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Because the Nature of Nature is Fractal: The Liberatory Potential of a Fractal Epistemology

(Commentary on Marks-Tarlow's "A Fractal Epistemology for Transpersonal Psychology")

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I am delighted to have had the privilege to serve as a guest editor, working with the authors and with Adam Rock (University of New England, Australia), copy-editing, proofreading, and reference-checking this IJTS special focus issue. I was invited to do so because, as a graduate student at the university home of IJTS in the PhD program founded and created by its editor, Glenn Hartelius, I expressed interest in fractals. Fractals are forms found in nature and generated by computers whose structure is characterized by rough edges, branching, and permeable borders such as snowflakes, trees, and the human respiratory system -- and fractals are also processes – the ways that these forms reproduce in an iterative, self-similar, recursive fashion regardless of scale.

When asked whether I would serve as guest editor for a section with a focus article by Terry Marks-Tarlow's entitled "A Fractal Epistemology for Transpersonal Psychology" and eighteen commentaries, my initial response was "let me see if I understand the article, and if so, I'd be honored." Thinking: I know what fractals are, but what is a fractal epistemology? When I read her piece, I not only understood it, but was energized and excited by it, feeling both intellectually and intuitively that this was a watershed thesis that could transform the academic landscape not only for transpersonal psychology, but for mainstream psychology as well. It felt fundamentally liberatory. This commentary is focused on explicating the reasons for my enthusiasm as a PhD student in transpersonal psychology, what I learned from the article, and why I see the ideas expressed in it / the story told by it as "fundamentally liberatory."

It starts with Mandelbrot and his creation of fractal geometry. Mandelbrot's (1977) primary insight was that the nature of nature is fractal. He wrote that existing mathematics "have increasingly chosen to flee from nature by devising theories unrelated to anything we can see or feel. Responding to this challenge, I conceived and developed a new geometry of nature and implemented its use in diverse fields." (p. 3) Marks-Tarlow (2020; this issue) writes: Mandelbrot "offered fractals as a framework for modeling aspects of nature previously considered too ambiguous, irregular, unique, discontinuous, or complicated for traditional mathematical methods" (p. 56). It is not that fractals are a small subset of the natural world: *it is that pretty much everything in nature is more fractal than Euclidean*. While Mandelbrot dealt in imaginary numbers and the complex plane, his contributions were not just theoretical abstractions relevant to mathematical discourse: they were intentionally grounded in observable and observed reality in the natural world, such as understanding coastlines and turbulence (Mandelbrot, 1967, 1974, 1977). Without fractal geometry, there would almost certainly be no Pixar animation or sophisticated bio-imaging technology because human circulatory, nervous, and respiratory systems all are more fractal than Euclidean in both structure and function. So, without ways to accurately and adequately model natural phenomena, without a deep and specific understanding of their fractal structure and dynamics, such technologies would not exist. Moreover, the better the understanding of the dynamic functioning of the natural world, the more possibility of developing technologies that preserve the environment instead of destroying it, such as the biomimicry work of Benyus, 1997.

Because math is foundational to science, without adequate mathematical language to express a more complex reality, science had been trapped in a hegemonic intellectual frame or paradigm. Leaving aside the political implications of an education that

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supports existing power relations (Friere, 1970), or feminist and other critical theories' critiques of the way that reality is described (Plumwood, 1993), this limitation had implications for science, philosophy, and technology in terms of their ability to advance their own conscious agendas. The point is twofold: (a) that somewhere along the way, in all the sciences and in psychology, academics started confusing man-made models of reality, which were crude, oversimplified approximations of it, with what actually is; and that (b) this tendency has limited the ability to understand or manipulate reality.

