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This forum invites a reflection on how we may understand ethics in global studies in light of the growing debate on thinking through quantum for the social sciences and humanities more broadly. Quantum principles such as entanglement and indeterminism challenge the notions of individuality and subjectivity and the validity of universal principles as sufficient guidelines for agency, all notions that constitute the foundations of modern deontological ethics. Science is not a separate sphere of society. Its concepts migrate across "disciplines" and end up constituting languages, accepted methodologies, and worldviews. The contributors to this special issue investigate how the shift from a Newtonian metaphysics to a quantum metaphysics may offer conceptual tools for transforming our understanding of causality, self and otherness, the human and the nonhuman, and how we may consequently live together in the world and act ethically in it.

Ce forum invite à réfléchir à la manière dont nous pouvons aborder l'éthique dans la recherche internationale, à la lumière de débats incitant de plus en plus à penser les sciences humaines et sociales par le prisme de la physique quantique. En effet, les concepts de la physique quantique, tels que l'intrication et l'indéterminisme, remettent en cause les notions d'individualité et de subjectivité, ainsi que la validité de principes universels qui seraient supposément suffisants pour guider nos actions, soit autant de conceptions fondamentales emblématiques de l'éthique et de la déontologie modernes. Or, la science n'est pas une sphère séparée de la société. Ses concepts voyagent entre les « disciplines » et finissent par constituer des langages, des méthodologies et des visions du monde. Les contributeur·rices de ce numéro spécial explorent la manière dont la transition d'une métaphysique newtonienne à une métaphysique quantique peut dégager des outils conceptuels pour transformer notre compréhension de la causalité, du rapport entre soi et autrui, entre humains et non-humains, mais également de la manière dont nous pourrions, par conséquent, habiter ensemble ce monde, d'une manière éthique.

Este foro invita a reflexionar sobre cómo podemos entender la ética en los estudios globales a la luz del creciente debate sobre la reflexión cuántica para las ciencias sociales y las humanidades en general. Los principios cuánticos, como el entrelazamiento y el indeterminismo, ponen en tela de juicio las nociones de individualidad y subjetividad, así como la validez de los principios universales como directrices suficientes para la acción. Todas estas nociones constituyen los fundamentos de la ética deontológica moderna. La ciencia no es una esfera separada de la sociedad. Sus conceptos migran a través de las «disciplinas» y acaban constituyendo lenguajes, metodologías aceptadas y visiones del mundo. Los colaboradores de este número especial investigan cómo el paso de una metafísica newtoniana a una metafísica cuántica puede ofrecer herramientas conceptuales para transformar nuestra comprensión de la causalidad, del yo y de la alteridad, de lo humano y de lo no humano, y de cómo podemos, en consecuencia, convivir en el mundo y actuar éticamente en él.

Introduction

This forum invites a reflection on how we may understand ethics in global studies in light of the growing debate on thinking through quantum for the social sciences and humanities more broadly. Quantum principles such as nonseparability, entanglement, and indeterminism challenge the notions of individuality, subjectivity, and the validity of universal principles as sufficient guidelines for agency, all notions that constitute the foundations of modern deontological ethics.

Science is not a separate sphere of society. Its concepts migrate across "disciplines" and end up constituting languages, accepted methodologies, and worldviews. Especially in the current rapid flux of information and severe challenges to the environment facing humanity and all others inhabiting the planet, it is urgent to question the atomistic and mechanistic views of the world. These views represent the world in ways that are failing to fully capture it and thus meet the existential challenges confronting us. Considering this, the contributors to this special issue investigate how the shift from a Newtonian metaphysics to a quantum metaphysics may of-

fer conceptual tools for transforming our understanding of causality, self and otherness, the human and the nonhuman, and how we may consequently live together in the world and act ethically in it.

