Subjects of Quantum Measurement: Surveillance and Affect in the War on Terror

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The idea of measurement (of bodies and identities) is a guiding principle of globalized surveillance in the War on Terror. Nevertheless, this inherently scientific notion is so naturalized in public and academic discourse that its meaning and implications are left undiscussed. This paper builds on quantum theory to present an immanent critique of measurement in surveillance. Foregrounding surveillance’s transdisciplinary conceptual foundations, it argues that a notion of identity measurement centered on ambiguity and embodiment, rather than fixity and abstraction, reshapes the scope for political action and opens new avenues for critique. I suggest that a lack of critical engagement with the concept of measurement accounts for Surveillance Studies’ and International Political Sociology’s difficulty in exploring the relation between the material–affective dimension of surveillance and its identity-fixing function. Challenging unquestioned notions of measurement in social science, quantum theory highlights the interconnected importance of ambiguity and embodiment in processes of identity measurement. Through the case of airport security, I illustrate how quantum measurement departs from recent critical accounts of surveillance—concerned with the fixity of unambiguous identities and the digital abstraction of bodies—and foregrounds the ambiguity of affect to postulate new forms of agency and resistance to the politics of surveillance.

L’idée de mesure (des corps et des identités) est un principe directeur de la surveillance mondialisée intervenant dans la guerre contre le terrorisme. Néanmoins, cette notion intrinsèquement scientifique est tellement devenue naturelle dans les discours publics et intellectuels que sa signification et ses implications sont restées inabordées. Cet article s’appuie sur la théorie quantique pour présenter une critique immanente de la mesure menée dans le cadre de la surveillance. Il met en avant les bases conceptuelles transdisciplinaires de la surveillance et soutient qu’une notion de mesure des identités centrée sur l’ambiguïté et l’incarnation, plutôt que sur la fixité et l’abstraction, remodèle le champ d’application de l’action politique et ouvre de nouvelles pistes de critique. Je suggère qu’un manque d’engagement critique concernant le concept de mesure explique la difficulté des études de la surveillance et de la sociologie politique internationale à explorer la relation entre la dimension matérielle/affective de la surveillance et sa fonction de fixation de l’identité. Remettant en question les notions incontestées de mesure en sciences sociales, la théorie quantique met en évidence l’importance interconnectée de l’ambiguïté et de l’incarnation dans les processus de mesure des identités. Je me base sur le cas de la sécurité aéroportuaire, j’illustre la manière dont la mesure quantique s’écarte des comptes rendus critiques récents de la surveillance—qui se préoccupent de la fixité des identités.
non ambiguës et de l’abstraction numérique des corps—et met en avant l’ambiguïté de l’affect pour proposer de nouvelles formes d’agentivité et de résistance aux politiques de surveillance.

La idea de medición (de cuerpos e identidades) es un principio rector en el marco de la vigilancia globalizada en la guerra contra el terrorismo. Sin embargo, esta noción intrínsecamente científica se encuentra tan arraigada en el discurso público y académico que su significado y sus implicaciones no son tema de debate. Este artículo se basa en la teoría cuántica para presentar una crítica inmanente de la medición en el marco de la vigilancia. Poniendo en primer plano los fundamentos conceptuales de la transdisciplinariedad de la vigilancia, en este artículo se postula que la noción de medición de la identidad centrada en la ambigüedad y la representación, en lugar del inmovilismo y la abstracción, reconfigura el alcance de la acción política y abre nuevas vías para la crítica. De igual modo, se sugiere que la dificultad de los Estudios de la vigilancia y de la Sociología de la política internacional a la hora de explorar la relación entre la dimensión material y afectiva de la vigilancia y su función de determinación de la identidad radica en la falta de implicación crítica. La teoría cuántica pone en relieve, desafiando nociones no cuestionadas de medición en las Ciencias Sociales, la importancia interconectada de la ambigüedad y de la representación en los procesos de medición de la identidad. Recurriendo al ejemplo de la seguridad en los aeropuertos, se ilustra como la medición cuántica se aleja de las recientes opiniones críticas sobre la vigilancia, preocupadas con la determinación de identidades inequívocas y la abstracción digital de los cuerpos, y pone en primer plano la ambigüedad del afecto con el fin de postular nuevas formas de actuar y de resistencia a las políticas de vigilancia.

Introduction

In 2018, a new US-based company called Discern Science International entered the global security market. Its flagship product is AVATAR (Automated Virtual Agent for Truth Assessment in Real-Time), a state-of-the-art deception detection system that employs biometric sensors to scan bodily, vocal, and facial responses to specific stimuli (Hodgson 2019). Through artificial intelligence, AVATAR “capture[s] information beyond human capacity,” identifying deceptive behavior much more accurately than human agents (Discern Science 2022).

The development of AVATAR exemplifies the growing dominance of surveillance in world politics. The research that led to its invention was funded by the US government, with trials taking place across border checkpoints and airports in Europe, Canada, and the United States (Hodgson 2019). AVATAR is but the latest iteration of a long-standing transnational effort, heavily stimulated by the threat of terrorism, to use “measurable physical characteristic[s] or personal behavior trait[s] to recognize the identity […] of an individual” and monitor mobile people (Transportation Security Administration 2018, 6; my emphasis). Affective responses are therefore being made increasingly intelligible to fulfill the ultimate obsession of surveillance in the War on Terror: to know and fix identity by distinguishing between “safe” and “dangerous” bodies (Lyon 2003a).

AVATAR is a contemporary example of the centrality of measurement to surveillance practices in the War on Terror and beyond. While its commercialization has resparked debates on whether emotions and identity can be measured (Hodgson 2019), the meaning of measurement itself stays undiscussed in public and academic discourse. Naturalized as a self-explanatory and objective social fact, measurement is instead a specific scientific notion. When translated into the social realm,
particular understandings of measurement carry political implications concerning how surveillance works and is apprehended. Problematically, the cardinal concept underpinning surveillance, and its political relevance, is therefore currently left unexplored.

This paper presents an immanent critique of measurement in surveillance through the lens of quantum theory. I argue that conceptualizing measurement as centered on ambiguity and embodiment—rather than fixity and abstraction—reshapes the scope for political action and opens new avenues for critique and resistance. A quantum approach to surveillance politicizes the centrality of measurement to rethink the dangerously underexamined “surveillance–embodiment nexus” (French and Smith 2016, 7). This paper therefore offers a twofold contribution to the study of surveillance in International Political Sociology (IPS). First, by foregrounding the intersections between scientific paradigms and surveillance practices, it illustrates how the neglect of measurement accounts for a poor understanding of the relation between identity and bodies in the discipline. Quantum theory challenges unquestioned assumptions about measurement in surveillance, departing from critical contributions that (1) see identity categories as ontologically fixed and unambiguous and (2) understand the technologies and materialities of surveillance in terms of the digital abstraction of human bodies. Second, and consequently, this paper uncovers critical forms of political agency that hinge on the intersection of ambiguity and embodiment and are otherwise analytically hindered by conventional conceptions of measurement in surveillance. Importantly—as I discuss in the conclusion—quantum measurement foregrounds notions of ambiguity and embodiment that significantly diverge from common understandings of these concepts in critical International Relations (IR) and social thought. To conceptions of ambiguity as mere epistemic opacity, a quantum approach juxtaposes an ontological and strictly material ambiguity; against a conceptualization of embodiment as discursively overdetermined, quantum measurement postulates the centrality of material–affective processes that cut across the discursive boundaries between science and society.

This argument unfolds across three sections. The first one critically inquires into dominant theories of globalized surveillance. While these imply the foundational importance of identities and bodies to surveillance practices, they poorly conceptualize the connection between surveillance’s embodied, affective dimension and its identity-fixing function. I thus propose that a deeper focus on measurement—a common denominator to both identity and the body in surveillance—sheds new light on this relationship. I put IPS and Surveillance Studies in conversation with another field characterized by a “measurement problem,” quantum mechanics, to see how a novel engagement with measurement benefits our understanding of identity and the body in surveillance.

In the second section, I locate surveillance’s drive to measure embodied identities within its broader conceptual landscape in the philosophy of (social) science to develop an alternative theorization of identity measurement. The social scientific conception of measurement, heavily indebted to deterministic science, is premised on the importance of fixity and abstract classification. In quantum theory, measurement is instead inherently related to ambiguity and embodiment, which peculiarly mirror surveillance’s concern with measuring identities (i.e., making them unambiguous) through the body. Re-reading existing quantum discussions of identity measurement, and especially Wendt’s (2015) pioneering work, vis-à-vis critical interventions in quantum IR (Zanotti 2019; Yıldız-Alanbay 2020; Murphy 2021), I retrieve affect as a crucial—embodied and ambiguous—tool of identity measurement that is prone to highlighting the often-neglected embodied dimension of surveillance.

