

DATA, DETECTION, AND THE REDISTRIBUTION OF THE SENSIBLE IN INTERNATIONAL LAW

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I. INTRODUCTION

One dusty day in 2002, at Takhta Baig Voluntary Repatriation Centre near Peshawar in northwestern Pakistan, an Afghan woman—let us call her Amena—entered a nondescript room and sat down in front of a camera. A brief conversation took place with a woman sitting nearby at a computer terminal. Amena placed her chin where she was directed to do so, swept back a few strands of hair creeping out of her veil, and stared straight ahead for a few seconds while a series of photographs of one of her eyes was taken. Almost immediately, a small alarm sounded on the computer terminal of the woman seated alongside her. Amena was gently ushered toward the other side of the room for discussions with other officials. Some short time later, she was advised that her request to the Office of the United Nations High Commissioner for Refugees (UNHCR) for a modest cash grant and some supplies to aid her and her family's repatriation to Afghanistan had been denied. This was because, according to output of the UNHCR's iris verification program, she had already received assistance earlier the same year. When asked, Amena admitted that she had indeed sought UNHCR repatriation assistance multiple times, under pressure from family members. She walked away. Soon, she could soon no longer be seen amid the press of trucks, cars, bicycles, and people that stretched to the suburbs in the distance.

Let us now imagine Amena in the same scenario—seeking UNHCR repatriation assistance at a refugee processing center in Pakistan near its border with Afghanistan—but envisage how it might have occurred in 1992. In that year, between April and December, an estimated 900,000 Afghans returned to Afghanistan with UNHCR support in what has been described as the “largest and fastest repatriation progra[m] ever assisted by the UNHCR” up to that point.¹ The UNHCR’s role and responsibilities vis-à-vis Amena at that time would have

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¹ Hiram A. Ruiz, *Afghanistan: Conflict and Displacement 1978 to 2001*, 13 FORCED MIGRATION REV. 8, 9 (2002). See generally Nasreen Ghulfran, *The Role of UNHCR and Afghan Refugees in Pakistan*, 35 STRATEGIC ANALYSIS 945 (2011).

been the same, but its enactment of them would have been quite different. Most notably, iris scanning would not have featured in the process. Amena and members of her family would have been required to attend an interview with UNHCR staff, to present documents (including ration books) and photographs for inspection attesting to their identity, and would likely have waited a long time for a determination of their eligibility for repatriation assistance. This would have been made on the basis of staff observations, including potentially the staff's sense of whether Amena and her family "looked tired and sick."²

Amena's story—in both these versions—is a fictional one, but it depicts a change in UNHCR practice that did in fact take place. The UNHCR did introduce biometric registration (specifically, iris scanning), alongside other identification methods, in its support for Afghan repatriation from Takhta Baig in September 2002 and it has since introduced this at other locations.³

Faced with this two-part story, there are a number of questions and concerns that one might expect international lawyers to raise, even while acknowledging that the changes described may have beneficial effects. Was Amena's "confession" of having sought multiple rounds of assistance truthful, or was she in fact wrongfully denied assistance on the basis of some error, human or mechanized? Even if that admission was accurate, were her rights respected in the course of eliciting it, in both the 1992 and the 2002 modes? Was her consent to the process in each case informed and freely given? Were the data drawn from her body during iris scanning, or disclosed during interview, kept secure, anonymized, and confidential? Were her religious freedoms respected during these interactions? What of the pressure from her family to which she referred—could she be a victim of sexual or gender-based violence? Adopting a wider-angle lens might elicit the following questions: Under what lawful authority was the UNHCR engaged in repatriation from Pakistan in 1992 and again in 2002? And in view of the security conditions in Afghanistan at these times, and obligations owed to refugees under international law, were these programs sound and well-advised?

These are all important questions. They are not, however, the sorts of questions on which this article dwells. What this combination of questions makes of this scene, in both time periods—a site of principled, rights-based engagement, forensic inquiry, privacy, and protective conundrums—is also not, in the main, what this article aims to make of it. What this article invites us to see in both versions of Amena's story is the constitution and exercise of jurisdiction on the part of an international institution—in this instance, the UNHCR—and also on the part of the discipline of international law. It also invites us to take note of significant changes in how this takes place, especially through the mediation of technology.

The changes to which this two-part story draws attention could signal expansion in international law's and institutions' capacity, enabling more precise and rapid responsiveness to

² See generally GUGLIELMO VERDIRAME & BARBARA HARRELL-BOND, RIGHTS IN EXILE: JANUS-FACED HUMANITARIANISM 68–70 (2005) (describing methods by which the UNHCR tried to distinguish "recyclers" from refugees first seeking assistance on the Kenyan-Sudanese border during the 1990s).

³ Afghan "Recyclers" Under Scrutiny of New Technology, UNHCR NEWS STORIES (Oct. 3, 2002), at <http://www.unhcr.org/3d9c57708.html>. On deployment elsewhere, see, e.g., Justin Lee, WFP, UNHCR Using Iris Recognition for Syrian Refugee Food Program in Zaatari, BIOMETRIC UPDATE (Oct. 17, 2016), at <http://www.biometricupdate.com/201610/wfp-unhcr-using-iris-recognition-for-syrian-refugee-food-program-in-zaatari>. Two of the four iris verification centers set up near the Afghan-Pakistan border in 2002 were closed in 2004 after a decline in the number of refugees returning to Afghanistan. UNHCR Closes Two Iris Verification Centres in Pakistan, IRIN (Sept. 20, 2004), at <http://www.irinnews.org/news/2004/09/20/unhcr-closes-two-iris-verification-centres-pakistan>.

need. It may be that automation allows international institutions to anticipate and temper violence and suffering like never before. Yet the very same changes may threaten to undermine international law's and institutions' operations, or narrow their effective jurisdiction, insofar as they heighten inequalities, magnify distrust, and impede communication and connection. Exercises of international legal authority that cannot be understood, represented, or justified in recognizable terms may be prone to rejection. The changes in international legal and institutional work to which this story draws attention are also important because of their role in shaping allocations of power, competence, and capital. It is these distributive implications on which this article will focus.

Sensing practice—or the work of trying to detect and verify certain worldly phenomena—that is carried out by international lawyers and international institutions creates uneven distributions of capacity and resources. It contributes to the creation and allocation of divergent ability to generate shareable sense-information. That distribution helps to ensure that particular configurations and aggregations of sense-information come to be experienced in common (however contentiously) as the factual condition of the world, while others do not: configurations that, in turn, shape prospects for lawful relation and action. This is not necessarily a bad thing; there are good reasons for vesting certain detection and verification responsibilities in those with particular expertise. Nonetheless, that which international law takes as its factual background, or the context in which it operates, are made out of relations of inequality to which international legal work contributes. This is important to highlight because it contradicts international law's implicit claim to be about all, by all, and for all. Far from enclosing "all" in an equalizing embrace, and responding to naturally occurring conditions of common humanity, international law generates prospects for experiencing commonality out of its profoundly unequal distribution of eligibility to sense, and to be sensed.

With the advent of new, technologically advanced modes of data gathering and analysis, those relations of inequality are taking on new configurations. These are reconfigurations with which international legal thought, doctrine, and practice are, in the main, poorly equipped to deal. One reason for this deficiency is that the introduction of machine learning (a form of artificial intelligence) to international institutional work takes those operations outside the scope of preexisting legal analyses of, and methods for grappling with, quantification and statistics. The very experience of characterizing the world's conditions, and of exercising power to govern, make legally significant decisions, and conduct juridical relationships on the global plane are under revision in the face of automation, especially with the growing prevalence of machine learning. Also shifting is the global distribution of capacity to engage critically with law and policy, and to attest to or verify phenomena to that end. These changes are occurring in ways with which international lawyers, and the publics of which they are a part, are, and should be, concerned—more so than most in the international legal field have been to date. These changes are explored here by recourse to two illustrative snapshots of changing technical practice: those surrounding the global movement of weapons (through the work of the International Atomic Energy Agency (IAEA)) and the mass movement of refugees (through the work of the UNHCR). As intimated by the reference to "snapshots," the accounts of these institutions' work put forward in this article are designed to be suggestive, not definitive.

Part II of this article explains some key terms and how the contribution made here both builds upon, and departs from, other scholarship in international law, historical and contemporary, including scholarship from the pages of this *Journal*. Part III describes how sensing

practice has occurred in two areas of international legal and policy work: in the tracing and handling of certain categories of nuclear material; and in the detection of, and response to, mass movement on the part of refugees. Part IV discusses some developments reshaping, or carrying potential to reshape, these two areas of international law and policy work—nuclear nonproliferation and the verification of refugee numbers and identities—and examines how these developments may affect the common sensorium of international law's crafting. The last section is a short conclusion, reflecting on the possibilities occasioned and questions raised by studying distributions and redistributions of the sensible in international law and policy.

II. TERMINOLOGY AND ORIENTATION

Before proceeding on the course just outlined, the terminology used in this article merits some explanation. This section explains the following terms and phrases: “jurisdiction”; “sensing”; “sensory economy”; “distribution of the sensible”; and “sensorium.” Recognizing that this is not the usual terminology one finds in international legal writing, the latter part of this section orients this contribution within, and by reference to, prior work in international law.

The UNHCR’s actions vis-à-vis the fictional Amena entail an exercise of jurisdiction in two ways. They do so in the common sense of the term, in that they manifest a “power of declaring and administering law or justice.”⁴ The UNHCR was entitled under a treaty regime to determine Amena’s entitlement to humanitarian aid and administer the process by which this determination was made.⁵ These actions also involve an exercise of jurisdiction of another kind: a sort of proto-jurisdiction concerned with taking note of someone or something—that is, the direction of authoritative, institutional attention toward a particular person, object, phenomenon, or site (or, expressed in the reverse, that person’s, object’s, phenomenon’s, or site’s elicitation of attention). In the second sense, jurisdiction gets exercised when something enters the awareness or records of some legally authorized agent, or when the latter gains both the capacity and inclination to sense a certain condition, person, or pattern. This latter kind of jurisdiction (or proto-jurisdiction) is often identified with fact-finding or evidence gathering and, at least in part, consigned to disciplines other than law. So categorized, it seems prefatory to the vital concerns and characteristics of international law: worthy of its own kinds of legal rules and processes and some scholarly and practitioner attention, but not constitutive of the discipline’s core competencies and effects in the world. Against this view, this article directs more attention to the exercise of this proto-jurisdiction than to the exercise of jurisdiction in conventional terms.

Sensing, in this context, refers to the work of eliciting, receiving, and processing impressions and information, both in the mode of intuitions or feelings, and in terms of data.⁶ This includes all bodily faculties of perception, but is not restricted to corporeal sensation,

⁴ *Jurisdiction*, n., OXFORD ENGLISH DICTIONARY ONLINE, at <http://www.oed.com> (last visited Mar. 28, 2017).

⁵ Marjoleine Zieck, *The Legal Status of Afghan Refugees in Pakistan, a Story of Eight Agreements and Two Suppressed Premises*, 20 INT’L J. REFUGEE L. 253 (2008).

⁶ *Sensory*, adj.; *sense*, n.; and *sensation*, n., OXFORD ENGLISH DICTIONARY ONLINE, at <http://www.oed.com> (last visited Mar. 28, 2017).

individual or collective. Sensing is never just about the body, as distinct from the mind.⁷ Sensing, in this article's account, is always mediated by language; sensory data are never raw. Moreover, as will become apparent over the course of this article, the sensory work described here can never be wholly distinguished from the material practices and modes of technological interface and analysis through which data pass or via which they are produced.⁸ A concern with sense in international legal work is distinct from a concern with knowledge, but sensing practice still encompasses those ways of knowing, or claims to knowledge, that are mobilized in the course of perception. What makes sensing different from, say, formulating ideas, opinions, or judgments, is the tendency for sensing to be experienced as unmediated, or as a matter of direct data transmission. Practices by which international institutions and other agents of international law take in or record seemingly unprocessed data about the world and its human and nonhuman inhabitants: these are the practices with which this article is concerned.

To suggest that international legal work maintains a “sensory economy” is to draw attention to the international legal discipline’s production and distribution of resources through its evocation, organization, and circulation of sensory experience. The resources so produced and distributed are both material and intangible; they include competence and authority, capacity and impairment, attention and effort, as well as objects, money, and bodies. The language of economy highlights that matters of significant value are at stake in what might otherwise appear to be relatively inconsequential details of, and changes in, governance technique.⁹

To characterize this sensory economy as global is not to suggest that all maintain a common worldview—far from it. The prospect of realizing sensory experience-in-common is always in contention. People live according to seemingly incommensurable time-scales and with vastly divergent perceptions of their placement in the world.¹⁰ Nonetheless, sensory dimensions of international legal work do engender a sense that the world is shared and that there is, at any one time, significant overlap among divergent perceptions of the world (a domain of overlap typically rendered in facts, or as the *zeitgeist*). Of course, such a sensory experience-in-common as may emerge, from time to time, is never of international law’s making alone. It is, nonetheless, a prospect often sustained by the operation of international legal doctrine and practice.

