it is based transforms stimulus inputs in ways that extract latent constructs that function as schemas (Rumelhart, Smolensky, McClelland, & Hinton, 1986). Further evidence that these models are cognitive is that they effectively simulate personality (Read & Miller, 2002; Read et al., 2010).

Cognitive-Behavioral Clinical Orientation

The APS clinical orientation is consistent with the cognitive-behavioral clinical orientation because it is consistent with the critical core concepts that characterize both the cognitive and behavioral clinical orientations discussed above. The cognitive-behavioral clinical orientation is not an equal mix of the cognitive and behavioral clinical orientations. It began more behavioral (Bandura, 1969) and became more cognitive (Beck, 2011).

Psychodynamic Clinical Orientation

Unconscious processing is a critical core concept of the psychodynamic clinical orientation (Summers & Barber, 2010). One cannot have a psychodynamic clinical orientation without it. All of the other psychodynamic concepts such as ego defense mechanisms and transference are derived from, depend upon, and entail unconscious processing. The APS clinical orientation is consistent with the psychodynamic clinical orientation because it is firmly founded on unconscious processing. Activations that flow through real and artificial neural networks do so unconsciously and automatically including when neural impulses propagate down axons and cross synapses. No greater emphasis can be placed on unconscious processing than is reflected in the APS clinical orientation.

The *developmental perspective* and its emphasis on the effects of *early experience* and *attachment* on subsequent personality formation are additional critical core concepts of the psychodynamic clinical orientation[2]. One cannot have a psychodynamic clinical orientation without taking a developmental perspective that emphasizes the importance of early experience.

The APS clinical orientation is consistent with the psychodynamic clinical orientation because the neural network models that form the basis of the APS clinical orientation are inherently and thoroughly developmental. This is because their "adult" properties result from an extensive developmental *training* process. Neural network models must be trained because no one knows how to program them. It is now well documented that the functional "adult" properties of "mature" neural network models depend critically upon their training history (O'Reilly, & Munakata, 2000). No greater emphasis can be placed on development than is reflected in the neural network models that support the APS clinical orientation.

The APS clinical orientation further emphasizes the effects of early experience by recognizing epigenetic effects that begin at birth. Epigenetics refers to the attachment of methyl, acetyl, and other chemical tags to DNA based on experience with the physical and social environment (Zhang, & Meaney, 2010). These chemical tags function as genetic switches. They activate or deactivate DNA segments and thus turn genes on or off in response to environmental events. Epigenetic effects constitute what Tryon (2014) referred to as "A second experience-dependent plasticity mechanism" (p. 189). Tryon (2014) reviewed epigenetic evidence that early maternal care in the form of licking and grooming rat pups epigenetically modifies the hypothalamic-pituitary-adrenal (HPA) axis that regulates the stress response (Weaver, Meaney, & Szyf, 2006; Zhang, & Meaney, 2010). Rat pups who receive attentive maternal care during infancy respond less to and recover more rapidly from stress than pups who do not receive such care. Child abuse in humans appears to create adverse epigenetic effects (McGowan et al., 2009). Evidence indicates that compensatory mothering can reverse some harmful developmental experiences (Kaufman, & Weder, 2010). Collectively, this epigenetic evidence, which is fundamental to the

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[2] The author wishes to thanks Nate Thoma for identifying these critical core concepts.

APS clinical orientation, strongly supports the psychodynamic emphasis on caregiver attachment as an important early formative experience. This developmental emphasis makes the APS clinical orientation consistent with the psychodynamic clinical orientation.

Tryon's (2014) discussion of *subcortical emotions* is another way that the APS clinical orientation is consistent with the psychodynamic clinical orientation. One of these subcortical neural networks generates lust. Other subcortical neural networks generate care and play as well as rage, fear, panic, and grief. These emotions can seem to arise on their own. Emotional regulation therefore becomes an important clinical objective of the APS clinical orientation. This emphasis on emotional regulation makes the APS clinical orientation consistent with the psychodynamic clinical orientation.

