



Journal of
Theoretical & Philosophical Criminology

August, 2015, 49-71

Rethinking Ontology in Criminology: Synopsis of Quantum Holographic Criminology: Paradigm Shift in Criminology, Law and Transformative Justice¹

Dragan Milovanovic, Northeastern Illinois University

Introduction

This book evolved from my on-going research in postmodern criminology. During my academic career and practical experiences in the field, I have grown continuously skeptical about the core assumptions we take as a given in our construction of reality. During grad school, Richard Quinney's *The Social Reality of Crime*, was pivotal in my conversion to a more critical criminology approach. In 1988, I was proud to have contributed to the development of the Division on Critical Criminology at the Annual ASC meeting in Chicago by starting a newsletter with Bernard Headley, *The Critical Criminologist* and subsequently the *Journal of Human Justice* with Brian MacLean, which further evolved into the *Journal of Critical Criminology*. Critical criminology has become well established and many of the early forms of academic repression have subsided providing the basis of lively and diverse critical analysis. However, much of critical criminology (and social sciences generally) often rests on core assumptions that need to be re-assessed. Key concepts such as cause, agency, information, language, entities ("objects"), time, and space remain rooted in Newtonian-based physics. Isaac Newton's monumental *Principia* (1687) certainly was revolutionary thought in physics, as was Albert Einstein's relativity principles (specific, general). But a new wave is afoot. Quantum mechanics, developed in the 1920s challenged much of conventional/classical physics, even as Einstein disagreed with one of its basic tenets in declaring "God does not play dice." Quantum holography theory (hereafter, QH), particularly the work of Dennis Gabor (1946), has extended on quantum theory to suggest that information should be seen as a key concept alongside the more traditional emphasis on force, energy, and matter. In two earlier articles published in *JTPC* (2011, 2013) we developed the initial approximations of applying QH to criminology. It remains to be seen how receptive contemporary scholars are to revisiting their underlying ontological and epistemological assumptions. Our goal for the book is more limited: not to produce a full-fledged theory of crime, or an alternative operation of law, but rather a suggestive work for paradigm

¹ Dragan Milovanovic (2014), *Quantum Holographic Criminology: Paradigm Shift in Criminology, Law and Transformative Justice*. Carolina Academic Press. Durham, N.C.

reflection. Thus in the last two substantive chapters presented are some initial forays in applying QH to criminology, law and transformative justice.

It is remarkable that with the incredible advances in quantum and holographic science experienced in the last several decades and the prevalence of wide applications in the media and consumer world that they have not been seriously considered by criminologists in their steadfast insistence on Newtonian-based principles. But, I suppose, we shouldn't be surprised when we consider the entrance of dynamic systems theory (chaos theory) and its minimal engagement in dominant criminology, law, and transformative justice. There has been a wide dissemination of the compelling nature of the peculiarities of quantum science in television science programming, from the possible existence of multiple worlds to the nature of black holes, but yet, reification remains the norm in criminology, law, and even the emerging field of transformative justice.

This book introduces the emerging field of quantum holography and its application to criminology, law and transformative justice. It suggests a paradigm shift with a new ontological basis. Physicists and cosmologists are, and have been for some time, pursuing understandings and integrations of quantum and holography theory. Contemporary criminology is rooted in a Newtonian-based ontology with little mention of the new sciences that have recently developed. Contemporary criminology (and dominant social sciences), has traditionally resisted quantum theory as pertaining only to the atomic and sub-atomic level. Recent evidence clearly shows its effects on the macro-level, particularly how consciousness, agency, and perceptions are created and how social constructions of reality take form, the basis of social action.² In quantum mechanics, all entities are characterized by wave functions which represent the possible states in which they can appear.³ It is observation or measurement that "collapses the wave function" producing one of the possibilities as "reality." This is the Copenhagen interpretation. Holography theory has shown how information can be constructed, stored, transmitted, and retrieved, all nonlocally; meaning, that it is spread out, and that we are all fundamentally interconnected. The quantum holographic approach is not metaphorical, nor analogy, but isomorphism. We see holograms in credit card inscriptions and demonstrated often in cinema.⁴ There has also been recent research for holographic storage to replace current DVDs. One cubic centimeter-sized sugar cube has been said to be sufficient to store all the information of the U.S. Library of Congress.

Quantum theory's core concepts were developed in the 1920s and have yet to be refuted in empirical studies. Alfred Whitehead, Milic Capek, and Abner Shimony were early scholars to pave the way for demonstrating the relevance of applying quantum theory to the social sciences. Holography theory developed in the late 1940s with the work of Dennis Gabor for which he received a Nobel Prize in 1971, and in the mid-1990s by cosmologists Leonard Susskind, Gerard 't Hooft and subsequently, Jakob Bekenstein and Juan Maldacena.⁵ It was popularized by Michael Talbot's book *The Holographic Universe* (1991). Karl Pribram extensive and influential writings, the most recent of

² Evidence clearly suggests that the retina of the eye is receptive to even one photon.

³ Much of this work is traced back to the work of Young's (1804) "double slit" experiments.

⁴ Early forms have appeared in Princes Lea's projection in an early Star Wars episode. The Matrix Trilogy and a Star Trek (The Next Generation) episode, "Ship in the Bottle," (Season 6, Episode 12) are further examples. Star Trek's continuous use of the "holodeck" is yet another example. For an accessible introduction to holography, see particularly parts 1-3 in:

<http://www.holographicuniverseworkshops.com/>

⁵ Juan Maldacena (1997) has provided a mathematical model that has supported the cosmologist's version ('t Hooft, Susskind, Bekenstein) of the "holographic principle." More recent investigations by a Japanese team (Hyakutak, 2013; Hanada *et al*, 2013) have given further mathematical support. A current research project directed by Craig Hogan (<http://holometer.fnal.gov/>) is taking place at the Fermilab in Illinois, called the Holometer experiment with results expected in 2015, although a noted holography cosmologist, Raphael Bousso, disagrees whether in fact it is really designed to test for the holographic principle (see: <http://www.math.columbia.edu/~woit/wordpress/?p=4572>).

which is *The Form Within* written at 93 years of age, building on Gabor, has provided a quantum holographic approach in understanding the processes of the brain. Henri Bergson's work, particularly his *Matter and Memory* (1896) has, many of us argue, anticipated some of the key concepts of holography theory. Ervin Laszlo (2007) has called for a re-orientation of Newtonian-based ontologies toward a holistic, quantum holographic model. Another key development is the work on phase conjugation/transaction interpretation (John Cramer, Walter Schempp, Peter Marcer, and Edgar Mitchell).⁶ Phase conjugation shows how a person and an object of attention each emit and absorb waves that reflect their fundamental quantum states. It is when we establish a resonance between them, a phase conjugation, or frequency interference pattern, that an information channel is created. And it is by this process that the object of attention takes on specific form "out there" from where it is emitted, not in the brain as traditional neural science has it.

There is some contemporary work also being done by Eastern European scholars who are integrating topology, matrix logic, and quantum holographic theory, and applying it to consciousness/brain studies, particularly influenced by the work of August Stern (*The Quantum Brain; Quantum Theoretic Machines*, 2000; see also Hungarian scholar Istvan Dienes, 2011, and his "holomatrix" model). It should be noted, as with Stern and Dienes, some approaches do not entail a collapse of the wave function. A new field in psychology, "quantum cognition," has recently emerged that is applying quantum, and in a more limited way, holography principles, to human lexicon structures (Busemyer and Bruza, 2012). Darius Plikynas (2010, 2014a, 2014b, 2014c, 2015d) and his research team from Vilnius, Lithuania have been developing a quantum-based oscillation agent model (OAM) which has much compatibility with QH. Current on-going exchanges between Darius and myself, indicates that their model will begin actively engaging QH principles (see Milovanovic, 2015c). A new journal, *NeuroQuantology*, has devoted itself to quantum and holographic studies.

Increasingly, studies in quantum holographic theory are also suggesting possible connections with string theory, Eastern philosophy, transcendental meditation, and spiritual studies.⁷ Of note, many of the key developers of quantum mechanics in the 1920s read or were acquainted with Eastern philosophy (see for example, Marin, 2009; Eddington and Jeans, 1984).⁸

Groundbreaking work in applying QH to the social science has been, and is being done by Raymond T. Bradley (and co-authored with Karl Pribram in earlier stages, see reference section), Steve Robbins (2012, 2014a, 2014b) an independent scholar, and Alexander Wendt (2010, 2015) in political science.⁹ My ongoing personal exchanges with them have been inspirational and highly productive. It is a considerable statement of protecting boundaries, disciplinary purity, and resisting ontological rethinking that their work has not been widely accessed and applied. Perhaps the labors

⁶ This is based on optical and phase conjugation. See early development by David Pepper in his 1980 Ph.D. Dissertation and developed for wider circulation in an article in *Scientific American* (1985: 74-83). For a more general introduction, see C. Jozef and P. Elena, <http://www.holografia.wz.cz/holography/index.php><http://www.holografia.wz.cz/holography/index>

⁷ The interdisciplinary nature of science, and particularly in the work of Albert Einstein has been well documented. See for example, Gerald Holton (1998): <https://culturalapparatus.wordpress.com/of-interest/einstein-and-the-cultural-roots-of-modern-science/> It is clear that Einstein had been studying David Hume, Ernst Mach and Emmanuel Kant.

⁸ Karl Jung's notion of the "archetypes" can be better understood by a quantum holography.

⁹ An earlier insightful work applying quantum theory, relying particularly on Niels Bohr, a key developer of quantum theory, especially his version of an indeterminacy principle (versus Heisenberg's uncertainty principle), to the social sciences (particularly Michel Foucault, Judith Butler and other feminist's treatises) is Karen Barad (2007) in *Meeting the Universe Halfway*. It is unfortunate that I have only recently come across this work, underscoring indeed how the works of innovative thinkers in this area still remain buried or untapped in the literature. I will greatly benefit in future work by engaging this highly thoughtful treatise.

of completing a Ph.D., getting published, and establishing oneself with security in a university department militates against cross-disciplinary discovery in research? This repetition undermines openness to alternative critical thought. Perhaps, as I suspect, when a quantum computer replaces our conventional computer logic, many argue within ten years, that a wider acceptance of quantum mechanics will materialize, particularly when it is combined with holographic theory.¹⁰

The extensive works by Deleuze and Guattari, making their way into various disciplines but marginalized in criminology and law, are especially noteworthy philosophers who have developed a more dynamic model of the socius that provides inspiration to thinking and organizing differently.¹¹ Many components of Jacques Lacan's work still remain quite compelling, as Deleuze and Guattari have also noted, and are the basis of our further integration with QH. Let us move to the substantive chapters with a brief synopsis of each.