Research on locating, identifying, understanding fractal structures and dynamics and their application to phenomena of interest to psychologists is in its infancy. It is a subset of work by psychologists who are integrating concepts, models, and methods from complexity sciences, chaos theory, non-linear dynamic systems theory, complex adaptive systems theory from physics to psychology. (cf. Abraham, Abraham, & Shaw, 1990; Guastello, Koopmans, & Pincus, 2009; Marks-Tarlow, 1999; Marks-Tarlow, Hay, & Klitzner, 2015, Shapiro & Scott, 2017). There are researchers studying how fractals show up and are involved in human brain structure and function (Bieberich, 2002; Vandervert, 2020, this issue; Werner, 2010), and information processing (Klitzner, 2020, this issue). Using power laws statistics, Pincus, Cadsky, Berardi, Asuncion, and Wann's (2019) study entitled "Fractal Self-Structure and Psychological Resilience" found that their results supported recent theories and empirical evidence that the personality is a self-organizing system, and that the structure of the self is complex network producing fractal outputs. Delignieres, Fortes, and Ninot (2004) identified fractal dynamics of self-esteem and the physical self. Richard Taylor, physicist and abstract expressionist artist, leads an interdisciplinary research network at the University of Oregon that investigates the positive physiological changes that occur when people look at fractals—specifically the fractals in Jackson Pollack paintings, which the group verified mimic fractals in nature (Taylor, Micholich, & Jonas, 1999; Taylor, Micholich, & Jonas, 2002). Their experiments over time have used eye-tracking equipment, quantitative electroencephelograpy (qEEG), and functional magnetic resonance imaging (fMRI) to measure brain activity when viewing fractals (Hagerhall et al., 2015; Hagerhall et al., 2008; Spehar & Taylor, 2013; Taylor, 2006; Taylor et al., 2011). Taylor's (2016) group found that when people look at a specific form of fractal found in nature and reproduced in art, stress levels go down by as much as 60%, perhaps because of physiological resonance between the fractal structure of the visual system and the fractal image. Marks-Tarlow herself has written extensively on the application of non-linear dynamic systems theory to psychology and psychotherapy, such as "The Self as a Dynamical System" (1999) and her 2008 book *Psyche's Veil: Psychotherapy, Fractals, and Complexity*.

With her article in this issue, however, Marks-Tarlow (2020, this issue) goes beyond identifying fractal structures and dynamics in phenomena of interest to psychologists and advocates the adoption of a fractal epistemology. This is not something she is creating, it is something that she is naming—as it emerges in synch with ontological shifts in science, psychology, and culture.

Adopting a new episteme is not a trivial suggestion: it is akin to or perhaps part and parcel of a paradigm shift (Kuhn, 1968). As Marks-Tarlow argued and Shapiro (2020, this issue) explicated, a fractal epistemology underlying a naturalistic, nonreductive scientific approach could be integral to evolving transpersonal psychological science. Such an approach may bring the exploration of so-called transpersonal phenomena from the fringes or margin to the center of understanding complex dynamics of the natural world. A fractal epistemology potentially offers a way of integrating subjective experience without reifying it and thus avoids the pitfalls inherent in reductionist empiricism, post-modern constructivism, and romantic scientism (Friedman & Brown, 2018).

I have understood by reading Marks-Tarlow (2020, this issue) and the commentaries, that adopting a fractal epistemology would change the underlying conditions of what would define scientific investigation and how knowledge would be produced. It would be a movement towards complexity rather than reduction. In non-linear dynamic systems, the power is in the tails of the bell curve, not in the center—so outliers would have different

relevance and importance. Reality if not defined by linear, reductive, mechanistic empirical models, could track closer to the experience of human beings and admit more subjective data. There would likely be less bracketing of research subjects considered inaccessible to scientific investigation. The transpersonal could be assumed as real rather than needing to prove the existence of it (e.g., Cardena, 2018). One state of consciousness would not necessarily be privileged over another. Research focus could extend to examining the fuzzy, permeable borders between seeming dichotomous polarities. Self-similar, recursive, scale-invariant patterns could be assumed, identified, and investigated.

This is because as fractals become visible and a fractal epistemology is embraced, ontology changes as well. Conscious and subconscious understandings about the physical and social world condition and circumscribe scientific inquiry or, in other words, ontology—what is---is integrally connected to epistemology—what and how we know. In his commentary on Marks-Tarlow's article, Fred Abraham (2020, this issue) describes the relationship between epistemology and ontology as a "yin/yang entanglement":

> Epistemology and ontology are inseparable, two perspectives on the same process. You can't fabricate knowledge about reality … unless you have some concept or commitment to the nature of reality, and your concepts about the nature of reality are under constant revision as you continue to investigate it. There is an ongoing dialogue between them, thus they are parts of an organic, holistic, process, no longer to be considered as parts. (p. 72)