In the final section, I articulate this framework with reference to the airport security apparatus as the globalized surveillance technology par excellence. My analysis
reads technologies of surveillance as apparatuses of identity measurement that strive to make bodily affects unambiguous to construct stable collective subjects. Exploring the affective atmospheres of airport security, quantum measurement accounts for the intertwined importance of ambiguity and embodiment in the collective production of “safe” and “dangerous” subjects in the War on Terror. Subsequently, I inquire into the ethical postures this reading enables, introducing the ambiguity of affect as a crucial locus of resistance to the violent (international) politics of surveillance.

Terror, Surveillance, and the Problem of Measurement

Emerging as a distinct area of social scientific enquiry in the early 1970s (Lyon 1994, 6), surveillance arguably constitutes “the dominant organising practice of late modernity” (Haggerty 2009, ix). While practices of surveillance share a remarkably global, centuries-long history that has its roots in the transatlantic slave trade, plantation capitalism, and Western colonial violence (Browne 2015; Axster et al. 2021, 430), it was the US-led “Global War on Terror” that—by stimulating an unprecedented globalization of surveillance (Wood, Konwitz, and Ball 2003)—turned them into a prolific topic of investigation for IR scholars. This transnational focus contributed significantly to the interdisciplinary field of Surveillance Studies, exploring the implications of new surveillance practices for the study of democracy (Bauman et al. 2014), security (Bigo 2001, 2008, 2012), mobility (Salter 2006, 2007), borders (Epstein 2007; Bellanova and González Fuster 2013), and the politics of risk premption (Amoore and De Goede 2008; Araduz, Lobo-Guerrero, and Van Munster 2008; De Goede 2014). Most significantly, the drastic changes in the scope of surveillance during the past decades, and especially after 9/11 (Elmer and Opel 2006, 141–42), uncovered the misleading anachronism of the “panopticon” (Foucault 1977)—Bentham’s utopian prison—as the hegemonic metaphor for surveillance (Haggerty 2006, 26; see Deleuze 1992; Mathiesen 1997; Bauman 1998, 48–54; Boyne 2000;), highlighting the need for new theoretical frameworks (Haggerty 2006, 26; Bigo 2008; Bauman et al. 2014).

Among numerous interventions, the contributions of Haggerty and Ericson (2000) and Bigo (2008) stand out due to their impact on the field and their relevance in the context of the War on Terror. Contending that Foucault’s framework neglects late-modern technologies of surveillance, Haggerty and Ericson theorize a “surveillant assemblage” that emerges from the contingent intersection of multiple surveillance systems. The assemblage targets human bodies, which are made knowable by being translated into information flows and then reassembled as incorporeal “data doubles” (Haggerty and Ericson 2000, 606). In the War on Terror, the surveillant assemblage is exemplified by the US-VISIT program, a border technology that originally calculated travelers’ degree of riskiness by integrating data collected from “over 20 existing databases, from police authorities, to health, financial and travel records” (Amoore 2006, 339). Bigo instead questions Foucault’s (1977, 202, 217) attempt to move beyond sovereign modes of power. He defines post-9/11 practices of global surveillance as a transnational “ban-opticon” (Bigo 2008), which targets and excludes selected minorities while normalizing the free movement of the remaining population. Hinging on the decentralized nature of contemporary surveillance (Bigo 2008, 31), discourses of insecurity in the War on Terror underlie the logic of exception and exclusion as the primary site where sovereignty and surveillance shape and reinforce each other.

These dominant theories of surveillance remarkably share two central assumptions. First, surveillance is aimed at molding and fixing identities. In the panoptic society, surveillance makes individuals self-regulate their behavior (Foucault 1977, 205), “producing a new form of political subjectivity” through discipline (Elmer 2012, 25). For Bigo (2006, 60; 2008, 35), the “ban-opticon” defines collective
identities that isolate the “excluded” from a community of “normals.” The biometric technologies employed in the War on Terror do not just “control identities” (Bigo 2006, 57); rather, they assign them to specific individuals, modulating surveillance practices differentially (Bigo 2008, 38). Haggerty and Ericson’s surveillant assemblage is instead claimed to be unconcerned with identities and focused exclusively on the flows of data bodies provided (Ball 2005, 94). The purposeful social implications of such virtual dissection, however, clearly challenge this perspective. Data flows produce categories that are projected back upon bodies (Ball 2005) and create a “data double,” which, as an “additional self” (Poster cited in Haggerty and Ericson 2000, 613), is fundamentally instrumental to the identification of individuals and populations (Haggerty and Ericson 2000, 611, 614). Thus, the surveillant assemblage also exposes modern surveillance as concerned with controlling and defining identities.

A second important commonality is the centrality of the body. Bodies appear as mediators between surveillance and individuals’ identities: it is through the body that subjects are constructed and their identities fixed. Foucault’s panopticon relies on a particular “location of bodies in space [and] distribution of individuals in relation to one another” (Foucault 1977, 205), so that bodies act as a link toward the transformation of the “soul” (Mathiesen 1997, 217). Similarly, Haggerty and Ericson as well as Bigo highlight how surveillance, especially in its focus on biometrics, uses the body as the ultimate authenticator of identity (Ball 2005, 102; Muller 2005, 83). While the human body is the surveillant assemblage’s main source of data (Haggerty and Ericson 2000, 611), bodily parameters such as phenotype, accent, and behavior are also central to the logic of exclusion regimented by the ban-opticon (Bigo 2008, 38).

Theories of surveillance expose the body as inherently social and identity as always embodied. Interventions in Surveillance Studies have indeed pointed repeatedly to the necessity of a focus on “embodied personhood” in the study of modern surveillance (Lyon 2007, 67; see also French and Smith 2016, 7–8). However, most accounts systematically fail to theorize how surveillance is “experienced in entirely socially embodied [. . .] ways” (Ady 2012, 195). More specifically, they seem unconcerned with affective experiences of surveillance and their relation to its identity-fixing function.1 This is all the more noteworthy since dominant frameworks still suggest their crucial importance. Foucault’s panopticon imbues surveilled bodies with an “anxious awareness of being observed” (Foucault 1977, 202), while recent approaches contend that contemporary surveillance practices are enabled by fear and insecurity (Bigo 2006, 47) and rely on the production of anxiety in scrutinized subjects (Monahan 2010, 3; see Epstein 2007, 149–50; Salter 2008a, 369). Consequently, studying the global politics of twenty-first-century surveillance fundamentally requires an analytic focus on embodiment and affect.

Building on these observations, this paper claims that the interrelated importance of identity and the body underscores processes of measurement as a cardinal concern of modern surveillance. At the turn of the century, Lyon had already influentially claimed that the “phematic fix”—the urge to identify and classify through “measurable similarities and differences” (Lyon 2003b, 5), generally via data collected from human bodies (Lyon 2002, 3)—now constitutes a peculiar characteristic of this domain. As the means of surveillance have become increasingly automated, measurement’s primacy has further been noted in scholarly accounts. Most evidently, the widespread deployment of biometric technologies was said to provide a new “means for ‘measurement’” (Muller 2005, 84), a sophisticated articulation of “knowledge-as-measurement” (Epstein 2007, 155), and a new way of “transforming bodies into objects to be measured, mapped, and manipulated” (Wilcox 2015, 109).

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1With few exceptions, Ady (2008, 2009), Hier (2004), Ellis et al. (2013), and Smith (2016).
The importance of measurement to surveillance is apparent in academic inquiry and, more intuitively, in the vocabulary that supports surveillance through the invocation of an array of “measures” (security measures, emergency measures, etc.). It is thus very peculiar, as Amoore (2013, 32–33) affirms in an analogous context, that “the question of measure” and “what is meant by ‘measures’” receive little attention. While this rightfully calls for a better understanding of what these measures are, it is equally important to interrogate the concept of “measurement” underlying both such practices and their analyses. Given these considerations, how we study and conceive of surveillance depend radically on the understanding of measurement that informs our enquiry. In other words, behind Amoore’s “question of measure” lies an equally critical “problem of measurement” in the study of the international political sociology of surveillance. This is especially interesting since questions around the meaning of measurement are not new nor are they peculiar to Surveillance Studies or IPS. Rather, the so-called problem of measurement has been one of the central philosophical concerns of quantum physicists in the past century. Astonished by the contradictions between the deterministic laws of Newtonian physics and the newly postulated axioms of quantum mechanics, these scientists ultimately had to grapple with the theoretical conundrum that what “measurement” meant mattered significantly (Albert 1994, 80).