Classical-materialist v. Process-informational paradigm

Chapter 2 compares a classical-materialist paradigm with the process-informational paradigm. These are not necessarily dichotomous, but for expository purposes they can orient salient differences. There are a number of dimensions we could conceivably compare each, but we look at 8 in particular: prominent founding theorists; objects; space/fields; time; cause; information; language; and processor of information.

The classical-materialist orientation posits: static essences located in 3-dimensional absolute, striated, Euclidean space characterized by the dynamics of four fundamental forces (electromagnetic, strong and weak nuclear, gravitational); forward flowing discrete, objective time much like the ticks of a clock; linear proportional causation; information as digital, binary and driven by Boolean and deductive logic in constructing truth by way of given axioms imbedded in a neutral language; and the processor of information as ultimately reducible to neuronal, bio-chemical functioning. It is a static, deterministic universe whereby all future happenings are driven by prior determinable forces. The foundational figures include Newton, Descartes, Euclid, and Laplace.

The process-informational paradigm differs. It posits: a wave like polyvalent, uncertain nature of entities (objects), each an emitter and absorber of energy best described by the Schrödinger wave function the collapse of which by observation or measurement produces a particle-form; space/fields better conceptualized as relational, non-Euclidean, fractal, topological and connected to a "zero point field" (ZPF) of fluctuating energy; a spacetime that is atemporal, and relative whereby backward time referral and Bergson's *durée* prevail; nonlinear, nonlocal causation whereby chance, indeterminacy, and "spooky action at a distance" are ubiquitous; information not digital but wavelike in form (analog), at any instantiation more a spacetime constrained quantum of information (Gabor's "logon"), whereby all information is embedded holographically in the ZPF ("in-formation" field); a language wave function privileging word forms, suggesting a polysemous nature until collapse of the wave function giving particular meaning; and processors of information (agents) conceptualized as emitters and absorbers of spectra (interference patterns) encoding and decoding holographic information (transducers). Key foundational thinkers include Schrödinger, Heisenberg, Bohm, Pribram and philosophers Leibniz, Spinoza, Bergson, and Whitehead.

Conventional and a good part of critical criminology, law, and theorists in transformative justice are centered on the classical-materialist paradigm. Its insistence in the face of clear evidence of shortcomings can be attested to by dominant forms of empirical analysis often found in the prestigious journal of *Criminology* and inflicted by often theoretically-challenged empiricists in grad schools – all of which continues to assume a logic that is flawed; for example, we have generally less than 40% variance explained in dominant empirical research. What of the "dark matter." Dynamic systems theory (chaos theory) has provided consistent and convincing evidence of sensitivity to initial conditions and disproportionate effects. Thus, such exercises as rounding up to say the

¹⁰ This will produce new "images of thought," to use Deleuze's language (1986, 1989).

¹¹ They often draw from complexity theory and on occasion, quantum mechanics is implicit.

hundredth place in offering “variance explained” is a failure, since even a difference of .01 or even .001 in dynamic systems theory has, with iteration, significant consequences (e.g., the butterfly effect). At best, conventional criminology provides static snapshots, a snapshot criminology, that arrests a process in otherwise continuous movement.¹² Academically-oriented and practicing lawyers, too, are wedded to a formal rational model that defies realistic adaptation to the real world of struggle, as earlier critical legal realists have argued. The language of law is a construct that systematically, be it in a disguised form, represses and maintains dominant visions of social reality. Those theorizing a transformative justice should be commended to have gone beyond restorative justice principles. However, much of their underlying ontology remains embedded in classical-materialist assumptions. We suggest not a solution, but a rethinking of core assumptions and established axioms in order to develop better understandings of agency in relations to forms of social order, examples of which we will return in our synopsis of the concluding two chapters. The wave function offers a new understanding about the diverse possibilities that each of us are. Consider how in law the collapse of the language wave function disallows multiple story-telling as critical race theorists have often argued. Why does it undergo collapse in one particular form of instantiation that reifies dominant orders rather than in a more liberating form?

Quantum Holography, Phase Conjugation and Primacy of Information

Chapter 3 concerns the holographic principle, phase conjugation, primacy of information, and assemblages. The holographic principle¹³ has several sources. Founding figure Dennis Gabor was interested in the limits of discernible information transmission across the Atlantic. He employed Heisenberg’s uncertainty principle which states that one cannot at the same time precisely measure momentum *and* location; doing one accurately comes at the cost of uncertainty of the other. He concluded that information must be conceptualized as a spacetime constrained quantum of information which he called a “logon.” Picture it as a mobile slice or cut of spacetime flux. It is but a momentary, more mobile snapshot of continuously moving events. He also conceptualized the logon in terms of holographic theory.

A hologram can be constructed by taking an object bearing beam (not the object itself, but the beam emitted from it) and mixing it with another beam producing a frequency interference pattern, or spectra that can be recorded on some surface. Looking at the recording surface we would only see various scratchy lines, but no discernable image. All information is encoded in this form as an energetic, geometric phenomenon. Karl Pribram was to be inspired by this in his study of the brain. He was not happy with traditional neurological explanations. He had a “hah ha!” moment and went on to continue research and publications which showed the brain operates holographically, that information is stored nonlocally across the whole brain.

A second approach was by Irvin Laszlo (2007). He provides the example of two ships plying the seas where their wakes interfere. From the interference patterns constructed one can ascertain (decode) such things as tonnage, speed, direction – all is encoded as an interference pattern (spectra). And, for Laszlo, all information is stored in the “in-formation” field. That is, space in which we exist is not empty, but a fluctuating field of energy, a zero point field (ZPF) (Puthoff, 1989). It is within this space that information is encoded spectrally (holographically). Pribram, Bohm, and Bradley like to employ the example that if it were not for the lenses of our eyes we would only see a plethora of scratchy marks much like on a recording surface of holograms.

A third approach is by Bohm, popularized by Talbot’s *The Holographic Universe* (1991) and building on de Broglie, an early developer of quantum mechanics and his notion that the wave function is physical. He identified a vast cosmos, an “implicate order” within which all entities are

¹² Alternatively, see, for example, my revisiting the societal reaction/labeling approach of the 60s by integrating a QH approach, Milovanovic (2015d).

¹³ For an accessible and popularized introduction, see the YouTube presentation, Parts 1-3: <http://www.holographicuniverseworkshops.com/>

encoded holographically (spectrally) and are all fundamentally interconnected. The “explicate order” is the way these potentialities are instantiated.

A fourth approach has been developed by cosmologists studying black holes. What happens when something crosses the horizon and enters the black hole? Traditionally it was said to disintegrate and becomes completely lost. However, two cosmologists, ‘t Hooft and David Susskind, independently in the mid-1990s, theorized that consistent with the second law of thermodynamics, nothing is lost. Thus all information of the disintegrating entity falling within the black hole is retained on the horizon of the black hole (Bekenstein, 2003). Generalizing from this, it has been argued that the cosmos has a boundary on which, in one less dimension all information of the interior, the “bulk,” is encoded, much like the squiggly lines of the holographic recording device explained above. And further, there are subsets of these boundary regions – a room, a classroom, Notre Dame, etc. – all of which have boundaries with all information of the interior recorded on it, not in a physical way, but mathematically.

The holographic principle in its various forms demands a reconceptualization of “empty” space and the nature of the construction, storage, transmission, and decoding of information. Conventional social sciences still rely on models that completely miss these processes. Take criminologists talking about subcultures. Often suggested is a boundary to this niche. QH argues all information is stored on the boundaries. Those entering the domain/niche, that is the bulk, are offered a field of information, much like Gibson’s (1979) notion of “affordances,” what an environment/niche offers as possibilities, or “invariant structures,” which are transmitted by optic arrays. Steve Robbins (2006, 2012, 2014a, 2012b) has mapped this work to QH and to Henri Bergson (particularly to *Matter and Memory*) to show that the brain is a modulated frequency pattern that accesses and decodes these affordances that are holograms in its construction of reality. Thus studying subcultures of delinquency, for example, can be re-thought in terms of how information is stored, accessed, transmitted, decoded, and how it becomes the basis of action. We will return to some further examples in our synopsis of the last two chapters.

A key component in understanding quantum holography and its relationship to information construction and transmission is the notion of phase conjugation.¹⁴ It concerns how a beam of light can be reflected by a particular kind of mirror (unlike conventional mirror) in such a way that the reverse direction follows the exact pathway as the incoming wave. This reverse beam is referred to as a conjugate beam.¹⁵ Together with the incoming beam and in a reverse direction a conjugate beam a “standing wave” is created. Subsequent research shows how an analogous process is involved in holography in which object bearing beams are mixed with a non-object bearing beam to produce an interference pattern recorded on some surface (for a simplified explanation, see Lehear (N.D.). John Cramer (1986) has provided one influential emitter-absorber model in his “transactional interpretation.” Here a wave front is emitted by an entity (Ψ), absorbed by a receiver, which is then reflected back along the same pathway (now called a complex conjugate wave/beam, Ψ^*). This is an informational pathway that is constructed. Quantum material is passed backward in time with no time passage involved (quantum mechanics is atemporal). It is at the emitter location that a “stochastic choice” is made based on the intensity of the returning wave. In other words, one instantiation takes place from the many possible actualizations. In his model, consciousness is not involved.

