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Groups as organisms: Implications for therapy and training☆

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ABSTRACT

The intellectual tradition of individualism treats the individual person as the fundamental unit of analysis and reduces all things social to the motives and actions of individuals. Most methods in clinical psychology are influenced by individualism and therefore treat the individual as the primary object of therapy/training, even when recognizing the importance of nurturing social relationships for individual wellbeing. Multilevel selection theory offers an alternative to individualism in which individuals become part of something larger than themselves that qualifies as an organism in its own right. Seeing individuals as parts of social organisms provides a new perspective with numerous implications for improving wellbeing at all scales, from individuals to the planet.

1. Introduction

All cultures make assumptions which are so pervasive that they become invisible, like the proverbial water that fish cannot see. Darwin, for example, and for all his genius, could not escape the assumptions of the Victorian Age concerning the superiority of European culture over other cultures, and men over women. Only the passage of time allows us to identify these assumptions and subject them to critical examination.

What is the water that we can't see, the cultural assumption of our age? We nominate Individualism, the unquestioned belief that the individual person is the fundamental unit of analysis and that all things social can be understood by reducing them to the motives and actions of individuals. In a therapeutic context, this results in the individual as overwhelmingly the unit of treatment, even when social ties are recognized as important for individual wellbeing.

A bit of scholarship reveals that Individualism, while having long historical roots, did not become the dominant intellectual tradition until the second half of the 20th century. The following two quotes illustrate what preceded individualism and the sea change that took place.

*Social commentators once found it very useful to analyze the behavior of groups by the same expedient used in analyzing the behavior of individuals. The group, like the person, was assumed to be sentient, to have a form of mental activity that guides action.*Rousseau *(1767)*and*Hegel (1807)were the early architects of this form of analysis, and it became so widely used in the 19th and early 20th centuries that almost every early social theorist we now recognize as a contributor to modern social psychology held a similar view–* (Wegner, 1986).

Methodological individualism dominates our neighboring field of economics, much of sociology, and all of psychology's excursions into organizational theory. This is the dogma that all human social group processes are to be explained by laws of individual behavior–that groups and social organizations have no ontological reality–that where used, references to organizations, etc. *are but convenient summaries of individual behavior. –(*Campbell, 1994).

Why was the concept of society as an organism in its own right rejected so swiftly? In part because it was assumed axiomatically, without explaining how societies got that way or the role of individual agency. But if group-level functionalism was criticized for being axiomatic, then modern-day individualism needs to be criticized for the same reason.

What's needed is a way to identify units of functional organization that is not axiomatic. Such a method exists called Multilevel Selection (MLS) theory, which offers a new perspective on how to improve human wellbeing at all scales, from individuals to global governance (Wilson, 2015, 2019; Wilson & Wilson, 2007).

In the following sections, we first clarify why it is important to identify and base analysis on units of functional organization. Then we introduce MLS theory and its relevance to human and genetic cultural evolution. Finally, we begin to explore the ways that MLS theory can improve therapeutic and training methods, stressing the importance of

☆ "For the last year, I've been feeling like something's wrong with me. And then this happened. And, all of a sudden, it all made sense. I wasn't me. My city is hurting. My city is depressed. My city is on fire." – Cornell Griffin, protesting against police violence in Minneapolis, June 2020 (pp. 37, Mogelson, 2020).

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going beyond the individual as the unit of therapy/training.

2. Why it is important to identify units of functional organization

Imagine that you are given two objects to study: a geode and an old-fashioned pocket watch. Both have a lot of structure, but your strategy for studying them would be completely different. A geode is a physical object and the only way to study it is in physical terms. Your study of the watch would be dominated by the fact that it has a function: to keep time. You would spend most of your time studying the parts of the watch in terms of how they contribute to its function. You might also take note of non-functional aspects of the watch, such as the date and location of its manufacture, the metal it is made of, and scratches on the surface, but these would be the least part of your analysis.

Now imagine that you were assigned the task of explaining the structure of a single cogwheel from the watch, without being told that it was from a watch. You would be lost. You can be confident that the cogwheel has a function, but without knowing the whole of which it is a part, you can't proceed further with your analysis. Even if you know that the cogwheel is from a watch, you are largely helpless without knowledge of the other parts with which it interacts.

This thought experiment demonstrates the necessity of knowing whether a given entity is functionally organized, and if so, the necessity of centering analysis on the whole object rather than confining the analysis to only some of its parts. We could have made the same point by using a biological organism such as a fruit fly as our functionally organized unit. In the case of the fly, some work would be required to identify its function, which is to survive and reproduce in its given environment. Once this is determined, you would proceed to study the fly's anatomy and physiology much like the parts of a watch, all the way down to its molecular structure. And if you were only presented with a single gene from the fly, you would be as lost as you were with only a cog from the watch.

Continuing the thought experiment, what if you were presented with a single worker bee from a honeybee colony? You could study it as a functionally organized unit in some respects, much like a fruit fly, but in other respects you would need to study it as a part of a larger functionally organized unit—the whole honeybee colony. Extensive research on ultrasocial insect colonies demonstrates unequivocally that they have their own extended anatomy, physiology, and even a group mind in which individuals play a role more like neurons than decision-making units in their own right (Seeley, 1995, 2010; Holldobler & Wilson, 2009). The colony deserves to be called an organism (or superorganism) in every sense of the word. Organisms are defined not by the boundaries of their skins, shells, or exoskeletons but rather by the coordination of their constituent elements toward a functional goal.

Continuing the thought experiment still further, the phenomenon of cancer can be understood as natural selection among the cells of multicellular organisms. A mutant cell that proliferates at the expense of other cells is adaptive in the evolutionary sense of the word. Since evolution has no foresight, the fact that cancer cells interfere with the functional organization of the body and ultimately bring about their own demise is beside the point. Cancer biologists study cancers as functionally organized units, designed to outcompete the normal cells that are themselves designed to contribute to the fitness of the whole multicellular organism (Aktipis, 2020).

As our final installment of the thought experiment, many species of aquatic insects are attracted to man-made reflective surfaces such as glass buildings and solar panels. Their attraction is fatal but can still be understood from an evolutionary perspective as a form of mismatch. These aquatic insects evolved their attraction to reflective surfaces in an environment where the only such surfaces were water bodies. A change in their environment has turned their adaptation into a liability and only subsequent evolution or a human intervention can solve the problem (Horvath et al., 2010).

Our multi-part thought experiment can be summarized by the following key points.

1) The study of functional organization demands identifying the entity that is functionally organized and the nature of its function.
2) The function of a human artifact such as a watch is obvious, but the functional organization that results from evolutionary processes can be more subtle and must be understood in terms of enhancing relative fitness in given environments.
3) What counts as functional (=adaptive) in the evolutionary sense of the word frequently departs from what counts as functional in the human normative sense of the word. Evolution doesn't make everything nice. It frequently results in outcomes that benefit me but not you, us but not them, or short-term benefits at the expense of long-term welfare. Cancers are an unambiguous example and social cancers at scales small and large, from individuals who exploit others to nations overheating the earth to grow their economies, can be listed almost without end.
4) In addition to pathologies that count as adaptive in the evolutionary sense of the word, mismatches result in pathologies that are maladaptive in every sense of the word, similar to the fatal attraction of aquatic insects to human-made reflective surfaces (Giphart & Van Vugt, 2018).
5) While individual organisms *can* be the appropriate unit of functional organization, this is not invariably the case, as we have seen for cancers and ultrasocial insect colonies.
6) By the same token, while social groups *can* be the appropriate unit of functional organization, such as ultrasocial insect colonies, this is by no means invariably the case.

3. Multilevel selection, major evolutionary transitions, and human evolution

Multilevel Selection (MLS) theory explains how functional organization can evolve—or fail to evolve—at any rung of a nested hierarchy of units, such as from genes to ecosystems in biological systems or (as we shall see) individuals to large scale societies in human systems. This is why MLS theory is such an important advance over the intellectual traditions of Functionalism and Individualism. MLS theory is not axiomatic the unit of functional organization, which can be determined on a case by case basis.

Darwin was the originator of MLS thinking, although he did not call it by that name, and it dawned upon him only gradually (Sober, 2010, Ch 2). At first he thought that his theory of natural selection could explain all examples of design attributed to the Creator, but then he realized that behaviors such as altruism, honesty, bravery, loyalty, charity, which would be called moral in human terms, constituted an exception. For convenience, let's use the single word prosocial to refer to these behaviors. Since prosocial behaviors are oriented toward the welfare of others or one's group as a whole, they are inherently vulnerable to the behaviors that would be called immoral in human terms, such as selfishness, dishonesty, cowardice, betrayal, and stinginess. If prosocial behaviors have a relative fitness disadvantage within social groups, how can they evolve?

Darwin reasoned that groups of individuals who behave prosocially toward each other have a relative fitness advantage over groups of individuals who cannot cohere. In other words, natural selection can be imagined to operate at two levels; between individuals within social groups (favoring non-prosocial behaviors) and between groups with a multi-group population (favoring prosocial behaviors). As Wilson and Wilson (2007) summarized MLS theory in a 2007 review article, "selfishness beats altruism within groups, altruistic groups beat selfish groups. Everything else is commentary". Also, the logic that we have explained for two levels of selection can be extended both downward (as in the case of cancer) and upward (to nested hierarchies of groups within groups within groups).

MLS theory has a colorful history, including widespread rejection in favor of individualistic and "selfish gene" views of natural selection during the 2nd half of the 20th century (Sober & Wilson, 1998; Sober, 2010, Ch 2). It is not a coincidence that evolutionary biology's individualistic swing coincided with the advent of individualism in economics, the social sciences, and popular culture. In any case, not only has MLS theory been revived, but all major theories of social evolution, including those that were developed as alternatives to MLS theory, can be shown to have the same logic embedded within their own structures; a concept known as equivalence (Okasha 2006; Wilson & Wilson, 2007; Wilson, 2015). No theory of social evolution can ignore the biological facts that social interactions take place in groups that are small compared to the total population, that prosocial behaviors tend to be selectively disadvantageous within these groups, so that the differential contribution of groups to the total evolving population is required for prosocial behaviors to evolve.

Most social species are a mosaic of self-oriented traits that evolve by lower-level selection and group-oriented traits that evolve by higher-level selection. For example, in the same primate troop, members can kill each other's babies to have their own babies (a product of within-group selection; Van Schaik & Janson, 2000) and cooperate to decide where to forage on a given day (a product of between-group selection; King, Sueur, King, & Sueur, 2011). The balance between levels of selection is not static, however, but can itself evolve. On rare occasions, mechanisms evolve that largely suppress disruptive within-group selection so that between-group selection becomes the dominant evolutionary force with respect to most traits. This is called a major evolutionary transition and it results in such a high degree of cooperation that social groups qualify as higher-level organisms in their own right. For example, nucleated cells evolved, not by small mutational steps from bacterial cells, but as symbiotic associations of bacteria. In fact, every entity that we call an organism is a highly coordinated society of lower-level entities that evolved by higher-level selection. The concept of society as an organism is no longer just a metaphor. It is literally the case, at least for societies that are mostly products of between-society selection (Czégel et al., 2019; Maynard Smith & Szathmary, 1995, 1999).