Delving into this peculiar transdisciplinary parallelism, in the rest of this paper I focus on what a quantum conception of measurement means for the study of surveillance in the War on Terror. In so doing, I perform what Murphy (2021) calls a “quantum translation” of the concept of measurement in Surveillance Studies and IPS. Noting the analytical limitations of a classical understanding of measurement, I use quantum theory as a tool to buttress existing critical approaches by further enabling “the imagination of alternative and emancipatory political futures” (Murphy 2021, 62–65). By introducing an ontology of ambiguity, quantum theory provides a new critical perspective on the relation between surveillance and its central components of identity and the body. This approach questions accounts that see surveillance’s measurement as solely premised on a clear-cut, unambiguous identity dualism where categories such as “safe” and “dangerous” constitute subject positions that are inherently mutually exclusive. Further, it spotlights the role of embodiment in the identity-fixing function of surveillance, complementing approaches centered on the virtual abstraction of the body and stressing the neglected “ambivalent potentiality” (Dricheľ cited in Schick 2019, 262; Massumi 2002, 35) of affect as a locus of resistance and critique.

**Measuring Identity between Classical and Quantum Worlds**

The concept of measurement is employed widely beyond the usual scope of pure scientific enquiry. Social–scientific understandings of its meaning, however, rely heavily on a so-called classical, deterministic reading of reality, which quantum mechanics specifically questions. In this section, I analyze the central properties of quantum measurement, differentiating it from the classical notion. To make sense of this concept in the social world and surveillance, I subsequently think about how “identity measurement” could be meaningfully theorized from a quantum perspective.

**Quantum Measurement: From Fissity and Abstraction to Ambiguity and Embodiment**

Exploring the micro dimension of nature since the early 1900s, quantum physicists have challenged the pillars of modern science in several respects. Quantum mechanics problematized the notions of causality, determinism, certainty, and subject–object separation on which classical physics is rooted (Overman 1991, 152),

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[1] My reading mainly rests on Bohr’s and Heisenberg’s influential Copenhagen Interpretation (Stapp 1972).
inaugurating a new framework of scientific enquiry. Unlike classical entities, quantum phenomena can be interpreted through “contradictory pictures of reality” that are both mutually exclusive and jointly necessary to fully describe them (Bohr 1937; Einstein and Infield 1938, 278). Such novel understanding is encapsulated in the “wave function,” a mathematical representation of “the probabilities associated with the outcomes of various measurements one can make on [a quantum] system” (Ney 2013, 12). As a figurative of the potential states of a system, the wave function “collapses” into particular actual outcomes whenever a measurement is performed (Ney 2013, 26). The process of measurement importantly affects the quantum system in two instances: first, the experimental design shapes the probabilities of the wave function; second, measurement itself produces its collapse (Wendt 2015, 235). The wave function thus conceptually signifies the fundamental shift from a (Newtonian) metaphysics of actuality to a (quantum) metaphysics of potentiality (Zohar and Marshall 1994, 118), pointing clearly to the importance of measurement in quantum mechanics.

The centrality of measurement arises from the recognition that there are two incompatible ways to theorize the evolution of quantum systems (Albert 1994, 79–80). If no measurement occurs, the system evolves deterministically and the wave function preserves a “superposition” of mutually exclusive potential states. When a measurement is performed, instead, the system is found in a specific state and the wave function collapses. What is peculiar about these pictures is that they are incompatible, since one excludes the other, yet they are also both incomplete, since each leaves out essential features of quantum systems. As is apparent from these formulations, an obliged step in thinking around this problem resides in a renewed attention to the meaning and consequences of measurement.

The “measurement problem” in quantum physics reveals how, far from being an inflexible scientific notion, the concept of measurement implies several philosophical assumptions whose nuance, as suggested so far, extends within both the physical and the social domains. In fact, few concepts have developed more transdisciplinarily than measurement, swiftly evading the boundaries between natural and social sciences. The Social Science Research building at the University of Chicago notably parades an inscription that still testifies to this transgression: “If you cannot measure, your knowledge is meager and unsatisfactory”—it recites, quoting Lord Kelvin, a British physicist (Kuhn 1978, 178).

The idea of measurement, therefore, came to the social sciences via its “success” in natural science (Porter 1995, viii). With the former trying to approximate the latter’s claims to objectivity, measurement has become a linchpin of both fields since the early nineteenth century. Nevertheless, the meaning of measurement in the social world has seldom been closely investigated. Rather, social scientific debate around measurement has been limited to two polarized positions: on the one hand, proponents defended its epistemic authority and were exclusively “concerned with the accuracy of measurement” (Espeland and Stevens 2008, 402); on the other, critics comprehensively rejected measurement as politically dangerous and “morally indefensible” (Porter 1995, 73).

Serious discussions around the sociological meaning of measurement only began to appear at the end of the twentieth century (see Hacking 1990; Porter 1995; Desrosières 1998), with increasingly numerous contributions being published only in the past decade (Mennicken and Espeland 2019, 224; see Espeland and Stevens 2008; Diaz-Bone and Didier 2016; Berman and Hirschman 2018). Most works considered measurement a key component in the emergence of statistics (e.g., Desrosières 1998; Porter 1995) and in a broader “sociology of quantification” (e.g., Espeland and Stevens 2008) whereby numbers populate, dissect, and control virtually all aspects of modern life. Exploring the application of quantitative methods to the sociopolitical sphere, such investigation unveiled a plurality of approaches to—and understandings of—measurement in social science, which can
be ultimately reduced to two interpretations (see Desrosières 2001; Espeland and Stevens 2008, 417–18).

On one end is the realist conception of measurement, directly inherited from astronomy and classical physics (Hacking 1990, 3; Porter 1995, 68–71; Desrosières 2001, 341). This view postulates that any object or system is always definitely circumscribed and “exhibits quantities to some definite degree at all times” (Krips cited in Forge 1987, xi). Because objects’ features are believed to be inherent in them, their measurement produces objective results that are independent of the measurement apparatus and the observers (Desrosières 2001, 341; Fierke and Macay 2020, 452). Classical measurement, therefore, operates a translation where the intrinsic properties of an object produce discrete, operationalizable representations, which perfectly correlate with the object itself. Measurement is the passive description of a preexisting reality, an external account that is (in principle) replicable and unchallengeable.

On the other end of the spectrum sits a constructivist (or nominalist) notion of measurement (Desrosières 2001, 350), which questions the reality of objects by framing them as “products of […] measurement conventions” (Espeland and Stevens 2008, 418–19). In so doing, it opens the politics of measurement up for critical discussion, asking whether the categories it relies on are necessary, helpful, or even desirable (Espeland and Stevens 2008, 432). By claiming that the measured objects are the result of intersubjective “formulas of agreement” (Desrosières 1998, 66) rather than immanent features of an underlying reality, more critical constructivists warned against measurement as a technology of political control that “makes up people” (Hacking 2002) and influences policy and behavior (Espeland 2016; Thévenot 2019).

Apparently contrasting, these positions share important similarities (see Desrosières 1998). Indeed, a constructivist take may still retain some degree of “realist” determinism, not because it embraces the existence of some independent permanent reality, but insofar as it understands measurement as the direct representation of an object (as conventional as it might be). Therefore, both views abide by a shared definition of measurement as a process centered on fixity and abstraction. On the one hand, all measurements assume the existence of relatively stable properties or objects to be measured—understood as objective or conventionally “objectified” (Desrosières 1998, 9). On the other, measurement is about processes of abstraction, classification, and encoding (Power 2004, 767; Mennicken and Espeland 2019, 225). In the attempt to produce results that are consistent and therefore actionable (Porter 1995, 14), individual materializations of an object (somatic traits in biometrics, financial transactions in accounting, etc.) are abstracted into collectively valid properties of a class (Porter 1995, 77).

The very possibility of abstraction and classification as mechanisms that “reduce [individual] complexity” is therefore essential to make measurement thinkable in the first place (Power 2004, 767, 771). As conceptualized within social scientific research, essentially, measurement reclaims the importance of determinism and thus hangs dearly onto its roots in classical scientific worldviews.

Curiously, while the measurement problem in quantum mechanics challenged some core premises of deterministic views, even more critical scholars seemed reluctant to rethinking what had become a foundational concept in social science. Instead, when quantum physics hinted at the inherent unpredictability of natural phenomena, quantitative social science replied by tentatively mastering it via probabilistic laws and the study of large numbers—paradoxically, uncertainty naturalized variation and error and thus made measurement even more objective (Hacking 1990, 181; Desrosières 1998, 9, 164, 287). In contrast, I suggest that insights from quantum mechanics can reframe our conception of measurement to further critical discussions of its polities without losing sight of its transdisciplinary history and character. Specifically, quantum theory moves away from a focus on fixity and
abstraction toward the importance of \textit{ambiguity} and \textit{embodiment} in processes of measurement.