Subsequently, Marcer and Schempp (1998, 1999), and Mitchell (2008; see also Mitchell and Staretz, 2011) developed a variation referred to as phase conjugate adaptive resonance (PCAR). Marcer had developed the mathematics of the quantum holographic process involved in the MRI.¹⁶

¹⁴ It has been developed as optical as well as acoustic phase conjugation. However, those applying PCAR suggest all of the sensory apparatus makes use of a similar process. For acoustic phase conjugation, see for example, Fink (1999).

¹⁵ Sometimes also referred to as a time-reversed reflection or wavefront reversal.

¹⁶ Bats, dolphins, and whales are also said to operate by phase conjugation principles.

In the PCAR model consciousness and observation are essential ingredients. The standing wave as a form of phase lock is seen as an information channel. An absorber (percipient), or sometimes called a “transducer” or “imagemaker,” decodes¹⁷ incoming spectra by way of the mathematical notion of (reverse) Fourier transforms¹⁸ projecting information back to the source. It is at the source that the image is finalized. An example often given by adherents is snap your fingers and you will witness the experience at the source, “out there,” not in the head. This also has many similarities with Henri Bergson’s (2002[1896]) insights that images are created “out there.” And in this model, the percipient leaves a trace of her/himself in the projected images out there. The emitting entity now has the event history and the percipient’s unique contribution permanently encoded at the quantum scale in its structure. We are all, then, fundamentally interconnected in the cosmos. There is no discrete separation of the emitter and absorber.

Chapter 3 also includes an integration with the work of Deleuze and Guattari (1987; see also Delanda, 2006 on “assemblages”). An assemblage is a basic organization of entities (or “multiplicities”).¹⁹ Agents as well as social institutions can be viewed in these terms.²⁰ There are two constitutive axes: territorialization-deterritorialization, content-expression. Territorialization concerns all those factors that contribute to form, structure and stability. It is how energy is bound in more stable forms. Deterritorialization, on the other hand, concerns destabilizing forces. The two, or in the terminology of physics, negentropy-entropy,²¹ are in a dialectic relationship tending to produce ever-new structures, or in dynamic system’s theory terminology, “dissipative structures.” Content concerns the internal configurational relations. Expression, on the other hand, concerns the forms of expression of content. Thus expression can be viewed as how the wave function (Ψ) collapses providing one instantiation from the possible. “Operators” are those factors that act on the wave function. For example, consider, in our adaptation: Foucault’s (1977) “disciplinary mechanisms” and panopticism; Pashukanis’s (1981) legal commodification process; Deleuze and Guattari’s (1987) axiomatic system which is constituted by core axioms of a political economy that are encoded and become the starting point in deductive logic leading to circumscribed “truths” (see also, Patton, 2000, 2010). Assemblages can be either more molar or molecular. The former connotes more rigid/static forms such as bureaucracies, the latter, more open, dynamic dissipative structures.

Applying the notion of assemblages to quantum holography, we can begin with Raymond Bradley’s groundbreaking work with Karl Pribram (1998) and subsequent work by Bradley (see references) on social organization. In their model two key factors structure information, “control” and “flux.” Control represents hierarchical power, flux the dynamic quantum state existing in a field. Placing these as orthogonals we have a phase map whereby one can locate ideal types of energy stabilization patterns at their intersections. Bradley then argues that we must consider Dennis Gabor’s (1946) notion of the logon. Gabor, as we previously saw, applying Heisenberg’s uncertainty principle, argued that information is but a spacetime constrained quantum of information. In other words, it is a slice of movement in spacetime; localization produces uncertainty. And each logon overlaps with each other. Thus the “head” of one has information anticipatory of the future.

¹⁷ A transducer is anything that converts one form of energy (i.e., electromagnetic, mechanical, acoustic, thermal, etc.) into another form. Light is one example.

¹⁸ Joseph Fourier developed a mathematical way of transforming spacetime patterns into the frequency domain (forward Fourier transform). A reverse Fourier transform moves from the frequency domain to spacetime patterns. It is widely believed that the eye acts much like a Fourier transform.

¹⁹ Multiplicities can be likened to the quantum wave function, or sometime referred to as a “cloud of possibilities.” Schrödinger has posited mathematical equations describing the movement or evolution of this “cloud of possibilities,” referred to as Schrödinger’s equations of evolution of a state.

²⁰ Wendt (2010) offers the notion of a “social wave function” to which we can be attuned.

²¹ Negentropy, or negative entropy, “free energy” was coined by Schrödinger (1967: 67-75).

Privileged is a wave form (analog) rather than a digital (discrete) form. Returning to Deleuze and Guattari (1987), “abstract machines” are the basis of a logic that is in play; in quantum holographic language, these are “operators.” They influence the collapse of the wave function in distinctive form. A capitalist mode of production, for example, systematically witnesses the wave form collapsing in the form of capital logic which permeates everyday constructions of reality. It is also formalized in the operation of the legal apparatus, from court trials, to resolution of case law. An axiomatic system, as a totality of spectra encoded within the ZPF and/or boundary surface, in particular niches or subcultures, provides the basis of what Deleuze and Guattari (1987) have termed a “point of subjectification,” or the location from which deductive logic proceeds and a speaking subject is created. An axiomatic system is, in short, a system of capture, and an operator in the collapse of the wave function of the normal flow/flux defined by Schrödinger’s equations of evolution. Agents form phase conjugate adaptive resonance with a narrow set of spectra reflecting configural networks located in a niche. These are, following Gibson (1979), “invariant structures,” or “affordances” – possible instantiations. Suggestive for further integration, consider here Bradley’s (2011) application of QH to terrorist cells. He shows how each terrorist cell can be identified by a specific frequency signature wave. It represents a collective signature wave with which members form local and nonlocal resonate relationships in their felt solidarity.

The “Hard Question of Agency”: Bringing agents back in

Engaging the “hard question of consciousness” (Chalmers, 1997, 1999) and of agency is developed in Chapter 4. Criminology, law and transformative justice literature on the most part either eliminates entirely the notion of a conscious, active agent, or only pays lip service to its importance. Arguably, the most comprehensive model developed by quantum theorists is that of influential physicist Roger Penrose and anesthesiologist Stuart Hameroff (Penrose and Hameroff, 2011; Hameroff and Penrose, 2014). They have developed a consistent model and have engaged their critics with compelling evidence. Their model is the “orchestrated reduction of quantum coherence” or “Orch OR.” They show how consciousness emerges by way of a quantum reduction of superposed states to one that becomes “reality.” The key mechanism is the network of microtubule which is the skeletal structure of every neuron. However, the agent him/herself, curiously, disappears in the sequence of conscious events.²²

An alternative promising model is being developed by Darius Plikynas (2010, 2014a, 2014b, 2014c, 2014d) and his research team at the University of Lithuania in Vilnius. Theirs is an oscillating agent model (OAM) and the nature of basic mind states (BMS) (Milovanovic, 2015c). More recently, they have focused on how the OAM relates to a societal model. In ongoing exchanges with this author, there is some movement between integrating the OAM with quantum holography. Their model, too, is still in need of an inter- and intra-subjectively constituted agent.

We respond to these needs by offering schema QD, a de-oedipalized adaptation of Jacques Lacan’s (1977) schema R. Lacan²³ has developed perhaps one of the most comprehensive and compelling models of the agent since Sigmund Freud. After two and a half decades studying his work it is clear to us that there are components of his model that are still compelling, acknowledged by Deleuze and Guattari, even as they have heavily criticized the oedipal foundations in *Anti-Oedipus* (1967).

Briefly, our schema QD responds to the call for a need of an ethical subject that constructs perception images and an “I” that takes residence in particular discursive regimes (for an earlier

²² Henry Stapp (2007) has offered an alternative direction that is based on Newmann’s (1932) positing an “abstract ego” as the basis of observation.

²³ For a repository of Jacques Lacan’s unpublished works in French, translatable by Google, see: <http://gaogoa.free.fr/SeminaireS.htm>

version, see Milovanovic, 2011, 2013).²⁴ It is an inter- and intra-subjectively constituted agent that can be mapped in topological forms. A unilateral Möbius band²⁵ frames visual gestalts or perception images. The four corners can be conceptualized as: ego, ego ideal, Other, and community generalized other. The inter-relations amongst these four²⁶ can be mapped on a Möbius band located at the center of the topological construct called the cross-cap²⁷ (see Milovanovic, 2013; Batiz and Milovanovic, 2014).²⁸ Further, a generalized abstract other representing normative societal standards as well as historically and political economically constituted discursive subject-positions act as operators influencing the eventual outcome of schema QD in movement. In other words, a distinct schema QD matrix signature wave of an agent is continuously emitted in all directions which holographically encodes all information about the agent. A characteristic “idling speed” is unique to each agent, but undergoes modulation as the person engages others and the environment. It is, following Lacan, a figure-8 cut done on the cross-cap that depicts the emergence of a subject and visual gestalts/perception images. Since this “cut,” tracing the outlines of a Möbius band, is a slice of otherwise movement in spacetime, the perception image is equivalent to a logon. The “line of intersection” which can be seen as a vertical line representing the crossing point along the twist in the Möbius band is also the source of an “I” that emerges in the process.²⁹ It is this narrative “I,” a speaking subject that can now take up residence in a particular discursive subject position within a discursive regime (i.e., legal, clinical, medical, scientific, religious, etc.). It is, then, the modulated schema QD matrix signature wave that is the basis of what Bradley (2006) calls a “bio-emotional wave of attention.” It is this wave form that interacts with incoming wave forms of entities/situational encounters. Following Bergson’s “circuit diagram” in *Matter and Memory*, whereby memory images are accessed for an appropriate recognition fit for the incoming image, we argue that first, a standing wave is created by PCAR dynamics; second, accessed are memory images stored in the ZPF by way of phase conjugation; and thirdly, drawing from Hameroff and Penrose, we recognize a developed superposed state (quantum coherence) of competing possible images that subsequently undergo quantum reduction. This information is returned by way of a complex conjugate wave to the emitting source, projecting an image “out there,” to which it now responds.