The collection speaks to a growing debate on thinking through quantum for the social sciences and humanities (Barad 2007; Wendt 2015; Arfi and Kessler 2018; Fierke 2019, 2022; Zanotti 2019, 2020; Der Derian and Wendt 2020; Fiere and Mckay 2020; Murphy 2020, 2021; O'Brien 2021; Project Q Sydney n.d.). Four special issues or forums of journals were dedicated to debating quantum for social science. The *Security Dialogue* (2020) special issue presented a variety of reflections on topics such as the scalability of "quantum," its relevance as a frame for exploring issues of international security, and effects of quantum technology. The *Millennium* (2020) forum discussed the contribution of Zanotti's *Ontological Entanglements* (2019) and her ontological critique of international relations (IR) and Western ethics' starting points through affect theory, feminism, and constructivism. The 2018 forum in the same journal focused on the pioneering contribution of Alex Wendt's *Quantum Mind and Social*

Science debating his conceptualization of consciousness and of humans as quantum walking waves. More recently, the *International Theory* special issue on Wendt's book explores, through his work, whether the social sciences require ontological foundations or agreement on what such foundations are, their relations to natural science, and what accounts for a valid explanation of the social world (Erskine and Guzzini 2022, 118).

In this special issue we pause on the quest for foundations, that is, we do not address the question of whether quantum is a "truer" depiction of reality than "Newtonian Physics" or if it constitutes the foundational science for understanding human interaction. Quantum-inspired social sciences do not provide a unified truth or worldview of what is. They resonate broadly with other relational perspectives with which they at times converge, such as feminist, queer, postmodernist, and postcolonial theories. Nevertheless, what is distinctive about quantum social theories (QST) is the focus on the way foundational ideas about how the world is and how we get to know it inform political thought. In this collection, contra what critics of QST have argued (Jackson 2016; Sjoberg 2020), we are not seeking the validation of social sciences and ethics through physics. On the contrary, we recognize that physics and social sciences share imaginaries of what is and that such ontological imaginaries remain often uncritically accepted while constituting the benchmarks for validating research methods, models of agency, and ethical choices.

This forum explores how the conceptual repertoire of quantum may offer interesting avenues for rethinking ethics (including scholarly research ethics) and political agency. Concepts of physics are embedded with, and constitutive of, broader epistemes and deepen the reflection on how a quantum conceptual repertoire contributes to rethinking what is taken for granted as foundations of ethics, subjectivity, and political agency. In other words, this forum contributes to a critique of the conceptual assumptions of Western ontological and epistemological traditions (which Karen Barad 2007 calls onto-epistemologies, arguing that these two fields cannot be considered as separate). It addresses how accepted Newtonian ontological imaginaries constitute standards of truth that shape what is considered just and possible, while exploring how the ontological imaginaries associated with quantum physics open alternative ethical, political, and epistemological spaces.

Bentley Allen (2018), Milja Kurki (2020), and Peter Katzenstein (2022) have shown that cosmologies have a bearing in shaping political discourses. Allen, for instance, argued that the notion of rational control and human progress that characterized the sixteenth-century European political discourse drew on "cosmological shifts in the image of the universe and the role of humanity in the cosmos" (Allen 2018, 4). In fact, Allen concludes, "in the absence of scientific ideas, the international pursuit of power and wealth would look very different than it does today" (Allen 2018). In the meantime, decolonial scholars have argued that a relational "epistemic reconstitution" challenging Western cosmologies and ontological and epistemological paradigms is central to decolonial thought (Mignolo 2002; Escobar 2018; Mignolo and Walsh 2018). In Mignolo and Escobar's words, "to name ontology a world-sense constituted by relations and not by entities (objects) is a Western misnomer equivalent to Hernan Cortés naming 'Mosques' the buildings where the Aztecs carried out their rituals. Western civilization was built on *entities* and *de-notation*, not in *relations* and *fluidity*" (Mignolo and Walsh 2018, 135).