Pharmacologic Clinical Orientation

Chemical neurotransmission across synapses is a critical core concept of the pharmacological clinical orientation (Katzung, & Trevor, 2015). Neurotransmitter modification is the mechanism by which psychoactive medications exert their effects (Katzung, & Trevor, 2015). One cannot have a pharmacologic clinical orientation without accepting and emphasizing the causative role that neurotransmitters play in modifying the properties of synapses that interconnect neurons. Seung (2012) used the term *connectome* to refer to all of the synapses that interconnect all of the neurons in the brain.

The neural network models upon which the APS clinical orientation is based simulate drug effects by modifying the properties of simulated synapses analogous to how psychotropic medications modify real synapses. The crucial role that simulated synapses play in the neural network models that support the APS clinical orientation makes the APS clinical orientation fully consistent with the pharmacologic clinical orientation.

Key Concepts of the Big Five Clinical Orientations

Key concepts are those that are commonly characteristic of a clinical orientation. Logic does not require that a unified clinical orientation include key concepts because they are not part of the conceptual kernel that defines each clinical orientation. However, incorporating key concepts makes a unified clinical orientation more complete, satisfactory, and generally acceptable. The following sections identify some of the key concepts of the Big Five clinical orientations that are included in, consistent with, the APS clinical orientation.

Behavioral Clinical Orientation

Tryon (1995) identified the following list of behavioral phenomena that constitute key concepts for the behavioral clinical orientation. Neural network

models that support the APS clinical orientation that simulate these behavioral phenomena have been available for more than two decades (Tryon, 1995).

> '*Stimulus summation, blocking, unblocking, overshadowing, partial reinforcement effects, inter-stimulus interval effects, second order conditioning, conditioned inhibition, extinction, reacquisition effects, backward conditioning, compound conditioning, discriminative stimulus effects, inverted-U as a function of inter-stimulus interval, anticipatory conditioned responses, secondary reinforcement, attentional focusing by conditioned motivation feedback, super-conditioning, and learned helplessness' (p. 302).*

This list could be expanded but the point should be secure by now that many key concepts associated with the behavioral clinical orientation are fully consistent with the APS clinical orientation. The ability of the APS clinical orientation to include so many key behavioral concepts shows that the APS clinical orientation is wholly consistent with the behavioral clinical orientation.

Cognitive Clinical Orientation

The following key concepts that are associated with the cognitive clinical orientation are consistent with the APS clinical orientation. These major key concepts show that the APS clinical orientation is consistent with the cognitive clinical orientation.

Personality
The concept of personality is a key concept of the cognitive clinical orientation (Rychlak, 1981b). Read and Miller (2002) used neural network models upon which the APS clinical orientation is based to develop virtual personalities. Read et al. (2010) improved these neural network virtual personality models by enabling them to learn from their environment. These models unify the nomothetic and ideographic approaches to personality (Rychlak, 1981b).

Schemas
The concept of schema is a key concept of the cognitive clinical orientation (Young, Klosko, & Weishaar, 2006). Rumelhart, Smolensky, McClelland, and Hinton (1986) developed neural network models upon which the APS clinical orientation is based to better understand schemata and sequential thought processes. McClelland (2013) advanced neocortical network models for learning new schema-consistent information.

Attitude formation and change
Cognitive psychologists who have specialized in social psychology have long been interested in attitude formation and change (Kalat, 2011).

Monroe and Read (2008) developed neural network models upon which the APS clinical orientation is based that inform our understanding of attitude formation and change.

Health decisions
The cognitive clinical orientation includes the field of health psychology (Suls, Davidson, & Kaplan, 2010). Orr, Thrush, and Plaut (2013) developed a neural network model upon which the APS clinical orientation is based that understands reasoned action regarding health behavior as a parallel constraint satisfaction process. This neural network model of health decision-making is fully consistent with the cognitive clinical orientation.