And we are that kind of species (Wilson, 2012)! In his book *The Goodness Paradox*, the primatologist Wrangham, 2019a, 2019b documents that cooperation among members of chimpanzee communities is limited to relations among close kin, small groups that hunt together, and groups of males seeking to enlarge the boundary of their community's territory. Most other social interactions within groups are highly competitive, with physical aggression over 100 times more common than in small-scale human societies. In laboratory studies, chimpanzees are indifferent about choosing a reward for themselves compared to the same reward plus a reward for another genetically unrelated chimpanzee. By this measure, they simply do not care about the welfare of other chimps (Silk et al., 2005).

In contrast, members of small-scale human societies cooperate in myriad ways and physical aggression seldom occurs—at least within groups (Wrangham, 2019a, 2019b; Boehm, 1999, 2011). Between-group aggression is another matter, but it is part of MLS theory to expect within-group cooperation and between-group competition to be joined at the hip. As we have already stressed, evolution doesn't make everything nice. In addition, it is important to note that between-group competition need not take violent forms. Just as drought-resistant plants outcompete drought-susceptible plants in the desert without any direct interactions among the plants, cooperative groups can outcompete divisive groups without any direct between-group interactions. That said, direct between-group competition has taken place throughout our history as a species, from our hunter-gatherer ancestors to modern warfare (Turchin, 2015). This is not something we want for the future, but it is a fact that we must acknowledge about the past and present.

Human cooperation has both a physical and mental dimension. Contexts for physical cooperation include hunting, gathering, childcare, modifying the physical environment, defense against predators, and offense and defense against other human groups. Contexts for mental cooperation include perception, decision making, memory, and the maintenance of an inventory of symbols with shared meaning for encoding and transmitting information. While some scenarios for human evolution assume that the capacity for language came first, it is more likely that the capacity for cooperation came first with language as a distal product. For example, it is almost certain that laughter preceded language. There was a time in human history when we were laughing merrily without having a single thing to say to each other (Gervais & Wilson, 2005).

The capacity for symbolic thought was transformative because it became a full-blown inheritance system alongside genetic evolution (Deacon, 1998; Jablonka & Lamb, 2006). The difference between symbolic thought and associative learning is that in the latter case, mental associations are closely linked to environmental associations, such as a rat associating the spoken word "cheese" with the object when they are paired with each other—a mental association that is broken as soon as environmental association is broken by saying the word repeatedly without presenting the object.

In the case of symbolic thought, mental associations are not closely linked to environmental associations. We could repeat the word "cheese" to you a million times without pairing it with the object and the mental association would remain. We even have symbols for entities such as "trolls" that don't exist in the real world. The main puzzle about the capacity for symbolic thought is not how it takes place mechanistically—for example, it isn't necessarily computationally difficult—but how it evolved in a functional sense. In other words, how did mental associations detached from environmental associations contribute to survival and reproduction? The answer is that even though our symbols might not directly correspond to the real world, they motivate behaviors that take place in the real world. There is an intriguing similarity between our genetic systems and our symbolic systems. Each of us is a collection of genes (our genotype) that influences our measurable properties (our phenotype), and a collection of symbols (call it our symbotype; Wilson, Hayes, Biglan, & Embry, 2014) that also influences our measurable properties. Selection operates on our symbotypes in the same way as our genes, but much faster, and the two streams of inheritance have been coevolving in our species for many thousands of generations. This is known as dual inheritance theory (Paul, 2015; Richerson, 2017; Richerson & Boyd, 2005).

Our genotypes and symbotypes share something else in common—combinatorial diversity. Ten genes with two alleles at each locus result in over 1000 genotypic combinations. A handful of symbols that vary and become connected to each other in different ways results in a similar explosion of symbotypic combinations—all potentially resulting in a different suite of behaviors enacted in the real world. Thinking of symbolic thought as an inheritance system is one of the most powerful insights of modern evolutionary thinking, with profound therapeutic implications (Hayes, Sanford, & Chin, 2017; Wilson et al., 2014).

Modern evolutionary thinking also identifies the small group as a fundamental unit of human functional organization. Our ancestors virtually *never* existed by themselves and nearly *always* functioned in the context of small cooperative groups for most of our history as a species. Against this background, the intellectual tradition of individualism appears as wrongheaded as attempting to study the cog of a watch without knowing about the rest of the watch.

Yet, small human groups do not invariably function well in modern life. Common experience tells us that they vary from the best to the worst. And larger societies can also function well as cooperative units, at least sometimes. Early in our history as a species, tribes of a few thousand people shared a common language, identity, and toolkit of cultural practices, even if members of the tribe were typically subdivided into smaller groups. And the last 10,000 years of history has resulted in nations of hundreds of millions of people that cooperate to an impressive

degree (Turchin, 2015). Cooperation even takes place at the global scale, such as the International Space Station, although much more of it is needed. Returning to our multi-part thought experiment at the beginning of this article, the study of functional organization demands identifying the entity that is functionally organized and the nature of its function. In modern life, this demands a richly multilevel approach to analysis and practical positive change efforts, which is the most general definition of the words "therapy" and "training".

4. Therapy and training from a MLS perspective

Before proceeding, it is important to clarify the distinction between the terms "therapy" and "training". People seek therapy when they are highly distressed. People at all current levels of function can benefit from training. Even the most elite athletes have trainers. Insofar as the same positive change methods apply across the full spectrum of current functioning, the terms can be used interchangeably. We will use the term "training" because it is less stigmatizing. We also acknowledge that some kinds of extreme dysfunction have causes that do not apply across the full spectrum of current functioning. For example, Keller and Miller (2006) distinguish between mental disorders within the normal range and extreme cases, which are caused in part by selection-mutation balance for highly polygenic traits (see also Crespi's article in this special issue).

The most important message of MLS theory for training efforts of all sorts is that the unit of functional organization should also be the primary unit of training. *Sometimes* the individual will be the appropriate unit, but *often* it will be groups of various sizes. As an example, consider the training that athletes receive when they are members of sports teams. There is physical and psychological training at the individual level, but there is also extensive training at the team level and integration between the two levels of training. This "goes without saying" for team sports because the team is so clearly the salient unit for the selection for performance-enhancing cultural practices, without the need for academic analysis. MLS theory helps us to see how much the example of team sports needs to be generalized to other contexts, including contexts relevant to clinical psychology.

Within the world of clinical psychology, it is an empirical fact that the focus is almost invariably on the individual client or at most couples and families. Group training is typically a convenient way to work with individual clients, not to work with groups of people who—like members of sports teams—are interacting with each other in the context of their daily lives.

Two barriers stand in the way of clinical psychologists employing a more multilevel approach to their discipline. The first barrier is *practical*. It might seem that working with individuals is much easier than working with functionally organized groups, although later we will argue that this need not be the case and that even standard individual-level training can be informed by MLS thinking.

The second barrier is *conceptual*, based on the fact that the discipline of clinical psychology has been influenced by the tradition of Individualism, no less than economics, the social sciences, and evolutionary biology during its "selfish gene" era. We will now address both of these barriers, starting with the conceptual.

4.1. Systemic perspectives in clinical psychology

Systemic perspectives do exist in clinical psychology, although they are in the minority. In the 1960s and 70s, various flavors of systemic therapy (Bertrando, 2018) attempted in varying degrees to grapple with what anthropologist and philosopher Gregory Bateson would call *relational dynamics* (Bateson, 2005), a view of human social behavior that cast the interaction between individuals in its own role, as an irreducible emergent system created by, but also different than, the individuals inhabiting it (Flaskas & Perlesz, 2019). Individuals, according to this view, could not change without changing the system they inhabited (and vice versa). These views were influential in their time and popularized by "systemic" therapists such as Jay Haley (Haley & Richeport-Haley, 2004), Paul Watzlawick (Watzlawick, Bavelas, Jackson, & O'Hanlon, 2011), Salvador Minuchin (Minuchin, 2009), Murray Bowen (Bowen, 2013) and many others (Rohrbaugh & Shoham, 2011; Shoham & Rohrbaugh, 1997, 2010).

Radical behavioral approaches such as Functional Analytic Psychotherapy (FAP; Tsai, Yoo, Hardebeck, Loudon, & Kohlenberg, 2019), Dialectical Behavior Therapy (DBT; Ward-Ciesielski, Limowski, & Krychiw, 2020), and Acceptance and Commitment Therapy (ACT; Hayes, 2016), have long located the individual in a vitally important *context* (hence Steven Hayes' rebranding of Radical Behaviorism as "Contextualism"; Hayes, 2010). In this there is considerable overlap between contextual and systemic approaches. (Indeed, attempts were made to deconstruct systemic therapies in radical behavioral terms; James Coyne, personal communication to JAC, April 1998.) But in our view, even radical behavioral/contextual therapeutic formulations fail to sufficiently grapple with the fundamentally *social* embeddedness of the human organism. That is, they have yet to acknowledge the biological primacy of the social context over other contextual influences.

An approach that comes closer to acknowledging this primacy is Emotionally Focused Therapy for Couples (Johnson, 2019a, 2019b; Wiebe & Johnson, 2017), which organizes itself around contemporary attachment theory. EFT relies on a large base of empirical support, both basic (via studies of attachment theory, per se) and applied (via RCTs and mechanism studies of the EFT approach; Johnson et al., 2013). EFT is largely concerned with attachment dynamics. It views individual emotion-regulation habits and capabilities as a partial reflection of the perceived availability of "attachment figures" (Burgess Moser et al., 2016; Johnson & Greenman, 2013). According to EFT, Couples are compelled by their fundamental biology to form emotion-regulatory systems, and the individuals inhabiting those systems *cannot be sufficiently known* without reference to that system. More pointedly, individuals cannot realize change without altering at least their relationship to that system.

