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Can Criminology make sense of the Quantum Revolution?
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NOTE: This paper builds on and expands a previous book review that appeared in *Criminal Justice Review* available at:
<http://voices.norwich.edu/johanneswheeldon/files/2015/03/CJR-Wheeldon.pdf>

It is hard to overstate the contributions of Dragan Milovanovic to critical, cultural, and transformative criminology. His work includes contributions to theory, sociology of law, and penology, alongside broader explorations of semiotics and psychoanalytic practice based on an attempt to understand the implications for justice given the power of the postmodern critique. By connecting constitutive criminological theory to criminal justice practices, he is part of a team of collaborators who challenge punitive practices by offering a means to re-think how expectations shift and are shaped by those who judge and those who are judged (Arrigo, Milovanic & Schehr, 2005; Arrigo & Milovanovic, 2009).

In *Quantum Holographic Criminology: Paradigm Shifts in Criminology, Law, and Transformative Justice*, Milovanovic (2014) applies key developments in theoretical physics, both past and present, to criminology, law, and justice. He argues that while other disciplines are applying Quantum Holographic theory, mainstream and critical criminologists have as yet failed to understand this paradigm shift. For those skeptical of the false certainty claimed by quantitative criminologists this book provides a novel explanation for why many contemporary approaches seem limited. For Milovanovic, it is hard to take seriously modern physics on the one hand, while remaining committed to the linear path promised through the standard top down quantitative exploration of cause/effect relationships. Given the complex and enigmatic nature of this quantum-based inquiry, it is difficult to summarize Milovanovic's many twists and turns. While the breadth and depth of the information the reader is asked to process is at times overwhelming, the inventive combination of findings from theoretical physics and analyses of criminological theories and practices make this contribution fascinating, if not wholly successful.

To make the leap from theoretical physics to criminological studies, Milovanovic relies upon what he refers to as *isomorphism*, generally defined as a “similarity in organisms of different ancestry resulting from convergence.” In this book, it is used as something more than analogy or metaphor, but less than a concrete interdisciplinary application. If the success of the book rests on his ability to properly apply principles of physics to practices of criminal justice, we must first define what it is he seeks to employ. If ever there was a book in need of a glossary, this is it. Here goes. The first set of principles is drawn from *Quantum mechanics*. Quantum theory posits that while all entities exist as both a particle and a wave, this wave-particle duality of energy and matter remains undefined up until the very moment someone engages them. Observation and/or measurement forces particles and/or waves to become one thing or the other. Accepting this duality (and the consequent conceptual uncertainty) makes a host of contemporary technologies possible. These include: lasers that allow CDs and DVDs to work, the small powerful computers that most of us carry around in our pockets, semi-conductors, MRI and PET scans and other medical developments, along with the equipment required to make the Internet possible.

The second key concept is based on the *holographic principle*. Holography theory accepts the idea that all entities are vibratory in nature and emit wave fields, but argues that embedded in the wave fields is holographically encoded information in the form of frequency waves. This means that what appears to us to be a world based on 3 dimensions (height, width, depth) may actually be a 2 dimensional-informational structure with data about the third dimension encoded in the other two. If correct, the world as we know it is merely a giant hologram, a massive movie screen or painting, perhaps like the simple images projected on the wall in Plato’s Cave or the complex constructions created in the enterprise’s Holodeck, presented in Star Trek: The Next Generation.

Third and finally, *Schema-QD* is Milovanovic’s theory of human agency developed to make sense of the impact of quantum mechanics and the holography theory on criminological descriptions of individual decision-making and choice. It is a unique contribution based on an adaptation of psychoanalyst Jacques Lacan’s Schema R (1977). Presented as an integrative effort that provides an alternative to the polarized formalistic quantitative descriptions on the one hand and non-formalistic qualitative accounts, on the other it has since been revisited and mathematically expounded upon (Batiz & Milovanovic, 2014).

The book is organized to set out the developments drawn from the quantum holographic literature and then to compare them with the Newtonian-driven ontology (pp. 3-47). To advance Schema-QD as an alternative “quantized” account of agency, Milovanovic must first show why criminology and its practitioners should move away from the Newtonian inspired, atomistic, and individualistic “classical-materialist” paradigm. Criminology, he is not the first to argue, is beset by the foolhardy quest to identify 3 or 4 variables that predict delinquency, for example, when even our best research still concedes that 60% of the explained variance in any relationship is still unknown. You simply cannot control for all spurious variables on the one hand and subjective shifts in the object of any study on the other. Human beings are complicated and contradictory, working to one’s perceived benefit at one moment and against their own interests the next. This is not to say that Newtonian understanding is always incorrect. Instead modern scientists – biologists, physicists, and epidemiologists – generally concede that such a view is only correct for a limited set of circumstances.