The fact that, historically, those who challenged accepted cosmologies, such as Galileo Galilei, have also been considered challengers to religious credos shows how much of the ontology of who we are as humans is entangled with representations of the universe we live in. Even staunch critics of the translation of quantum language into the social, such as Jennifer Burwell (2013, 2018)[1], recognize that "hard sciences" are not separate from the "social sciences." For Burwell, "concepts that at first express axiomatic principles in their original discipline can, over time, accrue and dispense meanings that expand to become touchstones for wider-ranging sensibilities" (Burwell 2013, 348). While Burwell dismisses quantum social science as a misinterpretation of quantum physics' language due to the little connection of quantum mathematics with lived experience, she recognizes that "worldviews and scientific advances are inseparable, with existing societal priorities driving the relative degree to which a given model is accepted and applied" (Burwell 2013, 348).

Quantum theories, Steven Hawking (2006) argued, radically differ not only from Newtonian frameworks, but also from Big Bang theories' explanations of the origins of the universe. Quantum theories for instance, introduce the principle of uncertainty in the laws of physics and related string theories do not necessarily imply a central starting point or a first cause for the existence of the universe. Yet, the assumptions of Newtonianism have been explicitly or implicitly accepted as an accurate portrait of "reality." Its atomistic ontology has informed IR theory conceptualizations of causality, power and subjectivity across realism, liberalism, and Marxism (Zanotti 2019). Newtonian physics has influenced what is currently considered a valid epistemology. As Peter Katzenstein (2022, xi) argues, "The conventional theories, models, and hypotheses that inform our study of world politics are grounded in a Newtonian worldview that has no place for uncertainty" (Peter Katzenstein 2022, xi).

Mechanistic views of the world nurture the idea that we can understand "reality" by dissecting it. Power, a central concept in IR, is imagined by realists as a Newtonian mass force, whose strength can be measured as the ability to push and direct smaller masses. This conceptualization, of course, is very relevant for studying the social and for shaping how we imagine ways for preserving peace, taming climate change, or responding to war and aggression. It is also relevant for the way we imagine our ability to make social change and how we assess the ethical value of our actions in the world we live in. In fact, conceptualizations of power as a mass force are conducive to attitudes of resignation (if we feel we do not have the "weight" to direct change) and/or to militarized notions of political agency (as related to the acquisition of enough strength to crush opponents' resistance). Such conceptualizations are politically relevant and ethically appeasing. Quantum ontological imaginaries challenge images of the world as made of mass forces, as well as the idea that power (or agency) is all about increasing one's "mass" and the ability to crush others. Therefore, a quantum ontological critique debunks the naturalness of the starting points of a vast body of political theories in IR. It challenges assumptions that humans behave as machines following measurable, predictable, or predetermined paths and that power is a mass to be possessed (Zanotti, 2019).

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[1] Burwell's critique of quantum (2013 and 2018), however, limits her inquiry to what she calls "quantum mysticism" and its commercialization, and surprisingly does not address the more reputable body of quantum scholarship that has emerged in international relations since the publication of Karen Barad's book in 2007.

These images constitute naturalized, and sometimes violent, practices, discourses, and cultures that are productive of effects that change the course of events. As David Campbell (1999) noted, "the greatest acts of violence in history have been made possible by the apparent naturalness of their practices, by the appearance that those carrying them out are doing no more than following commands necessitated by the order of things, and how that order has been understood in terms of the survival of a (supposedly pre-given) state, people, or culture" (Campbell 1999, 42). Changing what is taken for granted, namely an apparent order such as the atomistic and Newtonian perspective of the world, opens the possibility for imagining a different possible set of political practices.

Atomistic or individualistic ontologies contribute to forming an idea of agency based on the naturalness of the assumptions of Newtonian substantialism. In critiquing such ontologies from a feminist standpoint, Judith Butler (2020) bases her argument on the force of nonviolence upon a radical critique of individualistic ontologies that from Hobbes onward have portrayed violence as natural and normalized aggression. While not specifically debating the imbricatedness of scientific paradigms (and quantum in particular) with social imaginaries, for Butler, nonviolence as a radical political praxis must be rooted upon an act of ontological reimagination that sees us as part of a community first. This imaginary challenges discourses, including just war, which rationalize and legitimize violence. In fact, if we are ontologically entangled first, the object to be defended is not the self or a specific community, but the universe as such.