We have also been influenced by Bradley’s (2009, 2011, 2012, 2014; Bradley and Tomasino, 2011) compelling argument on the role of the heart. The heart, evidence clearly shows, is the biggest emitter of wave forms (see McCraty, 2002; McCraty *et al*, 2004a, 2004b, 2009).³⁰ Precise evidence

²⁴ Lacan has also argued that there are four basic forms of structured discourses: master, university, hysteric, analyst with a fifth undeveloped, the discourse of capitalism. Each can be seen as an operator that structures/shapes what can be said and what is left out (see generally, Ragland and Milovanovic (2004).

²⁵ For the construction and visualization of a Möbius band, see:

http://web1.kcn.jp/hp28ah77/us27f_mobi.htm

²⁶ This forms a matrix with varying values. A particular characteristic attractor state unique to each person is the basis of a distinct signature wave continuously emitted outward in all directions. Perturbation by incoming wave forms produces re-alignment of values that is the basis of a modulated signature wave.

²⁷ For its development by Jacques Lacan, see Granon-Lafont (1985). For a visual demonstration of the construction of a cross-cap, see: http://web1.kcn.jp/hp28ah77/us27g_cros.htm For application of Lacanian topology theory, see Ragland and Milovanovic (2004).

²⁸ The diagram is not being reproduced here for space considerations but it is easily accessible on-line in Research Gate, Batiz and Milovanovic (2014) “Quantum Holography and Agency,” see pp. 8, 10.

²⁹ Sterns (2000) and Dienes (2011) have posited the notion of topological effects that awaits further application.

³⁰ Based on an electrocardiogram reading (ECG).

also shows that the heart reacts to incoming wave forms *prior* to a conscious recognition (actual experiencing) by the brain (EEG patterns) (Radin, 1997a, 1997b, 2013; Libet, 2004; McCraty *et al: ibid*).³¹ Thus schema QD also incorporates emotionality by way of a ubiquitously present transverse bio-emotional wave³² that perhaps acts much like Freud's notion of hypercathexis developed in *Interpretation of Dreams*. Thus, superposed competing images are further energized by this wave form which leads to the collapse/reduction to one state. Mindful of Deleuze's statement in his two-volume *Cinema* books (1986, 1989) that affections are in the body, and in recognition of Lacan's portrayal of the figure-8 cut done on the cross-cap indicating not only the production of a Möbius band but also a disc,³³ we argue that the disc is better connected to emotionality at the center of the agent which plays itself out in interactions with others and the environment (see Denzin, 2007; Katz, 1999).

Memory images are accessed from the human lexicon by way of PCAR (Marcer and Schempp, 1997, 1998; Mitchell and Staretz, 2011). This responds to recent work in the emerging field of quantum cognition, particularly to theorists who are developing a quantum holographic human lexicon but have not yet found the mechanism by which the lexicon structure is accessed beyond recognition of nonlocality ("spooky action at a distance"), and to the use of a "holographic reduced representation model" particularly the "BEAGLE Model" (Jones and Mewhort, 2007; Cox *et al*, 2007). Mathematically, they make use of vectors in Hilbert space to show how words and context are energetically encoded. They have not, however, engaged Gabor's compelling argument that any instantiation is a logon, a spacetime constrained quantum of information, or, said in another way, a "cut" or slice in the spacetime flow/flux. In our model, memory images are accessed from the ZPF via PCAR and placed in a superposed state. During "evaluation" (Mitchell and Staretz, 2011) and/or "matching" (Bradley, 2011) the recollected images are compared with the incoming image. A person's unique history and a generated transverse bio-emotional wave cutting across via the phenomenon of "quantum tunneling" further energize ("hypercathexis?") these superposed possibilities. A collapse of the wave function returns one instantiation back along the same waveform pathway to the source where it appears as a classical 3-dimensional image. Perhaps early quantum mechanics founder Dirac's (1930) notion concerning "the choice by nature," also echoed in the work of Henry Stapp (2007), produces the uncertain outcome.

Indeterminacy and uncertainty, and hence nonlinearity, appears in this model by the acknowledgment of at least three specific phenomena: first, the generation of logons follows Heisenberg's uncertainty principle; second, once a standing wave is established it is "matching" (Bradley, 2011) or "evaluation" (Mitchell and Staretz, 2011) that assures idiosyncratic constructions.; and third, since sensitivity to initial conditions and disproportional effects are ubiquitous, following the logic of iteration, results can never be predicted with certainty from the varying and fluctuating initial conditions.

In short, integrating the above, political economies tend to capture dynamic quantum flux/energy in an axiomatic system and molar assemblages encoded as spectra in the ZPF, invariant structures, providing circumscribed affordances, the basis of a point of subjectification (via PCAR) from which a speaking subject is constituted.

Applications in Criminology, Law, and Transformative Justice

Our last two chapters provide examples in the application of QH. Chapter 5 applies it to criminology and law, Chapter 6 to transformative justice. We do not set out to develop a definitive

³¹ They (McCraty *et al*, 2004b: 334) further conclude that "*both the heart and brain appear to receive and respond to information about a future emotional stimuli prior to actually experiencing the stimuli.*"

³² Perhaps akin to a soliton wave.

³³ For the visualization of how the disc is situated within a cross cap, see:
http://web1.kcn.jp/hp28ah77/us27g_crop.htm

theory of crime, but merely provide suggestive directions employing QH. Moreover, we do find promising a focus on cultural, constitutive, and edgework-inspired criminology.

Jock Young's last book, *The Criminological Imagination* (2011) has much to say about "othering" practices situated in changing political economies. He has, for example, described two forms of othering, more liberal or more conservative. In both forms there is a reduction and repression of the possibilities that we are. Both can be mapped to forms of the "Other," one of the four corners of our developed Möbius band. These are more enduring spectra stored in the ZPF with which resonance via PCAR are established. By way of repetition, these are continuously reified. Consider, too, Foucault's (1997) late work on changing historical forms of "technologies of the self" as practices of presentation of a desirable object to oneself and others. This maps to our "ego" and "ego-ideal" located on a Möbius band. In this context, consider Sykes and Matza's work on "techniques of neutralization" or Cressey's classic work of embezzlers and their "neutralizations" to disavow deviant identities. These too are spectra, stored frequency interference patterns, in the ZPF. If we consider subcultures or workplaces as bounded spheres, following the cosmologist's versions of the Holographic Principle, all information in the "bulk" (the everyday world within the confines of the boundaries) is encoded in one less dimension on the boundaries. This provides the basis, perhaps, of optic arrays, the carriers of "invariances structures" and "affordances" (Gibson, 1979) which in turn become the points of subjectification and the generator of a particular form of speaking subject. Consider, finally, the notion of a generalized community other. This is, to draw from Bradley, the basis of "control," a normative subcultural order which further frames how energy is stabilized ("capture"), and how logons are constructed at any particular instantiation. Thus our four corners of a Möbius band can be understood by drawing from contemporary criminology and its integration with QH. The value is on the interpretive and its physicality.

In our book we provide an application to Charis Kubrin's (2005) influential work on "gangster rap music" and its relation to street codes, identity, and violence. The constitutive approach employed argues not linear relationship, that gangster rap music is not a cause of violence, but helps to constitute identities which are more open to violence. The notion of "subcultural directives" is employed that maps to invariant structures and affordances located in particular milieu or niches. These too can be seen as relatively stabilized axiomatic systems that are holographically encoded as spectra in the ZPF of a particular bounded locale. It is with these spectra that resonance can be established by way of PCAR dynamics, shaping the construction of social reality. Discursive subject positions within subcultures are affordances, or invariant structures that further provide stability in role playing. Constructions of reality, however, have a degree of variability, even as overall patterns persist, due to: the uncertainty of logon constructions (visual gestalts/perception images); sensitivity to initial conditions and iterative/disproportional effects; nuanced, idiosyncratic agents with varying schema QD matrix signature waves; the effects of variable, intensive, bio-emotional transverse waves of attention; and nuanced threshold values in responding to perturbations.

We could also provide alternative operationalizations of the ego, ego-ideal, Other, and generalized community other. Explaining the form of the Other, for example, could consider Martin Buber's idea of I-thou compared to I-it, or with Young's notion of othering, or with Levinas' notion of the infinite duty of care to the other. These are, again, spectra, energized frequency interference patterns embedded within the ZPF of a locale (consider Laszlo's previously explained notion of ships plying the sea leaving interfering wakes from which one can reconstruct speed, tonnage, direction, etc. of the respective ships.). We could also employ the cosmologist's version of the Holographic Principle in suggesting all information in the bulk (subculture) is encoded on the boundary surface. In either form of storage, consider how signifiers are encoded and accessed via PCAR and become the basis of discursive production (i.e., rap music). An "I" emerges from the figure-8 cut of the subject as a speaking subject. We have also integrated Deleuze and Guattari's (1987) idea of a "refrain," the beginnings of a tune reflective of configural networks, which begins to resonate with other agents. As Bradley (210: 229) notes, "as behavioral commonalities shared by all members, these particular modes of conduct establish a bandwidth of behavior and activity that create an energetic resonance

or vibration – a ‘vibe’ – that uniquely characterizes the group.” This is a socio-affective field marked by a community’s unique signature wave. Of course, any particular visual gestalt/perception image generated is inherently a logon having a degree of uncertainty in its instantiation. This is, therefore, not a linear, deterministic process.

Another example we employed is to Cottee and Hayward’s (2011) insightful study of the “existential attraction of terrorism.” Going beyond mere materialistic means/ends motivation or even ideology itself, they bring “edgework” into their formulation that provides a more comprehensive understanding of the phenomena. Bradley’s (2011) QH approach to terrorist groups can be applied to Cottee and Hayward to further an interpretive approach that includes the physicality of the phenomena. In response to “existential frustration,” they (Cottee and Hayward, pp. 969, 979) argue, “the excitement of violence derives in part from its emotional intensity and the heightened state of consciousness that this produces...a world of exhilarating action, violence, intrigue and drama.” These emotional laden configural patterns are also encoded as spectra in the socio-affective field which becomes the basis of resonance patterns continuously being established between the agent and the group. In other words, it is also the point of subjectification that is highly energized from which perception images/visual gestalts, and an “I” as speaking subject can be established. Indeed, a bio-emotional wave of attention has ample signifiers stored in the group’s niche as spectra with which to establish PCAR relations effectuating certain circumscribed narrative constructions. As to the dispersed nature of much of terrorist activity, the idea of nonlocality assures that separation by physical distance is not a dominant neutralizer. Drawing from constitutive theory, we witness how a modulated schema QD matrix bio-emotional signature wave both draws from and reinforces the group’s order.