Faced with the puzzling evidence that measurement plays an active role in defining the properties of a system (Bohr 1939, 19), quantum physicists decentered the deterministic undertones of the classical framework. According to Bohr, from a quantum perspective, measurement can be defined as:

the unambiguous comparison of some property of the object under investigation with a corresponding property of another system, serving as a measuring instrument, and for which this property is directly determinable according to its definition [...] in the terminology of classical physics. (Bohr 1939, 19)

This definition carries two crucial theoretical implications. First, quantum measurement is a relational epistemic procedure that centers its tension with ambiguity. The interaction between the measured object and the measuring apparatus produces an “entanglement,” which blurs the epistemic boundaries between the two and frames them as a single system (see Malin 2001, 66–67). Before measurement, quantum objects are inherently epistemically opaque, for it is impossible to describe completely their state in a discrete fashion (Malin 2001, 32). To define one of its aspects, the quantum object must interact with a measurement arrangement, whose setup is so crucial in determining which quantity we are “unambiguously” capturing (and, thus, so central to the measurement outcome) that we cannot meaningfully “distinguish between the autonomous behaviour of a physical object and its inevitable interaction with other bodies serving as measurement instruments” (Bohr 1937, 290). The ambiguity of the quantum object is thus displaced by understanding it relationally with the measurement apparatus.

Ultimately, however, measurement entails a forgetting of this entanglement. The description of the measurement outcome implies a classical vocabulary, namely a formulation that assumes the measured property to be inherent to an object. By acknowledging the result of the measurement process, we “break” the entanglement (Schrödinger cited in Barad 2007, 336) and separate the apparatus and the object as epistemically antithetical (a knowing body and a known one). Measurement, as Barad’s reading of Bohr suggests, therefore also rejects any a priori distinction between an experimental setup and a human observer. Rather, the ambiguous indeterminacy of quantum phenomena is negotiated via “practices of knowledge” that are simultaneously material and semantic and that symbiotically constitute meaningful measurements (Barad 2007, 117, 127, 140–50). In a quantum framework, measurement is an epistemic tool strictly related to ambiguity. On the one hand, it entangles opaque quantum objects to measurement apparatuses to describe their state unambiguously. On the other, measurement entails an epistemic separation of these entangled entities that not only describes the quantum object univocally, but also circumscribes it as an independent object of knowledge.

Second, quantum measurement is an ontological process rooted in materiality and embodiment. If the state of a system is not an intrinsic quantity “made apparent” by measurement, then ambiguity is more of a constitutive feature of reality than purely a synonym for epistemic obscurity. The process of measurement cannot be fully encapsulated within epistemological moves, since the eradication of ambiguity radically hangs on specific dispositions of bodies. To produce outcomes that appear objective, measurement relies on “permanent marks [...] left on bodies which define the experimental conditions” (Bohr cited in Barad 2007, 119)—it is the material alteration of the measuring apparatus that allows for an unambiguous appraisal of the object. The apparatus is thus always ontologically precedent to discrete objects in the system. The attributes of an object—like the ontological separation between the object and the measuring instrument—are produced, rather than captured, by measurement. The nature of the measuring apparatus is also material instead of merely epistemic; as “specific material reconfigurings,” apparatuses
enable “boundary-drawing practices” through which distinctions between “subjects” and “objects” become materially and conceptually meaningful (Barad 2007, 140, 148). In quantum theory, measurement is essentially embodied. Not only does measurement itself rely on its materialization, but even the objects it seeks to appraise, together with their properties, only come to exist through “their specific embodiment as part of the material arrangement” (Bohr cited in Barad 2007, 143).

Identity Measurement and the Quantum of Affect

The notion of quantum measurement strongly resonates with the case of surveillance, not only because it arises from a shared problématique but more impressively because quantum measurement centers the same features that animate surveillance: an emphasis on embodiment and the urge to identify unambiguously. To grasp the full analytical purchase of this connection, I employ quantum (social) theory to “translate” (Murphy 2021) the idea of identity measurement that is peculiar to social science, IPS, and Surveillance Studies. Rethinking Wendt’s (2015) quantum discussion of identity measurement alongside critical interventions in quantum IR (Zanotti 2019; Murphy 2021), I focus on the role of affect to illustrate how a quantum conception of measurement analytically and politically prioritizes the nexus between identity, ambiguity, and embodiment.

In his elaboration of a quantum social ontology, Wendt defines the individual as a macroscopic quantum entity (a wave function), whose subjectivity is performatively produced by “acting in the world,” collapsing a superposition of potential, unconscious mental states into actual, consciously held ones (Wendt 2006, 195). Social structures, and consequently collective identities, are similarly understood as social wave functions shared among entangled individuals (Wendt 2015, 258). Therefore, these also exist as potentialities that are made actual within individuals’ everyday practices (Wendt 2015, 268). In this framework, the measurement of identities (and of related meanings and social structures) is mainly performed by means of language. Language is understood as a tool through which individual minds are entangled together, sharing superpositions of meanings that are actualized in speech acts (Wendt 2015, 234, 237). When individuals successfully relate to each other linguistically, they refer to shared repositories of (potential) meaning that become mutually intelligible through dialogue (Wendt 2015). In this process, interacting agents use “language [. . .] as a measurement that puts a concept into context” (Wendt 2015, 217) and ultimately define each other’s identity. Understood as a cardinal dimension of human subjectivity (Wendt 2015, 234), language entangles individuals’ minds to constitute an apparatus of identity measurement.

Albeit innovative, Wendt’s language-centered formulation provides a limited engagement with the concept of quantum measurement. Specifically, the embodied dimension of measurement is severely underexplored in this approach. First, this framework solely relies on measurement’s relation to ambiguity to discuss identity from a quantum perspective. For Wendt, language displaces the ambiguity of potential meanings when it is contextualized in specific speech acts. Certainly, this understanding of language is explanatory in grappling with quantum measurement and subjectivity, especially in the context of terrorism and security. For instance, Fierke and Macay (2020, 452–53) draw on Wendt to suggest how, in the public discourse on the migration crisis, “language already contains a measurement of the identity of particular groups of people as humans ‘like us’ or as [. . .] a potential source of danger.” Here, language measures collective identities in the attempt to reduce the ambiguity of potential, mutually exclusive categories such as “refugee” and “terrorist” (Fierke and Macay 2020, 453) to a single coherent outcome. While this clarifies

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1 I do not claim that materiality is absent from Wendt’s framework (see Wendt 2015, chapter 6, 264–65), but that his discussion of measurement still overwhelmingly privileges language.
the relation between measurement and ambiguity, however, it leaves the role of embodiment strangely undefined.

Second, and relatedly, Wendt’s focus on language results in an anthropocentric quantum ontology where humans alone can perform measurements. This assumption, I contend, dangerously downplays the more-than-human materiality of the measurement apparatus. In highlighting Wendt’s emphasis on linguistic interactions as measurement, I endorse Zanotti’s view that “Wendt’s ontological reflections remain centered on human minds” (Zanotti 2019, 54). Indeed, Wendt’s arguments revolve around the physicalist assumption of the brain as exceptionally able to sustain quantum phenomena (Wendt 2015, 30, 95–108, 124) and postulate the primacy of human intentionality in the actualization of social structures and collective identities (Wendt 2015, 264–65; see Zanotti 2019, 50–56). As he explains, social structures are made actual through “[individuals’] free decisions to collapse the structure’s social wave function,” which simultaneously instantiate “not only a social structure, but also a determinate identity for themselves” (Wendt 2015, 264–65). Focusing on the mental and linguistic dimensions of identity measurement, Wendt develops a framework that “takes out of the picture all the material, murky, entangled ways of how we come to be subjectified” (Zanotti 2019, 55). If Wendt-inspired illustrations of language as measurement leave embodiment analytically unattended, the anthropocentric implications of a language-centered framework conceal the entangled materialities of social life ontologically.

Wendt’s quantum ontology fails to explore how measurement fundamentally relies on “an unambiguous account of marks on bodies” (Barad 2007, 348). To clarify the role of embodiment in identity measurement, we should embrace an extralinguistic, posthumanist conception of social structures as quantum objects. While Wendt (2015, 95–108) relies on the hypothesis of a quantum brain to justify his discussion of consciousness, we do not need to accept these speculative assumptions to examine how physical concepts nevertheless inform ontological imaginaries that carry critical theoretical and political implications, as the case of surveillance highlights (see Zanotti 2019, 1; Murphy 2021, 39). From this perspective, a quantum ontology entangles “humans, animals, objects, and other constituent parts” together within social structures (Murphy 2021, 92). Rather than a purely mental and linguistic process, identity measurement implies a “larger material configuration,” which importantly, but not exclusively, involves humans (Barad 2007, 337–38).