To redescribe international law’s concerns and effects in these terms in this way is to foreground and open to question what philosopher Jacques Rancière has termed the “distribution of the sensible.” The sensible is that which is capable of being sensed, in any of the myriad ways outlined above. The “distribution of the sensible” is a phrase used widely throughout Rancière’s work—and borrowed here—to refer to “that system of places . . . that allots to each

⁷ This article’s account of sense thus departs from a claim made in some legal theory scholarship that the law privileges the visual. See, e.g., ALISON DUNDES RENTELN, *SENSATIONAL JURISPRUDENCE: VISUAL CULTURE AND HUMAN RIGHTS. EMERGING TRENDS IN THE SOCIAL AND BEHAVIORAL SCIENCES: AN INTERDISCIPLINARY, SEARCHABLE, AND LINKABLE RESOURCE* 1–15 (2015).

⁸ Indeed, drawing upon feminist scholarship, the account of sense presented here rejects conventional oppositions between abstract, principled reasoning, and embodied, material practice. See, e.g., JANE GALLOP, *THINKING THROUGH THE BODY* (1988) (exploring how literature and philosophy have cast the body as that which must be transcended or dominated, and arguing instead for thinking of the body as a site of (philosophical) knowledge).

⁹ *Economy*, n., OXFORD ENGLISH DICTIONARY ONLINE, at <http://www.oed.com> (last visited Mar. 28, 2017).

¹⁰ Fleur Johns, *The Temporal Rivalries of Human Rights*, 23 IND. J. GLOB. LEGAL STUD. 39 (2016).

his or her proper role and function” in perceiving worldly phenomena.¹¹ In other words, the distribution of the sensible is that arrangement of competences organized around the practice of sensing, and through which sensing takes place. It is a term explicitly concerned with power. With particular reference to “the sensible,” Rancière has explained that he uses this phrase to mean: “the way in which . . . a social destination [in some hierarchy or other partitioning of power] is anticipated by the evidence of a perceptive universe, of a way of being, saying and seeing.”¹²

This article also makes occasional use of the term “sensorium” to try to encapsulate this sense of a perceptive universe unevenly distributed (and distributive), and yet capable of being experienced in common, that Rancière’s work makes available. This term is not used in a scientific sense. Rather, it serves as shorthand for an idea: an idea that is controversial insofar as many do not share or experience it. That idea is that being bodily located on this planet implies being confronted by and working with some basic facts about the world, or some part of it, and having some minimum level of commonality in perceiving and reacting to those conditions, or potentially doing so, difference, conflict, and particularity notwithstanding. This is an idea that international legal and policy work seeks to keep alive, but frequently fails to sustain.¹³

My redescription of international institutional work in these terms invites reflection on how international legal work organizes “self-evident facts of sense perception that simultaneously disclos[e] the existence [or prospective existence] of something in common and . . . define the respective parts and positions within [that something in common].”¹⁴ This account casts the work of detecting and reporting on the world, in which all sorts of people get involved under the rubric of international law, as work that allots roles, resources, and responsibilities hierarchically. It contends further that, but for the self-evidence instilled through practices of perception so configured, this apportionment might be regarded as controversial. In short, to read routine verification practices of international institutions as distributive, as this article does, and to describe emergent changes in those routines, is to seek to widen the lens on, and heighten concern with, who might have a stake in those practices.

One of the constituencies with a stake in the practices here described is that comprised of international lawyers. The language and concerns of this article may, at times, seem alien to the pages of the *American Journal of International Law*. Yet the analysis here intersects with much that has come before in international legal scholarship, including in this *Journal*. From its earliest days, contributors to the pages of this *Journal* have worried that relatively few partake of an international lawyer’s view of the world, and have sought to have certain versions of that outlook more widely shared.¹⁵ In recent decades, derivations of this preoccupation have emerged. International lawyers have worried, for instance, about the legitimacy of

¹¹ Paul Bowman & Richard Stamp, *Introduction: A Critical Dissensus*, in READING RANCIÈRE, CRITICAL DISSENSUS xi, xii (2011).

¹² Jacques Rancière, *The Thinking of Dissensus: Politics and Aesthetics*, in READING RANCIÈRE, CRITICAL DISSENSUS, *supra* note 11, at 1, 7 (Paul Bowman & Richard Stamp eds., 2011).

¹³ This idea may be related to the ideals of humanism, but that is not a relationship that will be developed here.

¹⁴ JACQUES RANCIÈRE, THE POLITICS OF AESTHETICS 12 (Gabriel Rockhill trans., 2004).

¹⁵ See, e.g., Elihu Root, *The Need of Popular Understanding of International Law*, 1 AJIL 1, 2 (1907) (arguing for the importance of improving public knowledge of international law, and “promot[ing] a popular habit of reading and thinking about international affairs,” in light of growing nonstate (popular) control over national conduct); Clyde Eagleton, *Organization of the Community of Nations*, 36 AJIL 229 (1942) (writing of the need for the

international institutions in their deployment of scientific expertise and other forms of governance authority, and about the values and principles underpinning (or not) those institutions' work.¹⁶ This article shares something of these concerns. However, unlike the scholarship just mentioned, its main aim is not to expand international law's efficacy, bolster its legitimacy, or better diagnose or reform its normative underpinnings. Rather, the primary aim of this article is to promote better understanding of, and broader engagement with, the distributive effects and stakes of international legal work by attending to the sensing practice that work entails.

In this respect, this article may be more closely linked to that body of scholarly work concerned with the role of experts, and expert knowledge, in international law.¹⁷ As that prior scholarship has done, this article displaces the idea that international legal work is most crucially conducted in the executive suite of overarching principle and bilateral or multilateral negotiation, rather than down on the assembly line of the merely technical. Leading scholars of "expert rule" have similarly traced the shaping of global "public reason" to the work of "technical" experts across a number of fields, including the international legal field.¹⁸ This work has illuminated the role of legal expert knowledge in the articulation of a world that is "everywhere politically and economically captured by the few, and yet somehow impossible for anyone to alter or escape."¹⁹ Like that prior work, this article is concerned with how particular, hierarchical understandings of the world become prevalent, normalized, and made seemingly intractable, in part through the mediation of experts.

There are, nonetheless, departures in this article from the body of literature just invoked. First, the analysis here suggests that there are limits to analysis that focuses, most heavily, on language and knowledge as such, as the literature on expertise in international law has done.²⁰ Sensing the world and gathering sensory authority are different to knowing the world and articulating knowledge of it; this article describes something other than a politics of expert

international lawyer to speak "[f]rom his [sic] post of expert knowledge" as the "authoritative voice" of a community, to "reveal to statesmen and to peoples what is necessary to make his law effective"[sic]).

¹⁶ See, e.g., Daniel Bodansky, *The Legitimacy of International Governance: A Coming Challenge for International Environmental Law?*, 93 AJIL 596 (1999) (highlighting the perception that international environmental institutions and processes are insufficiently democratic and surveying means by which this could be addressed); Galit A. Sarfaty, *Why Culture Matters in International Institutions: The Marginality of Human Rights at the World Bank*, 103 AJIL 647 (2009) (analyzing the organizational culture of one powerful international institution—the World Bank—to understand why international institutions behave as they do and exploring the marginality of human rights principles within this organizational culture).

¹⁷ See, e.g., THE ROLE OF 'EXPERTS' IN INTERNATIONAL AND EUROPEAN DECISION-MAKING PROCESSES: ADVISORS, DECISION MAKERS OR IRRELEVANT ACTORS? (Monika Ambrus, Karin Arts, Ellen Hey & Helena Raulus eds., 2014). The proliferation and circulation of experts charged with various types of international legal responsibility has been a topic of burgeoning scholarly interest over the past decade, but there is also a literature on this theme that dates from, or looks back to, the Cold War era. See, e.g., Donna C. Mehos & Suzanne M. Moon, *The Uses of Portability: Circulating Experts in the Technopolitics of Cold War and Decolonization*, in ENTANGLED GEOGRAPHIES: EMPIRE AND TECHNOPOLITICS IN THE COLD WAR 43–74 (Gabrielle Hecht ed., 2011); Zhihua Shen, *A Historical Examination of the Issue of Soviet Experts in China: Basic Situation and Policy Changes*, 29 RUSS. HIST. 377 (2002); GILLIAN WHITE, *THE USE OF EXPERTS BY INTERNATIONAL TRIBUNALS* (1965).

¹⁸ DAVID KENNEDY, A WORLD OF STRUGGLE: HOW POWER, LAW, AND EXPERTISE SHAPE GLOBAL POLITICAL ECONOMY (2016). The focus on the technical shaping of modes of "public reason" as such is Sheila Jasanoff's contribution. See SHEILA JASANOFF, SCIENCE AND PUBLIC REASON 5 (2012).

¹⁹ KENNEDY, *supra* note 18, at 32.

²⁰ Samuel Moyn voices comparable skepticism: Samuel Moyn, *Knowledge and Politics in International Law*, 129 HARV. L. REV. 2164, 2167 (2016) (reviewing Kennedy, *supra* note 18).

knowledge. Sensing in common on a global plane may sometimes take the form of knowing, but experiences and claims of knowingness are not essential to all of the practices described in this article. Tracing the distribution of sensory authority in international legal work takes one to a wide array of sites and invites attention to a broad range of dispositions and interactions. Many of these are not of a kind upon which one would likely focus if one were concerned solely with the accumulation and imparting of expert knowledge. Also, insofar as they appear in this article's account, experts are depicted in a range of postures that do not correspond to the mastery, or aspiration to mastery, characteristic of claims to knowledge. The story told in this article's opening paragraph is one example: it is a banal scene, a site of mechanical implementation by relatively low level staff who do not claim to know so much as operate the machines through which a knowledge claim unfolds.

Second, this article calls into question a claim—central to much of the literature just referenced—that experts' global authority depends most crucially on ruling nonexperts out, and on struggling with other experts over terms, techniques, and terrain. Struggle, discreditation, and demarcation along these lines are certainly part of the story told here, but there is much in this article that is irreducible to such an account. The practices described here are not exclusively those of experts. Many figures acting at the limits of their expertise, or making little or no claim to expertise at all, will be shown here to be laboring productively and powerfully in the sensory economy of international law. Moreover, experts are shown to be highly dependent on relationships with those over whom they are, in the aforementioned accounts, typically deemed to be ruling. This, in turn, raises the prospect of relatively low-level interactions and formally unqualified agents playing an active, central role in the construction of global public reason. Of course, leading accounts of expert rule—David Kennedy's important work, for instance—have already focused on “the lived mechanisms by which people actually struggle with one another” and highlighted that the prospect of being cast, or successfully self-nominating, as an expert “agent” or “actor”—from among any number of conceivable candidates—is among the stakes in this struggle.²¹ Nonetheless, this article shifts emphasis away from those “internal” contests among experts with which Kennedy seems most preoccupied.²² Nonexperts are not, in this article's account, “losers” bearing “problems” that may be consigned to the “outside” of “social forces and commitments,” as they often appear in Kennedy's work.²³ Their actions and capacities bear directly upon the terrain in contention. In short, although this article shares with Kennedy a sense that “alternatives to expert rule” are latent within expert knowledge practice, it does not locate these alternatives in the prospect of rival professionals “yielding” to one another in mystical communion.²⁴

Intersections between this article and preexisting international law scholarship are also apparent with regard to research on indicators. Important collaborative work among international lawyers and social scientists has elucidated the “quiet exercise of power” that occurs when data are converted into scales, ranks, and indices to serve as indicators of performance

²¹ KENNEDY, *supra* note 18, at 78–82.

²² *Id.* at 165–66.

²³ *Id.* at 93.

²⁴ *Id.* at 164–67 (describing the professional experience of “yielding” as one of relative freedom, or untethered expert discretion, that emerges when “an expert abandons his position in the face of another”).

in governance undertakings, global in scope or ambition.²⁵ This article shares with that prior work on indicators a concern with the constitutive power of knowledge practices and technological infrastructure. It also shares a concern with registers and artifacts of governance that are orthogonal to law “proper” or that are, in Davis, Kingsbury, and Merry’s terms, “comparable to law,” and that complicate divisions between public and private law and formal and informal norms.²⁶ Parts III and IV examine a wide range of hard and soft law instruments, as well as a variety of practices conducted under their auspices.