Ripe for QH application is the existing legal literature on conflicting witness’ recollections. This has been recently brought out in the death of Michael Brown. What *actually* happened? Witnesses to the event have provided often contradictory recollections. This underscores the importance of understanding how reality is constructed. What biases, prejudices, preconceptions, world view are working as background assumptions (spectrally encoded) that become the basis of memory image superposition and subsequent collapse to one instantiation of “what happened?” A more applied QH focus awaits interested scholars.³⁴

The final section of chapter 5 provides application of QH to law. Several articles applying quantum mechanics have appeared in law journals (Kelsey, 2013; Powell and Menendian, 2010; Yager, 2013; Mootz, 2013; Porter, 1991; Kuttner, 2011). Suggested is that law privileges static particle-like states, whereas assuming a wave-like orientations can lead to better dynamic forms of conflict resolution (see Kuttner, 2011). But, QH awaits application.

The first example in our book of an application of QH to law is to Alexandre Lefebvre’s book, *The Image of Law* (2008). This work is builds on Bergson and Deleuze but can be further developed by the use of QH. Lefebvre is especially interested in how judges decide. He acknowledges that the more dominant form is by way of “subsumption” which is an attempt by the judge to subsume what is constructed as a viable case in law under some principle of law followed by deductive logic to a clear conclusion in law. These are the most common, so-called “easy” cases. Each judge, too, clearly follows a political leaning in law – see, for example, Kennedy’s (1997) types of orientations by judges. This is also reflected by his/her unique schema QD matrix signature wave that is continuously emitted. The so-called “hard cases” are where uncertainty exists. How does a judge decide in these cases? Lefebvre quite precisely shows how Bergson’s model is compelling, and particularly how active recognition in problematic encounters is involved in the process. We build on this to first show how each corner of the Möbius band can be specified by drawing from critical legal

³⁴ See: <http://www.msn.com/en-us/news/us/was-michael-brown-surrendering-or-advancing-to-attack-officer/ar-BBg8CUh>; <http://www.kansascity.com/news/government-politics/article4152207.html>

studies for guidance (see for example Kennedy's study of types of judges, 1977), and then show how a perception image/visual gestalt instantiated by the judge of a problematic encounter is but a slice or cut of spacetime, a logon. Bergson's "circuit diagram" is applied by Lefebvre to show how memory images are activated by a judge. We argue that these memory images and signifiers in law are spectra, frequency interference patterns encoded in the ZPF bounded within the legal arena. It is resonance or PCAR established with these legally constituted and stabilized spectra that are subsequently placed in a superposed quantum state, each framed by the workings of schema QD. With the collapse of the wave function, one image is instantiated and projected out there to the source (problematic encounter). This provides a categorization which then can be subsumed under a recognized legal principle and through deductive logic/syllogistic reasoning, can linearly lead to a conclusion in law. We modify Lefebvre's rather insightful application to tort law in *Palsgraf v. Long Island Railroad Co.* (1928). We witness that the way a judge(s) summarizes the case and includes the formal version in the "facts of the case" always articulated in the beginning sections of a written decision, is but a retroactive construction as legal realists have continuously argued. But we now note the physicality and have a more comprehensive interpretive understanding. Problematic encounters, in other words, can be conceptualized as wave functions, clouds of possibility in movement from which instantiations take place. Schema QD provides the basis of understanding how a perception image/visual gestalt is framed, how an "I" (of the judge) emerges, and in the process, how a speaking subject can insert itself in the discourse of law. Circumscribed spectra within the legal arena/niche further constrain what can and cannot be said.

The second example of an application to law is to judges as "speaking" ("parlêtres"). Here we build on Jacques Lacan's semiotics. We head Deleuze and Guattari's *Anti-Oedipus* polemic against the underlying oedipal construction as well as Hegelian "lack" as the basis of desire. Alternatively, they offer the notion of active production, a continuous differentiation and creation of ever new unities.³⁵ We follow, but modify, Lacan's (1977) "graphs of desire" which indicate how speech production takes place. He indicates an anticipatory and a retrograde in signifier production³⁶; we map this to the anticipatory nature of logons (each overlaps in sinusoidal patterns) and retrocausation as we saw with the complex conjugate wave returning to the source creating a standing wave. Indicated is that the lexical structure of law is composed of circumscribed spectra (holographically encoded information, or frequency interference patterns) within legal niches; and/or, following the cosmologist's version, are encoded on the boundaries of legal spaces. These are invariant structures offering affordances. They are, to use Deleuze and Guattari's (1987) conceptualization, "points of subjectification" from which speaking subjects take form. The axiomatic system of law assures that once subsumed under a legal principle, a now "factual" situation can be resolved linearly in law by way of deductive logic. The "hard cases" once again offer novel opportunities for law to be otherwise. However, as many of the critical legal studies theorists over the last three decades have argued, internal and external constraints within law abound, and more likely, traditional discursive constructions are the outcome. Nevertheless, nonlinearity clearly exists when a judge(s) decides inconsistently with the pure dictates of formal rationality, as was the case in *Brown v. Board of Education* (1954), or in the *Mabo* (1992) decision in Australia.³⁷ Stefancic and

³⁵ This is more in line with Jung's version of Freud's libido as well as Bergson's notion of élan vital.

³⁶ Each signifier is anticipated and only after a punctuation is there a return to the beginning of the chain of signifiers ("retrograde") does the wave function collapse with a distinct meaning of the chain and each signifier.

³⁷ *Mabo* reconfirmed "native title." The "right to privacy" established in *Griswold v. Connecticut* (1965) and furthered in *Roe v. Wade* (1973) were based on non-linear reasoning. The right to privacy was said by the majority to be based on "emanations" or "penumbras" derived from the U.S. Constitutional Amendments. These cases can now be read as altering the legal axiomatic system and providing a new set of signifiers encoded as spectra, accessible via PCAR in legal discursive constructions.

Delgado's *Critical Race Theory* (2012) certainly highlights the need for alternative story-telling needed in law to address disenfranchised peoples; however, it downplays the significance of how stories are limited in their possible legal (semiotic, discursive) constructions (collapse of the wave function). Quantum cognition theorists are quick to point out that it is "context" itself that can collapse the otherwise polysemous nature of words, acting much like "observation" or "measurement" that collapses the wave function. To speak in law one needs to mobilize legal spectra that are always already speaking with a voice. It returns to Spivak's classic question of "how is the subaltern able to speak?"

Well suited for further QH application is Deleuze and Guattari's treatise on Kafka (1987), particularly with the elaboration by Ronald Bogue (2003: 78-86). A "machine" is a system of cuts, they inform us, on flows/flux. This would include our figure-8 cut establishing perception images/visual gestalts and a speaking subject. The "law machine" (in our conceptualization, an "operator"), produces particular forms of "cuts" in this flow/flux, effectuating a collapse of the wave function to static and categorical particle-form states. But a contrary force ("schiz-law") is always immanent that undoes what otherwise is materialized by the cut.³⁸ Thus, participants in the legal arena are subject to "virtual vectors" of the law machine, which act like "pilot waves," or in our reconceptualization, much like invariant structures and affordances (Gibson, 1979) that are holographically encoded (spectra stored in the legal arena's ZPF). But always present are "virtual vectors of deterritorialization," a "dismantling" (Bogue, *ibid.*, 84) undermining what is the normal tendency, representing the forces of permanent revolution. We could also reconceptualize this process, thermodynamically, as the dialectics between entropy and negentropy.

Our final chapter applies QH to transformative justice. Given ongoing injustices in political economies and the failures of "criminal justice," we seek alternatives. Restorative justice is a beginning, but as recent critical scholars have shown (Pavlich, 2005; Woolford, 2009), is much too susceptible to incorporation into and co-optation by traditional criminal justice, and, in our view, is overly wedded to classical-materialist ontology and epistemology. Key philosophers who are integrated with QH in this chapter are Deleuze and Guattari. It is surprising to see the dominant literature on alternative justice approaches disengaged with their extensive publications, since they have witnessed tremendous and lively discussion in other disciplines. Several books driven by their ontology which have profoundly impacted this section are: Hardt (1993), Hardt and Negri (2001, 2005, 2009), and Holland (2011).³⁹ What we seek is a "permanent revolution," molecular assemblages, an "affirmative nomadology," and alternatively conceptualized ethics principles. Connections with QH by the above authors have not been explicit, although they have been for connections to quantum mechanics in the work of Deleuze and Guattari (see Massumi, 1992). Deleuze's two-volume cinema theory books (1986, 1989) have implicit possibilities of connectedness to QH. And Bergson remains a key influential figure. Let us provide a brief synopsis of our ongoing engagement with the application of QH to this area.

Political economies are associated with systems of "capture" (Patton, 2000) by which energy/flux is systematically encoded in axiomatic systems. Consider, for example, Pashukanis' (2002) definitive work on the homology between commodity fetishism and legal fetishism. Agents are provided abstract legal identities with universal formal right. Capital logic and legal logic find themselves in a homological relationship. Thus core axioms can be envisioned as spectra encoded in the ZPF and/or the boundary of a particular socius. These are, as we previously argued, invariant structures from which particular, circumscribed affordances are constructed. They are also the source of points of subjectification. Our schema QD model has been presented as the diagram of the agent in-process. Political economies, too, tend to develop molar assemblages and resistance to change. A transformative justice must operate on various levels, one of which is the societal

³⁸ Max Weber has already informed us of the "insoluble conflict" between formal and substantive rationality.

³⁹ See also Patton's (2000) clear explication and application of Deleuze and Guattari's work.