Multicultural effects
The cognitive clinical orientation is multicultural (Hays, 1995). Hong, Morris, Chiu, and Benet-Martinez (2000) have shown how a connectionist perspective upon which the APS clinical orientation is based can help us better understand how bicultural people are able to think in two ways.

Aging
The cognitive clinical orientation includes gero-psychology and the process of aging (Schaie & Willis, 2011). Li, Lindenberger, and Sikström (2001) presented a neural network model of aging upon which the APS clinical orientation is based that accurately predicted the behavior of young and old people by modifying a single parameter.

Cognitive-Behavioral Clinical Orientation

The key concepts of the cognitive-behavioral clinical orientations are those of the cognitive and behavioral clinical orientations, which we have seen are consistent with the APS clinical orientation. The "third wave" (Öst, 2008)[3] of the cognitive-behavioral clinical orientation added the additional key concept that one's *attitude* toward and *acceptance* of their thoughts and emotions influences the degree of suffering that they experience (Thoma, Pilecki, & McKay, 2015). This attitude of accepting and nonjudgmental awareness of the present moment is also called *mindfulness*. This new CBT wave shares much in common with the Existential/Humanistic/Experiential clinical orientation (Hayes, Strosahl, & Wilson, 2011). A central therapeutic goal of this form of CBT is to shift the patient's attitude towards acceptance and support of their thoughts and feelings. The Monroe and Read (2008) network model of attitude formation and change mentioned above is part of the APS clinical orientation and provides mechanism information that helps us to better understand how mindfulness therapies work.

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[3] The "first wave" focused on the behavioral clinical orientation. The "second wave" focused on the cognitive clinical orientation.

The current cognitive-behavioral focus and emphasis on attitudes and acceptance is closely related to the psychodynamic clinical orientation discussed next. Clinicians who explore patient attitudes soon realize that thoughts and feelings are rooted in the patient's *explanatory narrative*. How one explains events in their life strongly influences their attitudes and consequently their behavior. The narrative-based therapies discussed next seek to change the ways that patients explain events in their lives (Angus & Greenberg, 2011). These alternative explanations can be based on any psychological theory or philosophical system including any one of the Big Five clinical orientations and the APS clinical orientation because it is consistent with all of them.

Psychodynamic Clinical Orientation

This section considers three key concepts that are associated with the psychodynamic clinical orientation that are consistent with the APS clinical orientation.

Narrative-based interventions
A key psychodynamic concept is that people develop and use explanatory narratives to understand their social and physical worlds (Angus & Greenberg, 2011). Psychodynamic therapy frequently focuses on these explanatory narratives with the aim of modifying them so that they become easier to live with. This form of the psychodynamic clinical orientation is exemplified by the work of Angus and Greenberg (2011). The APS clinical orientation embraces the concept of narrative therapy because the learning and memory mechanisms upon which it is based provide clinicians with alternative explanations that can be used to reframe explanations that client's present. Tryon (in press) provided supporting clinical examples.

I stated above that the Existential/Humanistic/Experiential (EHE) clinical orientation was not formally included in Tryon's (2014) effort to achieve the theoretical unification required for meaningful psychotherapy integration because it understands psychology as a human rather than as a natural science. However, a rapprochement of sorts is available through narrative-based therapies that are central to the EHE clinical orientation. This rapprochement is founded on the fact that all theories explain and therefore all theories can be used to understand, support, and/or modify the explanatory narratives that people bring to psychotherapy (Rychlak, 1981a). Cognitive-behavior therapy routinely uses psychoeducation to modify the explanatory narratives that patients bring to therapy. Behavioral and/or pharmacological explanations can also be used to modify explanatory narratives. This means that the Big Five, EHE, and the APS clinical orientations are all theoretically integrated because they all encourage understanding, supporting, and modifying explanatory narratives (Angus & Greenberg, 2011). The EHE and APS clinical

orientations are also unified in that the APS clinical orientation includes learning and memory mechanisms by which EHE treatments work even though the APS clinical orientation does not share the philosophy upon which the EHE is based. Therapies do not have to work for the reasons that their authors specified. One can be right for the wrong/different reasons (Tryon, 2014).