Recent work by Baucom and colleagues (Baucom et al., 2017; Belus, Baucom, & Abramowitz, 2014) takes a more pragmatic behavioral approach to understand the ways in which social systems—often enough romantic partners or family members—maintain and potentiate psychopathology through the accommodation of avoidance behaviors. Their Couples-Based CBT (CB-CBT) works to modify the many ways in which the accommodating partner assists individuals suffering from, for example, obsessive-compulsive disorder (OCD) in avoiding the emotional discomfort associated with their obsessions. Applied in small-scale RCTs to both OCD and Anorexia interventions, CB-CBT has shown great promise in increasing both the size and duration of treatment gains, probably because the system in which the disordered individual is embedded is explicitly targeted for intervention. Similar progress has been made in the work by individuals such as Alan Kazdin, who's interventions for children with oppositional defiant disorder (ODD) emphasize work with parents to, again, identify behaviors that are perpetuating and worsening the child's symptoms and replace those behaviors with strategies that help children to recover (Kazdin, 2008). We applaud the rigorous work coming out of these laboratories, and yet cannot help but note that they still identify an individual as the "client" or "patient," as opposed to the system the putative client inhabits.

In celebrated work throughout the 1980s and 90s, John Gottman and others, in identifying increasing levels of complexity in the behavioral and emotional dynamics of romantic couple behaviors, came to conclude that couples created highly complex patterns that could not easily be reduced to the actions of individuals (Gottman, Coan, Carrere, & Swanson, 1998; Gottman & Levenson, 1992; Levenson & Gottman, 1983; Levenson & Gottman, 1985). Coming from a mathematics background, Gottman viewed individuals as components in what we'd now call dynamical systems. In a series of large and detailed studies of couple interaction patterns, he began to describe individual affective behaviors

and even physiological responses in terms of *conditional probabilities*, where one person's behavior altered the likely responses of the other, whose subsequent response altered the likely responses of the first, and so on, back and forth, until any individual behavior could most profitably be viewed as a conditional parameter in a mathematical system. This went as far as a collaboration with the mathematical biologist James Murray to apply Murray's predator/prey models to the ways in which couples fight, and to use those behaviors to define and experiment with highly stable *attractor states*—essentially emergent properties that must be understood on their own terms (Gottman, Guralnick, Wilson, Swanson, & Murray, 1997; Gottman, Murray, Swanson, Tyson, & Swanson, 2002). More recently, Gottman, with his wife Julie Gottman, have constructed an intervention approach—*The Gottman Method*—that draws on this research in a principled, bottom-up attempt to clarify the problems couples face, and potentiate treatment gains in the bargain (Gottman, 2004; Gottman & Gottman, 2015; Gottman & Gottman, 2018). This last example may come the closest to what we hope to address here, and yet even this inspiring work has been derived empirically, almost inductively, without much specific reference to the needs and construction of the human being as a biological organism beholden to the advantages and constraints imposed on it by natural selection. By contrast, because the Gottman Method is based on research that is primarily descriptive and unbound to higher-order theory, it can be cumbersome as a matter of intervention to describe and implement. If the Gottman Method emphasizes empirical derivation and description to the detriment of theory, Johnson's EFT does something like the opposite, emphasizing theory to the detriment of empirical derivation and description.

Ultimately, although clinical psychology has grappled with the extreme social-mindedness of individual humans (Watzlawick et al., 2011), it has done so with limited success, both conceptually and as a practical matter. It is our perspective that resolving these limitations will require a more thorough grounding in human biology, and by that we do *not* mean to say (although we do not exclude) behavioral neuroscience. Indeed, neuroscientific investigations of systems (emotion, avoidance, attention, self-control) and mental disorders (depression, anxiety, schizophrenia, etc) have been extensive and, by our accounting, *also* quite limited, both conceptually and practically. As the pioneering ethologist and Nobel laureate Niko Tinbergen (1963) wisely noted, a fully rounded evolutionary approach requires asking four questions about all products of evolution, concerning their function, history, mechanism, and development. Only when mechanistic perspectives such as neuroscience are combined with the other perspectives will true progress be made (Wilson, 2019).

4.2. Social baseline theory: A multilevel evolutionary perspective

The perspectives reviewed in the previous section are systemic and draw upon evolutionary thinking to a degree, especially in the case of attachment theory, which was one of the first serious explorations of evolutionary psychology (Simpson & Steven Rholes, 2015). Although evolutionary psychologists have frequently written about a putative Environment of Evolutionary Adaptedness (EEA)—ostensibly the physical environment that shaped the evolution of *Homo sapiens* (Barkow, Cosmides, & Tooby, 1995)—the truth is that relatively little is specifically known about those physical environments except that they were highly diverse, even comprising marine in addition to terrestrial habitats (Reich, 2018). Some have suggested that the human EEA was not only diverse but also unstable, due to a long period of *variability selection* due to climatic instability (Grove, 2011; Potts, 1998; Potts & Faith, 2015). Indeed, it may have been this very instability that shaped humans to be so cooperative, interdependent, and, during periods of relative climate *stability*, restless enough to disperse around the globe (Grove, 2015; Grove et al., 2015).

Drawing on principles of attachment, behavioral ecology, cognitive science, and perception science, Social Baseline Theory (SBT) starts here, positing that humans have achieved unprecedented adaptability by transcending specific terrestrial environments and adapting themselves instead to each other (Beckes & Coan, 2011; Coan, 2016; Coan & Sbarra, 2015; Hare, 2017; Wrangham, 2019a, 2019b). Having transcended any particular ecological niche, humans wasted no time colonizing the entire planet. We live everywhere, eat nearly everything, and inhabit an astonishing diversity of cultures. We have been at or near the bottom of the ocean. We have walked on the moon. All things considered, among the few true human universals is our intense need to be around each other.

According to SBT, the human brain and body has been shaped by natural selection to *expect* access to stable social relationships that afford the probabilistic distribution of risk, shared goals, joint attention, cooperative effort, broad interdependence, and even ritual practices centered around birth, development, and death (Hrdy & Burkart, 2020; Norenzayan & Heine, 2005; Tomasello, 2020; Van Schaik, 2016). By extension, the human brain, a *predictive regulator* (Sterling, 2012, 2018) of the body's resources as it moves through the world, estimates available *bodily* resources not at the individual but at the dyadic or group levels, by default (Beckes, Coan, & Hasselmo, 2013; Gross & Medina-DeVilliers, 2020; Gross & Proffitt, 2013; Schnall, Harber, Stefanucci, & Proffitt, 2008). Thus, the human body's baseline estimate of its available resources and capabilities is intrinsically social. This is why social isolation is so unpleasant and even deadly. When, for whatever reason, the expectation of group-level resources is violated, the brain mounts a stress response characterized at the least by increased cognitive and physiological effort and commonly enough the release of stress hormones (including oxytocin and vasopressin, probably in service of motivating a quick reunion with the group) and the subjective experience of emotional pain (Bar-Kalifa & Rafaeli, 2014; DeAngelis, 2008; Eisenberger & Lieberman, 2004). This stress response is adaptive because social isolation *actually is* dangerous (Holt-Lunstad, 2018; Holt-Lunstad, Smith, & Layton, 2010). With chronic isolation comes chronic stress and a rise in all manner of risks to health and well being (Cacioppo, Grippo, London, Goossens, & Cacioppo, 2015; Hawkley, 2019).

The bedrock assumption of SBT is that human behavior orbits a proverbial center of gravity rooted in the management of bioenergetic resources, such as glucose, various proteins and amino acids, and other nutrients (Beckes & Coan, 2011). All behavior entails a cost, and staying alive entails behavior. Thus staying alive requires the acquisition of resources that will in effect pay for behavior (Davies, Krebs, & West, 2012; Proffitt, 2007; Proffitt & Baer, 2020). Although little can be said about the characteristics of the specific ecological niche that supported the earliest hominids, it is safe to assume that resource acquisition was not as effortless then as it is for many today. Humans, like most animals, have always selected their behaviors with the implicit goal of maximizing energy gain while minimizing energy cost (Proffitt & Baer, 2020; Sterling, 2020).

Among the more difficult strategies for managing the cost of resource acquisition is group cooperation. It is difficult because on the individual selection level, each individual competes with every other individual for scarce resources. Cooperating is a probabilistic game of trust, requiring you to invest part of your resources on behalf of another in the hopes that, when combined with the other's mirrored investment, you co-create a return in resource acquisition that is scaled up to far more than either could acquire alone.

Humans do this brilliantly, and without sacrificing much autonomous decision making (Tomasello, 2020). How to they do it? Drawing on a number of promising evolutionary and developmental models (Hare, 2017; Hrdy, 2007; Tomasello, 2019; Wilson & Hayes, 2018), SBT provides some proximally mechanistic answers (Coan & Sbarra, 2015).

First, it is apparent that the human brain relaxes its own cognitive, emotional, and physical labor—a phenomenon we call *yielding* (Gonzalez, Coppola & Coan, in review)—in the presence of trusted companions. For example, when threatened with electric shock, blood flow to regions

of the brain thought to mediate emotional responses (and the regulation of those responses) is substantially reduced. This is interesting in itself as far as it goes, but the implications are important. The brain is never "off." Rather, its overall metabolic rate and total blood perfusion are remarkably constant (Dienel, 2019). If blood isn't flowing to regions tasked with, to return to our example, managing an individual's response to the threat of shock, it is nevertheless flowing to *somewhere*, probably to regions of the brain tasked with other profitable activities, such as, say, regulating blood pressure or managing a shopping list. This is a vital point. Thinking hard doesn't cause more blood to flow to the brain, or an increase in glucose metabolism *overall*; just so, sleeping doesn't require less (Pellerin & Magistretti, 2003; Raichle & Gusnard, 2002; Sterling & Laughlin, 2015). The question isn't "how much" of these bioenergetic resources are needed, but *where* at any given time and in response to what prevailing demands (Schulkin & Sterling, 2019; Sterling, 2012). Acute emotional responding is costly in multiple ways to both brain and body. First, an acute emotional response will cause the brain—the body's predictive regulator—to anticipate an increase in the body's physiological output. Accordingly, the brain will direct the body to increase blood pressure, heart rate, respiration rate; it will direct the brain to release stress hormones that tune down costly immune system activity; and it will direct the body to convert glycogen into glucose, increasing blood-glucose concentration in anticipation of activating large muscles and keeping the body's overall metabolic rate high (Ein-Dor et al., 2015; Sterling, 2020). Second, while the brain busies itself with directing the body's responses, it is also (1) activating regulatory circuits within the prefrontal cortex and elsewhere in order to avoid responding too much, and (2) *not doing other things it could be doing*, which entails an opportunity cost (the shopping list goes unmanaged). The main point is that in the presence of trusted companions, *the brain is less likely to have an acute negative emotional response*, presumably on the expectation that the companion can indeed be trusted to take on part of whatever burden the threatening stimulus demands (Burleson & Quigley, 2019; Coan, Schaefer, & Davidson, 2006; Coan et al., 2017; Johnson et al., 2013; López-Solà, Geuter, Koban, Coan, & Wager, 2019). This is a *huge* savings for the brain and the body of the individual—savings that will benefit that individual's fitness in ways both direct and indirect.