(structural). Restorative justice models offer only minimal attention to this component. Thus, countering the abstract machine and reifying practices that sustain molar assemblages, strategies need to be devised along the lines of a “war machine” and molecular assemblages, the basis of becomings. By “war machines” Deleuze and Guattari do not necessarily mean to advocate war as we generally understand it, but ongoingly challenging practices against ossifying tendencies.

Holland (2011) has recently offered concrete examples of how to proceed along these lines with his analogy with improvisational jazz. American football and a traditional orchestra are much like molar assemblages, whereas soccer and jazz are much like molecular assemblages. It is the latter that is more in line with Deleuze and Guattari’s call for a “permanent revolution.” Holland (ibid.) offers the notion of a “slow motion strike” which would be compatible with Dyer-Witherford’s (1999) call not for a blueprint of a new order, but a “battlefield map,” a “series of initiatives whose advancement would contaminate and overload the circuitry of capital with demands and requirements contradictory to the imperatives of profit...and increasingly require the reassembly of everyday activities into a new configuration.” These are new configural patterns, more molecular assemblage in form, that begin as a “refrain,” or a tune (Deleuze and Guattari, 1987) and gain ascendancy with ubiquitous practice. In law, this is also consistent with Unger’s *What Should Legal Analysis Become?* Holland provides several concrete existing examples of participatory, small-scale, non-hierarchically organizations around the world. For example, they include: the Orpheous Chamber Orchestra, Wikipedia, Kuro5shin (89), Slashdot, Linux; as well as worker cooperatives – El Ceibo, a cocoa growing worker organization in Bolivia, Occupy Wall Street and its various forms worldwide; and we would add the Zapatista model.

Deleuze and Guattari have also noted that capitalism, unlike many previous forms of political economies, is inherently about coding and decoding, territorialization and deterritorialization, or in holography theory, the dialects of entropy and negentropy. In other words, capital logic also appears with its inherent subversive tendencies. Holland has suggested an “affirmative nomadology” which can be seen as a refinement of Deleuze and Guattari’s call for a “war machine,” that not only challenges ossified hierarchical structures, but provide guidelines for change. Elsewhere (Milovanovic, 2015b) we have advocated an integration of this literature with quantum holography in our “holographic affirmative nomadology.” Being especially cognizant of Walter Benjamin’s disavowal of violence as a change strategy in his “Critique of Violence” (1986), affirmative transformative change can be further infused with understanding how information is constructed, stored, accessed, and transmitted, as our book shows. This brings the agent back in as a viable, active, dynamic constructive entity.⁴⁰

A transformative justice is a call for a holistic approach. Not only is a materialist critique necessary but also one that recognizes an active bio-emotional agent the source of passionate emotions.⁴¹ From a schema QD framework needed is a cultivation of new values for its constitutive

⁴⁰ Although we recognize how an agent can be pacified and rendered particle-like form (objectification, see Matza, 1969), the basis of which is well described by Bergson’s (2002) notion of inattentive forms of recognition and depicted by Wendt (2010) as active, passive, and object-like instances of expression of agency in relation to the social wave function.

⁴¹ Bradley’s (2012, 2014; Bradley and Tomasino, 2011) recent work, drawing from the empirical studies of McCraty *et al* (2004a, 2004b, 2009) on the role of the heart as a generator of a distinct, recognizable wave form (ECG patterns) reflecting both positive (care, love, appreciation) and negative emotions (anger, frustration, anxiety), has suggested that forms of coherence (ECG patterns exhibit more organization for the former, more erratic patterns for the latter) can be established whereby not only do sustained positive emotions provide more coherent wave forms (“psychophysiological coherence”), but in more intense states are the basis of a deeper and more profound nonlocal connectedness to humanity and the cosmos (“emotional quiescence”) materializing in such practices as intuition and we would add, connectedness to Jung’s archetypes. Positive emotions, or “joyful passions,” having their source in the heart wave form, are also the

components: for the Other, for example, the work of Levin as (1969, 1998) on the infinite duty of care to the Other, feminist's ethics of care, and Buber's "I-thou" relations are compelling alternatives to Young's (2011) dire description of the forms of "othering" that have been generated by recent political economies; for the community generalized other, the notion of "becoming communities" (Fraser, 2000; Woolford, 2009: 107-109), an orientation that embraces differences and openness to the Other as well as Woolford's notion of the "good host" ideal whereby we longingly invest energy in knowing the other is compelling⁴²; for the notion of an ideal-ego, principles of ethics need to be cultivated that build on Nietzsche's active forces and Spinoza's "joyful passions" (for a clear exposition, see Hardt, 1993) that are useful alternatives to capital logic; for the notion of an ego, Foucault's (1997) work on historical forms of cultivation of the self is compelling to show the variations that may exist. This privileges "becoming identities" (Woolford, p. 182). For discursive subject-positions, Unger's (2004) work on "role jumbling," compatible with Deleuze and Guattari's (1987) call for becoming-other and becoming-imperceptible, is suggestive as to the benefits of experimentation with alternatives. And the notion of an abstract generalized other needs to be transformed more along the lines of Hardt and Negri's (2009) call for a "commonwealth." It is from these new emergents that alternative socio-affective fields can begin to materialize, perhaps beginning as a "refrain" (Deleuze and Guattari, 1987), a tune that resonates in the socius. A new modulated schema QD matrix bio-emotional signature wave can begin to traverse the holographic field, both accessing and reinforcing alternative forms of spectra. We are all fundamentally interconnected and our unique signature wave is encoded with all with which we interact.

Certainly, as Unger (2004) has suggested, increased diversity can be the occasion for differences and conflict, but also for more profound understanding of the Other. But rather than assuming particle-forms, a wave-form orientation would enhance mediation efforts (Kuttner, 2011). As to individual "problems in living" perhaps elements of a model of a transformative justice can be found in Lori Katz's (2005) recent "holographic reprocessing model" in which traumatic events (spectra, holographically encoded traumatic information) are sensitively re-visited and reconstructed toward more adaptive possible responses (for empirical evidence in support, see Katz et al, 2008; Basharpoor et al, 2011).

We have also shown how QH can be applied to intervention practices in gang work. CeaseFire Chicago (now called "Cure Violence") and its various adapted forms in several large cities, makes use of "interrupters" who are primarily ex-offenders turned gang workers. We conceptualize their work as literally interrupting the development of forms of perception images that are often the result of escalating rationalizations for violent retaliation.⁴³ In other word, consider the wave function representing a "cloud of possibilities" that normally collapses in repetitive fashion leading to escalating violence; now think in terms of how this same wave function can be collapsed otherwise producing alternative perception-images and a new form of "I" that can be inserted in an alternative discourse. Interrupters, keen to street corner contingencies, are especially well-suited to be catalysts in this process, perhaps with the aid of some further training in Freirian dialogical pedagogy principles.

source of coherent waves of bio-emotional attention that radiates outwardly in all directions. A spiritual dimension to our transformative justice recognizes that these need to be cultivated for more sustained caring, compassionate, empathetic, loving resonating forms of solidarity.

⁴² This can be a possible start in formulating a converse to existing harms of reduction and harms of repression (Milovanovic and Henry, 2001) and the excessive investor in hierarchical differences. An ethics can be constructed by moving in the opposite direction: here we have investors, or cultivators in expansion and reducing barriers toward greater ranges of instantiations of the wave function that we are in the form of continuous differentiation and ever new unities. This would contribute to ubiquitous becoming identities.

⁴³ These can also be seen as point and/or cyclic attractors.

For newly released inmates, we have reconceptualized Maruna's (2006) call for wider introduction of "redemption scripts" by offering how QH can lead to the instantiation of alternative perception images and an "I" as speaking subject now taking residence in replacement discourses as an antidote to otherwise ubiquitous "condemnation scripts."

Some elements of restorative justice can be retained and reformulated in a truly holistic approach that considers both agency and structure. QH and a process-informational paradigm offer to contribute to a new ontological basis for the development of more viable solutions.

We conclude the chapter on transformative justice with an engagement with the necessity of posing normative principles (this builds on our earlier versions, Milovanovic, 2011, 2013). Much activist's agendas have been criticized for their lack of some ethical/justice principle. Building on Nietzsche's notion of will to power and active forces, Spinoza's joyful passions, and Deleuze's vitalism driven by continuous differentiation and creation of ever new unities, we revisit Marx's classical statement "from each according to his [her] abilities, to each, according to [her] his needs" and posit a distributive justice principle as a first approximation. This is further specified by a Nietzschean call for a "genealogical evaluation of forces," particularly well operationalized by Fraser (1997, 2000) and Patton (2000). See also the work of May (1994, 2005). Our distributive principle reads:

'From each according to [her]/his abilities, to each, according to [her]/his needs' and desires; to and from each the active promotion of the power to effect and power to be affected; tempered, as much as possible, by the promotion of differences and antirepresentationalism, and subject to genealogical evaluation of forces (Milovanovic, 2014: 198).

For retributive principles of justice we postulate:

A retributive justice evaluates: degree to which measures deliver a transparent message of disapproval in a least-restrictive, collaborative, transparent, and transformative form; active and meaningful participation of those directly affected by harm, with involvement, as much as possible, by those indirectly affected; opportunities for ongoing reconceptualization of victim, offenders, community, networks and other social assemblages, and their implementation into practice; where employment of incarceration, prioritizing respect, concern, and redemption scripts and practices; diminution of subjugation and domination in institutions and social practices (assemblages), and privileging active, molecular lines of flight; the holistic reintegration of excessive investors in harm with presumption of equal moral worth; and the degree to which our distributive evaluative ethic is co-determinative in the responsive process - all subject to genealogical evaluation of forces (Milovanovic, 2014: 198-199).

As approximations these are more in the form of suggestive discussion (guidelines, not blueprints) for the development of more refined evaluative forms. Promising for future work is to integrate Spinoza's "joyful passions" as developed by Michael Hardt (1993: 56-122) dialoguing with Spinoza, Nietzsche, and Deleuze, with the feminist suggestion for an "ethic of care," along with Levinas's notion of an infinite duty of care for the other, bringing it all within a QH analysis by employing the recent work by Bradley (2012, 2014) on the generation of positive emotions and their effects. We need, in short, not only a materialist critique of political economy, but a spiritual reawakening in our "scientific" approaches in criminology, law, and transformative justice.