Emotion-focused interventions
Emotion regulation is a key psychodynamic concept (Maroda, 2012). Blatt and Bers (1993), two psychodynamic clinicians, objected to what they saw as a heavy if not exclusive CBT emphasis on cognition. They objected to the CBT view that emotions are singularly and wholly caused by cognitions. The emotion-focused form of the psychodynamic clinical orientation is concerned with affect and its regulation. This form of the psychodynamic clinical orientation is exemplified by the work of Greenberg (2002). Chapter 5 of Tryon (2014) concerns emotion and its unconscious subcortical origins (Panksepp, 1998, 2008). Understanding that emotions arise unconsciously from subcortical brain centers means that the APS clinical orientation recognizes the importance of emotional regulation (Panksepp, 1998, 2008).

Transference
Transference is a key psychodynamic concept (Gerber, & Peterson, 2006). Wachtel (1980) quoted Freud, who described transference as a "false connection" (p. 59) made by a patient between his or her therapist and a figure from the past. Stated otherwise, transference occurs when the patient responds to the therapist as if the therapist was some emotionally significant person in their past. The traditional emphasis is on how irrational, inappropriate, and undeserved such attributions are. Wachtel (1980) noted that some aspects of the therapist and/or their behavior are almost certainly involved in eliciting transference. Nevertheless, the primary psychodynamic feature of transference is that the patient treats the therapist as if he or she were someone else.

There are at least two reasons why transference is consistent with the APS clinical orientation (Tryon, in press). The first reason is that transference is largely an unconscious process (Gerber, & Peterson, 2006). We have already established that unconscious processing is fully consistent with the APS clinical orientation because of its basis in neural network models and the fact that activations propagate unconsciously from one neuron to another. Hence, transference is consistent with the APS clinical orientation.
The second reason why transference is consistent with the APS clinical orientation is that transference can be understood in Piagetian terms of assimilation and accommodation; both of which are consistent with the APS clinical orientation as explained in the following two subsections.

Assimilation and Accommodation
Wachtel (1980) clarified the relevance of Piaget's explanation of cognitive schemas to the psychodynamic concept of transference as follows. Piaget (1983) explained that equilibration generates schemas and other cognitive structures. Equilibration entails two interdependent biologically general processes: assimilation and accommodation. Assimilation is the process by which people understand and respond to the world in terms of their schemas. People are said to *assimilate* experience to existing schemas. Our schemata are not continuously active but are activated by relevant circumstances. On the other hand, psychological growth requires that we learn from experience. Learning requires that schemas change to *accommodate* new information and experiences. Equilibration refers to the process whereby people oscillate between assimilation and accommodation. Equilibration is said to drive cognitive development.

Wachtel (1980) observed that transference can be understood as a condition where assimilation greatly predominates over accommodation. The patient's cognitive schemas are dominated and activated by an emotional memory of a significant person in the patient's past. These schemata guide how the patient relates to other people including their therapist. The patient's inappropriate, irrational, and undeserved response to the therapist is how they responded to this person in the past. However, given that the patient is not completely psychotic, some degree of reality contact, accommodation, remains with which the therapist can work.

Neural Networks Assimilate and Accommodate
Neural network models are used to explain learning and memory within the APS clinical orientation. The ability of neural networks to explain assimilation and accommodation enables them, as explained above, to account for transference and that makes the APS clinical orientation consistent with the psychodynamic clinical orientation.