Once again, however, there are aspects of this article that set it apart from recent legal literature on indicators. Primary among these is this article’s range of concern. Although it focuses, for illustrative purposes, on specific “snapshots” of technical practice among international institutions, its concern is not with a particular variant or select subset of governance techniques (as is the case in the indicators scholarship). The claim it makes is far broader: that sensory practice plays a significant role in sustaining law generally on the global plane, and that it does so by propagating and repropagating inequality (more precisely, through the uneven distribution of sensory and sense-sharing capacity). In other words, the purchase of international law on global affairs depends, at least in part, on its partial distribution of sensibility (or capacity for sense).

Also distinct from the indicators literature is this article’s probing of verification practices that go beyond counting. The technical practices described here—especially insofar as they involve machine learning (that is, computation with automatic capacity to modify processing on the basis of newly acquired information)—are not well understood as “counting strategies.”²⁷ Similarly, they are not easily grasped in terms of statistical techniques concerned with “converting a mob into an orderly array” in some stable, standardized formation.²⁸ Conventional statistical assumptions and procedures often prove flawed when applied to large streams of data that are sourced observationally rather than being experimentally generated, as is the case with data in both the snapshots presented below.²⁹ For this reason, one cannot simply extend, to the practices described here, those historical, sociological, and genealogical analyses of quantification and statistics on which the legal scholarship on indicators has drawn so productively.³⁰ This article aspires to be part of a new wave of socio-legal scholarship that probes, and takes as one of its starting points, the limits of those analyses in

²⁵ THE QUIET POWER OF INDICATORS: MEASURING GOVERNANCE, CORRUPTION, AND THE RULE OF LAW (Sally Engle Merry, Kevin E. Davis & Benedict Kingsbury eds., 2015) (a book featuring chapters by social scientists, such as Sally Engle Merry and Smoki Musaraj, and lawyers, including Benedict Kingsbury, Kevin Davis, and René Urueña).

²⁶ *Id.* at 2.

²⁷ Compare Kevin E. Davis, Sally Engle Merry, Benedict Kingsbury, *Introduction: The Local-Global Life of Indicators: Law, Power, and Resistance*, in THE QUIET POWER OF INDICATORS, *supra* note 25, at 4 (2015).

²⁸ Francis Galton, *Biometry*, 1 BIOMETRIKA 7 (1901) (discussing the application to biology of the methods of statistics). Galton is noteworthy for his elaboration of the correlation coefficient and his observation of the phenomenon of regression to the mean. See NICHOLAS WRIGHT GILLHAM, A LIFE OF SIR FRANCIS GALTON: FROM AFRICAN EXPLORATION TO THE BIRTH OF EUGENICS (2001). See also Theodore Porter, *Making Things Quantitative*, 7 SCI. IN CONTEXT 389 (1994).

²⁹ Daniel A. McFarland & H. Richard McFarland, *Big Data and the Danger of Being Precisely Inaccurate*, 2 BIG DATA & SOC’Y (2015), at <http://bds.sagepub.com/content/2/2/2053951715602495> (last visited Mar. 28, 2017).

³⁰ See, e.g., THE QUIET POWER OF INDICATORS, *supra* note 25, at 2.

contemporary settings in which reliance is placed on data sourced more or less continuously, and analyzed without recourse to *a priori* models or hypotheses.³¹

Insofar as it does present an account of measurement or counting, this article also departs from certain key claims taken up in legal scholarship on indicators (and traceable to scholarship in the social sciences and humanities). In this article's analysis, it plainly matters a great deal to all involved *who* is doing the measurement of the phenomena in question; the credibility of data does not depend upon any disavowal or concealment of this, so there is no call to debunk it. This runs counter to an argument made in the influential work of Michael Power, a leading philosopher of accounting and risk. In work taken up in the legal scholarship on indicators referenced above, Power has argued that a "defining characteristic[] of measurement . . . is that we expect [it] not to depend on who is doing it" (and that this is an expectation of which readers should be disabused).³² This article calls that claim into question.

Also noteworthy is this article's emphasis on sensory practices contingent on proximity—touch and manual handling for instance—and their importance in the work of counting. This disputes historian Theodore Porter's famous characterization of "quantification [as] a technology of distance" (again, work explicitly taken up in legal scholarship on indicators). In Porter's analysis, the power and utility of numbers for governance rest on their capacity to make things discernible and manageable by those not present at their place or time of provenance.³³ In contrast, the practices discussed here frequently depend on the maintenance of some sense of intimacy with the sites, objects, and instances of measurement. Hence, insofar as this article tells a story of quantification (and this is only part of its story), it argues for the importance of more particularized, differentiated accounts of governance by number—particularized, that is, by time, space, and field.

Before finally turning to some particularized accounts of governance work by the IAEA and the UNHCR, the character of this article's intervention in and around these scholarly fields warrants some specification. This article entails a type of legal theoretical intervention for which arguments have been made explicitly elsewhere that will not be replayed here: that is, theorization through description or redescription.³⁴ What is attempted here is a meso-level redescription of quite mundane techniques of legal argument, practice, and analysis: a redescription that remains cognizant of the terms of those techniques' conventional articulation while drawing attention, in the extravernacular terms explained above, to that which they

³¹ Rob Kitchin, *Big Data, New Epistemologies, and Paradigm Shifts*, 1 BIG DATA & SOC'Y 1 (2014).

³² Michael Power, *Counting, Control and Calculation: Reflections on Measuring and Management*, 57 HUM. REL. 765, 769 (2004). See, e.g., Smoki Musaraj, *Indicators, Global Expertise, and a Local Political Drama: Producing and Deploying Corruption Perception Data in Post-Socialist Albania*, in THE QUIET POWER OF INDICATORS, *supra* note 25, at 222, 224 (citing the work of Michael Power, among others).

³³ THEODORE M. PORTER, TRUST IN NUMBERS: THE PURSUIT OF OBJECTIVITY IN SCIENCE AND PUBLIC LIFE ix (1996); Theodore Porter, *Objectivity, and Trust*, 1 MEASUREMENT: INTERDISC. RES. & PERSP. 241, 242 (2003). See, e.g., THE QUIET POWER OF INDICATORS, *supra* note 25, at 2 (citing the work of Theodore Porter, among others).

³⁴ Cf. Anne Orford, *In Praise of Description*, 25 LEIDEN J. INT'L L. 609 (2012) (arguing for the productiveness of a turn to description, as a method of writing about law, in lieu of explanation and critique, or at least an alternative to those modes of critique most prevalent in international legal scholarship). Of course, philosophy often also entails description, phenomenological description being the obvious example. However, unlike most works of phenomenological description, this article is not a study of the structure or nature of consciousness as experienced in the first person by an individual human subject. See DERMOT MORAN, INTRODUCTION TO PHENOMENOLOGY (2000) (introducing the principal writings of the classical phenomenologists and those of some related thinkers).

put forward as self-evident.³⁵ This describes international legal efforts to construct a global sensorium capable of being experienced in common, or some sense of being confronted by basically the same worldly conditions and prospects for ordering.

The work of Jacques Rancière, to which quite sparing reference is made in this article, makes apparent how the mapping of a sensory economy within the international legal order represents a political intervention in the international legal field—specifically, a challenge to its embedded inequality.³⁶ However its introduction here does not purport to make this article a work of philosophy. To focus on international law's sensory register is not to weigh in on longstanding philosophical debates about idealism and materialism, Enlightenment controversies about empiricism, theories of phenomenology, or contemporary arguments about representation, and “making sense.”³⁷ The aim here is not to disclose some underlying structure or logic to international law, nor to embroider the discipline with a diagnostic overlay of a kind accessible only to those with the requisite expertise or predilection. It is also not the aim to try to temper or tame international law's operations, by recourse to human rights or otherwise. Rancière offers no keys to unlock the mysteries of global governance, nor tools for making the world more rightful.³⁸

The aim of this article is, nonetheless, to work against hopelessness and foreclosure. It is especially concerned with notions that global inequality—as it exists and as it is expanding—is ever more intractably encoded in the networks of contemporary existence. In place of that which seems most impenetrable and forbidding about those networks (decision-making by

³⁵ Cf. David Kennedy, *When Renewal Repeats: Thinking Against the Box*, 32 N.Y.U. J. INT'L L. & POL. 335, 476–500 (2000) (describing Kennedy's “efforts to launch and sustain an extravernacular project in the field [of international law]”—that is, a project that departs from argumentative routines and concerns typical of international legal scholarship). This description is meso-level in the sense that it is neither a deep empirical dive into the details of any one or more case study or studies, nor an all-encompassing, all-explaining account of global legal order.

³⁶ SAMUEL A. CHAMBERS, THE LESSONS OF RANCIÈRE 38–64, 122–56 (2013) (explaining Rancière's reinvention of politics premised on the prevalence of orders of inequality and domination, and insistence that the “disordering logic” of democracy must operate on this terrain). In referring to the embedded inequality of the international legal field, I am saying something more than that international law is implicated in, and helps to reproduce “real world” inequalities understood as external to the field. Rather, the claim is that the purported commonality of the international legal field is *made* of inequality; that inequality in the distribution of sense-making capacity is fundamental to its operation in ways not well captured by critiques of international law for gender bias, racial bias, or other modes of external critique.

³⁷ See, e.g., PLATO, REPUBLIC, BOOK VII 107–17 (Chris Emyln-Jones & William Preddy ed. & trans., Harvard Univ. Press 2014) (c. 380–360 B.C.E.) (the allegory of the cave, a famous exposition of Plato's conviction that reality may only be apprehended intellectually, through an appreciation of abstract “forms,” not by the senses); DAVID HUME, AN ENQUIRY CONCERNING HUMAN UNDERSTANDING 23–29 (Peter Millican ed., Oxford Univ. Press 2007) (1748) (arguing that knowledge arises not from reason but from experience); MAURICE MERLEAU-PONTY, PHENOMENOLOGY OF PERCEPTION (Donald A. Landes trans., Routledge 2012) (1945) (emphasizing the role of bodily experience in consciousness); Jean-Luc Nancy & Michael Syrotinski, *Extraordinary Sense*, 8 THE SENSES & SOC'Y 10 (2013) (on the sensory or sensible foundations of philosophic thought and their resistance to rational ordering).

³⁸ These statements are not made out of any circumspection about Rancière's project, or doubt about the importance or politics of his work. What I am seeking to avoid here is any suggestion that the dilemmas by which international law is plagued and by which international lawyers should be concerned—as represented in this article—might be cured or transcended by recourse to another discipline. All too often in legal writing, appeal is made to some *deus ex machina* drawn from another scholarly field, presumed to be free of the difficulties attributed to the legal discipline in question and capable of leading hapless lawyers out of those difficulties with benign grace. My engagement with Rancière's work in this article is brief and contained only to avoid any such representation of his power (a representation of which Rancière's work itself counsels wariness).

recourse to machine learning, for instance), this article shows highly technical, part-automated terrain to be littered with humans working in a range of sensory roles and registers. Moreover, it endeavors to show this, and to open up associated routes for thinking and action, by working with techniques quite close at hand: in this instance, by examining routine practices of some of the most prominent institutions on the global plane. With these objectives in view, let us proceed to describing some of these institutions' practices afresh.

III. SENSING MOVEMENT, THREAT, AND NEED IN INTERNATIONAL LEGAL ORDER

Insofar as activity on the global plane is perceived as orderly, or amenable to ordering, international law is often cast as that order's nervous system: performing coordinating, communicative, and signaling functions; detecting phenomena and conditions; and mobilizing evaluated, expertized, or otherwise accredited accounts of, and responses to, those conditions. Onuma Yasuaki's 2003 restatement of the "binding, communicative, value-declaratory, and justifying and legitimating functions" of international law is illustrative of the power and persistence of these ideas.³⁹

Among the phenomena to which international law is especially attuned are those identifiable as threats to its order. The UN Charter famously identifies "threats to the peace" as that which must be "prevent[ed] and remov[ed]" if international peace and security are to be maintained and "succeeding generations" saved from war by law.⁴⁰

"Movement" is not generally perceived as a threat to peace; for instance, international lawyers commonly characterize their field of work as dynamic and in constant flux, and either celebrate or take for granted the mobility of capital, goods, and migratory species.⁴¹ There are, nevertheless, certain types of movement that international lawyers commonly greet with alarm, or at least alertness. The first of these is movement of certain types of weaponry, or weapon-grade material, in the absence of legal authorization of appropriate kinds. The second is the sudden, mass movement of people from their places of habitual residence, especially across state borders, when that movement is taken to be characteristic of unmet needs, or breakdowns in politico-legal infrastructure—both of which are understood to pose a form of threat to international legal order.