Conclusion

Our book develops an alternative to the classical-materialist paradigm. A QH approach is an interdisciplinary approach that asks scholars to rethink basic ontological assumptions. We have set

out not to present definitive, comprehensive theories of criminal behavior, law or justice, but rather to provide possible directions along QH lines in suggesting not only interpretation but also a physicality to dynamic processes toward a transformative justice and comprehensive criminology.

References

- Barad, Karen (2007) *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning*. Durham: Duke University Press.
- Basharpour, S., M. Narimani, H. Gamari-Give, A. Abolgasemi, and P. Molavi (2011) "Effect of Cognitive Processing Therapy and Holographic Reprocessing on Reduction of Posttraumatic Cognition in Students Exposed to Trauma." *Iranian Journal of Psychiatry* 6(4): 138-144.
- Batiz, Z. and D. Milovanovic (2014) "Quantum Holography and Agency." See Research Gate, arXiv.
- Bekenstein, J. (2003) "Information in the Holographic Universe." *Scientific American* 289(2): 58-66.
- Benjamin, W. (1986). "Critique of Violence." In Schocken (Ed.). *Reflections: Essays, Aphorism, Autobiographical Writings*, pp. 277-300. Schocken.
- Bergson, H. (2002) *Matter and Memory*. New York: Zone Books.
- Bohm, D. (1983) *Wholeness and the Implicate Order*. Routledge.
- Bogue, R. (2003) *Deleuze on Literature*. New York: Routledge.
- Bradley, R.T. (1998) "Quantum Vacuum Interaction and Psychosocial Organization," in D. Loyle (ed.) *The Evolutionary Outrider*. Pp. 117-149. Westport, Connecticut: Praeger.
- Bradley, R.T. (2001) "The Origin and Organization of Socioeffective Dialogue." *International Journal of Public Administration* 24(7&8): 799-842.
- Bradley, R.T. (2009) "Transformational Dynamics of Entrepreneurial Systems: Organizational Basis of Intuitive Action." *International Journal of Entrepreneurship and Small Business* 11(2): 183-204.
- Bradley, R.T. (2011) "Communication of Collective Identity in Secret Social Groups." *Behavioral Sciences of Terrorism and Political Aggression* 3(3): 198-224.
- Bradley, R.T. and D. Tomasino (2011) "A Quantum-Holographic Approach to the Psychophysiology of Intuitive Action." In L-P. Dana (ed.) *World Encyclopedia of Entrepreneurship*. Northampton, MA: Edward Elgar.
- Bradley, R.T. (2012) "Nonlocality, Consciousness and the Eye of Love." *Spandal Journal* 3(1): 193-205.
- Bradley, R.T. (2014) "The Lense of Love: Eye of Universal Consciousness." (expanded version, ebook, in progress).
- Bradley, R.T. and K. Pribram (1998) "Communication and Stability in Social Collectives," *Journal of Social and Evolutionary Systems* 21(1): 29-81.
- Busemeyer, J. and P. Bruza (2012) *Quantum Models of Cognition and Decision*. Cambridge University Press.
- Chalmers, D. (1996) "Facing Up to the Problem of Consciousness." *Consciousness Studies* 2(3): 200-219.
- Chalmers, D. (1997) *The Conscious Mind*. Oxford University Press.
- Cox, G.E., G. Kachergis, G. Recchia, and M. Jones (2011) "Toward a Scalable Holographic Word-Form Representation." *Behavioral Research Methods* 43(3): 602-15.
- Cottee, S. and K. Hayward (2011) "Terrorist (E)motives: The Existential Attraction of Terrorism." *Studies in Conflict and Terrorism* 34:963-986.
- Cramer, J. (1986) "The Transactional Interpretation of Quantum Mechanics." *Review of Modern Physics* 58: 647-688: http://mist.npl.washington.edu/npl/int_rep/tiqm/TI_toc.html
- Delanda, M. (2006) *A New Philosophy of Society*. N.Y.: Continuum.
- Deleuze, G. and F. Guattari (1987) *A Thousand Plateaus*. Minneapolis, MN: University of Minnesota Press.
- Deleuze and Guattari (1987) *Kafka*. Minneapolis, MN: University of Minnesota Press.
- Deleuze, G. (1986) *Cinema 1: The Movement Image*. Minneapolis, MN: University of Minnesota Press.
- Deleuze, G. (1989) *Cinema 2: The Time Image*. Minneapolis, MN: University of Minnesota Press.
- Denzin, N. (2007) *On Understanding Emotion*. San Francisco: Jossey-Bass Publishers.
- Dienes, I. (2011) "The Consciousness-Holomatrix." In I. Diennes, D. Vargo and R. Amoroso (eds.)

- Unified Theories*. 2ed. Noetic Press.
- Diric, P. (1930) *Principles of Quantum Mechanics*. New York: Oxford University Press.
- Dyer-Witherford, N. (1999) *Cyber-Marx: Cycles and Circuits of Struggle in High-Technology Capitalism*. Chicago, IL: Illinois University Press.
- Eddington, A.S. and J. Jeans (1984) *Quantum Questions: Mystical Writing of the World's Greatest Physicists*. New York: Random House.
- Ferrell, J., K. Hayward, and J. Young (2008) *Cultural Criminology*. London: Sage.
- Fink, M. (1999). "Time-Reversed Acoustics." *Scientific American*, pp. 91-97.
- Foucault, M. (1977) *Discipline and Punish*. London: Penguin.
- Foucault, M. (1997) *Ethics, Subjectivity and Truth*. P. Rabinow (ed.). The New Press.
- Fraser, N. (1997) *Justice Interruptus: Critical Reflections on the 'Postsocialist Condition*. New York: Routledge.
- Fraser, N. (2000) "Rethinking Recognition." *New Left Review* 3: 107-120.
- Gabor, D. (1946) "Theory of Communication." *Journal of the Institute of Electrical Engineers* 93: 429-441.
- Gibson, J. (1979) *The Ecological Approach to Perception*. Hillsdale, N.J.: Lawrence Erlbaum.
- Granon-Lafont, J. (1985) *La Topologie Ordinaire de Jacques Lacan*. Paris: Point Hors Lignes.
- Halsey, M. (2006) *Deleuze and Environmental Damage*. Hampshire, England Ashgate.
- Hameroff, S. and R. Penrose (2014) "Consciousness in the Universe: A Review of the 'Orch OR' Theory." *Physics of Life Reviews* 11: 39-79.
- Hanada, M., Y. Hyakutake, G. Ishiki, and J. Nichimura (2013) "Holographic Description of Quantum Black Hole on a Computer" <http://arxiv.org/abs/1311.5607>
- Hardt, M. (1993) *Gilles Deleuze*. Minneapolis, MN: University of Minnesota Press.
- Hardt, M. and A. Negri (2001) *Empire*. Cambridge, MA: Harvard University Press.
- Hardt, M. and A. Negri (2005) *Multitude*. New York: Penguin.
- Hardt, M. and A. Negri (2009), *Commonwealth*. Cambridge, MA: Harvard University Press
- Holland, E. (2011) *Nomad Citizenship*. Minneapolis, MN: University of Minnesota Press.
- Holton, G. (1998) "Einstein and the Cultural Roots of Modern Science." *Daedalus* 127(1): 1-44.
- Hyakutake, Y. Preprint available at <http://arxiv.org/abs/1311.7526> (2013)
- Hanada, M., Hyakutake, Y., Ishiki, G. & Nishimura, J. Preprint available <http://arxiv.org/abs/1311.5607> (2013)
- Jones, M. and D. Mewhort (2007) "Representing Word Meaning and Order Information in a Composite Holographic Lexicon." *Psychological Review*: 114(1): 1-37.
- Katz, J. (1988), *Seductions of Crime*. New York: Basic Books.
- Katz, J. (1999), *How Emotions Work*. Chicago, ILL: University of Chicago Press.
- Katz, L. (2005) *Holographic Reprocessing*. New York: Routledge.
- Katz, L., M.R. Snetter, A.H. Robinson, P. Hewitt, and G. Cojucar (2008) "Holographic Reprocessing: Empirical Evidence to Reduce Posttraumatic Cognitions in Women Veterans with PTSD from Sexual Trauma and Abuse." *Psychotherapy* 45(2): 186-198.
- Kelsey, A. (2013) "The Law of Physics and the Physics of Law." *Regent University Law Review* 25: 89-102.
- Kennedy, D. (1977) *A Critique of Adjudication*. Cambridge, MA: Harvard University Press.
- Krohn, M. (1986) "The Web of Conformity: A Network Approach to the Explanations of Delinquent Behavior." *Social Problems* 33: 581-593.
- Krohn, M. (1986) "The Web of Conformity: A Network Approach to the Explanations of Delinquent Behavior." *Social Problems* 33: 581-593.
- Kubrin, C. (2005) "Gangsters, Thugs, and Hustlers: Identity and the Code of the Street in Rap Music." *Social Problems* 52(3): 360-378.
- Kuttner, R. (2011) "The Negotiation Within: The Wave/Particle Tension in Negotiation." *Harvard Negotiation Law Review* 16: 331-355.