Bechtel and Abrahamsen (1991) equated the process of assimilation with the network's tendency to "settle into the most appropriate of its stable (attractor) states when input is presented to it" (p. 271). Without any change to the networks "connectome" (Seung, 2012) structure, repeated stimulus presentations will be responded to in exactly the same way. Such behavior represents an extreme form of transference. Pure assimilation cannot exist anymore than a coin can have but one side. Accommodation is the other side of our coin. "Assimilation and accommodation are the two poles of the same activity of adaptation that characterizes any biological organism" (Piaget 1927/1995, p. 216). Accommodation occurs because real neural networks are changed by the processing that they do because processing activates experience-dependent neuroplasticity mechanisms that modify the functional properties of synapses and that changes how

they process subsequent activations (Bear, Connors, & Paradiso, 2007). It is through such changes that new memories are formed, learning occurs, and transference can be treated. Individual differences in the rate and extent to which these experience-dependent changes occur are to be expected. The ability of neural networks upon which the APS clinical orientation is based to assimilate and accommodate in combination with a way to understand transference in terms of assimilation and accommodation make the APS clinical orientation consistent with the psychodynamic clinical orientation.

Prototypes

Prototype formation is another key psychodynamic concept (Schwartz, Bleiberg, & Weissman, 1995). The psychodynamic clinical orientation has long been concerned with prototypes such as "mother", "father", and "authority figures". Knapp and Anderson (1984) discussed a parallel-distributed processing model of category learning that forms prototypes from repeated exposure to stimuli. Anderson and Murphy (1986) presented a mathematical explanation of neural network prototype formation. An essential part of their proof is that the Hebb rule (McLeod, Plunkett, & Rolls, 1998), which is used to modify connection weights to simulate experience-dependent synaptic plasticity mechanisms, is mathematically equivalent to: a) an average composite of common stimulus components and b) unique deviation features from this average. The common components reinforce one another and form the prototype while the unique deviations tend to cancel each other out (McLeod, Plunkett, & Rolls, 1998). It is more nearly correct to view the prototype as a running average over time. For example, each dog we see has four legs, a head with two eyes, two ears, a nose, a torso, and a tail. These common features reinforce our dog prototype. The different lengths of the dog's legs and ears, their varying eye color, etc. are unique features that tend to cancel each other out and therefore do not contribute to our dog prototype beyond their average properties.

Neural network models are typically trained on variants of a prototype; the exact form of the prototype is never presented during training. For example, if the prototype is an equilateral triangle, the variants will be slightly different shaped triangles. If the model is presented with the exact prototype stimulus after training has finished, it will respond more strongly to this *never before seen* stimulus than to any of the previously seen training stimuli. It is remarkable that a never before seen stimulus can produce a greater response than any of the stimuli previously seen during training.

It is important to note that neural networks automatically and intrinsically form prototypes; no additional properties are required to explain prototype extraction. Prototype extraction facilitates generalization in that commonalties between the prototype and the novel stimulus provide a basis for a generalized response. Neural network models assimilate novel stimuli to the prototype in this

way. These several ways in which the APS clinical orientation accounts for prototypes makes the APS clinical orientation consistent with the psychodynamic clinical orientation.

Ego Defense Mechanisms

Ego defense mechanisms are key psychodynamic concepts (Summers, & Barber, 2010). All ego defense mechanisms entail unconscious processing. The APS clinical orientation has a strong unconscious-centric orientation. Therefore, the APS clinical orientation is consistent with ego defense mechanisms and the psychodynamic clinical orientation.

Other features

Olds (1994) noted that the neural network models upon which the APS clinical orientation is based provide the psychodynamic clinical orientation with a neuroscience-based brain model that is both more current and relevant than the outdated steam and hydraulic models that Freud used (Rychlak, 1981b). This change also makes the APS clinical orientation consistent with the psychodynamic clinical orientation.