One of the ways the human brain accomplishes this social fitness benefit is via changes in perception. As many readers will know, perception is not a passive activity, but rather an active one, where the brain, in its role as feed-forward, predictive regulator of the body's activity and resources, modifies subjective perception in the service of selecting the most efficient behavioral response (Proffitt & Baer, 2020).

For example, when using a small virtual paddle in the video game "pong," individuals report that the ball moves more quickly than it does when using a large paddle, even though the speed of the ball is the same in both conditions (Tenhundfeld & Witt, 2020; Witt & Sugovic, 2010). The subtle shift in perception has a motivational purpose; those with smaller paddles are motivated to move the smaller paddle more quickly in part because they perceive the ball to be moving more quickly. This is predictive regulation by the brain applied to perception. The regulation results in a shift in perception that causes a behavioral adaptation—moving the smaller paddle more quickly increases the likelihood of hitting the virtual ball. Note also that moving the ball faster will require more attention devoted to the ball and more costly muscle coordination devoted to moving the paddle. So it isn't only that the shift in perception changes the *behavior*; it also *changes the investment* in that behavior. Why in the end do we prefer larger paddles? Because they make hitting balls easier. But what do we mean by easier? We mean less costly, including less physiologically costly (Clore & Proffitt, 2016; Schnall, Zadra, & Proffitt, 2010; Zadra, Weltman, & Proffitt, 2015).

The pong example illustrates the adaptive function of active perception and its consequences for the management of bioenergetic resources, but this process extends in fascinating ways to one's social group. For example, individuals report the steepness of hills to be lower when standing next to a friend (Schnall et al., 2008). How can this be? As a matter of predictive regulation, the brain seems to be anticipating a lower bioenergetic cost to walking up a hill when a friend is present. Other evidence suggests the brain indeed adjusts the body's literal bioenergetic budget as a function of social proximity. Social isolation is associated with increased sugar consumption even after adjusting for everything from body mass index to depression, anxiety, physical activity, age, and income (Henriksen, Torsheim, & Thuen, 2014). Expected social isolation (inferred from a measure of attachment avoidance) is associated with increased blood glucose concentration, even after adjusting for anxiety, DHEA-cortisol, and hypertension (Ein-Dor et al., 2015). The brain is capable of treating the bioenergetic resources of self and other as relatively interchangeable, and to do so both rapidly and outside of awareness. How the brain accomplishes this is a serious scientific question. The other's body, with its sugars and fats and amino acids, are after all not literally one's own, and we presume the brain is not considering metabolizing the friend's bioenergetic resources directly via cannibalism.

Although many theorists have characterized the self as conceptually composed of one's relationships (Aron, Lewandowski, Mashek, & Aron, 2013; Mashek, Aron, & Boncimino, 2003), SBT suggests that this "conceptual" composition *is literally true* with regard to how the brain both models a "self" and subsequently serves that model up to perception and subjective consciousness (Beckes et al., 2013; see also Ereira et al., 2020; Fitzsimons & Finkel, 2018; Huebner, 2016; Wittmann et al., 2016). For example, when facing a threat directed at a close friend, the brain responds to that threat *as if* it is directed at the self (Beckes et al., 2013), but when facing a threat directed at a stranger, the brain does *not* respond as if the threat is directed at the self. Within the SBT framework, this is another instance of the brain predictively regulating perception and action, in this case perception of the all the demands imposed on, and resources available to, the self, which in turn informs which actions are economically feasible. Because is it at baseline embedded in a social ecology, our predictively regulating brain perceives its own resources to include those of the groups to which we belong. Our group's resources are our resources. Our resources are our group's. Or, more likely, there are only THE RESOURCES, available to the dyad or group. (Critically, our challenges are also the group's challenges, and our group's challenges are also our own, all of which point in a similar way the existence, simply, of THE CHALLENGES.)

The implications of this extend far beyond the simple management of resources, however. For example, dyads and groups can be construed as regulatory systems of their own, with individual behaviors affecting and being affected by other members of the dyad or group (or even devices, such as smart phones) at essentially all times (Fitzsimons, Sackett, & Finkel, 2016; Hollingshead, 2001; Shteynberg, 2018; Shteynberg, Hirsh, Bentley, & Garthoff, 2020; Sparrow, Liu, & Wegner, 2011). As we will discuss in more detail below, groups larger than couples, nuclear families, or even extended kin-groups were hugely important during human evolution, and our dependence upon them is reflected in the design of our individual brains and bodies. The adage "It takes a village…" needs to be taken very seriously in both clinical psychology theory and practice.

4.3. Cooperative organization: Brain, body and group

The brain is not capable of activating every one of its circuits at the same time simultaneously. It doesn't have enough blood for that, and if it did, it would be too large to rest at the top of our body or would be otherwise far too costly to maintain. Its efficiency derives from its ability to adapt its activities to prevailing situational demands by *moving* blood from circuits that are relatively less needed to those that are relatively more needed. In effect, the various systems of the brain serve as creditors to each other, granting short term loans as circumstances require (Sterling, 2020). The brain is thus a cooperative system, comprised of parts, certainly, but also a coherent whole. Just so the body, which has nowhere near the resources at any one time to simultaneously

accomplish all of the things it is capable of. With the help of the brain (its predictive regulator), the organs of the body, too, grant each other short term loans of blood and other vital bioenergetic resources as situations demand. The body, like the brain, is a cooperative system comprised of strikingly different—almost autonomous—organs that nevertheless coordinate to form a coherent whole. And just so our social networks. A human social network—a human group—cannot simultaneously accomplish everything it is theoretically capable of accomplishing. Instead, autonomous members of the group cooperate to meet prevailing situational group demands and goals. They do so in part by granting each other short term resource loans, creating a cooperative system comprised of autonomous individuals who nevertheless form a coherent whole—a *group* that manages to share attention and goals, and to distribute the labor of everything from hunting to building to remembering, learning, and even maintaining core body temperature (Huebner, 2016; IJzerman et al., 2015; Shteynberg et al., 2020). More than that, SBT suggests that the group level model of "self" is the *default*—that our baseline estimate of resource availability *assumes* embeddedness in a social system, treating departures from the social system as inherently threatening and requiring an obligatory stress response (Brown, Beckes, Allen, & Coan, 2017; Coan et al., 2017; Maresh, Beckes, & Coan, 2013; Saxbe, Beckes, Stoycos, & Coan, 2020).

If true, clinical psychology's tendency to focus on individuals has placed clinical practice in the difficult (and perhaps even nonsensical) position of attempting to work within a more or less *fictional* psychological framework. We work primarily with individuals, on putatively individual problems. But the individuals we work with don't even do that.

We stress that abundant evidence supports this view. Humans think, perceive, emote, develop, suffer, and, yes, recover, differently in the presence of familiar and trusted others than they do any of those things alone (Clark-Polner & Clark, 2014). The implications for how clinicians do their work, and what effects they can expect their work to have, are thus manifold, and only beginning to be known. Progress on this front will require, at minimum, widespread acknowledgment of this problem, and, more likely, a broad reconceptualization of what is needed for basic clinical etiology and intervention.

5. Working with individuals and beyond

Earlier we gave the example of team sports as a context where integrated training at the individual and group levels "goes without saying". MLS theory, and SBT as an elaboration, suggest that what goes for team sports goes for all of us all of the time and penetrates so deeply into our brains and bodies that the very concept of what it means to be an individual must be rethought. Clinical psychology has made great strides, and we do not intend to say otherwise. On the other hand, most of the major progress in clinical efficacy occurred decades ago. Since that time, advances have slowed to a steady asymptote, as if there is little or no further progress to make. We believe that if the discipline of clinical psychology doesn't work harder to question its reliance upon Individualism as an intellectual tradition, it is indeed unlikely to progress much further in its mission of improving human wellbeing. In this final section of our article, we will first outline what MLS- and SBT-informed training might look like, subject to the practical constraint of working primarily with individual clients. Then we will discuss how to expand the horizons of clinical psychology to work directly with whole units of functional organization.

5.1. Working with individuals as a practical constraint

With only a few exceptions, most of the problems that clients present to clinical psychologists are systemic, based not just on the individual client but on problematic relationships (or their absence), economic and political structures, and culture. But as a practical matter, the only point of contact will often be with the individual client, often for only brief periods of time.

Just how constraining this can be is illustrated by a meta-analysis of treatments for adult depression that compared non-directive support—establishing a basic nurturing relationship with the client—and a more specific type of treatment such as psychotherapy or pharmacotherapy (Cuijpers et al., 2012). Their results indicate that 33% of client improvement could be attributed to factors outside of therapy, 50% could be attributed to non-directive support, and only 17% could be attributed to specific factors. But even the slim effect of specific factors was reduced to *zero* when researcher allegiance to a given type of therapy was taken into account. In other words, by far the largest beneficial effect of visiting the clinical psychologist (some 83%!) either remains unknown or amounts to non-trivially compensating for the broader social influences (or lack thereof) on their clients' everyday lives.

While clinical psychologists should certainly cultivate nurturing relationships with their clients, their main job is to help their clients in a way that no longer requires their services. To that formidable end, their main tools remain: 1) pharmaceuticals; 2) the direct reinforcement of desirable behaviors; 3) altering symbolic meaning systems that control behavior. In all cases, there is often an assumption, explicit or implicit, that the individual client is the functional and regulatory unit.

For example, in Acceptance and Commitment Training (ACT; Hayes, 2016), individuals reflect upon their values, how they would behave according to those values, mental obstacles to more positive thoughts and behaviors, and how those mental obstacles manifest as behaviors that take the client away from their valued goals. Accepting the existence of obstacles and committing to working around them has been shown in literally hundreds of RCTs to be effective at accomplishing positive change (Hayes, 2019). ACT theorists are increasingly describing this process in evolutionary terms. An individual's mental world is conceptualized as a cultural inheritance system—a "symbotype" that interacts with the individual's genotype to determine how they act (their phenotype). Focusing on values-based action establishes a target of selection (the change goal). In this framework, *psychological flexibility* is a form of variation that is oriented around the selection target. Training becomes a process of personal symbotype evolution that is managed to achieve valued goals. Left unmanaged, the symbotype is still subject to selection pressures, often evolving behaviors that are adaptive in a very limited sense—such as threat avoidance and heightened sensitivity to discomfort—but that also wind up being the very obstacles that stand in the way of working toward valued goals.

Thinking of ACT and other training techniques as a way of managing personal evolution is an important advance—but still treats the individual as the agent and unit of selection. What if an individual is a node in not only one but a number of larger social systems—more a cog in a stopwatch than the entire watch? Taking that proposition seriously can result in new training strategies, even when the individual remains the only point of contact as a practical matter.