This section provides a brief overview of selected international legal measures designed to detect or predict these two types of movement, focusing on some particular, representative instruments and practices in each field. It does so not so much with a view to engaging directly with debates and dilemmas with which those working in these areas are typically concerned. Rather, the aim here is to build up a sketch of the sensory capacities (and incapacities) with which the discipline and institutions of international law are invested, and how these tend to be distributed, in particular areas of doctrine and practice. Although this sketch gives some prominence to the IAEA and the UNHCR, respectively, in the two fields it depicts, it does not

³⁹ Onuma Yasuaki, *International Law in and with International Politics: The Functions of International Law in International Society*, 14 EUR. J. INT'L L. 105, 108 (2003). On the role played by functionalism in international legal thought, see Douglas M. Johnston, *Functionalism in the Theory of International Law*, 26 CAN. Y.B. INT'L L. 3 (1988).

⁴⁰ UN Charter pmb.; Art. 1, para.1.

⁴¹ See, e.g., MARTTI KOSKENNIEMI, FROM APOLOGY TO UTOPIA: THE STRUCTURE OF INTERNATIONAL LEGAL ARGUMENT 515 (rev. ed. 2005) ("Juristic discussion appeared to remain in a constant flux. It could find no position in which to remain permanently.").

proceed on the basis of empirical study of those institutions, nor does it approach each of them in the same way, or by reference to the same types of work product. The aim of this diptych is also not, generally, to compare these two institutions. Rather, as highlighted above, this article aims to reflect on how international law and policy establish “normal” distributions of positions between the one [or ones] who exercise[s] power and the one [or ones] subject to it” as well as “dispositions ‘proper’ to such classifications,” and to examine particular manifestations of, and apparent changes, in the sensory work of these international agencies.⁴² This is, as noted above, for the purpose of both making, and making seem more possible, political intervention in the international legal field in the sense suggested by the work of Jacques Rancière. The aim is to enable prospects for “ruptur[ing]” the self-evidence of these distributions or their identification with, and as, the “way things are.” This might, in turn, permit challenges to the presumed entitlement of those who rule according to the “normal” order.⁴³ We will return to this notion of politics in the Conclusion. Let us begin with the distribution of sense on nuclear nonproliferation that is engendered by international law.

Sensing Weapons

International law seeks to regulate the movement of weapons, and material that can be used to make military grade weapons, in a range of ways broadly premised on the detection or attestation of movement. Legal attention is directed, for example, to the development, manufacture (or potential manufacture), testing, retention, sale, dissemination, and transportation of weapons of mass destruction (WMD) (a category typically reserved for nuclear, biological, and chemical weapons), as well as their deployment or threatened deployment.⁴⁴ Also of international legal concern—and the focus of distinct legal measures and doctrines—are the environmental effects of such weapons’ usage and associated movements of hazardous wastes and toxic substances, as well as the prospect of weapons’ and related materials’ seizure by, or unauthorized rerouting to, nonstate actors.⁴⁵ International law is directed, too, toward the movement of other categories of weapons and related materials, including mines and small arms.⁴⁶

Rather than survey the range of international laws touching upon the question of the movement of weapons and related materials, during warfare and otherwise, this section will focus on a single instrument illustrative of the kind of sensorium that international law seeks to

⁴² Jacques Rancière, Davide Panagia & Rachel Bowlby, *Ten Theses on Politics*, 5(3) THEORY & EVENT (2001), available at http://muse.jhu.edu/journals/theory_and_event/v005/5.3ranciere.html.

⁴³ *Id.*

⁴⁴ Milagros Alvarez-Verdugo, *Comparing U.S. and E.U. Strategies Against Weapons of Mass Destruction: Some Legal Consequences*, 11 ANN. SURV. INT'L & COMP. L. 119 (2005) (“Weapon(s) of mass destruction (WMD) is not a legal concept. Nonetheless the social sciences regularly use this term to encompass nuclear, chemical and biological weapons to distinguish them from conventional weapons . . .”). See generally DANIEL JOYNER, INTERNATIONAL LAW AND THE PROLIFERATION OF WEAPONS OF MASS DESTRUCTION (2009); Daniel Joyner, *The Security Council as a Legal Hegemon*, 43 GEO. J. INT'L L. 225 (2012) (discussing UN Security Council Resolution 1540 and related resolutions, concerning the proliferation of weapons of mass destruction).

⁴⁵ Eric Talbot Jensen, *The International Law of Environmental Warfare: Active and Passive Damage During Armed Conflict*, 38 VAND. J. TRANSNAT'L L. 145 (2005); Thomas Burch, *Non-state Actors in the Nuclear Black Market: Proposing an International Legal Framework for Preventing Nuclear Expertise Proliferation & Nuclear Smuggling by Non-state Actors*, 2 SANTA CLARA J. INT'L L. 84 (2004).

⁴⁶ WEAPONS UNDER INTERNATIONAL HUMAN RIGHTS LAW (Stuart Casey-Maslin ed., 2014).

produce around, and anchor in, such objects: the 1968 Treaty on the Non-Proliferation of Nuclear Weapons (NPT).⁴⁷

The Nuclear Non-Proliferation Treaty

The NPT was a product of the Cold War and its fragmentation: a period during which politico-legal perception tended to be oriented around the state and characterized by suspicion and, during the 1960s, growing skepticism (including toward state authority).⁴⁸ Conceived as a containment device, in anticipation of states concluding a general disarmament agreement, the NPT was designed to offset small states’ “temptation[s] to exploit the enormous temporary advantage derived from the possession of [nuclear] weapons.”⁴⁹ This would, it was hoped, avert the prospect of a “small State or a revolutionary group . . . set[ting] off a world-wide nuclear war” while those “few highly developed States” possessed of both nuclear weapons, and “a sense of deep responsibility” associated with those, were engaged in negotiations toward general disarmament.⁵⁰ Reflecting this predisposition for entrusting small groups of “responsible” states and state representatives with the capacity to sense and act on behalf of many, a Geneva-based multilateral forum known as the Conference of the Eighteen-Nation Committee on Disarmament was charged by the United Nations General Assembly with negotiating the treaty, in the course of which they “took wide soundings from other nations.”⁵¹ The text of the treaty, so negotiated and opened for signature in 1968 (simultaneously in Washington, D.C., London, and Moscow), codified a “*quid pro quo* relationship between two classes of states parties, each class having differing rights and obligations accorded them under the treaty”: nuclear weapon states and non-nuclear-weapon states.⁵² The NPT entered into force in March 1970 with forty-three parties, including three of the five states defined as nuclear-weapon states according to the treaty’s criteria.⁵³ As of March 2017, the NPT had 191 states parties.⁵⁴ Only five UN member states have declined to become parties to the NPT: India, Israel, Pakistan, South Sudan, and the Democratic People’s Republic of Korea (which withdrew from the treaty in 2003).⁵⁵

Characteristic of the NPT is its combination of nuclear nonproliferation goals with the promotion of “peaceful” uses of nuclear technology. Under Article I, nuclear-weapon states parties commit “not to transfer . . . nuclear weapons or other nuclear explosive devices or control over such weapons or explosive devices,” nor to “assist, encourage, or induce”

⁴⁷ Treaty on the Non-Proliferation of Nuclear Weapons, *opened for signature* July 1, 1968, 21 UST 483, 729 UNTS 161 (entered into force March 5, 1970), available at <http://www.un.org/disarmament/WMD/Nuclear/NPTtext.shtml> [hereinafter Nuclear Non-Proliferation Treaty].

⁴⁸ STEPHEN J. WHITFIELD, THE CULTURE OF THE COLD WAR 1–25, 203–31 (2d ed. 1996).

⁴⁹ MOHAMED SHAKER, THE NUCLEAR NONPROLIFERATION TREATY: ORIGIN AND IMPLEMENTATION 1959–1979, VOL. 1, at 5 (1980). See also JOYNER, *supra* note 44, at 3–11.

⁵⁰ SHAKER, *supra* note 49

⁵¹ JOYNER, *supra* note 44, at 7.

⁵² *Id.* at 9.

⁵³ *Id.* at 8. See Nuclear Non-Proliferation Treaty, *supra* note 47, Art. IX, para. 3.

⁵⁴ UNODA, *Treaty on the Non-Proliferation of Nuclear Weapons, Status of the Treaty*, at <http://disarmament.un.org/treaties/t/npt> (last visited Mar. 28, 2017).

⁵⁵ UNRCPD, *Nuclear Non-Proliferation Treaty*, at <http://unrcpd.org/wmd/the-nuclear-non-proliferation-treaty> (last visited Mar. 28, 2017).

non-nuclear-weapon states to manufacture or acquire them.⁵⁶ No prohibition is thereby imposed on cooperative nuclear weapons development among nuclear-weapon states, nor on transfers by nuclear-weapon states of components of, or information and materials related to, such weapons and devices.⁵⁷ Non-nuclear-weapon states parties, on the other hand, are bound by Article II not to receive transfers of, manufacture, or otherwise acquire, seek, or receive assistance in the manufacture of such weapons or devices.⁵⁸ Pursuant to this undertaking, non-nuclear-weapon states parties are required by Article III to conclude safeguards agreements with the IAEA to verify fulfillment of their NPT obligations—transfers of “source or special fissionable material” or related equipment to such states can only occur under the rubric of such safeguards.⁵⁹ Also provided by the NPT are state commitments to: facilitate exchange in “equipment, materials and scientific and technological information for the peaceful uses of nuclear energy”; and make available the “potential benefits” from peaceful applications of nuclear explosions to non-nuclear-weapon states on a nondiscriminatory basis and “under appropriate international observation.”⁶⁰ Further, parties to the NPT also undertake to pursue good faith negotiations toward “a treaty on general and complete disarmament under strict and effective international control.”⁶¹

The sensory economy contemplated by the NPT is marked by at least five characteristics. *First*, this economy is in large part an ocular one. The NPT prioritizes “observation”: a priority also apparent in the system of safeguards prescribed in INCIRC/153, the document adopted in 1972 which set out “The Structure and Content of Agreements between the [International Atomic Energy] Agency and States Required in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons.”⁶² The two main “verification” mechanisms which INCIRC/153 provides are: (1) recordkeeping and reporting on the part of non-nuclear-weapon states, on the one hand (including maintenance of a “system of accounting . . . and control”); and (2) the conducting of “observations” and “examination” by the IAEA through the medium of “Agency inspectors,” on the other.⁶³

Even so, this ocular economy is not uniform or comprehensive in its sweep. Rather, it is telescopic; it is predicated on the privileging of, and attribution of depth and meaning to, certain sites and scenes, and the assumption of a partially obscured, yet penetrating, confidential viewpoint on those. Access to these sites is conditional on adherence to a carefully moderated style of address or exchange between inspector and inspectee. This is comparable to the generation of a perspectival illusion of depth on a two-dimensional surface through the

⁵⁶ Nuclear Non-Proliferation Treaty, *supra* note 47, Art. I.

⁵⁷ JOYNER, *supra* note 44, at 11.

⁵⁸ Nuclear Non-Proliferation Treaty, *supra* note 47, Art. II.

⁵⁹ *Id.* Art. III. For wider-angle insights into the work of the IAEA, see DAVID FISCHER, HISTORY OF THE INTERNATIONAL ATOMIC ENERGY AGENCY: THE FIRST FORTY YEARS (1997) (narrating the history of the IAEA from 1957 to 1997); Gabrielle Hecht, *The Power of Nuclear Things*, 51 TECH. & CULTURE 1, 8 (2010) (arguing that the IAEA’s “distinctions about nuclearity” serve in part to constitute “a technopolitical frame for global trade”).

⁶⁰ Nuclear Non-Proliferation Treaty, *supra* note 47, Arts. IV–V.

⁶¹ *Id.* Art. VI.

⁶² IAEA, *The Structure and Content of Agreements Between the Agency and States Required in Connection with the Treaty on the Non-proliferation of Nuclear Weapons* (June 1, 1972), at <https://www.iaea.org/sites/default/files/publications/documents/infcircs/1972/infcirc153.pdf> [hereinafter INF CIRC/153]. See JOYNER, *supra* note 44, at 20.