Alexander Wendt (2022b) noted that while Newtonian worldviews do not seem to withstand the burden of proof, they provide good explanations for human interactions and constitute the foundations of Western pedagogy. In his words,

> The issue is pedagogy, in the first instance the classical methods training we currently give to almost all graduate students in the human sciences. What this does is not just teach them to use specialized statistical tools, important although that is. It also hard wires their brains—our brains—to "see" a mostly invisible social world as if it were full of classical objects and "mechanisms." (Wendt 2022b, 205)

This pedagogy, Wendt continues, produces the kind of self-interested individuals predicted by the substantialist ontologies of Newtonianism. It also validates "scientific" research methods that are based on the same implicit but powerful Newtonian assumptions.

As scholar, activist, and a Nobel Prize corecipient Karen O'Brien (2021) stated, "paradigms matter. They represent the dominant thought patterns that underlie theories and methods of science, as well as practices related to how we organize society. Paradigms influence the way that problems are defined and addressed, including what is considered realistic, legitimate and effective" (O'Brien 2021, 19). Thus, O'Brien urged us to "consider how meanings, metaphors, and methods informed by quantum physics can inspire social change, and in particular our response to climate change" (O'Brien 2021, 2). In fact, while classical Newtonianism, and the politics arising from this, relies on assumptions of separatedness, "from a perspective of quantum physics, connections, relationships, and communication are foundational, and this has implications for social change" (O'Brien 2021, 4). What kind of politics and ethics can a quantum perspective founded on relationality, indeterminism, and an array of potentialities inspire? How do we understand power and ethics in a world of quantum connections, dynamism, and flows?

Understanding the implications of wide-ranging assumptions of separateness is all the more important if we consider the complex connectivity driving the many spheres of politics and IR, in fact of global life altogether, in the past, present, and future. The speed and spread of information flows central to the current Ukrainian defense against the Russian invasion and the ripple effects of that conflict on the world economy are cases in point. Furthermore, the pandemic and the insecurities connected with the climate crisis have brought to the forefront the deep uncertainty that characterizes the world we live in. The catastrophic challenges to the environment we are currently facing cannot be met by assumptions of the human species being separate or distinct from other species or nature altogether. In the current Covid-19 pandemic, we are (once again) learning painfully the way humans are not separate or apart from viruses and other species and the political effects such species may entail in human societies. We are deeply and globally connected to all kinds of microorganisms and other species, whose pathogenicity is also dependent on the sociopolitical and natural environment that humans significantly helped to shape particularly throughout modernity. As Voelkner considers in her forum contribution, a quantum perspective offers a conceptual repertoire for thinking through this complex relationality as well as uncertainty. It also invites thinking anew about how to act (politically and ethically) in the world. Complex relationality is also central to Fierke and Mackay's contribution to this forum, assessing global forced migration. They start with practices of forced displacement spanning global distances but view these through the notion of quantum complementarity. Rather than understanding displacement merely as a question of physical relocation of those who are forced to leave, they examine the spatial and temporal entanglements of emotions and grief between refugees with those who are left behind, and reflect on the ethical implications of such a perspective.

Quantum thinking challenges modern worldviews of objectivity and subjectivity. The notion of the "observer effect" puts into doubt the separation of the object from the observing subject, which is the pillar of positivist science. Concepts then are not objective labels of an empirical world that can be captured by a detached researcher. Rather, the observer and the observed are formed and transformed in their mutual encounter in/through the scientific apparatus (Bohr 1937; Heisenberg 1958; Barad 2007). Thus, apparatuses of observation have causal power and affect the phenomena of which they are part. As a number of critical scholars have noted, scientific apparatuses are historical assemblages suffused with power relations (Foucault 1980) that embody material (nondiscursive) and theoretical (discursive) elements. As part of apparatuses, knowledge is performative and theorizing becomes a political practice (Barad 2007). Concepts are thereby worlding practices that bring forth context-specific political effects. This has deep implications not only for how we conduct research but even more so for how we conduct ourselves in the world. In her contribution to this forum, Chee is particularly concerned with the way power is entangled in how research is conducted, while McIntosh, in his contribution, takes a step further in making the case that research has ethicopolitical implications also for political policy-making.