To begin, the trainer might work with the client to identify the most important groups in their lives, or perhaps the absence of groups that can endow their lives with meaning. Throughout our history as a species, individuals have participated in multiple groupings organized around what it takes to survive and reproduce in a given environment—hunting, gathering, childcare, building things together, offense and defense among other groups. Some groups were composed of close kin but others were not. Sometimes group members knew each other as individuals but in other cases the social glue was a set of shared symbols such as a flag or a god, designed to unite total strangers.

Modern times are not so different. Clients will have partners, families, workplaces, religious and political affiliations, hobbies, passionate causes. If they lack meaningful social ties, then that is likely to be the main problem requiring a solution. Helping clients become part of meaningful and efficacious groups is probably the single most important training goal, akin to returning an ant to its ant colony. And if the problem of the individual is located in the larger system within which

the individual resides, then that is something that needs to be directly addressed—even if the individual is the only point of contact.

As mentioned above, modern systemic or strategic therapies were designed in part to do just this. As an example, in the Gottman Method for couples, individuals are (among many other things) taught how their behaviors are likely to reinforce specific behaviors in their partner (or indeed any human), and vice versa (Gottman & Gottman, 2015). One very common such sequence starts with *criticism* in partner A and is followed with *defensiveness* by partner B. This pattern is common because defensiveness is naturally reinforced (and hence selected for) by the all too momentary feeling of satisfaction that comes with warding off criticism, almost no matter who you are. This dynamic is difficult to observe objectively and thus difficult to control, and so partner-blaming explanations—manifest as criticism and worse—are easily selected for, reinforced as they are by momentary feelings that control is at least a possibility. All of which causes the pattern to rapidly *evolve* (our characterization) into what the Gottmans call "negative reciprocity," where, for example, person A is critical, person B is defensive and "counter-critical", person A is then defensive and counter-critical, and so on until the negativity escalates disastrously or each participant retreats in exhaustion.

The system of behavior partners A and B find themselves in are like dynamical traps, existing outside of or in addition to the individuals themselves, because, again, criticism *compels* defensiveness, even in the most well-meaning partner. As we keep pointing out, these patterns can easily evolve *no matter who you—individually—are*. They evolve within the social ecosystem (at least one of them) that you inhabit, and it is the stability of that ecosystem that they serve. This doesn't mean you are powerless to stop it. In an MLS framework, the individual is, after all, one level of selection. But step one is accurate understanding of the multiple levels of the system within which the individual is embedded. Then individual behaviors may be modified to alter the system in ways that may cause the system to evolve in different ways. Thus, again in the Gottman Method, one recommendation is the "softened startup," where criticism, when apparently necessary, is delivered in a way that is empirically less likely to cue defensiveness, thus depriving the criticism-defensiveness cycle of some of its fuel. Another strategy is to check one's heart rate before responding to a criticism, waiting for it to drop to or near resting levels. Empirically, this lowers the probability of a defensive response, or for that response to be reinforced by a moment of relief. Each of these recommendations is fine for the individual, as far as they go, but the target of treatment is the system, a system that in some sense has a "mind of its own" that must be predictively regulated.

5.2. Working with whole units of functional organizations

The idea that working with individuals or at most couples is easier than working with whole groups is largely an artifact of disciplinary silos. There are abundant opportunities for clinical psychologists to work with groups of all sorts—businesses, families, churches, schools, neighborhoods, volunteer organizations, government agencies, NGO's, and more. Any group whose members are working to achieve a common goal has a strong interest in their own efficacy and a plethora of training methods exists to help them. Unfortunately, these training methods largely reside within their own disciplinary silos and are therefore unknown to most clinical psychologists.

There is an urgent need to solve the silo problem by deriving a general set of training methods that can be made available to any functionally organized unit. That is the ambitious goal of Prosocial.world (*Prosocial* for short), an organization devoted to forging, maintaining, and healing groups, which has been under development for over ten years and is now being implemented around the world (Atkins, Wilson, & Hayes, 2019). We will conclude this article with a description of Prosocial as a model for how clinical psychology can move beyond its disciplinary silo and the intellectual tradition of Individualism.

Prosocial treats functionally oriented groups – in other words, groups whose members are trying to get something done together—as the primary unit of analysis and training. It can be applied across all contexts and cultures: past and ongoing projects include a government agency in Australia, efforts to stem the Ebola epidemic in Sierra Leone, a major tech corporation in Canada, a regenerative agriculture initiative in the American Midwest, and the National Health Service in the United Kingdom. Group members are led through a training process that includes two major components. The first is based on Acceptance and Commitment Training (ACT), which will be familiar to many readers with a background in clinical psychology. The second is based on the work of the political scientist Elinor Ostrom, who was awarded the Nobel Prize in economics in 2009 (Ostrom, 1990, 2010). Both components have been generalized from an evolutionary perspective and are presented to group members as a process of cultural evolution that is managed to achieve agreed-upon valued goals. To our knowledge, this is the first time that these two components have been combined into a single training method.

Prosocial uses a rapid form of ACT training called the Matrix (Polk et al., 2016), an image that is divided into four quadrants (Fig. 1). The top and bottom halves represent the world of the mind and the world of action, which fits nicely with the evolutionary distinction between symbolic meaning systems (symbotypes) and the actions that they motivate (phenotypes). The right and left halves represent thoughts and actions that lead toward and away from valued goals. As an aside, in some versions of the Matrix, the world of the mind and the world of action occupy the bottom and top halves, respectively. In this version they have been flipped and an image of a person has been added with its head and heart in the top half (representing the world of the mind) and its hands and feet in the bottom half (representing the world of action).

As with other ACT methods, the Matrix was developed primarily for individuals to reflect upon their valued goals (top right quadrant), how those goals can be manifested as behavior (bottom right quadrant), mental obstacles that get in the way (top left quadrant), and how they manifest as problematic behaviors (bottom left quadrant). Prosocial uses the Matrix at *both* the individual and group levels to first align the interests of the individual to the objectives of the group and then for the group as a whole to reflect upon their shared values, how they can behave collectively to move toward their values goals, problems that for groups include both interpersonal and mental obstacles, and how attempts to overcome those obstacles can paradoxically evolve into counterproductive patterns that reinforce and maintain rather than solve them.

In our experience, using the Matrix at the level of both the individual and the functionally oriented group has a powerful effect that can be experienced during the very first session and then enhanced by continuing to use the Matrix in the context of the group's daily round of activities (visit the blog section of www.prosocial.world for articles and video case reports). When the right side of the Matrix becomes the agreed-upon norms for the whole group, then all of the social reinforcement that takes place in a functionally oriented group can be added to the individual's own reinforcement efforts.

While the ACT component of Prosocial can be efficacious by itself, more is needed for groups to function at their best. Elinor Ostrom won the Nobel prize by studying the tragedy of the commons (Hardin, 1968), which is the propensity of groups to overexploit common-pool resources such as forests, pastures, fisheries, and groundwater, based on the temptation of each member to take more than their sustainable share. Conventional economic wisdom held that the tragedy would always occur unless the resource was privatized (when possible) or subject to top-down regulation. By compiling and studying a worldwide database of common-pool resource groups, Ostrom showed that some of them were able to avoid the tragedy of overuse on their own, but only if they possessed certain *Core Design Principles* (CDPs) that are listed in Fig. 2. It was her derivation of these principles that merited the economics profession's most coveted honor.

Later, author DSW worked with Ostrom and her associate Michael

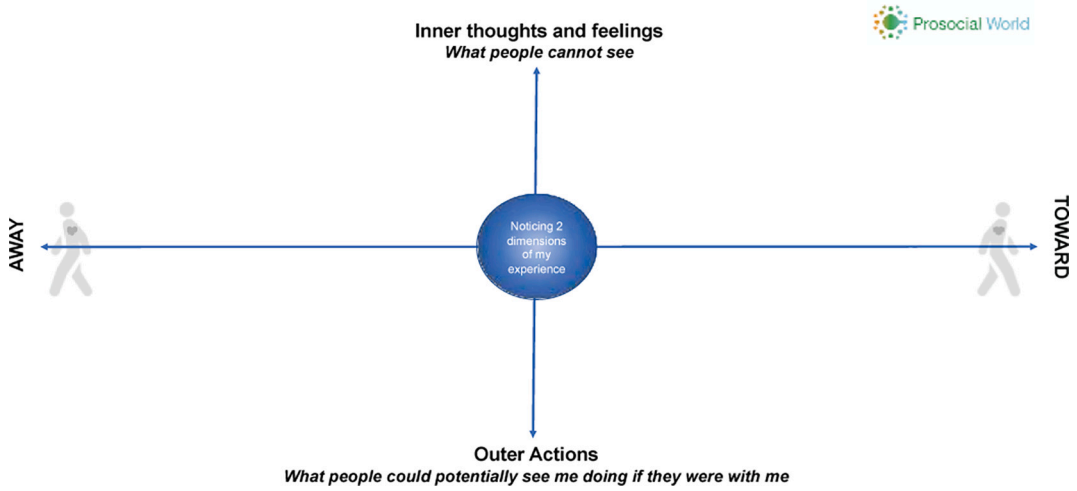

Fig. 1. The ACT Training Matrix, adapted from Polk, Schoendorff, & Webster, 2016.

Core Design Principles for the Efficacy of Groups

1. Strong Group Identity and Sense of Purpose
2. Fair distribution of costs and benefits
3. Fair and inclusive decision making
4. Monitoring of agreed upon behaviors
5. Graduated Sanctions for misbehaviors
6. Fast and fair conflict resolution
7. Authority to self-govern
8. Appropriate relations with other groups

Fig. 2. Core design principles adapted from Wilson, Ostrom, & Cox, 2013.

Cox to generalize the CDPs from an evolutionary perspective (Wilson et al., 2013). The most important take-home message is that the CDPs are needed for nearly all forms of cooperation and therefore nearly all functionally-oriented groups, along with *Auxiliary Design Principles* (ADPs) that are needed by some groups but not others. When ACT training is combined with CDP and ADP training, groups become much more efficacious and capable of "evolving their future" to achieve their valued goals.

Even a brief introduction to MLS theory reveals why the CDPs are so general that they are needed by virtually all groups whose members are trying to get something done together. Groups that strongly implement the CDPs are well-protected against disruptive self-serving behaviors. Group members who are inclined to be cooperative are willing to extend themselves, knowing that their efforts will not be exploited. Groups that weakly implement the CDPs are vulnerable to exploitation and result in cooperators who defensively withhold their efforts. From the standpoint of SBT, this makes all the difference in optimizing use of the common pool of resources available to the group and its members.