Moving away from language as the sole tool of identity measurement constitutes a significant step in overcoming the limitations of Wendt’s approach. In its stead, I propose affect as a prolific entry point into quantum discussions of measurement. Wendt-inspired analyses already occasionally mention the embodied dimension of identity, and they do so through a noteworthy reference to affect. Wendt mentions affective states as foundational to collective identities, which ultimately rely on individuals being entangled through a shared, unspecified “We-feeling” (Wendt 2015, 277–78). More explicitly, Fierke and Macay (2020, 453) note that measurement also dictates emotional dispositions toward migrant groups (“this [...] becomes a measure of what we should feel, whether compassion or fear”). The role of affect, they claim, relates powerfully to the entanglement that produces these identities, such that individuals’ emotional responses are entangled with past collective experiences of trauma (Fierke and Macay 2020, 456–57). Unlike language, however, in these discussions affect only matters when it appears as discrete, already actualized (through language) or already defined by past experiences. To fully illustrate the quantum implications of identity measurement, we instead need a notion of affect that privileges both its embodied and ambiguous dimensions. In this sense, as Yıldız-Alanbay (2020, 152) claims with reference to Zanotti’s quantum approach, paying attention to affect in a quantum ontology can “demonstrat[e] how the indeterminate and dense tangle of affective human and non-human relationalities is also involved in our becoming.”
A quantum understanding of affect ideally recalls Deleuze-inspired conceptions in social theory and, partly, IR. Affect should here be conceived as a “prepersonal intensity” (Massumi in Deleuze and Guattari 2004, xvii) that binds bodies together through a “potential for interaction” that exceeds but is also “anchored” in them (Massumi 2002, 34–35). From this perspective, affect is defined by three main features. First, affect is ambiguous, since it exists as an ensemble of “mutually exclusive potentials” (Massumi 2002, 32) that lie beyond the realms of discourse and representation (Hutchison 2016, 99). As such, if language is “a superposition of potential meanings” (Wendt 2015, 234), affect is not a specific emotion but a superposition of embodied, nonreflective emotional states (Massumi 2005, 39; Hutchison and Bleiker 2014, 496). Second, affect entangles (human and nonhuman; Ash 2015) bodies together. It can be shared within social environments and across time (as Fierke and Macay claim), providing the emotional basis upon which collective identities are constructed yet preserving a constitutive ambiguity that makes their actualization contingent (Ross 2014, 16, 49). Third, affect is embodied, both in its potential and in its actual form. The actualization of affective potentials, like the constitution of the identities it underpins, requires specific embodied configurations. While a shared wave function frames collective subjects and their attendant emotional states as potentialities, such identities only emerge as measured in (and as) individual bodies. Acting with (in) their environment, measured bodies “collapse” affective wave functions into specific, socioculturally intelligible emotions (Solomon and Van Rythoven 2019, 143) that actualize their respective identities. It is not simply—as Fierke and Macay suggest—linguistically mediated identity measurement that elicits particular emotional dispositions, but even the actualization of embodied affects itself fixes specific identities.

In this section, I have used quantum theory to rethink well-rooted notions of (identity) measurement in social science. Unlike dominant understandings of measurement, the concept of quantum measurement is inherently married to ambiguity and embodiment. Building on quantum approaches in social theory and critical IR, I foreground the importance of affect as a tool of identity measurement that emphasizes both facets of quantum measurement. In such a framework, affect is ambiguous, relational, and embodied. Constituted in potentiality through affective entanglements, collective and individual subjects emerge as social actualities when their attendant emotional states are evoked via “socially meaningful bodily performances” (Bially-Mattern 2011, 76). I thus move back onto the opening conundrum to illustrate the implications of this framework for surveillance’s “measurement problem.”

**Quantum Surveillance in the War on Terror: Embodied Subjects and the Ambiguity of Affect**

The global politics of the War on Terror notably rely on a normatively loaded identity binary that juxtaposes a civilized collective Self to a barbaric and hateful Other (Jackson 2005; Hülsse and Spencer 2008). Through its drive to measure bodies and identify dangerous subjects, globalized surveillance plays a major role in sustaining these Newtonian, unambiguous binaries. Building on anecdotal evidence and social psychological research on airport security, I argue that technologies of surveillance act as quantum apparatuses of identity measurement. Airport surveillance modulates affective potentials to inscribe the War on Terror’s architecture of enmity on individual bodies and therefore “measure” and evoke specific collective subjects. A quantum reading offers a critical perspective that finally hints at the ambiguity of affect as a new locus of resistance to the politics of surveillance.
Airports are now widely recognized as the epitome of global surveillance and its urge to “classify populations according to their degree of threat” (Amoore 2006, 337; Monahan 2012, 286). Nonetheless, the experience of border surveillance is characterized by affective investments that stay marginally discussed in the scholarly literature (Lyon 2007, 24; Adey 2012, 195). Foregrounding the embodied politics of measurement, a quantum-theoretical approach understands surveillance practices as apparatuses of identity measurement where the affective entanglement between travelers and surveillance technologies attends to the emergence of seemingly discrete collective subjects.

Anxiety at the Airport: Challenging the Fixity of Surveillance Binaries

Alongside trained officers and sophisticated devices, airport surveillance features the constant production of ontological insecurity. The architecture of airport security environments is often purposefully designed to constrain individuals’ affects, containing bodies’ capacity for movement to induce feelings of angst and pressure (Adey 2008, 445). An instillation of anxiety is the linchpin of post-9/11 border security practices (Epstein 2007, 149), producing a “neurotic” traveler who is “governed through its affects” (Isin 2004, 222). However, most accounts of airport surveillance understand anxiety as a tool to discipline individuals into conforming to security procedures (Salter 2005, 45; Adey 2008, 445), while simultaneously neglecting how it also underpins a crucial lack of a stable self-identity. Travelers’ encounter with the airport surveillance infrastructure breaks in on the “emotional inoculation” (Giddens 1991, 39–41) through which our daily routines and performances sustain a coherent sense of self; we thus approach the border with an affectively laden ontological insecurity that makes us question our identity as a docile Self as opposed to a dangerous Other (Salter 2008a, 374; Lisle 2016, 269).

Largely oblivious to the complex relations between identity, ambiguity, and measurement in surveillance, many contributions causally reduce the experience of anxiety to the claim that “at the border we are all enemies” (Salter 2008a, 375). Focusing on how surveillance “enlist[s] everybody under the category of suspicion” (Aradau and Van Munster 2007, 108) and “produce[s] an everyday anxiety” (De Goede, Simon, and Hoijtink 2014, 418) where anyone can be read as a terrorist and is “designated as risky” (Lisle 2016, 266), these readings preserve a classical understanding of identity measurement. The dynamics of surveillance are here situated within an identity binary where the categories of “safe” and “deviant” are assumed as inherently mutually exclusive—that is, one is either a threat or not. The uncertainty and anxiety that characterize the experience of surveillance thus frame the ambiguity surrounding identity measurement as a purely epistemic problem—one to be kept distinct from the subjects to be measured, whose identities are instead always fixed and only waiting to be calculated (see Salter 2008b).

Quantum measurement, instead, considers ambiguity as an ontological condition of the object to be measured. The measurement apparatus plays an active role in delineating the boundaries and properties of an object, and it is therefore crucially designed to produce specific outcomes for specific purposes (Barad 2007, cited in Aradau 2010, 499). The entanglement between the object and the measurement apparatus simultaneously testifies to the object’s ambiguity and shapes the potential outcomes of measurement. Analogously, the encounter between travelers and the airport surveillance apparatus generates an anxious atmosphere not as proof of the preemptive guiltiness of all subjects but as an ambiguous affective intensity that gauges their potential identities, yet to be shaped and measured. In the routines of airport security, “coparticipants become focused on a common object, [...] develop common expectations of which emotions others [could] express” and try to coordinate with them (Ross 2014, 22). Approaching the border, passengers partake
in an “interaction ritual” (Ross 2014) through which they come to embody their ambiguity to the eyes of the measurement apparatus, sharing in potentiality the identities they are expected to express and the emotional dispositions they demand. Through its focus on ambiguity, quantum measurement conceives of the security apparatus as “attempt[ing] to grapple or ‘calibrate’ dispositions rather than simply produce fears” (Adely and Anderson 2012, 105). Like the entanglement between the measurement apparatus and the quantum object shapes the probabilities of particular outcomes, the surveillant apparatus shapes each traveler’s bodily affects, preparing “the shared ground from which subjective states and their attendant feelings and emotions emerge” (Anderson 2009, 78; see Wendt 2015, 264).