Next Milovanovic makes the case for integrating Holography theory within Quantum

theory (pgs. 49-96). Focusing on the integration of holographic theorizing, he argues, better explains the nature of information construction, storage, and dissemination. This is the basis for Milovanovic's call for a shift from more traditional rational-choice criminological constructions to a "process-information" paradigm in which understanding core criminological concepts like agency and responsibility is only possible if we consider in more detail the processes in which information arises, is processed, and ultimately applied. To assist in bridging this gulf, Milovanovic engages in some in depth descriptions of Deleuze and Guattari's (1983; 1987) work in which people can effect and be affected and break out of "...repressive modern forms of identity and stasis to become desiring nomads in a constant process of becoming and transformation" (Woods, 1999: 30). By way of specific example, Milovanovic details the application of quantum thinking to international relations and the rise of individuals and groups to challenge state centric conceptions (Wendt, 2006; 2010) and group dynamics, solidarity, and terrorism (Bradley, 1998; 2010). In both, the conceptual starting place rejects singular understandings and universal definitions. As unique examples of a quantum approach to social science they provide a means to consider how the existence of numerous non-linear phenomena that operate in interconnected ways could apply to non-physics scholarship.

In chapter 4 (pgs 97-134), Milovanovic focuses on what these developments and proposed integration may mean for human agency in criminology. He notes that social science often lacks a comprehensive notion of agency. Building on approaches to quantum consciousness by Penrose and Hameroff (2012) and Henry Stapp (2007), Milovanovic presents a revised and adapted Schema R from psychoanalyst Jacques Lacan (1977). He describes Schema-QD as a novel statement of agency to explain the inter & intra- subjective agent that is neither a transcendental nor passive subject. Based on Möbius strip architecture, imagination, perception, and memory interact. Twisted back on itself within this strip, these elements (among others) interact with the four-cornered subject (ego, ego-ideal, other, generalized community other) as part of a macro-signature reference wave. This wave, he suggests, is made up of a series of bounded regions in which all information (past, present, and future) is encoded. Got it? This section is perhaps the densest part of the book. Work from different areas within theoretical physics is weaved together alongside post-modern language, philosophic conceptions of the self and quantum-inspired theories of consciousness.

Chapter 5 (pgs. 135-166) explores the practical applications for applying the quantum holographic revolution to criminology and law. Adopting this approach, Milovanovic argues, could mean re-situating Matza's (1960) work on delinquency and drift, Maruna's (2006) focus on narratives and post prison reintegration, and re-focusing the phenomenological impulse at the heart of some of the best cultural criminology (Cottee & Haywood, 2011; Ferrell & Sanders, 1995). It means drawing new energy from philosophers like Spinoza, Leibniz, and Whitehead and telling new kinds of stories that reject the disciplinary divisions and discord that continue to splinter and fracture academia's already shaky foundation. Chapter 6 (pgs. 167-208) includes an invigorating and sometimes dizzying effort to re-situate transformative justice that is both connected with but cognizant of, critiques of restorative practices. By resisting universal definitions of crimes and punishment, groups can define harm, promote shared understandings of responsibility, and consider what repairing the connective tissue within and among members of a community would require. Quantum consciousness would require seeing this community in the broadest of terms. As Milovanovic notes early on in the book: "we are all part of the universe. This is inescapable. We are intricately interconnected with the cosmos (pg. 6)."

There is a lovely irony (for those of us amused by such things) that turns criminology's so-called physics envy on its head. In short: the quest for certainty among the so-called softer social scientists bears no resemblance to the acceptance of uncertainty in harder sciences like physics. On this reading, adopting probability theory and putting one's faith in p values and effect sizes is simply inadequate. The idea that matter can shift and change based on the relationship between observers and the observed should fundamentally alter numerous criminological research designs. The best of the book may be the sections in which he explores the implications of the quantum revolution for criminological theory and practice. By showing the informational exchange at the heart of Sutherland's differential association (1947), the early boundary work implied by Cloward and Ohlin's subculture theory (1966), and the connections between "patterned spectra" and the ecological approach of Shaw and McKay (1969), Milovanovic is connecting canonical works of criminology in an entirely new way. Rethinking these classics in terms of quantum holographic principles is a worthy project, firmly in line with calls by the late Jock Young (2011) to renew the criminological imagination. The "process-information" paradigm, as described, would offer a new way to think about criminological truth claims on the one hand, and what I have called the theory/practice problem – in which the role of human agency in undertaking action is neither presumed nor ignored (Wheeldon, 2014).