Even better, the CDPs can be used to govern relations among groups in a multi-group society in addition to relations among individuals within groups. For example, a business that has implemented the CDPs internally can also work to implement them with its customers, suppliers, local community, and so on. This is a generalization of what Ostrom and her associates called "polycentric governance", which points out that life consists of many spheres of activity, each sphere has an optimal scale, and good governance requires determining the optimal scale for each sphere and appropriately coordinating among the spheres (McGinnis, 1999; Ostrom, 2010). Hence, Prosocial can be used to work with multi-group units that need to become functionally organized, such as a corporation with its various departments, an economic supply chain, a city, a county, a watershed, a nation, even the planet, since so many modern problems and their solutions take place at a global scale. This is clearly a tall order, but the conceptual resources are at hand.

5.3. *Evidence for the efficacy of prosocial and opportunities for research and training*

While the two components of Prosocial, ACT and the CDPs, have been extensively validated in other contexts (including a review of the efficacy of the CDPs in the management literature; Atkins et al., 2019; Hayes, Atkins, & Wilson, in press), research on the efficacy of Prosocial per se as a training method is only beginning and is so far limited to single case studies. In addition, attention has been primarily focused on group performance outcomes. For example, the contextual behavioral scientist Robert Styles implemented Prosocial in two Australian government agencies and was able to rigorously assess pre- and post- improvements based on census data that the Australian Public Service gathers on an annual basis for all of its government agencies. Compared to their own starting points and with other agencies, the two agencies experienced sustained (multi-year) performance improvements along several dimensions, including employee engagement, leadership, organizational change, workplace culture, workplace conditions, performance management, career management, inclusion and diversity, and agency-specific performance (Styles & Atkins, 2019; Styles & DeCruz, 2020). While these measures relate to group performance, the public service reports also gather data suggestive of increased subjective well being and health, such as job satisfaction, self-reported work-life balance, feelings of being treated with respect, and job-related feelings of pride.

SBT predicts that the psychological well-being of any individual, as well as their physiological health (Brown et al., 2017), varies in large part with the quality of the social groups they inhabit, and a large body of research support this view (Clark, Holt-Lunstad, Romney, Steffen, & Sandberg, 2014; Holt-Lunstad et al., 2010; Holt-Lunstad, Robles, & Sbarra, 2017). These effects reflect the degree to which group identity is enhanced and group-level resources are effectively optimized in the service of meeting group-level goals. Prosocial enables these group-level

variables to be the direct targets of training by working with the whole group. It is not obvious to us how an individual relationship between a client and a clinical psychologist could achieve these kinds of outcomes. At the same time, these outcomes were made possible by leveraging just one of the many efficacious psychotherapies developed by clinical psychologists over the previous decades.

We freely acknowledge that Prosocial requires much more evaluation as a training method that can be applied to all functionally organized groups. It is the concept of Prosocial, however, that we wish to stress at the conclusion of this article, which is oriented toward a clinical psychology audience. Here is how the discipline of clinical psychology is described on the website of the American Psychological Association[1]:

Clinical psychology is the psychological specialty that provides continuing and comprehensive mental and behavioral health care for individuals and families; consultation to agencies and communities; training, education and supervision; and research-based practice. It is a specialty in breadth — one that is broadly inclusive of severe psychopathology — and marked by comprehensiveness and integration of knowledge and skill from a broad array of disciplines within and outside of psychology proper. The scope of clinical psychology encompasses all ages, multiple diversities and varied systems.

In this article, we have identified two major steps that can bring clinical psychology, as practiced, closer to this broad and systemic vision for the discipline. The first step is conceptual, by going beyond the intellectual tradition of Individualism and recognizing the importance of working with many levels of functional organization. The second step is practical, by finding opportunities to work with whole groups as functionally organized units and not just with individual clients. MLS theory and SBT provide the conceptual resources and rationales for bringing a more multi-level approach to the work clinical psychologists do. Prosocial, as discussed here, is just one of the approaches that broadens the scope of clinical practice both conceptually and practically. But it is our strong feeling that clinical psychology as a field has much more to contribute, with boundless expertise in domains from designing rigorous efficacy trials to leveraging clinical technologies in ways we have yet to envision. Indeed, in recent years clinical psychologists have been at the forefront of urging the development of federal policies that take social connection seriously as a public health issue (Holt-Lunstad et al., 2017). This article, at its core, is an invitation to clinical psychologists to lend their creativity and expertise to expanding these goals at the level of clinical practice, and indeed to envisioning what more clinical practice is and could be.

Declaration of Competing Interest

The authors declare no conflicts of interest for this article.

References

Aktipis, A. (2020). *The cheating cell: How evolution helps us understand and treat Cancer*. Princeton: Princeton University Press.

Aron, A., Lewandowski, G. W., Mashek, D., & Aron, E. N. (2013). The self-expansion model of motivation and cognition in close relationships. In *Oxford handbooks online*. https://doi.org/10.1093/oxfordhb/9780195398694.013.0005.

Atkins, P. W. D., Wilson, D. S., & Hayes, S. C. (2019). *Prosocial: Using evolutionary science to build productive, equitable, and collaborative groups*. New Harbinger.

Bar-Kalifa, E., & Rafaeli, E. (2014). Above and below baselines: The nonmonotonic effects of dyadic emotional support in daily life. *Journal of Social and Personal Relationships, 32*, 161–179.

Barkow, J. H., Cosmides, L., & Tooby, J. (1995). *The adapted mind: Evolutionary psychology and the generation of culture*. Oxford University Press.

Bateson, G. (2005). *Gregory Bateson: Essays for an ecology of ideas*. Cybernetics & Human Knowing.

Baucom, D. H., Kirby, J. S., Fischer, M. S., Baucom, B. R., Hamer, R., & Bulik, C. M. (2017). Findings from a couple-based open trial for adult anorexia nervosa. *Journal of Family Psychology: JFP: Journal of the Division of Family Psychology of the American Psychological Association, 31*(5), 584–591.

Beckes, L., & Coan, J. A. (2011). Social baseline theory: The role of social proximity in emotion and economy of action. *Social and Personality Psychology Compass, 5*(12), 976–988.

Beckes, L., Coan, J. A., & Hasselmo, K. (2013). Familiarity promotes the blurring of self and other in the neural representation of threat. *Social Cognitive and Affective Neuroscience, 8*, 670–677.

Belus, J. M., Baucom, D. H., & Abramowitz, J. S. (2014). The effect of a couple-based treatment for OCD on intimate partners. *Journal of Behavior Therapy and Experimental Psychiatry, 45*(4), 484–488.

Bertrando, P. (2018). *Systemic therapy with individuals*. Routledge.

Boehm, C. (1999). *Hierarchy in the forest*. Cambridge, MA: Harvard University Press.

Boehm, C. (2011). *Moral origins: The evolution of virtue, altruism, and shame*. New York: Basic Books.

Bowen, M. (2013). *The origins of family psychotherapy: The NIMH family study project*. Jason Aronson, Incorporated.

Brown, C. L., Beckes, L., Allen, J. P., & Coan, J. A. (2017). Subjective general health and the social regulation of hypothalamic activity. *Psychosomatic Medicine, 79*(6), 670–673.

Burgess Moser, M., Johnson, S. M., Dalgleish, T. L., Lafontaine, M.-F., Wiebe, S. A., & Tasca, G. A. (2016). Changes in relationship-specific attachment in emotionally focused couple therapy. *Journal of Marital and Family Therapy, 42*(2), 231–245.

Burleson, M. H., & Quigley, K. S. (2019). Social interoception and social allostasis through touch: Legacy of the somatovisceral afference model of emotion. *Social Neuroscience*, 1–11.

Cacioppo, S., Grippo, A. J., London, S., Goossens, L., & Cacioppo, J. T. (2015). Loneliness: Clinical import and interventions. *Perspectives on Psychological Science: A Journal of the Association for Psychological Science, 10*(2), 238–249.

Campbell, D. T. (1994). How individual and face-to-face-group selection undermine firm selection in organizational evolution. In J. A. C. Baum, & J. V. Singh (Eds.), *Evolutionary dynamics of organizations* (pp. 23–38). New York: Oxford University Press.

Clark, B., Holt-Lunstad, J., Romney, C., Steffen, P., & Sandberg, J. (2014). The influence of supportive social networks on stress and sleep outcomes. In *PsycEXTRA dataset*. https://doi.org/10.1037/e522252014-093.

Clark-Polner, E., & Clark, M. S. (2014). Understanding and accounting for relational context is critical for social neuroscience. *Frontiers in Human Neuroscience, 8*, 127.

Clore, G. L., & Proffitt, D. R. (2016). The myth of pure perception. *The Behavioral and Brain Sciences, 39*, Article e235.

Coan, J. A. (2016). Toward a neuroscience of attachment. In J. Cassidy, & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (3rd ed., pp. 242–269). Guilford Press.

Coan, J. A., Beckes, L., Gonzalez, M. Z., Maresh, E. L., Brown, C. L., & Hasselmo, K. (2017). Relationship status and perceived support in the social regulation of neural responses to threat. *Social Cognitive and Affective Neuroscience, 12*(10), 1574–1583.

Coan, J. A., & Sbarra, D. A. (2015). Social baseline theory: The social regulation of risk and effort. *Current Opinion in Psychology, 1*, 87–91.

Coan, J. A., Schaefer, H. S., & Davidson, R. J. (2006). Lending a hand: Social regulation of the neural response to threat. *Psychological Science, 17*(12), 1032–1039.

Cuijpers, P., Driessen, E., Hollon, S. D., van Oppen, P., Barth, J., & Andersson, G. (2012). The efficacy of non-directive supportive therapy for adult depression: A meta-analysis. *Clinical Psychology Review, 32*(4), 280–291.

Czégel, D., Zachar, I., & Szathmáry, E. (2019). Multilevel selection as Bayesian inference, major transitions in individuality as structure learning. *Royal Society Open Science, 6*(8), 190202. https://doi.org/10.1098/rsos.190202.

Davies, N. B., Krebs, J. R., & West, S. A. (2012). *An introduction to behavioural ecology* (4th ed.). Wiley-Blackwell.

Deacon, T. W. (1998). *The symbolic species*. New York: Norton.

DeAngelis, T. (2008). The two faces of oxytocin: Why does the "tend and befriend" hormone come into play at the best and worst of times?. In *PsycEXTRA dataset*. https://doi.org/10.1037/e531092009-019.

Dienel, G. A. (2019). Brain glucose metabolism: Integration of energetics with function. *Physiological Reviews, 99*(1), 949–1045.

Ein-Dor, T., Coan, J. A., Reizer, A., Gross, E. B., Dahan, D., Wegener, M. A., … Zohar, A. H. (2015). Sugarcoated isolation: Evidence that social avoidance is linked to higher basal glucose levels and higher consumption of glucose. *Frontiers in Psychology, 6*, 492.