The ambiguity of traveling subjects is far from unbiased or apolitical. The productive power of the surveillance apparatus purposefully makes some outcomes more likely than others (see Wendt 2015, 264); apparatuses indeed constitute “the conditions of possibility for determinate boundaries and properties of objects,” yet without causally determining them (Barad 2007, 143). Travelers’ ambiguity, embodied as an ambivalent anxiety, carries with it the normative weight of the War on Terror’s identity binary: while ontological insecurity is felt by all, the apparatus already “weigh[s] down some bodies more than others” (Browne 2015, 28,134).

Previous social psychological research on British Muslims’ experience of airport security exemplifies the affective sense of ontological insecurity in surveillance as well as its centrality to measurement. British Muslims arguably find the atmosphere of airport security distressing since they associate it with a fundamental “denial of identity” (Blackwood, Hopkins, and Reicher 2013, 1101; see also Blackwood, Hopkins, and Reicher 2015). On the one hand, they fear that their Britishness—which would ideally identify them as “safe” bodies—might not be fully recognized; on the other, they are anxious about their faith being potentially misrecognized, framing them as a threat (Blackwood, Hopkins, and Reicher 2013, 1101–1104). Entangled with the surveillance apparatus, British Muslim travelers understand “airport security practices [as] intimately bound up with global fears of ‘Muslim extremism’,” and therefore share the expectation that their Muslim identity will be “made salient” and turn them into threatening subjects (Blackwood, Hopkins, and Reicher 2013, 1105), no matter how positive their previous experiences of airport security (Blackwood, Hopkins, and Reicher 2013, 1098). The anxious British Muslim traveler incarnates the ultimate example of ambiguity in identity measurement. Attuned to the politicized atmosphere of counterterrorism, they lose a stable sense of self-identity by embodying identities that—while previously coexistent in their lived experience—are now recognized by the measurement apparatus as incompatible and mutually exclusive potentials.

Through their affective entanglement with bodies to be measured, technologies of surveillance constitute a quantum apparatus of measurement that gauges the conditions of possibility for particular identity “outcomes.” Remarkably, under surveillance we are not all presumed guilty until proved innocent (Epstein 2007, 156); rather, we are made to feel simultaneously like potentially safe and deviant bodies—“to be under surveillance is an ambivalent emotional event” (Koskela 2000, 259; Ellis, Tucker, and Harper 2013; Svenonius 2018). Quantum measurement reads the anxiety pervading travelers’ bodies as a politically important ambiguous affect that enfolds potential, mutually exclusive emotional states and identities.

Measurement and the Embodiment of Affect: Beyond the Abstracted Body
In both academic and public debates on airport security, discussions on identity measurement seem tightly related to the material relation between travelers’ bodies and security devices. The notion of measurement implied in extant analyses is—however—a remarkably classical one, rooted in processes of abstraction. Focusing mainly on the far-reaching deployment of body scanners, they suggest that
measurement is performed via “the abstraction and calculation of the body” (Amoore and Hall 2009, 451). Surveillance practices fix travelers’ identities by virtually dissecting their bodies into digitized “identifying traces” in order to classify them as safe or deviant, in such a way that “an image of the ‘potentially risky’ body is abstracted from the person” (Amoore and Hall 2009, 448). The material mediation of the apparatus, therefore, is fundamental in turning passengers’ bodies and appendices (luggage, prostheses, etc.)—which were “formerly incommensurable”—into abstract and calculable objects of measurement (Shouten 2014, 54).

Understanding identity measurement in terms of abstraction and classification, critical readings of airport security have focused on the political consequences of this digitized dissection. On the one hand, they linked it to matters of privacy, rights, and bodily self-sovereignty. The use of biometrics and scanners was thus contested and negotiated by reference to its capacity to reveal the naked body, potentially endanger its health, and store individual data (e.g., Bellanova and González Fuster 2013; Leese 2015; Valkenburg and van der Ploeg 2015). On the other, some contributions focused on the apparatus’s power to not simply make bodies digitally “disappear” (Bellanova and González Fuster 2013) but to depoliticize them by depriving them of subjectivity (Amoore and Hall 2009; Amir and Kotef 2018). Separating the body from the person, and making it hypervisible and measurable, body scanners inscribe identity in a statistical matrix where visions of “normality” and “deviance” are “cleansed of the[ir] historical, social and cultural contexts” (Amir and Kotef 2018, 250).

Quantum measurement complements existing discussions of the surveillance apparatus by highlighting not processes of “dematerialization” (Wilcox 2015, 105) but the embodied dynamics and experiences that are made possible by the apparatus and actualize the outcome of measurement. In so doing, a quantum approach echoes Adèy and Anderson’s (2012, 104) call for a study of the security apparatus that “turn[s] to the material-affective relations performed between subject and object,” where “the lively matter of security itself is what comes to matter as experience.” Quantum measurement, therefore, illuminates the embodiment of affect as a central tool through which technologies of airport security measure identities. The surveillance apparatus acts as a “boundary-drawing practice” (Barad 2007, 208; Ahmed 2014, 76–79) that makes affect unambiguous to produce “safe” and “deviant” not as abstracted categories but as embodied and apparent collective subjects.

Through the interaction with technologies of surveillance at the border, travelers’ affects are measured and actualized as their bodies become attuned to specific emotional dispositions. The War on Terror’s obedient Self and dangerous Other are therefore reified when measurement performatively realizes their affective potentials (see Wendl 2015, 268; Murphy 2021, 92) and evokes specific emotional experiences of surveillance. Relying on “dialectics of pleasure and anxiety” (Salter 2008a, 374), processes of identity measurement exceed the extraction, translation, and classification of the body-as-data. As analogously suggested by sociologists of quantification, here measurement is instead exposed as a practice that generates and is materialized within particular emotional attachments (Espeland 2016; Mennicken and Espeland 2019, 231, 238).

Conceiving of airport surveillance through the embodied dimension of measurement illustrates how the “reduction” of the person through normative, statistically produced categories is not only the product of the body’s visualization as a bundle of data (Amoore and Hall 2009, 451) or of allegedly apolitical forms of misrecognition and “objectivity” (Amir and Kotef 2018, 242). Rather, the production of “safe” and “deviant” subjects is always embodied via the measurement instruments, as they shape not only their abstract classification but also their moods and experiences. While technologies of identity measurement at the border might differ, each subordinates the measurement outcome to specific affective relations between body
subjects and the apparatus. AVATAR and the body scanner provide two evident examples in this respect.

As illustrated in the opening section, AVATAR is a device that uses “hundreds of psychophysiological and behavioral cues (e.g., body language, vocal, cardiorespiratory, eye behavior)” to identify travelers “who exhibit suspicious or anomalous behavior” (DHS 2018). As the posthuman evolution of behavioral detection programs (see Adey 2009, 281; Gates 2011, 180–81), AVATAR performs identity measurement by capturing and analyzing travelers’ bodily affects (see Adey 2009). Through the deployment of sensors that are “non-invasive” and allegedly unbiased, and by “screen[ing] for cues that are not perceptible by human senses” (DHS 2018; Muller 2015, 58), AVATAR effaces human agency in measurement and sidelines explicit discussions of rights and privacy.

Such technologies seek to identify bodies by measuring their affects as a specific emotion. In so doing, they rely on the assumption of the “autonomy of affect”—its capacity to “escap[e] confinement in [a] particular body” (Massumi 2002, 35)—to capture its unconscious, uncontrollable bodily manifestations (Adey 2009, 284).

As David Mackstaller, chief strategy officer at AVATAR’s company, declares, “you as a human may be able to manage some of your signals, but not all of them” (Hodgson 2019). In the attempt to circumvent human agency—and therefore make the potential, implicit dimension of affect actual and measurable—AVATAR interrogates travelers and tries to elicit particular emotional responses that would identify them. Focusing on embodied traces, screening machines probe “the biology of fear” (Airports Council International 2021) as the cardinal emotion dangerous bodies are expected to experience (and conceal) at the border. Measurement, therefore, fixes a body’s identity by pushing it to display its affects unambiguously. When the ambiguity of affect morphs into an embodied, manifested fear through allegedly objective “marks” on human and nonhuman bodies (see Barad 2007, 340, 345), a traveler is identified as a dangerous subject.

The measurement apparatus of airport surveillance displaces ambiguity by mapping identity categories neatly onto the embodied trace of affective states. This is most evident in debates over “false positives,” which disproportionately concern individuals whose bodies challenge safe and acceptable modes of embodiment. Paraphrasing Simone Browne (2015, 156–57), bodies that do not align with normative and legitimate performances of a gendered, racialized, or able-bodied individual “are interpreted as a questioning of security measures” and “come to be seen as a security threat.” In the case of AVATAR, this tension is palpable within the widespread concern that “a machine might register as suspicious a microexpression if someone is in pain or confused” (Hodgson 2019). However, in other cases, such as for body scanners, travelers are pushed to surveil and “measure” their own bodies in ways that not only appear safe but also makes them feel as such.