Pharmacologic Clinical Orientation

I mentioned above that pharmacologic clinical orientation is based on the fact that psychotropic medications modify the functional properties of the synapses that connect one neuron with another (Katzung & Trevor, 2015). I mentioned above that the APS clinical orientation is consistent with the pharmacologic clinical orientation because its neural network models simulate the synaptic changes that psychotropic medications produce. Brain damage is another way that the brain is physically changed that can alter cognition, affect, and/or behavior. The neural network models upon which the APS clinical orientation is based are especially able to simulate brain damage because they specify a neural network wiring diagram that can be selectively damaged. Hinton, Plaut, and Shallice (1993) simulated the effects of brain damage on reading. They first developed a neural network model that could read English sentences. Then they "lesioned" the simulated neural network by removing some of the simulated synapses. The result was that symptoms of surface or deep dyslexia emerged depending upon where in the model "lesions" occurred. This ability of a neural network model upon which the APS clinical orientation is based to simulate the effects of synaptic modification/damage makes the APS clinical orientation consistent with the pharmacologic clinical orientation.

Unification Alters Emphasis

Ideally, successful theoretical unification would preserve the explanatory emphasis of all critical core and key concepts associated with the theories being

unified. For example, ego defense mechanisms might be accorded the same central explanatory status in a unified theory that they have been given in psychodynamic theories. This need not be the case because synthesis is more about inclusion than it is about preservation of emphasis. Inclusion with altered emphasis is still synthesis. Requiring preservation of emphasis adds an additional constraint that although desirable greatly complicates synthesis and substantially reduces the likelihood of success. I therefore chose to relax this requirement.

Natural Science Mechanisms Explain

Tryon (2014) reported that "The second definition returned by the Google command "*define:mechanism*" reflects the natural science orientation: "**A natural or established process by which something takes place or is brought about**" (p. 25, bold emphasis in the original). Tryon (in press) focused on natural science mechanisms because they allow for scientific explanations (Pennington, 2014) rather than personal interpretations (Teo, 2012). Pennington (2014) asked and answered the question of what is required to provide a natural science explanation as follows: "What does it mean to explain something? Basically, it means that we identify the cause of that thing in terms of relevant mechanisms" (p. 3).

My out of the box approach led me to realize that the absence of explanatory mechanisms unified the Big Five plus the Existential/Humanistic/Experiential clinical orientations. This focus on a common attribute that was *absent* from existing clinical orientations contrasts sharply with the traditional focus on common attributes that are *present* across clinical orientations. It then occurred to me that providing explanatory mechanisms regarding learning and memory that are consistent with all identified clinical orientations would theoretically unify them in a way that would support meaningful psychotherapy integration.

Neuroscience Mechanisms

Psychologists appear to have a lot of mechanism information. A PsycINFO search for "psychological mechanism" in the first search box without quotes on 01/12/16 returned 2,587 references. Strictly speaking, genuine psychological mechanisms require a psychological substrate to operate on just as neuroscience mechanisms require a biological substrate to operate on. Unfortunately, there is no evidence that a psychological substrate exists. Hence, there cannot actually be any purely psychological mechanisms. Only a biological substrate exists. Psychological phenomena must therefore be mediated by neuroscience mechanisms. For example, it is now well known that learning and memory are mediated by experience-dependent synaptic plasticity, glial, and epigenetic mechanisms (Tryon 2014; Bear, Connors, & Paradiso, 2007).

I am not making a reductionist claim here. The concept of *emergence* is crucial. The explanatory system upon which the APS clinical orientation rests is not reductionist; on the contrary, it is emergent[4]. The APS clinical orientation maintains that all psychological phenomena are emergent properties of active complex neural networks (Tryon, 2014). Unlike computers that remain unchanged by the processing they do, real neural networks are changed by the processing that they do. Synaptic properties change with every processing cycle in complex ways that can only be studied via simulation at this time. These physical changes mediate psychological changes.