Eisenberger, N. I., & Lieberman, M. D. (2004). Why rejection hurts: A common neural alarm system for physical and social pain. *Trends in Cognitive Sciences, 8*(7), 294–300.

Ereira, S., Hauser, T. U., Moran, R., Story, G. W., Dolan, R. J., & Kurth-Nelson, Z. (2020). Social training reconfigures prediction errors to shape self-other boundaries. *Nature Communications, 11*(1), 3030.

Fitzsimons, G. M., & Finkel, E. J. (2018). Transactive-goal-dynamics theory: A discipline-wide perspective. *Current Directions in Psychological Science, 27*(5), 332–338. https://doi.org/10.1177/0963721417754199.

Fitzsimons, G. M., Sackett, E., & Finkel, E. J. (2016). Transactive goal dynamics theory: A relational goals perspective on work teams and leadership. *Research in Organizational Behavior, 36*, 135–155. https://doi.org/10.1016/j.riob.2016.11.006.

Flaskas, C., & Perlesz, A. (2019). *The therapeutic relationship in systemic therapy*. Routledge.

Gervais, M., & Wilson, D. S. (2005). The evolution and functions of laughter and humor: A synthetic approach. *QUARTERLY REVIEW OF BIOLOGY, 80*, 395–430.

Giphart, R., & Van Vugt, M. (2018). *Mismatch: How our stone age brain deceives us every day (and what we can do about it)*. Robinson.

Gottman, J. S. (2004). *The marriage clinic casebook*. W. W. Norton & Company.

[1] https://www.apa.org/ed/graduate/specialize/clinical.

Gottman, J. M., Coan, J., Carrere, S., & Swanson, C. (1998). Predicting marital happiness and stability from newlywed interactions. *Journal of Marriage and the Family, 60*(1), 5–22.
Gottman, J. S., & Gottman, J. M. (2015). *10 principles for doing effective couples therapy (Norton series on interpersonal neurobiology)*. W. W. Norton & Company.
Gottman, J. M., & Gottman, J. S. (2018). *The science of couples and family therapy: behind the scenes at the "love lab"*. W. W. Norton & Company.
Gottman, J. M., Guralnick, M. J., Wilson, B., Swanson, C. C., & Murray, J. D. (1997). What should be the focus of emotion regulation in children? A nonlinear dynamic mathematical model of children's peer interaction in groups. *Development and Psychopathology, 9*(2), 421–452.
Gottman, J. M., & Levenson, R. W. (1992). Marital processes predictive of later dissolution: Behavior, physiology, and health. *Journal of Personality and Social Psychology, 63*(2), 221–233.
Gottman, J. M., Murray, J. D., Swanson, C. C., Tyson, R., & Swanson, K. R. (2002). *The mathematics of marriage*. https://doi.org/10.7551/mitpress/4499.001.0001.
Gross, E. B., & Medina-DeVilliers, S. E. (2020). Cognitive processes unfold in a social context: A review and extension of social baseline theory. *Frontiers in Psychology, 11*, 378.
Gross, E. B., & Proffitt, D. (2013). The economy of social resources and its influence on spatial perceptions. *Frontiers in Human Neuroscience, 7*, 772.
Grove, M. (2011). Change and variability in Plio-Pleistocene climates: Modelling the hominin response. *Journal of Archaeological Science, 38*(11), 3038–3047. https://doi.org/10.1016/j.jas.2011.07.002.
Grove, M. (2015). Palaeoclimates, plasticity, and the early dispersal of *Homo sapiens*. *Quaternary International, 369*, 17–37. https://doi.org/10.1016/j.quaint.2014.08.019.
Grove, M., Lamb, H., Roberts, H., Davies, S., Marshall, M., Bates, R., & Huws, D. (2015). Climatic variability, plasticity, and dispersal: A case study from Lake Tana, Ethiopia. *Journal of Human Evolution, 87*, 32–47.
Haley, J., & Richeport-Haley, M. (2004). *The art of strategic therapy*. Routledge.
Hardin, G. (1968). The tragedy of the commons. *Science, 162*, 1243–1248.
Hare, B. (2017). Survival of the friendliest: Homo sapiens evolved via selection for Prosociality. *Annual Review of Psychology, 68*, 155–186.
Hawkley, L. (2019). Social isolation, loneliness, and health. *Solitary Confinement*, 185–198. https://doi.org/10.1093/oso/9780190947927.003.0011.
Hayes, S. C. (2010). Contextualism. In *The corsini encyclopedia of psychology*. https://doi.org/10.1002/9780470479216.corpsy0225.
Hayes, S. C. (2016). Acceptance and commitment therapy, relational frame theory, and the third wave of behavioral and cognitive therapies - republished article. *Behavior Therapy, 47*(6), 869–885.
Hayes, S. C. (2019). *A liberated mind: How to pivot toward what matters*. Penguin.
Hayes, S. C., Atkins, P., & Wilson, D. S. (2020). Prosocial: Using an evolutionary approach to modify cooperation in small groups. In R. Houmanfar, M. Fryling, & M. Alavosius (Eds.), *Applied behavior science in organizations: Consilience of historical and emerging trends in organizational behavior management*. New York: Springer.
Hayes, S. C., Sanford, B. T., & Chin, F. T. (2017). Carrying the baton: Evolution science and a contextual behavioral analysis of language and cognition. *Journal of Contextual Behavioral Science*. https://doi.org/10.1016/j.jcbs.2017.01.002.
Hegel, P. T. (1807). *The phenomenology of mind (Transl.)*. London: Allen and Unwin.
Henriksen, R. E., Torsheim, T., & Thuen, F. (2014). Loneliness, social integration and consumption of sugar-containing beverages: Testing the social baseline theory. *PLoS One, 9*(8), Article e104421.
Holldobler, B., & Wilson, E. O. (2009). *The super-organism: The beauty, elegance, and strangeness of insect societies*. New York: Norton.
Hollingshead, A. B. (2001). Cognitive interdependence and convergent expectations in transactive memory. *Journal of Personality and Social Psychology, 81*(6), 1080–1089.
Holt-Lunstad, J. (2018). Why social relationships are important for physical health: A systems approach to understanding and modifying risk and protection. *Annual Review of Psychology, 69*, 437–458.
Holt-Lunstad, J., Robles, T. F., & Sbarra, D. A. (2017). Advancing social connection as a public health priority in the United States. *The American Psychologist, 72*(6), 517–530.
Holt-Lunstad, J., Smith, T. B., & Layton, J. B. (2010). Social relationships and mortality risk: A meta-analytic review. *PLoS Medicine, 7*, Article e1000316.
Horvath, G., Blaho, M., Egri, A., Gyorgy, K., Istvan, S., & Robertson, B. (2010). Reducing the maladaptive attractiveness of solar panels to polarotactic insects. *Conservation Biology, 24*(6), 1644–1653. https://doi.org/10.1111/j.1523-1739.2010.01518.x.
Hrdy, S. B. (2007). Evolutionary context of human development. The cooperative breeding model. *Family Relationships: An Evolutionary Perspective*, 24–47.
Hrdy, S. B., & Burkart, J. M. (2020). The emergence of emotionally modern humans: Implications for language and learning. *Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences, 375*(1803), Article 20190499.
Huebner, B. (2016). Transactive memory reconstructed: Rethinking Wegner's research program. *The Southern Journal of Philosophy, 54*(1), 48–69.
IJzerman, H., Coan, J. A., Wagemans, F. M. A., Missler, M. A., van Beest, I., Lindenberg, S., & Tops, M. (2015). A theory of social thermoregulation in human primates. *Frontiers in Psychology, 6*, 464.
Jablonka, E., & Lamb, M. (2006). *Evolution in four dimensions: Genetic, epigenetic, behavioral, and symbolic variation in the history of life*. Cambridge, MA: MIT Press.
Johnson, S. M. (2019a). The basics of EFT interventions: Emotions and the macro-intervention, the EFT tango. *The Practice of Emotionally Focused Couple Therapy*, 51–84. https://doi.org/10.4324/9781351168366-5.
Johnson, S. M. (2019b). The EFT theory of change: Within and between. *The Practice of Emotionally Focused Couple Therapy*, 40–50. https://doi.org/10.4324/9781351168366-4.
Johnson, S. M., Burgess Moser, M., Beckes, L., Smith, A., Dalgleish, T., Halchuk, R., … Coan, J. A. (2013). Soothing the threatened brain: Leveraging contact comfort with emotionally focused therapy. *PLoS One, 8*(11), Article e79314.
Johnson, S., & Greenman, P. (2013). Commentary: Of course it is all about attachment! [review of commentary: Of course it is all about attachment!]. *Journal of Marital and Family Therapy, 39*(4), 421–423.
Kazdin, A. E. (2008). *Parent management training: Treatment for oppositional, aggressive, and antisocial behavior in children and adolescents*. Oxford University Press.
Keller, M. C., & Miller, G. (2006). Resolving the paradox of common, harmful, heritable mental disorders: Which evolutionary genetic models work best? *The Behavioral and Brain Sciences, 29*(4), 385–404 (discussion 405–452) https://doi.org/10.1017/S0140525X06009095.
King, A. J., Sueur, C., King, A. J., & Sueur, C. (2011). Where next? Group coordination and collective decision making by primates. *International Journal of Primatology, 32*, 1245–1267. https://doi.org/10.1007/s10764-011-9526-7.
Levenson, R. W., & Gottman, J. M. (1983). Marital interaction: Physiological linkage and affective exchange. *Journal of Personality and Social Psychology, 45*(3), 587–597.
Levenson, R. W., & Gottman, J. M. (1985). Physiological and affective predictors of change in relationship satisfaction. *Journal of Personality and Social Psychology, 49*(1), 85–94.
López-Solà, M., Geuter, S., Koban, L., Coan, J. A., & Wager, T. D. (2019). Brain mechanisms of social touch-induced analgesia in females. *Pain, 160*(9), 2072–2085.
Maresh, E. L., Beckes, L., & Coan, J. A. (2013). The social regulation of threat-related attentional disengagement in highly anxious individuals. *Frontiers in Human Neuroscience, 7*, 515.
Mashek, D. J., Aron, A., & Boncimino, M. (2003). Confusions of self with close others. *Personality and Social Psychology Bulletin, 29*(3), 382–392.
Maynard Smith, J., & Szathmary, E. (1995). *The major transitions in evolution*. New York: W.H. Freeman.
Maynard Smith, J., & Szathmary, E. (1999). *The origins of life: From the birth of life to the origin of language*. Oxford: Oxford University Press.
McGinnis, M. D. (1999). *Polycentric governance and development: Readings from the workshop in political theory and policy analysis*. Ann Arbor: University of Michigan Press.
Minuchin, S. (2009). *Families and family therapy*. https://doi.org/10.2307/j.ctvjz83h8.
Mogelson, L. (2020, June 22). Letter from Minneapolis: The uprising. *New York, 96*(17), 30.
Norenzayan, A., & Heine, S. J. (2005). Psychological universals: What are they and how can we know? *Psychological Bulletin, 131*(5), 763–784.
Ostrom, E. (1990). *Governing the commons: The evolution of institutions for collective action*. Cambridge, UK: Cambridge University Press.
Ostrom, E. (2010). Beyond markets and states: Polycentric governance of complex economic systems. *American Economic Review, 100*, 1–33.
Paul, R. A. (2015). *Mixed messages: Cultural and genetic inheritance in the constitution of human society*. Chicago: University of Chicago Press.
Pellerin, L., & Magistretti, P. J. (2003). How to balance the brain energy budget while spending glucose differently. *The Journal of Physiology, 546*(2), 325. https://doi.org/10.1113/jphysiol.2002.035105.
Polk, K. L., Schoendorff, B., & Webster, M. (2016). *The essential guide to the ACT matrix: A step-by-step approach to using the ACT matrix model in clinical practice*. Reno, NV: Context Press.
Potts, R. (1998). Variability selection in hominid evolution. *Evolutionary Anthropology: Issues, News, and Reviews, 7*(3), 81–96. https://doi.org/10.1002/(SICI)1520-6505(1998)7:3<81::AID-EVAN3>3.0.CO;2-A.
Potts, R., & Faith, J. T. (2015). Alternating high and low climate variability: The context of natural selection and speciation in Plio-Pleistocene hominin evolution. *Journal of Human Evolution, 87*, 5–20.
Proffitt, D. (2007). The bio-energetic scaling of perceived space. In *PsycEXTRA dataset*. https://doi.org/10.1037/e527342012-167.
Proffitt, D., & Baer, D. (2020). *Perception: How our bodies shape our minds*. St. Martin's Press.
Raichle, M. E., & Gusnard, D. A. (2002). Appraising the brain's energy budget. *Proceedings of the National Academy of Sciences, 99*(16), 10237–10239. https://doi.org/10.1073/pnas.172399499.
Reich, D. (2018). *Who we are and how we got Here: Ancient DNA and the new science of the human past*. Oxford University Press.
Richerson, P. J. (2017). Recent critiques of dual inheritance theory. *Evolutionary Studies in Imaginative Culture, 1*(1), 203. https://doi.org/10.26613/esic.1.1.27.
Richerson, P. J., & Boyd, R. (2005). *Not by genes alone: How culture transformed human evolution*. Chicago: University of Chicago Press.
Rohrbaugh, M. J., & Shoham, V. (2011). Family consultation for couples coping with health Problems: A social cybernetic approach. In *Oxford handbooks online*. https://doi.org/10.1093/oxfordhb/9780195342819.013.0020.
Rousseau, J. J. (1767). *A treatise on the social contract*. London: Beckett and DeHondt.
Saxbe, D. E., Beckes, L., Stoycos, S. A., & Coan, J. A. (2020). Social Allostasis and social allostatic load: A new model for research in social dynamics, stress, and health. *Perspectives on Psychological Science: A Journal of the Association for Psychological Science, 15*(2), 469–482.
Schnall, S., Harber, K. D., Stefanucci, J. K., & Proffitt, D. R. (2008). Social support and the perception of geographical slant. *Journal of Experimental Social Psychology, 44*(5), 1246–1255.
Schnall, S., Zadra, J. R., & Proffitt, D. R. (2010). Direct evidence for the economy of action: Glucose and the perception of geographical slant. *Perception, 39*(4), 464–482.
Schulkin, J., & Sterling, P. (2019). Allostasis: A brain-centered, predictive mode of physiological regulation. *Trends in Neurosciences, 42*(10), 740–752.
Seeley, T. (1995). *The wisdom of the hive*. Cambridge, MA: Harvard University Press.