⁶³ INF CIRC/153, *supra* note 62, paras. 7–9, 31–32, 51–90.

guided interaction of painter and viewer, or (in the case of the written word) writer and reader, and the “parceling out of the visible and the invisible” effected thereby.⁶⁴ In both settings, the propriety and impropriety of certain forms of conduct and human-nonhuman interaction are matters to which particular attention is devoted in order to produce the desired perceptive effect. Consider, for instance paragraph 87 of INFCIRC/153, which provides that inspectors “shall carry out their activities in a manner designed to avoid hampering or delaying the construction, commissioning or operation of facilities.”⁶⁵

By this means (as a *second* noteworthy feature), the NPT constitutes a class of officials charged with registering worldly phenomena and maintaining the global sensorium on the behalf of all. Throughout the *fin de siècle* of the 20th and the early 21st century, such figures were popularly and credibly embodied by the directors general of the IAEA: Dr. Hans Blix (who headed the IAEA from 1981 to 1997 and later led the UN Monitoring, Verification and Inspection Commission (UNMOVIC) in charge of monitoring Iraq); and Dr. Mohamed ElBaradei (who headed the IAEA between 1997 and 2009).⁶⁶ Blix was at the center of public controversy preceding the 2003 invasion of Iraq.⁶⁷ Later, he was honored with a range of awards attesting to the stance he took at that time as well as his broader service, including the Sydney Peace Prize in 2007, and a Fulbright Prize in 2014.⁶⁸ ElBaradei was a recipient of the 2005 Nobel Peace Prize (together with the IAEA itself) and much celebrated as a truth-teller in an “age of deception.”⁶⁹

The world of the NPT is to be made so through the movement and sensory intake of specially anointed bodies such as Blix’s, ElBaradei’s, and those of the teams of inspectors that they have led. To the task of detecting worldly phenomena, these figures are expected to bring a particular set of dispositions, inculcated by training. Hans Blix is reported to have told trainees in February 2003 that an inspector should be “driving and dynamic—but not angry and aggressive”; “ingenious—but not deceptive”; capable of “keeping some distance—but not arrogant or pompous”; and able to maintain a facility for the “craft and tools of inspection.”⁷⁰ This is a role to which IAEA inspectors are also expected to bring formal qualifications—credentials that must be made known to the state in question and may inform that state’s acceptance or not of the inspector’s designation.⁷¹ Even so, their capacity to draw on banks of expert knowledge does not sustain IAEA inspectors’ authority under the NPT; this is not a case of some epistemic community bearing down on the international legal

⁶⁴ RANCIÈRE, *supra* note 14, at 19.

⁶⁵ INFCIRC/153, *supra* note 62, para. 87 (emphasis in original).

⁶⁶ IAEA, *Biography of Hans Blix*, at <https://www.iaea.org/about/dg/blix/biography> (last visited Mar. 28, 2017).

⁶⁷ Helena Smith, *Blix: I Was Smeared by the Pentagon*, GUARDIAN (June 11, 2003), at <http://www.theguardian.com/world/2003/jun/11/iraq.usa>. See generally HANS BLIX, DISARMING IRAQ (2004).

⁶⁸ Sydney Peace Found., *Hans Blix, 2007*, at <http://sydneypeacefoundation.org.au/peace-prize-recipients/2007-hans-blix> (last visited Mar. 28, 2017); Fulbright Ass’n, *Past Laureates of the Fulbright Prize, 2014 – Hans Blix*, at <http://fulbright.org/fulbright-prize/past-prize-laureates> (last visited Mar. 28, 2017).

⁶⁹ Nobel Prize, *Mohamed ElBaradei – Biographical*, at http://www.nobelprize.org/nobel_prizes/peace/laureates/2005/elbaradei-bio.html (last visited Mar. 28, 2017). The latter was the title of ElBaradei’s 2011 memoir: MOHAMED ELBARADEI, THE AGE OF DECEPTION: NUCLEAR DIPLOMACY IN TREACHEROUS TIMES (2011).

⁷⁰ Scott Ritter, *We Ain’t Found Shit*, 37 LONDON REV. BOOKS 35 (July 7, 2015).

⁷¹ INFCIRC/153, *supra* note 62, para. 85.

order by force of scientific expertise.⁷² The state may decline to accept an inspector's designation and the IAEA may withdraw that designation (at the request of the state of inspection or at its own initiative) at any time without explanation.⁷³ Rather, it is through the generation, recording, processing, and transmission of sense data in a manner and style appropriate to their office that the currency of IAEA inspectors' authority may be kept in circulation.⁷⁴

Of particular significance to the NPT's operation in this respect is the passage of texts through the hands of such official sensors. The NPT is, in this sense, a manual arrangement—a *third* noteworthy aspect of its sensory economy. It contemplates the physical handling and examination of descriptions, inventories, documents, reports, files, and copies of files.⁷⁵ And their analysis, for the most part, is made contingent on the human faculties and intuitions of those inspectors proposed by the director general of the IAEA (and accepted by the state in question) as they engage in the ritualized “performance of inspections.”⁷⁶

A *fourth* characteristic of the sensory economy of the NPT is that it presumes that the small is revelatory of the large. This is apparent in the focus on sampling evident in both the NPT and associated texts: INF/CIRC/153, discussed above; and the later Model Additional Protocol, INF/CIRC/540, adopted in 1997 in the aftermath of the First Gulf War.⁷⁷ The latter was designed to bolster the powers of IAEA inspectors and remedy the weakness of the safeguards regime that had become apparent in the unearthing of a significant, clandestine nuclear weapon program in Iraq, maintained despite it being a non-nuclear-weapon state party to the NPT.⁷⁸ “In order to ensure optimum cost effectiveness,” INF/CIRC/153 provides that use should be made of “statistical techniques and random sampling to evaluate the flow of *nuclear material*.⁷⁹ Similarly, INF/CIRC/540 provides for the “collection of environmental samples” (both location-specific and wide-area samples) alongside visual observation, the use of radiation detection devices, and “other objective measures which have been demonstrated to be technically feasible.”⁸⁰

These international legal instruments thus rely on that “economical metonymy . . . by which a tiny part allows the grasping of the immense whole.”⁸¹ Through the collection, transfer, analysis, and description of samples, the NPT and associated agreements provide for the

⁷² But see THE ROLE OF ‘EXPERTS’ IN INTERNATIONAL AND EUROPEAN DECISION-MAKING PROCESSES, *supra* note 17 (analyzing experts’ role at the international and European levels in the policy areas of environment, trade, human rights, migration, and financial regulation).

⁷³ INF/CIRC/153, *supra* note 62, paras. 9, 49–69.

⁷⁴ This seems in tension with Michael Power’s widely read account of the “drift from an inspection style to an audit style of oversight” with audit style treating “the management system as its primary object” whereas inspection style “focuses more on the substantive conduct of the inspectee” (although it is “difficult to distinguish definitively between them”). See MICHAEL POWER, THE AUDIT SOCIETY: RITUALS OF VERIFICATION 130–31 (1997).

⁷⁵ INF/CIRC/153, *supra* note 62, paras. 51–69, 74–75.

⁷⁶ *Id.*, paras. 8–9, 88.

⁷⁷ INF/CIRC/153, *supra* note 62; IAEA, *Model Protocol Additional to the Agreement(s) Between State(s) and the International Atomic Energy Agency for the Application of Safeguards* (Sept. 1, 1997), at <https://www.iaea.org/sites/default/files/infocirc540.pdf> [hereinafter INF/CIRC/540].

⁷⁸ Theodore Hirsch, *The IAEA Additional Protocol: What It Is and Why It Matters*, 2004 NON-PROLIFERATION REV. 140, 143 (2004).

⁷⁹ INF/CIRC/153, *supra* note 62, para. 6.

⁸⁰ INF/CIRC/540, *supra* note 77, Arts. 5(c), 6, 9, 18(f), 18(g).

⁸¹ Bruno Latour, *Circulating Reference. Sampling the Soil in the Amazon Forest*, in PANDORA’S HOPE: ESSAYS ON THE REALITY OF SCIENCE STUDIES 24, 36 (1999).

specifics of the localities on which they focus to expand and change. In this way, samples yield far more sense data than they might otherwise and circulate along a far more expansive route than they might traverse by other means.⁸² In particular, they come to speak to the question of a state's adherence to, or diversion from, the pathway of nuclear energy's peaceful uses.⁸³

Fifth, and finally, the NPT and related protocols establish a proprioceptive sensory scheme: that is, they generate information about bodies' and objects' positions in and movements through space, and direct such movements accordingly. They do this in a narrative register: providing for the creation and circulation of "descriptions" of the "general arrangement," "layout," and "features" of facilities relevant to the safeguarding of nuclear material and of the uses and locations of nuclear material, for instance, and of "the sequence of the actions taken" to prepare certain inventories.⁸⁴ They do this also through measurement and physical containment measures (such as "seals and other . . . tamper indicating devices") and reporting of transfers of nuclear material.⁸⁵ Proprioceptive information is gathered and organized, too, through provision for IAEA inspectors' access to certain locations, without "undue concentration on particular *facilities*."⁸⁶ Again, bodies and information must circulate along specified paths in order to generate the references and assurances demanded of them by the NPT and related agreements.

Within and around the sensorium just described, there are also broader and narrower configurations of sense and capacity related to it. There is the broader distribution of "responsibility" alluded to above, whereby nuclear-weapon states parties to the NPT are vested with certain dispositions and freedoms (individual and collaborative), while non-nuclear-weapon states parties are "safeguarded" and shepherded along a path of "peaceful use," risk-laden and volatile. There is also a narrower arrangement of confidences nestled within this sensorium, whereby "confidential information" must be subject to a "stringent regime to ensure effective protection against disclosure . . ."⁸⁷ Within the sensorium of the NPT, the incidence of "proprietary or commercially sensitive information or design information" elicits a tailored sensory approach, overlaid with imperatives associated with the market.⁸⁸

Far from setting all things and people on a single, common plane, or purporting to gaze upon them from some higher vantage point, the NPT and related legal instruments follow an array of interlocking sensory routes and set in motion a variety of sensory practices and interactions, always anticipating the prospect of failure, omission, obstruction, and friction. The IAEA "shall not mechanistically or systematically seek to verify the information" reported to it, INF/CIRC/540 stipulates, despite that instrument's apparent effort "to transform IAEA inspectors from accountants to detectives."⁸⁹ Rather, the tenor of those inspectors' sensory work is to remain intensely human, guided by the intuitions, stylized dispositions, and multisensory capacities of the body.

⁸² On the notion of "circulating reference" being drawn upon here, see *id.*

⁸³ INF/CIRC/153, *supra* note 62, para. 1; Nuclear Non-Proliferation Treaty, *supra* note 47, Art. III, para. 1.

⁸⁴ INF/CIRC/153, *supra* note 62, paras. 43(b)–(c), 49(a), 58(c), and, for the definition of a "facility" to be so described, para. 106; INF/CIRC/540, *supra* note 77, Art. 2.

⁸⁵ INF/CIRC/153, *supra* note 62, paras. 74–75, 91–97; INF/CIRC/540, *supra* note 77, Art. 6(a).

⁸⁶ INF/CIRC/153, *supra* note 62, paras. 76–82; INF/CIRC/540, *supra* note 77, Arts. 4–9 (emphasis in original).

⁸⁷ INF/CIRC/540, *supra* note 77, Art. 15.

⁸⁸ *Id.* Art. 14(b).

⁸⁹ Hirsch, *supra* note 78, at 143.

Relatively few dimensions of this sensory work will be familiar to those to whom it is broadly of concern. Not many people understand the specialized vocabulary, equipment, or protocols of inspection under the NPT. Opportunities for public witnessing of this work are extremely limited. Nonetheless, the operation of the NPT and related instruments depends on the continuous, ritualized circulation of sense data and the disposition and status of the bodies, objects, and procedures through which that data are understood to pass. Over and above any question of the juridical soundness of its principles, their representation of social habit, or their defense of elite interests, it is this sensory economy which sustains what one scholar of the NPT has referred to as the “normative and legal weight of the [NPT] regime.”⁹⁰

The manual reports and telescopic inspections, for which the NPT and related instruments provide, anticipate objects and machines playing significant roles; they occasion a wide range of human-nonhuman alliances. These involve documents, files, transportation technologies, “instruments and other measuring and control equipment,” “tamper-indicating devices,” surveillance technology, “radiation detection and measurement devices,” communication systems, including satellite systems, and the many different types of technology described in the Annexes to INFCIRC/540.⁹¹ Thus, the heightened automation of sense—and expectation of its further automation—which we will turn in Part IV of this article does not represent abandonment or replacement of the sensorium installed by the NPT and related instruments so much as its extension and reorientation, with which significant redistributions of competence and authority are associated. Before turning to that redistribution, however, let us examine a further dimension of the sensory economy elicited and maintained by international law and policy—that surrounding the detection of refugee migration.