The Missing Explanatory Link

The term *psychobiology* generally refers to the influence of psychology on biology whereas the term *biopsychology* generally refers to the effects of biology on psychology. The hyphens in these terms symbolize explanatory gaps concerning how biology and psychology are connected and interact. This knowledge gap has hampered theory construction in psychology ever since its official beginning in 1879 (Brennan, 2013). The neural network models and principles that comprise the APS clinical orientation help to fill these knowledge gaps and thereby promote theoretical unification across clinical orientations. This information is foundational for the following sections in which I express neural network properties as psychological principles.

How Psychology Emerges From Biology

Descartes's unfortunate distinction between mind and brain created an apparent problem of how the mind and brain interact (Damasio, 1994). Neural network simulations solve this problem by: a) not distinguishing mind from brain in which case the mind-body problem does not exist, and b) doing psychology with brain-like neural network models. Learning and memory are the basis of all psychological phenomena (Kalat, 2011). If infants could not form memories they would not learn and develop psychologically. Neural network models show that learning and memory can be effectively simulated by modifying the connections, simulated synapses, among layers of simple neuron-like processing nodes. These connectionist neuropsychological models simulate[5] the functional effects of experience-dependent plasticity mechanisms that modify the synapses in biological neural networks thereby enabling them to form memories and learn (O'Reilly, & Munakata, 2000).

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[4] Appropriately, the free neural network simulation software is called emergent https://grey.colorado.edu/emergent/index.php/Comparison_of_Neural_Network_Simulators

[5] Simulations are not exact reproductions. Software simulations use mathematics to reflect functional properties. Hardware simulations use transistors to simulate neurons.

How Biology Alters Psychology

How do psychoactive medications alter our psychology; the ways that we think, feel and act? Neural network models provide an overarching framework for understanding how and why this happens. We know that psychoactive medications alter synaptic function (Katzung, & Trevor, 2015). We also know that psychoactive medications alter psychology. But what is the causal connection between synapses and psychology? The short answer to this question is that neural network models bridge this knowledge gap by showing how the modification of connections, simulated synapses, among layers of simple neuron-like processing nodes results in memories, learning, and the latent constructs that constitute psychology (O'Reilly, & Munakata, 2000).

Our memories of family, friends, and life experiences define who we are. The ravages of Alzheimer's disease and other dementias that rob us of our memories prove that much of our personality is memory based. These memories reside in our neural networks. Neural network models of memory and learning therefore enable us to understand how changes to these neural networks alters psychology.

Network Properties and Psychological Principles: The ability of neural network models to bridge the explanatory gaps identified by the hyphens in the terms psychobiology and biopsychology warrant describing neural network properties as psychological principles. Tryon (2012) introduced and Tryon (2014) elaborated these neural network properties as core and corollary psychological principles. Tryon (2014; in press) derived cognitive principles from fundamental neural network properties that enable effective simulation of psychological phenomena. I briefly review them below. These principles permit psychologists to operate at an emergent psychological level rather than at a reductionist biological level while preserving an explanatory path to hard neuroscience.

These psychological principles also enable narrative modification therapy because they provide an alternative way to explain psychology and behavior. They explain why empirically supported treatments derived from all of the Big Five and the Existential/Humanistic/Experiential clinical orientations work. They enable clinicians to customize therapy to their patient's needs and characteristics. They provide a conceptual basis for a comprehensive clinical practice that is grounded in cognitive neuroscience.

Neural Architecture Property/Principle: Psychological phenomena emerge as network activations cascade across a suitably complex neural architecture (Tryon, 2014, in press). This mechanism is fundamental to all other mechanisms listed below.

Constraint Satisfaction Property/Principle: Excitatory and inhibitory network activations jointly constrain each other. Health decisions can be understood as a constraint satisfaction process (Orr, Thrush, & Plaut, 2013). Thagard (1989,

2000, 2006) applied this constraint satisfaction principle to law, medicine, ethics, psychology, and everyday life.