Seeley, T. D. (2010). *Honeybee democracy*. Princeton: Princeton University Press.
Shoham, V., & Rohrbaugh, M. (1997). Interrupting ironic processes. *Psychological Science, 8*(3), 151–153. https://doi.org/10.1111/j.1467-9280.1997.tb00400.x.
Shoham, V., & Rohrbaugh, M. J. (2010). Paradoxical intervention. In *The corsini encyclopedia of psychology*. https://doi.org/10.1002/9780470479216.corpsy0634.
Shteynberg, G. (2018). A collective perspective: Shared attention and the mind. *Current Opinion in Psychology, 23*, 93–97.
Shteynberg, G., Hirsh, J. B., Bentley, R. A., & Garthoff, J. (2020). Shared worlds and shared minds: A theory of collective learning and a psychology of common knowledge. *Psychological Review*. https://doi.org/10.1037/rev0000200.
Silk, J. B., Brosnan, S. F., Vonk, J., Henrich, J., Povinelli, D. J., Richardson, A. S., … Schapiro, S. J. (2005). Chimpanzees are indifferent to the welfare of unrelated group members. *Nature, 437*(7063), 1357–1359. https://doi.org/10.1038/nature04243.
Simpson, J. A., & Steven Rholes, W. (2015). *Attachment theory and research: New directions and emerging themes*. Guilford Publications.
Sober, E. (2010). *Did Darwin write the origin backwards?: Philosophical essays on Darwin's theory*. Amherst, NY: Prometheus Press.
Sober, E., & Wilson, D. S. (1998). *Unto others: The evolution and psychology of unselfish behavior*. Cambridge, MA: Harvard University Press.
Sparrow, B., Liu, J., & Wegner, D. M. (2011). Google effects on memory: Cognitive consequences of having information at our fingertips. *Science, 333*(6043), 776–778.
Sterling, P. (2012). Allostasis: A model of predictive regulation. *Physiology & Behavior, 106*(1), 5–15. https://doi.org/10.1016/j.physbeh.2011.06.004.
Sterling, P. (2018). Predictive regulation and human design. *eLife, 7*. https://doi.org/10.7554/elife.36133.
Sterling, P. (2020). *What is health?: Allostasis and the evolution of human design*. MIT Press.
Sterling, P., & Laughlin, S. (2015). *Principles of neural design*. https://doi.org/10.7551/mitpress/9780262028707.001.0001.
Styles, R., & Atkins, P. W. D. (2019). Solid evidence for PROSOCIAL within government agency settings: A conversation with Robert styles. *Prosocial World Magazine*. article: https://www.prosocial.world/b3/solid-evidence-for-prosocial-within-government-agency-settings-a.
Styles, R., & DeCruz, E. (2020). Evolving effective and cooperative networks through polycentric governance and Prosociality. *Journal of Contextual Behavioral Science* (submitted).
Tenhundfeld, N. L., & Witt, J. K. (2020). Human and machine: Evaluating whether action automation influences visual perception. *Attention, Perception, & Psychophysics*. https://doi.org/10.3758/s13414-020-02037-8.
Tomasello, M. (2019). *Becoming human: A theory of ontogeny*. Belknap Press.
Tomasello, M. (2020). The adaptive origins of uniquely human sociality. *Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences, 375*(1803), Article 20190493.
Tsai, M., Yoo, D., Hardebeck, E. J., Loudon, M. P., & Kohlenberg, R. J. (2019). Creating safe, evocative, attuned, and mutually vulnerable therapeutic beginnings: Strategies from functional analytic psychotherapy. *Psychotherapy, 56*(1), 55–61.
Turchin, P. (2015). *Ultrasociety: How 10,000 years of war made humans the greatest cooperators on earth*. Storrs, CT: Baresta Books.
Van Schaik, C. P. (2016). *The primate origins of human nature*. John Wiley & Sons.
Van Schaik, C., & Janson, C. H. (2000). *Infanticide by males and its implications*. Cambridge, UK: Cambridge University Press.
Ward-Ciesielski, E. F., Limowski, A. R., & Krychiw, J. K. (2020). History and overview of dialectical behavior therapy. *The Handbook of Dialectical Behavior Therapy*, 3–30. https://doi.org/10.1016/b978-0-12-816384-9.00001-4.
Watzlawick, P., Bavelas, J. B., Jackson, D. D., & O'Hanlon, B. (2011). *Pragmatics of human communication: A study of interactional patterns, pathologies and paradoxes*. W. W. Norton & Company.
Wegner, D. M. (1986). Transactive memory: A contemporary analysis of the group mind. In B. Mullen, & G. R. Goethals (Eds.), *Theories of group behavior*. New York: Springer-Verlag.
Wiebe, S. A., & Johnson, S. M. (2017). Creating relationships that foster resilience in emotionally focused therapy. *Current Opinion in Psychology, 13*, 65–69.
Wilson, E. O. (2012). *The social conquest of earth*. New York: Norton.
Wilson, D. S. (2015). *Does altruism exist? Culture, genes, and the welfare of others*. New Haven, CT: Yale University Press.
Wilson, D. S. (2019). *This view of life: Completing the Darwinian revolution*. New York: Pantheon/Random House.
Wilson, D. S., & Hayes, S. C. (2018). *Evolution and contextual behavioral science: An integrated framework for understanding, predicting, and influencing human behavior*. New Harbinger Publications.
Wilson, D. S., Hayes, S. C., Biglan, A., & Embry, D. (2014). Evolving the future: Toward a science of intentional change. *Behavioral and Brain Sciences, 37*, 395–460.
Wilson, D. S., Ostrom, E., & Cox, M. E. (2013). Generalizing the core design principles for the efficacy of groups. *Journal of Economic Behavior & Organization, 90*, S21–S32. https://doi.org/10.1016/j.jebo.2012.12.0.
Wilson, D. S., & Wilson, E. O. (2007). Rethinking the theoretical foundation of sociobiology. *QUARTERLY REVIEW OF BIOLOGY, 82*, 327–348.
Witt, J. K., & Sugovic, M. (2010). Performance and ease influence perceived speed. *Perception, 39*(10), 1341–1353.
Wittmann, M. K., Kolling, N., Faber, N. S., Scholl, J., Nelissen, N., & Rushworth, M. F. S. (2016). Self-other mergence in the frontal cortex during cooperation and competition. *Neuron, 91*(2), 482–493.
Wrangham, R. W. (2019a). Hypotheses for the evolution of reduced reactive aggression in the context of human self-domestication. *Frontiers in Psychology, 10*, 1914.
Wrangham, R. (2019b). *The goodness paradox: The strange relationship between virtue and violence in human evolution*. New York: Pantheon.
Zadra, J. R., Weltman, A. L., & Proffitt, D. R. (2015). Walkable distances are bioenergetically scaled. *Journal of Experimental Psychology. Human Perception and Performance*. https://doi.org/10.1037/xhp0000107.

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