Sensing Mass Migration

Mass movement of persons is not *per se* a phenomenon of which public international law doctrine and international institutions seek to keep track. However, when persons moving in significant numbers are identified—or self-identify—as refugees in large part, their movement is taken to warrant international legal notice, monitoring, and response. The large-scale claiming or determination of refugee status is symptomatic for international lawyers of “breaches of human rights standards or . . . the collapse of an existing social order in the wake of revolution, civil strife, or aggression . . .” and so of the prospect or actuality of politico-legal disorder.⁹² Such phenomena trigger international legal obligations on the part of states to take measures to try to bring those migrating within the protective embrace of a sovereign state and thereby restore a sense of global order premised on the coexistence of such politico-territorial units. They also trigger authority and entitlement on the part of international institutions, especially the UNHCR.⁹³

⁹⁰ Joseph F. Pilat, *The Future of the NPT*, in ROUTLEDGE HANDBOOK OF NUCLEAR PROLIFERATION AND POLICY 131, 139 (Joseph F. Pilat & Nathan E. Busch eds., 2015).

⁹¹ INFCIRC/153, *supra* note 62, paras. 74–75; INFCIRC/540, *supra* note 77, Arts. 6, 14. For background on the controversies and sensitivities surrounding the IAEA gaining access to, and relying on, intelligence data gleaned from satellites under individual nations’ control, see FISCHER, *supra* note 59, at 283.

⁹² GUY S. GOODWIN-GILL & JANE MCADAM, THE REFUGEE IN INTERNATIONAL LAW 1 (2d ed. 2007).

⁹³ *Id.*; see also Fleur Johns, *The Madness of Migration: Disquiet in the International Law Relating to Refugees*, 27 INT'L J. L. & PSYCH. 587, 588 (2004) (discussing the tendency of “international refugee law . . . to foster a sense that multivalent allegiance and migratory diffusion are deviant, unnatural impulses”).

Like the sensory economy manifest in international law and policy regarding nuclear non-proliferation, that surrounding refugees is designed to be sensitive to, and (ideally) preventative of, threats of violence and disorder. Once again, however, this article offers no more than a snapshot of that sensory economy. It does so through a focus on selected instruments representative of international law and policy in this field from a certain period. In this case, the instruments in question are two UNHCR policy manuals from the mid-1990s. The first, published by the UNHCR in January 1994, is entitled *Registration: A Practical Guide for Field Staff* (1994 UNHCR Guide).⁹⁴ This is designed to guide UNHCR field workers in grappling “with the problem of collecting data about refugees who need protection or assistance,” primarily through “registration” or recording information about individuals or families that will serve identification and programming purposes.⁹⁵ A related manual, published in June 1997, is concerned with the design and implementation of systems for the distribution of resources to those seeking humanitarian assistance from the UNHCR: the *Commodity Distribution Guide for Field Staff* (1997 UNHCR Guide).⁹⁶

In contrast to the status and aims of the NPT, both of the aforementioned manuals present practical knowledge drawn from the experience of UNHCR field workers and extract from that “current best practice which must be adapted to the particular circumstances of your operation” as of the mid-1990s, or “a kind of ‘toolbox’ . . . [to] be applied or adapted to various situations . . .”⁹⁷ As such, they represent an instance of what international lawyers commonly characterize as “soft law”: norms that tend to guide behavior pedagogically and demonstratively, rather than prescriptively or by recourse to formal sanction.⁹⁸

Sensing Refugees in the Mid-1990s

Six features of the sensory economy advanced in the 1994 and 1997 UNHCR Guides merit highlighting alongside the practices described above and below in Part IV.

First, both the 1994 UNHCR Guide and the 1997 UNHCR Guide emphasize the direct participation, of those whose susceptibility to UNHCR authority and eligibility for UNHCR assistance are being assessed, in the economy of their detection and evaluation. The process of detecting refugees’ presence and ascertaining their needs is cast as an interactive and, at least potentially, reflexive process. The objects or targets of sense are expected to become sensing

⁹⁴ UNHCR, REGISTRATION: A PRACTICAL GUIDE FOR FIELD STAFF (Jan. 1, 1994), available at <http://reliefweb.int/sites/reliefweb.int/files/resources/AD0FDA8A15FAB9EEC1256D360037732C-hcr-register.pdf> [hereinafter 1994 UNHCR Guide].

⁹⁵ *Id.*

⁹⁶ UNHCR, COMMODITY DISTRIBUTION: A PRACTICAL GUIDE FOR FIELD STAFF (June 1997), at <http://www.unhcr.org/3c4d44554.html> [hereinafter 1997 UNHCR Guide]. For insight into practices of refugee registration, identification, and counting beyond the scope of these manuals, and ways in which these play into the global politics of refugee protection and aid distribution, see Barbara Harrell-Bond, Eftihia Voutira & Mark Leopold, *Counting the Refugees: Gifts, Givers, Patrons and Clients*, 5 J. REFUGEE STUD. 205 (1992); Alice Edwards, *A Numbers Game: Counting Refugees and International Burden-Sharing*, 32 U. TASMANIA L. REV. 1 (2013); Roger Zetter, *Labelling Refugees: Forming and Transforming a Bureaucratic Identity*, 4 J. REFUGEE STUD. 39 (1991).

⁹⁷ 1994 UNHCR Guide, *supra* note 94; 1997 UNHCR Guide, *supra* note 96.

⁹⁸ See Gunther F. Handl, W. Michael Reisman, Bruno Simma, Pierre Marie Dupuy & Christine Chinkin, *A Hard Look at Soft Law*, 82 ASIL PROC. 371 (1988); Anna di Robilant, *Genealogies of Soft Law*, 54 AM. J. COMP. L. 499 (2006).

subjects themselves, cultivating and contributing expertise on their own condition.⁹⁹ The “we” to be interpellated by the 1994 UNHCR Guide and the 1997 UNHCR Guide, and associated circulation of data, is thus configured quite differently to the “we” called forth by the NPT, which tends to be assembled among, around, or in opposition to states.

Accordingly, the 1994 UNHCR Guide advocates “actively promot[ing] community understanding and responsibility in registration activities”¹⁰⁰ It emphasizes the “usefulness” of “working with the refugee population over a prolonged period” and “promoting community responsibility and participation in all stages of the process”—both for the task of registration and in the forging of “durable solutions for the population concerned.”¹⁰¹ UNHCR field workers are advised to “first . . . consider whether, given the necessary support and tools, [the target population] could organize a satisfactory registration system for themselves” and where this is not possible, to retain the local population’s involvement.¹⁰² “[E]ven in the most uncooperative situation,” the 1994 UNHCR Guide insists, “there should be involvement of both parties [that is, the UNHCR and the target population] in the planning and information phase” of refugee registration.¹⁰³ “It is vital,” the 1994 UNHCR Guide continues, “to convince the population that it is in their own interests to cooperate with a registration exercise.”¹⁰⁴

Similarly, one of the 1997 UNHCR Guide’s “key points” is that those responsible for distributing assistance must involve and inform the refugees in question in the process of determining and addressing their needs:

Refugees should be able to see the distribution process for themselves. Involve them directly, don’t let information on the distribution process come to them only through their leadership. Ensure the participation of the refugees (women and men) at all levels of the distribution process.¹⁰⁵

In contrast to the NPT’s reliance on state reporting, sensory inputs from refugees are not to be mediated through the leadership of sovereign states, nor even through their own leadership; would-be leaders within refugee communities attract circumspection on the part of the UNHCR. “Any well-designed distribution system must provide a way to keep refugees continuously and directly informed (i.e., not just through the refugee leadership),” the 1997 UNHCR Guide insists.¹⁰⁶

Second, the sensory economy that the 1994 UNHCR Guide seeks to establish and maintain is not primarily an ocular economy premised on observation. Instead, it is in large part a tactile economy, premised on the marking, mingling, touching, and handling of bodies. For purposes of “fixing” a refugee population, for instance, or “defining the target group for [initial] registration,” the following options are presented in the 1994 UNHCR Guide: affixing

⁹⁹ *Contra* Harrell-Bond, Voutira & Leopold, *supra* note 96, at 211 (arguing that “the attitudes of assistance agencies themselves lead to disbelief of any self-generated estimates of refugee numbers . . . ”).

¹⁰⁰ 1994 UNHCR Guide, *supra* note 94, pt. 2, para. 7.3.

¹⁰¹ *Id.*, pt. 2, para. 7.3; pt. 3, para. 1.2.

¹⁰² *Id.*, pt. 2, para. 7.11.

¹⁰³ *Id.*

¹⁰⁴ *Id.*, pt. 4, para. 6.2(e).

¹⁰⁵ 1997 UNHCR Guide, *supra* note 96, *Key Points*.

¹⁰⁶ *Id.*, sec. 1.4.5.

wristbands, handing out fixing tokens, temporary cards, or marking hands with gentian violet antiseptic dye—either by moving “house to house” among a refugee population, or by having that population pass through designated registration points. A further alternative entails requiring refugees to enter an enclosure for a specified period for purposes of registration staff, bearing identifying armbands, issuing fixing tokens to them “simultaneously.”¹⁰⁷ For purposes of estimating the size of a refugee population, the 1994 UNHCR Guide recommends “organiz[ing] a headcount in the camp or centre” or “during an influx at entry points, bridges or transportation points.”¹⁰⁸ Aerial photography is recommended as a way of gaining “a ‘bird’s eye view’ of the camp,” to “prepare maps and to help estimate the population.”¹⁰⁹ Nonetheless, those who count are expected to move among the bodies that they are seeking to record—touching and marking them, adorning them, handing them tokens.

Third, the 1994 UNHCR Guide urges those working in the field not to individualize the targets of their sensory work. Rather, individuals are to be assembled in groups and recorded, addressed, and supported in some collective configuration—as a population, especially—for purposes of their engagement with the international legal system in question. In the 1994 UNHCR Guide, those planning to register refugees are advised to “consider . . . the characteristics of the population,” including “[n]ationality,” “ethnic origin(s),” and the “[p]revious refugee experience of [the] population” as a whole.¹¹⁰

In detecting a population as such, the 1994 UNHCR Guide also provides for the distribution of capacity unevenly across it. It is “usually necessary,” the Guide stipulates, “to identify those who are vulnerable, who are often the least likely to come forward and make their needs known”; likewise, the UNHCR must “[d]efine the number of people . . . who have special needs.”¹¹¹ The input of the self-sensing refugee alluded to above is, accordingly, to be distrusted; his or her sensory capacity is conditioned and must be supplemented and verified, especially when combined with vulnerability. In the 1994 UNHCR Guide, scarcity, sufficiency, incapacity, and capacity are to be distributed across a population through the mechanism of registration, although the basis for doing so is the “family registration form.”¹¹²

In the 1997 UNHCR Guide, the primary groupings into which refugees are corralled for recording purposes are those of family and nationality, the latter of which is determined by reference to citizenship, and other “group[ings] of beneficiaries based on their original administrative or social structure.”¹¹³ According to the 1997 UNHCR Guide, “the distribution system should aim to support the family Only in exceptional circumstances, and for short periods, should the focus of assistance move from the family level to individuals within the family.”¹¹⁴ In the case of “large populations,” the 1997 UNHCR Guide recommends “it may be useful to divide the camp into zones (or blocks),” but these are envisaged as being comprised of “groups of families of the same size.”¹¹⁵

¹⁰⁷ 1994 UNHCR Guide, *supra* note 94, pt. 2, para. 7.10; pt. 3, para. 2.2; pt. 4, paras. 1.7, 6.1, 6.3.

¹⁰⁸ *Id.*, pt. 4, para. 10.6.

¹⁰⁹ *Id.*, pt. 4, para. 10.8.

¹¹⁰ *Id.*, pt. 2, para. 7.12.

¹¹¹ *Id.*, pt. 2, paras. 1.3–1.4.

¹¹² *Id.*, pt. 2, para. 9.5.

¹¹³ 1997 UNHCR Guide, *supra* note 96, secs. 1.2, 3.1.

¹¹⁴ *Id.*, sec. 1.1.

¹¹⁵ *Id.*, sec. 3.5.