In relationship to transpersonal psychology, what current scientific trends toward nonreduction and advances in epigenetics, chaos and complexity theory, fractal geometry, social neurobiology, quantum physics, and biology, as well as new materialist thought in the social sciences and humanities (Coole & Frost, 2010), have to teach is that "natural" can be decoupled from models and metaphors and theories and methods that are reductionist, dualistic, or Industrial-Age-mechanistic. Ferrer (2017) approached this stance by advocating for a "more liberal open naturalism—one that is receptive to both the ontological integrity of spiritual referents and the plausibility of subtle worlds or dimensions of reality" (p. 2). A fractal epistemology acknowledges the continuity between between material dimensions of the natural world and subtle aspects often deemed nonmaterial. Fractal geometry has the potential to offer transpersonal psychology the possibility of new epistemes to close the ontological gap between "metaphysics (what exists) and epistemology (knowing what exists)" by illuminating "the submerged interface between the unconscious and the nonlocal reality that defines the field of transpersonal science" (Shapiro, 2020, p. 134, this issue).

This is important for the field because what draws people to transpersonal studies, including transpersonal psychology, is often first-person, subjective knowledge through empirical experience of the nature of reality that is qualitatively and quantitatively different from what they have been inculcated to embrace and understand as ontologically real. Whether experienced as an awakening or a spiritual emergency (Grof & Grof, 1989) or an epistemological crisis (MacIntyre, 1977), or a little of each, mystical experience, psi experience, entheogenic experience, or immersion in psycho-physical-spiritual technologies such as yoga, tantra, meditation, or Kabbalistic Judaism have in common that they rock people's worlds. What has typically been taught in school does not give the tools to integrate these experiences into people's lives, as science has tended to categorically reject the epistemic or cognitive referents of these phenomenological experiences because they conflict with current theories about what is real and possible. The major games in town for understanding and integrating them had been religion and spiritual traditions, Indigenous cosmologies, and Eastern philosophies, as these approaches seemed to be able to assist people with connecting the dots and linking their subjective experience to larger communities of people and bodies of knowledge. Enter transpersonal psychology as a disruptive discourse that sought to create a new Western scientific subdiscipline of psychology that would account for what mainstream Western academic disciplines classified as anomalous and, consequently, unimportant or even markers of psychopathology. Harris Friedman (2018) wrote:

> Transpersonal psychology is a subdiscipline of psychology that rests on an alternate worldview that contrasts with the dominant paradigm of mainstream contemporary psychology… Transpersonal psychology grew out of … humanistic psychology … but the subdiscipline goes much further in challenging many of contemporary psychology's most basic assumptions to the core. (p. 2)

Friedman (2002, 2013) has been a longstanding voice in the field of transpersonal psychology encouraging a scientific approach that eschews the supernatural when exploring transpersonal phenomena. He is a champion of mixed methods research and argues that transpersonal psychology can be brought into a scientific worldview, while "remaining on the cutting edge of so many frontier areas of study that it is uniquely positioned to address" by eradicating the "excesses of romanticism that trouble the subdiscipline" (Friedman, 2018, p. 19).

Transpersonal psychology and fractal geometry have similar geneses. Both transpersonal psychology and fractal geometry were seeking to reinterpret what had been deemed pathological in their respective disciplines. For fractal geometry this was "mathematical monsters" or phenomena that did not behave and could not be explained by current mathematical theory. For transpersonal psychology this was about a subset of non-ordinary states of consciousness that were healing and transformative as well as the domain of spirituality as an integral part of human experience and wellbeing (Grof, 2008). Both subdisciplines were arguing for a revision of what is considered ontologically real as a foundation for undertaking a rigorous scientific exploration of the phenomena of interest. Reading Marks-Tarlow (2020, this issue), I was captivated by the idea that a fractal epistemology could provide a path out of Newtonian-Cartesian, monistic, materialistic, mechanistic worldview and into a more nuanced and complex understanding of the reality people experience.