If we embrace a quantum ontological framework, Zanotti (2019, 2021) has argued, in making ethical decisions, we should not only rely on abstract prescriptions, but also give

in-depth consideration to the entire apparatuses through which we engage specific situations at hand. In a quantum view, ethics, ontology, and epistemology are not separate spheres. They are in fact *entangled*, that is, they are both part of the same mattering phenomenon and produce context-specific differential cascade effects. In an intra-agential perspective (as Barad named her quantum onto-epistemology), the apparatuses we adopt to engage with the world contribute to form and transform it, although in a diffractive and nonlinear manner. Hence, humans or the institutions they create are not endowed with the power to ordain material dynamics as the results of planning rationalities. Rather, actional plans are cluttered with context-specific consequences, unexplainable by positivist and other forms of lineal causality.

Justifications of ethics based upon abstract principles are deeply rooted in Newtonian worldviews, assuming that causal effects remain the same regardless of circumstances. The Kantian categorical imperative, Zanotti (2021) argued, "act that you can will your maxim to become a universal law," is based upon the assumptions that the world is homogeneous, and constitutes a radical excision of the ethical relevance of practices and situational diversity. The categorical imperative is patterned upon the Newtonian imaginary regarding the certainty of the laws of nature. Here, universal applicability is the test for the validity for action principles. This way of adjudicating ethical validity can only stand in the context of a world in which linear causality and the stability of cause/effect relations obtains. For Kant, "Since the universality of the law according to which effects are produced constitutes what is properly called nature in the most general sense (as to form), that is, the existence of things so far as it is determined by general laws, the imperative of duty may be expressed thus: Act as if the maxims of your action were to become through your will a universal law of nature" (Kant 2008, 10).

Furthermore, Kantian ethics is grounded within substantialist assumptions regarding the ontological character of the human subject, who is constituted in a struggle between "nature" and "reason." Zanotti critiqued the questionable implications of a political ethos based upon substantialist ontological assumptions regarding who humans are as subjects, its conceptualization of reason, its aversion to uncertainty, and its obsession with abstractions and universality. The categorical imperative is a formal principle, excising contingency and prescribing universal applicability as the criterion for ethical adjudication, which also relieves subjects from assuming responsibility for the practical consequences of their actions. In summary, for Zanotti, the very distinction between the "material" and the "ideal" feeds into Western moral and political failures. In line with this view, for instance, the political rationality of international intervention and development and their justificatory narratives rely upon assumptions that reality can be driven mainly by aspirations, regardless of specific conditions or circumstances.[2] Ethics in a quantum world would then be driven by the notion of responsibility instead of universal applicability of abstract rules. Ethical behavior is connected with an attitude of prudence and remains concerned with *how* the apparatuses we put in place produce consequences for real human beings in real life (Zanotti 2021).

In challenging the ontological separation between subject and object, as well as linear causality and agency, a quantum

perspective redefines the contours of the Western ethical subject (see Voelkner in this forum). In a quantum ontology such as Barad's, uncertainty, indeterminacy and potentiality, and the infinite alterity and intra-action of self and matter reshape the meaning of acting ethically. The human subject is conceived as inseparable from all its cohabitants, living and nonliving; it emerges in context. Its actions affect everything that it is entangled with. What is the ethical subject if it is irrevocably shaped by the dynamism of the context/environment that it also helps to shape? Acting ethically means acting in a way sensitive to the potential effects and outcome on all in context. As New Materialists have argued, matter is not passive, but its agency or ability to produce an effect reveals itself immanently, that is, in specific contexts, which quantum physicist Karen Barad has called intra-actions.