There are three problems that challenge this otherwise important contribution. The first is definitional. As has been pointed out, in mathematics the "isomorphic" application of quantum holography to criminology may require a point to point mapping of all elements of two sets (Clark, 2013). Even if such a feat were possible, this would mean more than simply integrating the elements of quantum theory one likes, while ignoring the others. While Milovanovic notes that no experiment has refuted its core premises, physicists like Lee Smolin (2007) and others have noted that there are numerous inconsistencies inherent in the current formulation of Quantum Mechanics. For example, the holographic principle at the root of Milovanovic's Quantum Holographic Criminology may be the missing link that unifies general relativity and quantum field. It may, however, suggest something else entirely. Gerard 't Hooft, a respected physicist and scholar, believes the holographic principle is inconsistent with quantum theory and moreover that quantum physics itself may in fact be completely wrong. The sometimes acrimonious debates described by Smolin are nowhere in this book, which sometimes treats developments in theoretical physics as far more settled than reports from the field imply. While subsequent work provides some detailed examples (Batiz & Milovanovic, 2014), nowhere in the book does Milovanovic consider how the high level math that is the basis for the work of many theoretical and then in depth measurements required for experimental physicists could be applied in criminology. Instead, the evaluative components of the project appear to focus on broader measures of community well-being, self-actualization, and genealogical analysis of forces in historical moments (2014: 206). There is more definitional work to be done here to allow for researchers and lay readers alike to comprehend how exactly the evaluative schemas as presented (2014: 194) might apply more generally.

Another challenge is practical. There is limited discussion of the challenge represented by the uncertainty principle for the criminal justice system and the people who work within it. Uncertainty, while essential to make predictions in physics, is dangerous for political actors who use crime and crime control as tools based on the prevailing social perspectives of the time. In academia this has been shown to lead to research that focuses on topics and theories advocated by state actors (Savelsberg, King & Cleveland, 2002). In policy terms, this reality can prioritize crime control practices based on theories that contain convenient assumptions about human nature (Wheeldon & Heidt, 2007). Conceding that multiple views exist creates doubt and in an era of insecurity, manufactured or otherwise,

policies designed to manage risk will inevitably be favored (Hope & Sparks, 2000). For example, Milovanovic highlights the work of Lefebvre (2008) and others to show how quantum principles may apply to judicial decision-making. The conclusion that judges “decide” and then retroactively interpret the facts and the law to fit this decision while perhaps accurate, it is unlikely to lead to confidence in the judicial process. This does not mean it should be ignored. However, the consequences of accepting that the same uncertainty principle that makes so much of the technology in our lives possible also plays a central role in human affairs is unsettling for most, and terrifying for some.

My final concern is the lack of limitations in the book. While Milovanovic concedes more work is to be done, an honest accounting of where his detailed isomorphic reach may have exceeded his constitutive criminological grasp would have been welcome. For those of us moved by the critiques of contemporary criminology’s to properly account for limitations, be they ontological, epistemological, or reflexive, it is surprising to find so little critical self introspection here. Such an examination might have suggested the potential for alternative quantum accounts such as Rovelli’s Relational Quantum Mechanics (1996) to serve as a basis for the sort of interdisciplinary application Milovanovic attempts. Likewise, while Milovanovic cites Smolin’s latest book on the crisis in physics (2013), the serious contradictions and debates within the physics community itself are given scant attention. There is a wonderful potential paper here comparing what Smolin (2007) called the physics community’s “sociology” in which revolutionary speculations are simply accepted, despite the fact they cannot be tested on the one hand, and the ironic position criminologists sometimes find themselves of having to repeat studies that test “... the same limited and disciplinary theories in mostly the same ways, completely isolated from the real-world of criminal justice policy” (Robinson, 2012: 28). Careers require funding, and funding requires investigating phenomena that can be tested and communicated based on the political orthodoxies of the moment. Why is it that the “sociology” that continues to fund and promote the inventive (if untestable) propositions of string theory in physics operates so differently from the mundane funding priorities of contemporary criminology?

Despite the concerns listed above, *Quantum Holographic Criminology* offers unique application of quantum theory based on a detailed if sometimes one sided view of theoretical physics. It also provides a fascinating summary of a number of criminological developments that seem to defy simplistic statistical signifiers and signs. While the book represents the distillation of the views of a criminologist who has been wrestling with the ideas he explores for decades, its presentation is based on a wholly novel means to present, describe, and connect them. Milovanovic is a collaborator by nature and appears to be continuing this approach by working with Zoltan Batiz from the Centre for Theoretical and Particle Physics, among others. This means the book will likely be the starting place for further work, designed to test, explore, and refine Schema-QD. This is good. The ‘chaos’ accepted within quantum approaches may better fit our criminal justice system than many might assume. It may likewise account for what has been called the replication crisis in the social sciences. If the mathematical models that have been presented in Milovanovic’s most recent collaborative work are any indication of how this project might proceed, the world of quantitative criminology is in for quite a shock.

In sum, this book should be read for the cognitive dissonance that results. That a field requiring so much high-level math should inspire a criminologist who has spent decades disputing the value of and reliance upon numeric data is fascinating. While I am convinced of the value of quantum thinking, I am less sure about what how the holographic principle applies in practice. Readers will certainly know more about what the quantum revolution might mean for criminology after engaging this book. As a provocation to social scientists

who aspire to the (un)certainly of their hard science cousins, this book is an exceptional interdisciplinary effort. It should be read alongside other efforts detailed in these pages to understand the complexity around a unified understanding of criminology (See July 2012 issue). It is hard to disagree with Einstein's reminder that "humanity will never solve its problems until we understand how we think." Are criminologists ready to rethink their discipline?

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