To be clear, the elucidation of a fractal epistemology likely will not be / is not the driver of theory and praxis shift in transpersonal psychology, mainstream psychology, or in popular conceptions of ontology, but it does give language to describe what is already happening. In Western popular culture, binaries seem to be eroding and giving way to more complex understandings of phenomena that have traditionally been understood in dualistic (and hierarchical) terms. Sex and gender are one example of this trajectory—but arguably, supernatural and natural, nature and culture, science and religion are all implicated. I describe the relationship of sex and gender with society / culture, science, and psychology at some length as one example of the emergence of a meta/trans-binary ontological landscape. It is a narrative that is possible owing to the emergence of a fractal epistemology.

Traditionally, newborns have been assigned a sex at birth—either male or female. Gender, the social category based on biological sexual markers, has flowed from that assignment and has been understood as relatively immutable. Gender has historically circumscribed social roles, within the patriarchal context. Psychological theory and praxis have tracked with these and assumed a role of assisting people with adapting to and reconciling their selves with this reality. For example, generative theories such as Freud's *penis envy* (1908/2014) were directly related to the binary hegemonic episteme and the logical possibilities that inhered from it.

Over the last 50 years, sex and gender have become increasingly complex: feminist discourses and activism have been unraveling and severing the tethers between gender and socio-cultural destiny; the dualisms of male/female and feminine/masculine have been questioned and deconstructed; queer and trans individuals and communities have been and are challenging both the immutability of sex assignment at birth and the assumed correlation between biology and gender while exploring how to shift their gender and sexual identity within and outside of the binaries. Examples of other cultures that have dealt with gender differently have emerged in popular literature. For example, the two-spirit reality of Native American cultures, where, at point of colonial contact, five genders were recognized: male, female, two-spirit male, two-spirit female, and transgender (Brayboy, 2017).

Science too, has been questioning the binary of sex and gender since at least 1968, when in

the context of rules for Olympic sports, biologist, Moore (1968), identified nine different components of sexual identity. The biological complexity is being reaffirmed with acknowledgement of the existence of millions of intersex individuals (Ainsworth, 2015), which problematizes the binary by showing that anatomy, hormones, cells, and chromosomes are all involved in "sexing the body" (Fausto-Sterling, 2000). In short, there has been growing awareness that Western culture has reinforced its binary sex and gender taxonomy, knowing that it is insufficient for describing the reality that exists, and that there are better descriptions of what exists (i.e., more accurate, and therefore also more helpful and less traumatizing).

As the socio-cultural landscape changes, psychology must adapt as well, such as in Hyde, Bigler, Joel, Tate, and Anders' (2019) article "The Future of Sex and Gender in Psychology: Five Challenges to the Gender Binary," published in *American Psychologist*, in which they argued that, while binary gender has shaped the history of psychology as science, scientific evidence undermines the gender binary as physiological reality. Rather, gender seems to be culturally determined and malleable, and with the current sociocultural landscape, relying on the gender binary has significant costs.

Thinking about the future of scientific psychology, the greatest hope of many transpersonal psychologists may be to liberate the psyche from the chains that reductionist, narrowly materialist, patriarchal, machine-age mechanistic science has imprisoned her with.

What this commentary strives to communicate is that the transpersonal scientific path may be an embodied one, in this sense an extended materialist journey, with scientists walking arm-in-arm with Nature, continuing to dialogically, respectfully ask her to reveal her secrets. Arguably, this symbiotic approach to Nature is urgently needed in order to fulfill the mission of transpersonal psychology as a fourth force in psychology, growing out of prior behavioristic, psychoanalytic, and humanistic movements, "particularly concerned with alleviating suffering on the individual, social, and ecological dimensions" (Lahood, 2007, p. 2).

To paraphrase Richard Tarnas (2006), the time of pursuing Nature's wisdom and secrets through an epistemology that relates to her as though her existence is primarily valuable only to the extent that we can develop and exploit her resources to satisfy our various needs, motivated by the desire to increase our own intellectual mastery, our ability to predict with certainty, and to exercise efficient control over Nature for our own self-aggrandizement, has passed. The stance implied by a fractal epistemology is rather that of Tarnas' second suitor who listens, who seeks to learn in order to love, to engage reciprocally and creatively, with the goal of sustaining an intelligent, peaceful, harmonious relationship that is mutually beneficial.

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About the Journal

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