People whose bodies might be recognized as threatening often approach the measurement apparatus with fear and distress (Valkenburg and van der Ploeg 2015, 339). However, regardless of the truthfulness of their declarations, these travelers are invited to dismiss their anxieties and perform as comfortable and agreeable subjects to be recognized as safe (see Lisle 2016, 267–68). In March 2021, Latinx trans activist Rosalynne Montoya famously denounced her distressful experience(s) of the Transportation Security Administration’s (TSA) security system. In a popular video posted on her social media, Montoya recounted how, in order to allay officers’ suspicions when they scanned her body, she had to declare her trans identity. Nevertheless, Montoya was still not released until she complied to being scanned as a man and further patted down. Notably, these concessions were accompanied by new affective modulations, whereby Montoya was only made to feel “safe” as she started accommodating the officers’ will in a seemingly agreeable and friendly manner (“then my boobs set off the
scanner—because, of course—so I tried to make a joke out of it, I was like ‘Yeah, there’s a lot of plastic in there, it’s fine’”) (O’Connell 2021).

While we should be wary of trans people being widely used—if not abused (Richter-Montpetit 2018, 236–37)—to highlight the gendered politics of airport security (see Shepherd and Sjoberg 2012; Wilcox 2015, 115–24; 2017a; Beauchamp 2019, Chapter 2), this case points to a much broader dimension of surveillance-as-measurement. Specifically, so-called false positives further highlight how processes of identity measurement do not only consist in the virtual dissection of the body, but also fundamentally rely on embodied performances and specific affective registers. By disciplining their bodies into socially meaningful scripts and choreographies, travelers dispense with affect’s ambiguity as anxiety turns into relief or even pleasure (Salter 2008a, 374; Lisle 2016, 268). These security procedures thus involve “emotional practices” (Bially-Mattern 2011) whereby bodily performances actualize affect into unambiguous emotions. As travelers finally experience a feeling of relief—and their practices are authenticated within the measuring apparatus—their moods identify both individual body subjects and the collective Self to which they are claimed to belong (see Bially-Mattern 2011, 79; Ahmed 2014, 10; Hutchison 2016, 105).

Perturbing Surveillance: Quantum Measurement and the Affective Politics of Resistance

A quantum approach exposes the politics of ambiguity and embodiment within the measurement apparatus, expanding on previous critical understandings of the international political sociology of surveillance. Nevertheless, allegedly neutral surveillance practices have already been extensively blamed for constructing political subjectivities in problematic fashions. In particular, they normalize specific ways of being a body and foster xenophobic and transphobic prejudice by making non-normative bodies and expressions (e.g., emotional microexpressions) unclassifiable and therefore suspicious (Pugliese 2010, cited in Wilcox 2015, 111; Valkenburg and van der Ploeg 2015; Amir and Kotef 2018). In so doing, surveillance’s practices of exclusion-as-measurement further institutionalize the politics of fear and distrust that justify violent domestic and foreign interventions in the War on Terror (see Hutchison and Bleiker 2008; Crawford 2014, 549).

The concept of measurement in surveillance lies at the heart of these ethico-political concerns, its history being intertwined with instances of discriminatory and colonial exclusion. Francis Galton, one of the fathers of biometrics (and eugenics), drew direct inspiration from the fingerprinting system employed by the British in India to identify and control colonial subjects (Maguire 2009, 10–12; Mirzoeff 2020). Galton’s work—together with that of related key figures in biometrics—was ultimately fundamental to the development of measurement as a statistical notion to discern human “races” and identify criminal attitude through the body (Hacking 1990, 178, 180–88; Desrosières 1998, 43, 103–39; Amoore and Hall 2009, 454; Browne 2015, 112). Foregrounding the politics of measurement, a quantum approach highlights ambiguity and embodiment as intertwined tools to critically engage the issues surrounding surveillance. Most significantly, quantum measurement emphasizes the ambiguity of affect as a critical locus of resistance to surveillance. Stressing ambiguity as a site of political responsibility invites an ethical posture that eschews normative and mechanistic exclusions. Measurement highlights a fundamental sense in which “we are both self and other” (Zohar and Marshall 1994, 275) and shows how we participate in enacting the very cuts that distinguish the normal from the deviant (Zohar and Marshall 1994, 151; Barad 2007, 179). By taking responsibility for the boundaries we contribute to constructing, we can develop an “embodied sensibility” (Barad 2007, 391) where ambiguity underlies a pathic form of “subjective pluralism” that thrives on uncertainty and potentiality (see
Bertelsen and Murphie 2010, 139). Preserving that multiplicity thus calls for new forms of resistance to the attempts of surveillance to fix bodies and subjects.

The ethical implications of a quantum ontology have been a central concern of critical quantum IR. Zanotti stresses that “the opportunity of political agency is rooted in ambiguity and performativity” (Zanotti 2019, 75) and thus suggests that “embracing uncertainty” constitutes the starting point for political action (Zanotti 2019, 5, 107 and passim). Following this intuition, Yıldız-Alanbay zeroes in on the affective dimension of ethics. In a quantum imaginary, she claims, ethics involves an engagement with the potentiality of affect, which opens unexpected and unimaginable paths of action (2020, 160; see also Bertelsen and Murphie 2010, 156). In drawing on these contributions, I contend that a focus on the contingency of measurement clarifies how new forms of political agency come about through these ethical engagements. Read as a quantum apparatus of identity measurement, the surveillance apparatus produces both the discursive (meanings, vocabularies, laws) and the material (technologies, government departments, affects, safe and dangerous bodies) contours of the War on Terror. The subjectivities this entanglement creates, however, are always the contingent outcome of measurement; as the experience of surveillance demonstrates, these identities exist only as potentialities that need to be repeatedly installed and materialized within specific measurement processes (Barad 2007, cited in Zanotti 2019, 70; Murphy 2021, 92).

The politics of surveillance are therefore inherently duplicitous: while surveillance constructs collective identities by measuring embodied affects, this always implies the emergence of an ambiguous potential that dissolves the boundaries of the subject. In this reading, “embracing uncertainty” involves a form of political agency that disturbs the process of measurement. By attuning our bodies to unexpected emotional dispositions, for instance, we can challenge the closures that surveillance inevitably seeks to enact. This demands the exploration of affective potentials that exceed the identity dualism regulating the measurement process and “go beyond the preponderance of [...] the emotions and affects named and excited by the security apparatus with deliberate purpose” (Adey and Anderson 2012, 104).

Within the surveillant apparatus, embodying emotions that fail to align with normative notions of safe or dangerous subjects potentially prevents measurements that would unambiguously identify mobile bodies. This creative practice amounts to a form of “political self-sacrifice” that inverts conventional understandings of the concept. Affect-centered approaches in IR define political self-sacrifice as a bodily act that sustains or produces a political community (Fierke 2013; Koschut 2017). The destruction of a body imbibes it with an “emotional meaning” that constitutes and reverberates through collective subjects (Fierke 2013, 79, 82). In contrast, this form of self-sacrifice engages with the relation between the materiality of the body and its social signification in new ways, thriving on the zones of multiplicity where the body exceeds the subject. While the conventional self-sacrifice implies an embodied performance that simultaneously identifies (i.e., measures) a body and defines a political community, this alternative self-sacrifice seeks to eschew measurement to hinder the constitution of a collective subject. As a body relinquishes the possibility of a coherent subjectivity, it is able to perform emotional dispositions that fail to signify within the measurement apparatus, preventing the reification of the War on Terror’s exclusive binaries. As Yıldız-Alanbay (2020) argues, “affective ethics is about developing a realisation of and an appreciation for the unknown” (160). Engaging ethically with surveillance requires that we forgo any desire for being “measured” as stable and authenticated selves, and instead experiment with anomalous emotional practices.

Humor provides an affective resource through which such self-sacrifice might take shape. Humorous performances at the airport fundamentally challenge the surveillant apparatus by interfering with the measurement process. Such dispositions are disqualified by the affective architecture of airport security, and
terrorism-related forms of irony are socially and legally sanctioned (Salter 2007, 62). Nevertheless, displays of humor at airport security are by no means exceptional (Burkeman 2012), and their political significance is still marginally explored in scholarly enquiry (Martin 2010; Salter 2011; Leese and Koenigseder 2015). As previous work suggests, while in principle humor disrupts the affective architecture of surveillance, its political potential is remarkably contextual, and humorous attitudes often fail to counter the security apparatus. Inasmuch as joking does not disrupt security practices (as in Montoya’s case) and mostly happens after the identity of a traveler has been fully ascertained, “jokers are still obedient, docile subjects of the national security state” (Salter 2011, 43).