- Lacan, J. (1977) *Écrits*. New York: Norton.
- Laszlo, E. (2007) *Science and the Akashic Field*. Rochester, Vermont: Inner Traditions.
- Lefebvre, A. (2008) *Images of Law*. Stanford, California: Stanford University Press.
- Lehar, S. (N.D.), "An Intuitive Explanation of Phase Conjugation."
<http://cns-alumni.bu.edu/~sleher/PhaseConjugate/PhaseConjugates.html>
- Levinas, E. (1969) *Totality and Infinity*. Pittsburgh, Pennsylvania: Duquesne University Press.
- Levinas, E. (1998) *Entre Nous: Thinking of the Other*. New York: Columbia University Press.
- Libet, B., E. Wright, B. Feinstein and D. Pearl (1979) "Subjective Referral of the Timing for a Conscious Sensory Experience." *Brain* 102: 193-224.
- Libet, B. (2004) *Mind Time: The Temporal Factor in Consciousness*. Harvard University Press.
- Maldacena, J. (1998) "The Large N Limit of Superconformal Field Theories and Supergravity." *Advances in Theoretical mathematical Physics* 2: 231-252.
- Marcer, P. and W. Schempp (1997) "Model of the Neuron Working by Quantum Holography." *Informatica* 21: 519-534.
- Marcer, P. and W. Schempp (1998) "The Brain as a Conscious System." *International Journal of General Systems* 27(1): 231-248.
- Marcer, P. and W. Schempp (1999) "Quantum Holography: The Paradigm of Quantum Entanglement," *Computing Anticipatory Systems - 2d International Conference*. D. Dubois (ed.), pp. 461-467. American Institute of Physics.
- Massumi, B. (1992) *A User's Guide to Capitalism and Schizophrenia*. London: MIT Press.
- Marin, J.M. (2009) "'Mysticism' in Quantum Mechanics." *European Journal of Physics* 30: 807-822.
- Massumi, B. (1992) *A User's Guide to Capitalism and Schizophrenia*. Cambridge, MA: MIT Press.
- Matza, D. (1969) *Becoming Deviant*. Englewood Cliffs, NJ: Prentice-Hall.
- May, T. (1994) *The Political Philosophy of Poststructuralist Anarchism*. University Park, PA: Pennsylvania State University Press.
- May, T. (2005) *The Moral Theory of Poststructuralism*. University Park, PA: Pennsylvania State University Press.
- McCraty, R. (2002) "Influence of Cardiac Afferent Input on Heart-Brain Synchronization and Cognitive Performance." *International Journal of Psychophysiology* 45(1-2): 72-73.
- McCraty, R., M. Atkinson, and R. Bradley (2004a) "Electrophysiological Evidence of Intuition. Part 1. The Surprising Role of the Heart." *The Journal of Alternative and Complementary Medicine* 10(2): 325-336.
- McCraty, R., M. Atkinson, and R. Bradley (2004b) "Electrophysiological Evidence of Intuition: Part 2. A System-Wide Process?" *Journal of Alternative and Complementary Medicine* 10(2): 325-336.
- McCraty, R., M. Atkinson, D. Tomasino, and R.T. Bradley (2009) "The Coherent Heart: Heart-Brain Interactions, Psychophysiological Coherence, and the Emergence of System-Wide Order." *Integral Review* 5(2): 10-115.
- Milovanovic, D. and S. Henry (2001) "Constitutive Definition of Harm." In S. Henry and M. Lanier (eds.) *What is Crime?* pp. 165-178. Boulder, CO: Rowman and Littlefield.
- Milovanovic, D. (2003) *Critical Criminology at the Edge*. Monsey, NY: Criminal Justice Press.
- Milovanovic, D. (2011) "Justice Rendering Schemas." *Journal of Theoretical and Philosophical Criminology* 3(1): 1-56.
- Milovanovic, D. (2013a) "Quantum Holographic Critical Criminology." *Journal of Theoretical and Philosophical Criminology* 5(2): 1-29.
- Milovanovic, D. (2013b) "Postmodernism and Thinking Quantum Holographically." *Journal of Critical Criminology* 21(3): 341-357.
- Milovanovic, D. (2014) *Quantum Holographic Criminology*. Durham, NC: Carolina Academic Press.
- Milovanovic, D. (2015a) "The Quantum Holographic Turn: 'Normal Science' Versus Quantized, Holographic Affirmative Nomadology." In D. Crewe and R. Lippens (eds.) *What is Criminology*

- About? Pp. 66-83. Taylor and Francis Books.
- Milovanovic, D. (2015b, forthcoming) "Revisiting Societal Reaction (Labeling) by Way of Quantum Holographic Theory," *Crimem: Journal for Criminal Justice*.
- Milovanovic, D. (2015c) "Basic Mind States and Quantum Holography." Forthcoming, 2015. In D. Plikynas (ed.), *Oscillation-Based Paradigm: From Agent to Social Systems*.
- Mitchell, E. (2008) "Nature's Mind: The Quantum Hologram." Institute of Noetic Sciences. Lake Worth, Florida.
- Mitchell, E. and R. Staretz (2011) "The Quantum Hologram and the Nature of Consciousness." *Journal of Cosmology* 14: 1-19.
- Mootz, F. (2013) "Is The Rule of Law Possible in a Postmodern World." *Washington Law Review* 68: 249-285.
- Newmann, Von. J. (1932). *The Mathematical Foundations of Quantum Mechanics*. Princeton, NJ: Princeton University Press.
- Pashukanis, E. (2002) *The General Theory of Law and Marxism*. Transaction Book.
- Patton, P. (2000), *Deleuze and the Political*. New York: Routledge.
- Patton, P. (2010), *Deleuzian Concepts*. Stanford, California: Stanford University Press.
- Pavlich, G. (2005) *Governing Paradoxes of Restorative Justice*. London: Glass House Press.
- Penrose, R. and S. Hameroff (2011) "Consciousness in the Universe." *Journal of Cosmology* 14: 1-31.
- Pepper, D. (1985) "Applications of Optical Phase Conjugation." *Scientific American* pp. 74-83
- Plikynas, D. (2010) "A Virtual Field-Based Conceptual Framework for the Simulation of Complex Social Systems." *Journal of Systems Science and Complexity*, 22: 1-17.
- Plikynas, D. (September, 2014a, under review) "Oscillating Agent Model: Quantum Approach."
- Plikynas, D. (2014b) "Social Systems in Terms of Self-Organized Oscillations and Coherent Order." *Advances in Neural Networks, Fuzzy Systems and Artificial Intelligence*.
- Plikynas, D., G. Basinskas, A. Laukaitis, and F. Gediminas (2014c) "Towards Oscillations-Based Simulation of Social Systems." *Connection Science* (forthcoming).
- Plikynas, D. G. Basinskas, P. Kumar, S. Masteika, D. Kezys, and A. Laukaitis (2014d) "Social Systems in Terms of Coherent Individual Neurodynamics." *International Journal of General Systems* 43 (5): 434-469).
- Porter, E. (1991) "The Player and the Dice: Physics and Critical Legal Theory." *Ohio State Law Journal* 52: 1571-1593.
- Powell, J. and S. Menendian (2010) "Remaking Law: Moving Beyond Enlightenment Jurisprudence." *Saint Louis University Law Journal* 54: 1035-1,112.
- Pribram, K. (1971), *Languages of the Brain*. Monterey, California: Wadsworth.
- Pribram, K. (1991) *Brain and Perception*. Hillsdale, N.J.: Lawrence and Erlbaum.
- Pribram, K. (2003). *The Form Within*. The Prospecta Press.
- Prigogine, I. (1981) *From Being to Becoming*. San Francisco: W.H. Freeman.
- Puthoff, H. (1989) "Source of Vacuum Electromagnetic Zero-Point Energy." *Physical Review* 40: 4857-4862.
- Radin, D. (1997a) *The Conscious Universe*. San Francisco: HarperEdge.
- Radin, D (1997b) "Unconscious Perception of Future Emotions." *Journal of Scientific Exploration* 11: 163-180
- Radin, D. (2013), *Supernormal: Science, Yoga, and the Evidence for Extraordinary Psychic Realities*. New York: Deepak Chopra Books.
- Ragland, E. and D. Milovanovic (eds.) (2004): *Lacan: Topologically Speaking*. New York: Other Press.
- Robbins, S. (2006) "Bergson and the Holographic Theory of Mind." *Phenomenological Cognitive Science* 5: 365-395.
- Robbins, S. (2012) *Time and Memory*. North Charleston, South Carolina: CreateSpace Independent Publishing.
- Robbins, S. (2014a) *Collapsing the Singularity: Bergson, Gibson and the Mythologies of Artificial*

- Intelligence*. CreateSpace Independent Publishing Platform.
- Robbins, S. (2014b) *The Mists of Special Relativity: Time, Consciousness and a Deep Illusion in Physics*. CreateSpace Independent Publishing Platform.
- Schrödinger, E. (1967) *What is Life?* Cambridge, UK: Cambridge University Press.
- Sheehan, D. (ed.) (2006), *Frontiers of Science: Retrocausation-Experiment and Theory*. Melville, New York: AIP Conference Proceedings, Volume 863.
- Stapp, H. (2007) *Mindful Universe: Quantum Mechanics and the Participating Observer*. Springer-Verlag.
- Stern, A (2000) *Quantum Theoretic Machines*. Amsterdam: North Holland-Elsevier.
- Susskind, L. (1995) "The World as a Hologram." *Journal of Mathematical Physics* 36: arXiv:hep-th/9409089.
- 't Hooft, G. (1993) "Dimensional Reduction in Quantum Gravity." arXiv:gr-qc/9310026.
- Talbert, M. (1991) *The Holographic Universe*. New York: Harper Collins.
- Unger, R. (1996) *What Should Legal Analysis Become?* New York: Verso.
- Unger, R. (2004) *False Necessity*. N.Y.: Verso.
- Vetlugin, A. and I. Sokolov (2014) "Addressable Parallel Cavity-Based Quantum Memory." *The European Physical Journal* 68(9) DOI: 10.1140/epjd/e2014-50185-4.
- Weisburd, D. and A. Piquero (2008) "How Well do Criminologists Explain Crime?" in M. Tonry (ed). *Crime and Justice*, pp. 153-202. Chicago: Chicago University Press.
- Wendt, A. (2010) "Flatland: Quantum Mind and the International System of Hologram." In M. Albert, L. Cederman, and A. Wendt (eds.) *New Systems Theory of World Politics*, pp. 279-310. London: Palgrave.
- Wendt, A. (forthcoming, 2015) *Quantum Holographic Social Sciences*. Cambridge University Press.
- Woolford, A. (2009) *The Politics of Restorative Justice*. Winnipeg, Canada: Fernwood Publishing.
- Yager, M. (2013) "E-Discover as Quantum law: Clash of Cultures – What the Future Portends."
- Young, J. (2011) *The Criminological Imagination*. Malden, MA: Polity Press.