A *fourth* noteworthy feature of both the 1994 and 1997 UNHCR Guides is their framing of the economy of sense in transactional terms: as a series of “deals” whereby participation in “fixing, documentation and verification,” and associated data yield, are traded for certain “benefits” flowing to the “target population.”¹¹⁶ More than a matter of establishing reliable “ground truth” data, the 1994 UNHCR Guide envisages the determination of refugee numbers and needs as a matter of ongoing negotiation around “interests” and “investment[s],” approached with a view to the “honour[ing]” of “promises.”¹¹⁷ These deals in data depend upon persuasion, the 1994 UNHCR Guide makes clear, for which purpose the prospect of greater fairness for the “vast majority of people” must be “publicize[d]” in order to “outweigh initial resistance from a minority with vested interests.”¹¹⁸

The 1997 UNHCR Guide counsels fieldworkers in comparable terms as follows: “[t]he needs, and your assessment of them, will change with time, but at any given time it is assumed that you will have reached a consensus with key partners as to what they are.”¹¹⁹ This also entails reaching agreement around clearly defined roles for “key partners”: “It is important to know and appreciate the roles and responsibilities of the main actors involved at various stages of commodity distribution,” the 1997 UNHCR Guide stresses, as well as to monitor and report the equity of distributions made.¹²⁰ In the 1994 UNHCR Guide, those with recognized stakes in the “data deals” for which it provides include: “donors”; “the public”; “the host government”; the UNHCR; the World Food Program; and nongovernmental organizations, “in their capacity as operational partners.”¹²¹

Comparing this to the NPT, the latter does provide for safeguards agreements to be “negotiated and concluded” between the IAEA and non-nuclear-weapon state parties.¹²² Once acting under the rubric of such an agreement, however, the IAEA is invested with “jurisdiction” and capacity for “control” so long as that is exercised “for the exclusive purpose of verifying” the nondiversion of “source or special fissionable material” from “peaceful nuclear activities within the territory of the State.”¹²³ The NPT thus contemplates a far more durable, infrastructural, and concentrated distribution of sensory capacity than that envisaged by the 1994 and 1997 UNHCR Guides.

A *fifth* feature of the sensory economy fostered by the 1994 and 1997 UNHCR Guides is its emphasis on prior, accumulated knowledge, demanding that those charged with distributive evaluation “know the refugees” with whom they are called upon to deal, over and above any sensory data that they might draw directly from them.¹²⁴ In this version of a sensory economy, those wielding greatest authority according to law or policy must exercise not just their sensory faculties, but also their good sense or common sense. “Population estimation requires experience, prudence and good judgment,” counsels the 1994 UNHCR Guide.¹²⁵

¹¹⁶ 1994 UNHCR Guide, *supra* note 94, pt. 2, paras. 8.1–8.4.

¹¹⁷ *Id.*, pt. 2, paras. 5.1, 7.8, 8.4.

¹¹⁸ *Id.*, pt. 2, para. 8.3.

¹¹⁹ 1997 UNHCR Guide, *supra* note 96, sec. 1.4.1.

¹²⁰ *Id.*, secs. 1.2, 5.2.

¹²¹ 1994 UNHCR Guide, *supra* note 94, pt. 2, paras. 1.6, 10.1.

¹²² Nuclear Non-Proliferation Treaty, *supra* note 47, Art. III.

¹²³ INF/CIRC/153, *supra* note 62, para. 2.

¹²⁴ 1997 UNHCR Guide, *supra* note 96, sec. 1.4.2.

¹²⁵ 1994 UNHCR Guide, *supra* note 94, pt. 4, para. 10.5(c).

“Experience shows,” the 1997 UNHCR Guide instructs, “that it is essential to find out specific information concerning every distinct refugee group in order to provide appropriate services efficiently.”¹²⁶ For this reason, decision makers “must have specific information on the refugees, including on the population composition, gender and age, division of labour, access to and control of resources.”¹²⁷ Likewise, they must “know the policy of the host government regarding refugees,” including “land use, type of settlement, local economy, [and] job opportunities.”¹²⁸

In this characterization, sensory processing must be iterative, synthetic, and multisource, if it is to be authoritative. “It should be a rule of thumb in registration,” directs the 1994 UNHCR Guide, “that it is preferable to be receptive to a variety of indicators, allowing them to confirm or contradict each other, rather than taking a single indicator, such as a one-time ‘snap shot’ of physical presence, in isolation.”¹²⁹ “This approach,” the 1994 UNHCR Guide continues, “encourages openness on the part of respondents, and responsiveness on the part of the registration system itself”¹³⁰ Similarly, decisions regarding the “[t]argeting of assistance” must “reconcile a mix of objectives,” according to the 1997 UNHCR Guide.¹³¹

Sampling makes up a part of this mix, recalling the economical metonymy highlighted above with reference to the NPT.¹³² However, the sample is not envisaged as quite as rich and revelatory as in the nuclear nonproliferation context; rather, sampling is “a technique” among many, the results of which should be “fed back into the analysis . . . [to] help in elaborating a more detailed set of localized estimates.”¹³³ In other words, the small (or local) is expected to be revelatory, for the most part, of the small (or local).

Further, both the 1994 and 1997 UNHCR Guides contemplate the use of computers in sensory processing.¹³⁴ They do so, however, in limited and mostly instrumental terms, much as one might deploy a reliable underling to undertake a straightforward task. They envisage, for instance, the computerized generation of lists and cards and the processing of “very simple forms of documentation.”¹³⁵ As the 1994 UNHCR Guide puts it, quaintly: “[i]t is useful to ask the computer to provide you with a list of all records where there are considerable similarities [among registrants] ([e.g.,] 75 per cent of information is the same).”¹³⁶ In this sense, the sensory economy of the 1994 and 1997 UNHCR Guides is mostly manual.

In these respects, both the 1994 and 1997 UNHCR Guides cast sensory determination of worldly phenomena as a complex, creative, and intensely human process. According to this conception, the sensory “task [of the UNHCR] becomes that of the pragmatic manager of conflicting interests. Everything is dependent on . . . professional ability and good sense . . . [and]

¹²⁶ 1997 UNHCR Guide, *supra* note 96, sec. 1.4.2.

¹²⁷ *Id.*

¹²⁸ *Id.*, sec. 1.4.3.

¹²⁹ 1994 UNHCR Guide, *supra* note 94, pt. 2, para. 9.10.

¹³⁰ *Id.*

¹³¹ 1997 UNHCR Guide, *supra* note 96, sec. 2.1.

¹³² 1994 UNHCR Guide, *supra* note 94, pt. 4, para. 10.11.

¹³³ *Id.*, pt. 4, paras. 10.11(a), (g).

¹³⁴ *Id.*, pt. 4, para. 9.2; 1997 UNHCR Guide, *supra* note 96, secs. 3.5–3.6.

¹³⁵ 1994 UNHCR Guide, *supra* note 94, pt. 3, para. 2.3(b); 1997 UNHCR Guide, *supra* note 96, secs. 2.3, 3.5.

¹³⁶ 1994 UNHCR Guide, *supra* note 94, pt. 4, para. 9.2.

ability to manage the world order by equitable compromises. . . .”¹³⁷ As in the NPT and related practice, the sensory economy of international law and policy on refugees depends on the prevalence of faith in a class of officials, armed with accumulated “best practice” and “good sense,” who are charged with sensing the world, in all its multiplicity, on behalf of others. In the 1994 and 1997 UNHCR Guides, however, these officials are to remain in continuous negotiation with other sensory sources, including refugee bodies; no such input is contemplated by the NPT except through mechanisms of state reporting and intelligence cooperation.

Sixth, and finally, the 1994 and 1997 UNHCR Guides invite a particular relationship to uncertainty in the detection of worldly phenomena—that is, an approach attentive to, yet undeterred by, the ubiquity of falsehood. “In most situations, but particularly in emergencies, the exact number of persons of concern will evolve day by day” and “[t]here is no system capable of establishing daily numbers with complete accuracy,” observes the 1994 UNHCR Guide.¹³⁸ “Incorrect registration and cheating occurs in all situations and is impossible to stop completely,” that Guide continues.¹³⁹ In similar terms, the 1997 UNHCR Guide emphasizes that “[r]efugee situations evolve” and that “there is usually great uncertainty about numbers.”¹⁴⁰ Moreover, the “issue of population numbers” is recognized as “one linked to power and perspective.”¹⁴¹ Decision makers “may well have to organise distribution in . . . situation[s] of uncertainty,” the 1997 UNHCR Guide counsels.¹⁴² Uncertainty is, in this account, something with which field workers must continually wrestle, yet by which they need not be paralyzed. Rather, UNHCR fieldworkers are encouraged to “live with uncertainty.”¹⁴³ Grappling with uncertainty, and with associated differences of perception, is an indispensable part of maintaining a viable sensory economy on the global plane, according to the 1994 and 1997 UNHCR Guides.

From the NPT and related instruments, and the 1994 and 1997 UNHCR Guides, we can discern how international legal authority is sustained (in both “soft” and “hard” forms) through the continuous, ritualized circulation and translation of sensory data. Far from a common scheme aspiring to uniformity and universality, such as international law is often presumed to install, the sensory economy just described appears more a collection of traveling fairs, following divergent routes and relying on differing resources. In the foregoing account, clusters of some-time official sensors traffic the distinct sensory capacities with which they have been entrusted by international law and policy, struggling to sustain, through their combined endeavors and accumulated authority, the durable prospect of a sensory commons. This is no “catalaxy,” or “spontaneous order of the market,” animated by free choice and marked by competition; this sensory economy both demands and consolidates investments, collaborations, entrenchments, hierarchies, and accumulations of many kinds.¹⁴⁴

¹³⁷ MARTTI KOSKENNIEMI, THE GENTLE CIVILIZER OF NATIONS: THE RISE AND FALL OF INTERNATIONAL LAW 1870–1960, at 406 (2004).

¹³⁸ 1994 UNHCR Guide, *supra* note 94, pt. 2, para. 9.1.

¹³⁹ *Id.*, pt. 5, para. 4.1.

¹⁴⁰ 1997 UNHCR Guide, *supra* note 96, sec. 2.2.

¹⁴¹ *Id.*

¹⁴² *Id.*, sec. 6.2.

¹⁴³ *Id.*, sec. 2.2.

¹⁴⁴ *Contra* FRIEDRICH A. HAYEK, 2 LAW, LEGISLATION, AND LIBERTY: THE MIRAGE OF SOCIAL JUSTICE 107, 109 (1978).

International legal infrastructure both sustains and is sustained by the uneven circulation of data and the variable distribution of sensory capacity.

Sensing bodies do not predate the operation of this juridical sensorium, existing in some preverbal, prelegal condition of authenticity.¹⁴⁵ Rather, sensing bodies are vital to the maintenance of legal authority on the global plane—hence the preoccupation of international legal instruments and institutions with distributing them and vesting them with distinct competencies and powers of attestation. International legal authority thus depends not so much on the disciplining of sensing bodies through forces of reason, abstraction, or temperance as on practices of enabling, enrolling, and mobilizing sensing bodies, setting them on winding and interlocking paths of inquiry, dissemination, and distribution.¹⁴⁶ It is in this way that, for all the divergences just described, international legal work strives to make possible experiences of collectively inhabiting a common sense-world or global sensorium and by this means, however contentiously, sustains the authority of international law and policy to act upon that world.

IV. SHIFTS IN THE SENSORY ECONOMY OF INTERNATIONAL LAW

Part III of this article sought to show how significant the uneven circulation and translation of sense data has been (and remains) to the efficacy and authority of international law and policy and to sketch some different configurations and modes in which this circulation has taken place. We turn now to the claim made earlier in the article regarding change in the sensory economy just described. The intuition pursued in this Part IV is that some conventional routes of sensory circulation may be in the process of being redirected through media (devices, institutions, bodies, and techniques) that do not generate the same yield of authority, faith, and common sense as those described in Part III. A further, related intuition is that this may call into question the continued “weight” or “pull” of international law and policy, posing challenges for those committed to sustaining that weight or pull.¹⁴⁷ This Part IV will present some features emergent in contemporary technical practices of nuclear nonproliferation and refugee registration in order to explore possible ramifications for international law and policy of changing modes of detection, monitoring and verification. Following the sequence of Part III, let us begin with shifts in the practice of monitoring nuclear materials’ movement.

¹⁴⁵ *Contra* Andreas Philippopoulos-Mihalopoulos, *Atmospheres of Law: Senses, Affects, Lawscapes*, 7 EMOTION, SPACE & SOC’Y 35 (2013) (emphasizing law’s regulation and control of the sensing body, although Philippopoulos-Mihalopoulos does not, admittedly, posit a prelegal, authentic mode of bodily existence as such).

¹⁴⁶ *Contra* Danilo Mandic, Caterina Nirta, Andrea Pavoni & Andreas Philippopoulos-Mihalopoulos, *Introduction: Law and Taste* 5 (The Westminster Online Working Papers Series, Law and the Senses Series: The Taste Issue, 2013), available at <https://nonliquefiedlaw.files.wordpress.com/2013/05/law-and-the-sense-s-taste.pdf> (“[S]ince [it is] deemed much too close to the animal, the elemental, the corporeal . . . taste has to be controlled, disciplined and moderated, to avoid it turning into a capital vice (gluttony.”).