Conversely, so-called bomb jokes constitute an embodied performance that preserves the ambiguity surveillance seeks to control. Bomb jokes deploy humor in doubly ambiguous ways. Affectively, humor at the airport represents an emotional disposition that is undesirable and unexpected, meaning that humorous bodies fall short of actualizing either the obedient Self or the threatening Other. As such, it exploits the affective ambiguity of the surveilled body to resist identity measurement. Hermeneutically, humor is premised on the “discursive display of opposing interpretative possibilities” (Mulkay 1988, 26), sustained by accordingly ambivalent performances (Martin 2010, 27). What makes the bomb joke politically powerful, therefore, is precisely its polysemic nature, which preserves the affective–subjective potentialities of individual bodies (the jokers cannot be easily identified; they are simultaneously safe and dangerous) and disrupts the equivalence between emotions, bodies, and identities through which measurement in surveillance works (Martin 2010, 28–29).

To be precise, I am not claiming that bomb jokes are always employed as an ethicopolitical tool of resistance. Instead, I am suggesting that this form of humor acts as a performance that ruptures the affective normativity of measurement. By troubling surveillance’s effort to measure identities, bomb jokes invoke a political self-sacrifice that exposes the violent exclusions on which the measurement apparatus of counterterrorism relies. Through the ambiguity of affect, the anxious drive for ontological security—amplified by the atmosphere of surveillance—can be re-framed, setting the ground for an ethics that challenges the politics of terror to repoliticize the nexus between identity and security (Amoore 2006, 344).

**Conclusion**

This paper delved into the unusual parallelism between surveillance’s urge to “measure” identity and quantum mechanics’ “measurement problem” to rethink the concept of measurement in surveillance. Far from assuming a merely physicalist understanding of quantum mechanics, I have used it as a conceptual tool to challenge the indiscriminate naturalization of a scientific notion in the social realm and provide new avenues for critical inquiry. By way of conclusion, I hereby sketch the implications of this contribution for the fields it engages with.

First, this article engages with emerging debates on quantum approaches in IR (see Zanotti 2019; Der Derian and Wendt 2020; Murphy 2021). On the one hand, it emphasizes the political significance of the concept of measurement, central to quantum theory yet largely neglected in quantum IR and social science. By reflecting upon the implications of a quantum understanding of measurement, it expands on how specific scientific imaginaries shape the scope for both theoretical inquiry and political action and should therefore be subject to sustained critical attention (Murphy 2021, 3, 8). On the other hand, the article speaks to critical discussions of ethics and agency in quantum IR (Zanotti 2019; Yildız-Alanbay 2020). Through the notion of measurement, it unravels the ethical principle of “embracing uncertainty” in a context of global political relevance, bringing identity, agency, and affect coherently together in a quantum ontology.
Second, this paper pushes for further discussion on some unquestioned assumptions in the study of surveillance in IPS, in and beyond counterterrorism. Relying on a deterministic notion of (identity) measurement, the current approaches are rooted in the assumption of clear-cut, mutually exclusive identity categories and overwhelmingly focus on the abstract classification of bodies. Quantum measurement, instead, frames surveillance as a political praxis that depends upon ambiguity and specific forms of embodiment, reworking the ontological and analytical foundations of Surveillance Studies. This article, therefore, calls for critical engagement with the ethicopolitical dimension of surveillance, asking how specific readings of “measurement” can be deployed for political purposes and shape agency and subjectivity. Most significantly, quantum measurement provides a deeper focus on “embodied personhood” (Lyon 2007, 67) in surveillance. A quantum reframing of the identity–embodiment nexus further emphasizes the need to explore the affective atmospheres of surveillance and understand how the embodied dynamics of measurement trace clearly discernible distinctions between who/what knows and who/what can be known.

Last, quantum measurement promises productive engagements with ambiguity and embodiment as concepts that are central to critical theorizing and global political analysis. A quantum approach rethinks common understandings of ambiguity in IR, mostly indebted to poststructuralist thought. Drawing on the work of Derrida (Engelkamp and Glaab 2015), Foucault (Best 2007; 2008; 2012a, 2012b), or Laclau and Mouffe (Linsenmaier, Schmidt, and Spandler 2021), recent scholarship mostly frames ambiguity as an epistemological problem, which describes the “limits of modern knowledge” (Best 2008, 357) or highlights interpretive plurality (Best 2008, 88–89; 2012a, 677; Hansen 2016, 193,207; Linsenmaier, Schmidt, and Spandler 2021, 509–17), and whose “epistemological violence” can be ascribed primarily to the linguistic domain (Best 2007, 23–24; 2008, 356; Engelkamp and Glaab 2015, 205; Linsenmaier, Schmidt, and Spandler 2021, 509, 516). This reading denounces a foundational tension between ambiguity’s (inter)subjectivity and the rationalist desire for objective knowledge harbored by Western (social) scientific epistemology (Rathbun 2007, 534–36; Engelkamp and Glaab 2015, 202, 211). Quantum ambiguity, instead, has an inherently ontological character: outside of measurement, we cannot postulate the existence of objects with defined properties and material boundaries or the distinctions between subject and object (Barad 2007, 117, 122–23, 127, 154–55). Accordingly, quantum measurement complicates critical conceptions of “scientific objectivity” and instead reclaims a notion of “scientific” knowledge that embraces ambiguity and radically hangs on bodies’ “specific materializations” through measurement (Barad 2007, 119–20, 178; cf. Haraway 1988).

Quantum measurement also furthers discussions on embodiment in social theory and IR. As Barad’s criticism of Butler and Foucault suggests, quantum theory moves beyond “feminist postmodern and poststructuralist theories that acknowledge materiality as an effect or consequence of discursive practices” and “focus exclusively on the human/social realm” (Barad 2007, 225; see Kirby 2011, 96–97). Such perspective is still dominant in IR scholarship (Meiches 2019, 247), where bodies and affects are framed as politically meaningful only when “enmeshed” (Auchter 2021, 5–10) or “translated” (Solomon 2012, 920) in discourse (Fierce 2013, 80; Hutchison and Bleiker 2014, 505–507; Hutchison 2019, 294–95; e.g., Shinko 2010, 2012; Wilcox 2015; Dyvik 2016, 139; Gregory 2016, 956–57; Purnell 2021).

A quantum approach instead centers “material constraints and exclusions” and “the material dimensions of agency [and] regulatory practices” (Barad 2007, 192). Quantum measurement interrogates material–affective forces as excessive and productive of discursive distinctions between the social (as human) and the natural (as nonhuman) (Barad 2007, 209; see Manning 2010, 2013, 17; Blackman 2012, 13; 1

See Ní Mhurchú (2015) for an exception.
cf. Haraway 1985; Hayles 1999, 192–207; Wilcox 2017b). Challenging the poststructuralist conception of “different kinds of materialities” pertaining to “different discursive domains” (Butler in Barad 2007, 211), a quantum approach frames embodiment through the entanglement of apparently separate domains. In so doing, quantum measurement uniquely responds to calls in cultural studies to develop “more genealogical approaches to both science and affect” (Blackman 2012, 19; see Barad 2007, 149–50) and historicize the scientific concepts informing theories of embodiment (as well as “their reconfiguring through quantum mechanics”—Blackman 2012, 89; 2019, Chapter 6). Rather than reproducing a “physics envy” (Wilcox 2019, 307; see Grove 2020), quantum measurement exemplarily foregrounds the shared conceptual genealogy of surveillance and quantum physics, theorizing embodiment across the discursive boundaries between science and society (Barad 2007, 334–38; Blackman 2012, 25; in IR, Fishel 2017, 98–100).

Through the concept of measurement, I sought to problematize the conceptual juncture between scientific cosmologies and the politics of security. Following Barad (2007) and Murphy (2021), this paper calls for deeper critical interest in the scientific notions informing global security practices. By decisively disowning scientific discourse and metaphysics, most critical approaches left the historical and intellectual “mutual constitution of the ‘social’ and the ‘scientific’” unattended (Barad 2007, 87). Instead, I have inquired into the conceptual foundations of measurement as “a potent moment of constitution of scientific knowledge” (Barad 2007, 67) that is politically contested yet consistently underexplored. The analysis of surveillance and airport security illustrates how the neglected problem of measurement “can be investigated only by examining implicit assumptions in specific fields” (Barad 2007, 70). Delving into the co-constitution of measurement as a scientific concept and its political function, this paper demonstrated not only that a specific understanding of measurement cannot be accepted as the neutral foundation of political practices but also that the nature(s) of measurement can themselves be mobilized as a heuristic tool of critique. A quantum inquiry into the security politics of measurement, therefore, calls for a renewed attention to the transdisciplinary foundations of global politics and its practices.

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