Memory and Learning Property/Principle: Psychotherapies differ mainly with regard with what needs to be learned and how best to teach it (Tryon, 2014, in press). The ability of neural network models to simulate and thereby explain learning and memory enable them to explain how and why all psychotherapies work.

Memory Superposition Property/Principle: All visual aspects of every memory are superimposed within the visual cortex. All auditory aspects of every memory are superimposed within the auditory cortex. Memory superposition can readily explain many memory errors (Tryon, 2014; in press).

Priming Property/Principle: The processing pathways taken through neural networks automatically activate experience-dependent neuroplasticity mechanisms that strengthen these pathways thereby making them more probable processing routes in future (Tryon, 2014; in press).

Transformation Property/Principle: Network activations are necessarily transformed as they traverse synaptic connections. McClelland (2013) and Rogers and McClelland (2014) provide details regarding how the brain extracts latent psychological constructs.

Part-whole Pattern Completion Property/Principle: Neural networks can create a more complete image or thought through auto-association. This process explains how we form both perceptual and cognitive gestalts (Tryon, 2014; in press).

Dissonance/Consonance Property/Principle: It has long been known that people seek consonance (Heider, 1958) and avoid dissonance (Festinger, 1957). Kunda (1990) documented that people reach the conclusions that they want to reach; i.e., conclusions that are consonant with their emotions. Neural networks effectively simulate and thereby provide mechanism information regarding this psychological process.

Prototype Formation Property/Principle: The transformation property mentioned above enables neural networks to automatically form prototypes. They do so by extracting and averaging common features (Tryon, 2014; in press).

Graceful Degradation Property/Principle: That processing and storage are distributed across neural networks makes them both resilient to damage/insult and responsive to rehabilitation through activating alternative pathways (Tryon, 2014; in press).

Conclusions

Meaningful psychotherapy integration requires substantial theoretical unification because therapists will only treat people with the same diagnoses similarly when they share a common understanding of what is wrong and what needs to be done. Can we agree that an explanatory system that incorporates all of the critical core concepts and some of the key concepts of the major clinical orientations constitutes meaningful theoretical unification? If so, then the evidence and argument presented here and elsewhere (Tryon, 2012, 2014; in press; Tryon, Hoffman and McKay, 2016) supports the conclusion that the proposed APS clinical orientation has achieved meaningful theoretical unification. The claim of psychotherapy integration follows directly from the achieved theoretical unification because that common understanding authorizes treating the full range of patients presently treated by all of the Big Five and now the Existential/Humanistic/Experiential clinical orientation as well.

The main impact of the proposed theoretical unification on psychotherapy integration will occur in the following three ways. First, clinical interventions will be based on the psychological principles presented above and elsewhere by Tryon (in press) and Tryon, Hoffman and McKay (2016) instead of on manuals. They will enable treatments to be customized to client needs. They will also facilitate doctoral and post-doctoral training because there are far fewer principles than there are published manuals.

Second, clinical practice will become more comprehensive. Clinicians will broaden the goals and objectives that they establish with their clients. These therapeutic goals will now include increasing psychological mindedness, augmenting emotional regulation, and modifying personal narratives in addition to symptom reduction/removal. The best methods of reaching these goals and objectives will be used because clinicians will accept all empirically supported treatments regardless of the clinical orientation from which they were developed because the APS clinical orientation supports all of these goals and objectives.
Clinicians are now free to use methods developed from alternative clinical orientations without endorsing any of those clinical orientations because they now have a transtheoretic transdiagnostic clinical perspective to operate from. Clinicians will use more than one treatment as necessary. Clinicians who previously identified as eclectic will now have a coherent theoretical basis for their practice.

Third, applied behavior analytic interventions are now justified as cognitive methods because conditioning is cognitive (Tryon, 2014). Hence, behavioral methods of diagnosis and assessment are also now justified for general clinical use.

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