A quantum ontology perspective proposes an empowering view of individual agency and micropolitical initiatives. As William Connolly has also argued, small actions may contribute to creating cascade effects (Connolly 2013). Such initiatives are inevitably entangled with the world, and diffractively intra-act as waves to shape outcomes (see Murphy in this forum). By challenging Newtonian substantialism, quantum entanglements trace the ontological and methodological horizons for devising notions of agency that embrace uncertainty and complexity. Small initiatives may resonate with, amplify, or cancel out other systemic patterns, and thus become cumulative, causally relevant, and transformative. As Michael Murphy in this forum argues, understanding social relations as waves, for instance, emphasizes the importance of "interference" of different social forces, and calls attention to "the medium" within which waves travel, which affects their strength and motion. One of the pillars of realist IR theory, that is, the conceptualization of power as a quantity and a mass force, comes into question to favor alternative ideas of agency centered on relationally differentiated diffractive effects.

To an extent, our biological inseparability from the environment, as Voelkner reflects in this forum, is already demonstrated in the (micro)biological sciences, where the postgenomic sciences of epigenetics and microbiomics show how the human body is colonized by a multiplicity of dynamic microorganisms in, on, and around humans. This not only already challenges the discreteness of the modern human subject but also its deep interconnectedness with its surrounding habitat that influences its biological and subjective development. Agency becomes a matter not of A acting on B but of the human acting on the world that comprises it and that it comprises. Social theorists have reflected on the implications of this for ethics, politics (security), and agency of this emerging posthuman subject (see, e.g., Eroukhmanoff and Harker 2017). As Voelkner demonstrates in her discussion of a quantum perspective to interspecies care, agency becomes not merely taking responsibility for the microactions that contribute to the emergence of pandemics but caring for what becomes with others.

Embracing a quantum relational perspective for re-imaging ethics is profound. The contributors to this forum highlight in different ways the connections between ontological imaginaries, ethics, and praxis and explore how quantum relational ontologies offer tools for questioning the substantialist assumptions of Western political theories of subjectivity, knowledge, and agency. Nadine Voelkner reflects on the implications of quantum entanglements for re-imagining interspecies co-living. She questions rigid forms

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[2] Relying on overarching assumptions instead of contextual competence has led to disastrous initiatives, as for instance the war in Iraq, as Jack Amoureux and Brent Steele (2014) have documented.

of individuality and agency, suggesting that living organisms may be permeable and forever (de/re)composing all the way down to the quanta in resonance to their different habitats, thus requiring a rethinking of how we conduct ourselves as co-inhabitants in an entangled world to prevent pandemics. Michael Murphy argues reimagining agency and structures as waves that travel differently through different materials and interact with other waves, canceling or amplifying each other. In this way it is possible to redefine that debate in nondeterministic terms, and thus rethinking agency in a nonmechanistic way in the context of structural constraints. Liberty Chee and Christopher McIntosh highlight the generative power of quantum concepts for exploring scholarly ethics. McIntosh redefines the notion of scholarship's responsibility and policy relevance through a critical exploration of temporality and quantum entanglements. He affirms that the entanglement of ourselves and processes of knowledge production are "quantum, not merely a matter of complicated ways of cause and effect. It is dynamic, in process and heterotemporal, and constitutive of physical and social reality". Based on these premises, McIntosh calls for a broader conceptualization of scholarly "policy relevance." Chee questions relations of power imbedded in scholarly research, and the limits of reflexivity, through Barad's notion of diffraction and Michel Foucault's notion of parrhesia, suggesting the value of adopting a diffractive ethics for democratizing social science. Karen Fierke and Nikola Mackay, on the other hand, explore the implications of an ethics of quantum complementarity for refugee and migration policy more generally by questioning the emotional and grievous entanglements across time and spaces between those who have left and those who are left behind in Afghanistan.

Acknowledgment

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