¹⁴⁷ The reference to law and policy having “weight” makes use of a phrase in Pilat, *supra* note 90, at 139 (discussing the “normative and legal weight of the [NPT] regime”). Regarding the “pull” to/of law and lawfulness, there are many scholarly accounts of this phenomenon and how it may be sustained. One of my favorites, albeit not one directly transposable here, is Duncan Kennedy’s account of an encounter with a rule that “just applies itself” in the course of adjudication. See Duncan Kennedy, *Freedom and Constraint in Adjudication: A Critical Phenomenology*, 36 J. LEG. EDUC. 518, 520 (1986).

Remote Sensing Weapons

Despite the elaborate normative and sensory infrastructure described in Part III, perhaps nowhere are the limits of human perception on the global plane more acutely felt than in the field of nuclear nonproliferation. This awareness may be all the more painful because of its coexistence with a sense of humans' sublime destructive potential. Humans have demonstrated seemingly infinite capacity to devise ways to kill one another and destroy nonhuman forms of life—continuing innovation surrounding nuclear weaponry and related technologies being one expression of that. Yet human faculties have proven consistently wanting in detecting nuclear proliferation efforts secreted by those responsible for them. The IAEA's gross underestimation of the state of Iraq's uranium enrichment program that became apparent after the end of the First Gulf War in 1991, noted above, despite years of apparent compliance by Iraq with its NPT obligations, was the subject of public derision and IAEA self-criticism.¹⁴⁸ As television viewers around the world watched a standoff between Iraqi police and soldiers and some forty-four IAEA inspectors in a Baghdad car park in September 1991, IAEA inspection appeared more a matter of smash-and-grab spectacle (featuring a miscast group of global extras) than the overseeing of a decorous, reliable, and measurable flow of data.¹⁴⁹ To the extent that clandestine uranium enrichment efforts have become known, this has often seemed to depend more on chance than treaty compliance. Insight into the North Korean nuclear program, for example, emerged from the "weird access" afforded Stanford Professor Siegfried Hecker and academic colleagues during visits to that country, most notably in 2010.¹⁵⁰

These sensory failings, combined with other factors, have informed a growing conviction that the future of nuclear nonproliferation lies, at least in part, with automation and computation. The range and complexity of technologies deployed, or projected to be deployed, in the course of monitoring and verification under the NPT (and otherwise by the IAEA and comparable bodies) are too great to survey here. A January 2014 workshop convened by the IAEA entitled "Scanning the Horizon: Novel Techniques and Methods for Safeguards" discussed, for example, statistical methods, robotics, and machine-aided techniques for analyzing material of unknown composition, among them: active neutron interrogation (direct measurement of the fissile content of irradiated fuel using a large neutron source to induce fission); and x-ray fluorescence (measurement of the frequency, wavelength, energy, and intensity of electromagnetic radiation—that is, x-rays—emitted by a material that has been bombarded with x-rays or gamma rays).¹⁵¹ The range of technologies discussed at an October

¹⁴⁸ Gary Milhollin, *The Iraqi Bomb*, NEW YORKER, Feb. 1, 1993, at 47; ELBARADEI, *supra* note 69, at 9–28.

¹⁴⁹ Philip Towle, *The Disarmament of Iraq: Precedents and Prospects*, 12 DEFENSE ANALYSIS 53, 57 (1996); *Iraq: A Deadly Game of Chicken*, TIME (Oct. 7, 1991), at <http://content.time.com/time/magazine/article/0,9171,973980,00.html>.

¹⁵⁰ Adam Gorlick, *Stanford's North Korea Team of Siegfried Hecker and John Lewis Keeps the World Informed of Pyongyang Nuclear March*, STANFORD NEWS (Nov. 30, 2010), at <http://news.stanford.edu/news/2010/november/hecker-lewis-cisac-113010.html>.

¹⁵¹ IAEA, *Strengthening the Effectiveness and Improving the Efficiency of Agency Safeguards*, General Conference, GC (58)/16, 3 (Aug. 5, 2014), at https://www.iaea.org/About/Policy/GC/GC58/GC58Documents/English/gc58-16_en.pdf; JAMES DOYLE, NUCLEAR SAFEGUARDS, SECURITY AND NONPROLIFERATION: ACHIEVING SECURITY WITH TECHNOLOGY AND POLICY 74 (2011); EUGENE P. BERTIN, PRINCIPLES AND PRACTICE OF X-RAY SPECTROMETRIC ANALYSIS 6–12, 89–92 (2012); HEM RAJ VERMA, ATOMIC AND NUCLEAR ANALYTICAL METHODS: XRF, MöSSBAUER, XPS, NAA AND ION-BEAM SPECTROSCOPIC TECHNIQUES 1–2, 19 (2007).

2014 IAEA Symposium on International Safeguards included: satellite imaging and image processing capabilities; developments in spectrometry and spectroscopy; surveillance technologies, remote monitoring instruments, electronic seals, and associated data systems; techniques and software for quantification of detection probabilities and error rates (including open source data analysis); training applications of virtual reality software; modeling and simulation technologies; communication systems; materials accountancy software; sampling and containment technologies; information management, data mining, and pattern recognition software; and more.¹⁵²

Technologies for detecting, analyzing, and cross-correlating seismo-acoustic signals, infrasound, and radioactive particles are also projected to play a significant role in nuclear nonproliferation and related endeavors. The Comprehensive Test-Ban-Treaty Organization (CTBTO) is said to operate “170 seismic stations worldwide, 11 under hydroacoustic centres detecting sound waves in the oceans, 60 listening stations for atmospheric infrasound (low-frequency acoustic waves that can travel long distances) and 96 labs and radionuclide-sampling facilities.”¹⁵³ This reportedly represents “the optimal number [of autonomous sensors] for global coverage” so that it is “now impossible to test even a small nuclear weapon in secret anywhere on earth.”¹⁵⁴ Even so, the CTBTO is committed to installing an even more comprehensive network of 337 seismic, hydroacoustic, infrasound, and radionuclide detecting stations.¹⁵⁵

In the nuclear nonproliferation context, these technologies seem, to many, to hold out the prospect of the world’s unconcealment: that is, a renewal of the hope that we (at least a “we” that has access to the relevant data or representations of those data) might more fully inhabit a common sensory domain on the global plane; that all might come to know and grapple with more or less the same basic facts about the world, at more or less the same time.¹⁵⁶ “What we’re really aiming for is continuous high sensitivity of the entire network’, so no corner of the globe ever goes unmonitored” one commentator recounts, quoting W. Randy Bell, Director of the CTBTO’s International Data Center.¹⁵⁷ Yet the prospect of this unconcealment is to come at a price; no longer are the publics to whom this work may be of concern likely to

¹⁵² IAEA Symposium on International Safeguards: Linking Strategy, Implementation and People, Oct. 20–24, 2014, *Book of Abstracts Presentations and Papers*, Doc. No. IAEA-CN-220 (Mar. 23, 2015), at https://www.iaea.org/safeguards/symposium/2014/home/eproceedings/sg2014_eproceedings_online.pdf [hereinafter IAEA Safeguards Symposium Proceedings].

¹⁵³ *Monitoring Nuclear Weapons: The Nuke Detectives*, ECONOMIST (Sept. 5, 2015), at <http://www.economist.com/topics/nuclear-weapons>.

¹⁵⁴ *Id.* (quoting Dr. Lassina Zerbo, head of the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization).

¹⁵⁵ Timothy Oleson, *Beyond the Bomb: The World’s Nuclear Watchdog Expands its Science*, EARTH MAG. (Apr. 27, 2015), at <http://www.earthmagazine.org/article/beyond-bomb-worlds-nuclear-watchdog-expands-its-science>.

¹⁵⁶ Cf. Martin Heidegger, *The Question Concerning Technology*, in THE QUESTION CONCERNING TECHNOLOGY AND OTHER ESSAYS 3–35 (William Lovitt trans., 1977) (on technology as revealing). Not all, however, subscribe to this expectation, and those who do voice it do so in varying degrees. Former director general of the IAEA Hans Blix, for example, has emphasized that “international civil servants” charged with on-site inspection and qualitative, as well as quantitative, analysis may reach “conclusions . . . closer to reality” than conclusions yielded by remotely or indirectly sourced intelligence data. For this reason, Blix has argued strongly for the maintenance of both modes of verification practice—inspection and intelligence data-gathering—and for “keep[ing] them apart.” Miles A. Pomper, *Getting it Right the Next Time: An Interview with Hans Blix*, 34 ARMS CONTROL TODAY 14, 16 (2004).

¹⁵⁷ Oleson, *supra* note 155.

appreciate—that is, maintain some rudimentary, “common sense” grasp of—the sensory work ongoing in this context. W. Randy Bell does not explain exactly how, or by whom, this monitoring will be conducted, nor express any compulsion to so explain.

This prospect is not without its benefits. Technologies in use or under review for nuclear safeguards work offer the prospect of relief from the psychic, political, and economic costs of struggling to verify the unknown, amid more widespread use of nuclear energy, associated demand for monitoring, and a record of recurrent failure. As an indication of the strain upon the IAEA, one specialist publication observed that the “entire analysis section” within the IAEA’s Department of Safeguards (“encompassing open-source analysts, satellite imagery analysts, and trade analysts”) numbered approximately sixty people as of 2015, and that the verification of Iranian nuclear activities alone would require dedication of approximately one third of that section.¹⁵⁸ At the October 2014 IAEA Symposium on International Safeguards, the IAEA Director General, Yukiya Amano, lamented that

[f]unding for the Agency has not kept pace with growing demand for our services and is unlikely to do so in the coming years. That means we must constantly find ways of working more effectively and more efficiently in all areas of our work, including safeguards.¹⁵⁹

To this end, Amano remarked in an address at the Brookings Institution later that same month, the IAEA “make[s] increasing use of modern technology such as remote monitoring and satellite imagery.”¹⁶⁰

Far from attempting to track the redistribution of sensory competences that may be associated with all these technologies, this section will focus only on increasing reliance placed (both in actuality and as a matter of aspiration) on satellite image data and their automated analysis in NPT verification and monitoring work. This section explores the implications of this for the sensory economy surrounding the NPT.

Satellites and Citizen Sensors

Advanced satellite imaging technology has been an “area of development” in IAEA safeguards work since the mid-1990s.¹⁶¹ Since that period, the IAEA has used analysis of satellite imagery to assist in its evaluation of site declarations and reports submitted by state parties, in its detection and assessment of undeclared nuclear facilities, and in preparing for (or sometimes prompting the initiation of) safeguards inspections or related visits.¹⁶² Except to the

¹⁵⁸ Alisa L. Carrigan, *Can the IAEA Verify the Iran Deal?*, BULL. ATOMIC SCIENTISTS (May 5, 2015), at <http://thebulletin.org/can-iaea-verify-iran-deal8302>.

¹⁵⁹ Yukiya Amano, Statement at IAEA Symposium on International Safeguards: Linking Strategy, Implementation and People (Oct. 20, 2014), at https://www.iaea.org/safeguards/symposium/2014/images/pdfs/Speech_DG.pdf.

¹⁶⁰ Yukiya Amano, *Challenges in Nuclear Verification: The IAEA’s Role on the Iranian Nuclear Issue* (Oct. 31, 2014), at <https://www.iaea.org/newscenter/statements/challenges-nuclear-verification-iaea-s-role-iranian-nuclear-issue>.

¹⁶¹ DENISE BLEAKLY, KARL HORAK, & MICHAEL McDANIEL, SANDIA NATIONAL LABORATORIES, ENHANCING SAFEGUARDS ANALYSTS’ GEOSPATIAL USAGE 15 (2012). See BHUPENDRA JASANI, BERND RICHTER, GOTTHARD STEIN, MAURICE D. WARD & MARK KILLINGER, ENHANCING IAEA SAFEGUARDS USING COMMERCIAL SATELLITE IMAGERY: A PILOT STUDY (1996).

¹⁶² Irmgard Niemeyer, Clemens Listner & Sven Nussbaum, *Object-Based Image Analysis Using Very High-Resolution Satellite Data*, 40 J. INST. NUCLEAR MATERIALS MGMT. 100, 100 (2012); IAEA, IAEA SAFEGUARDS: STAYING AHEAD OF THE GAME 21 (2007); IAEA, *New and Emerging Trends in Satellite Imagery*, Presentation at

extent that satellite image data are included in information provided by NPT states parties to the IAEA, the data in question are sourced from commercial satellites.¹⁶³

Alongside satellite imagery, emphasis has more recently been placed on the potential for IAEA safeguards personnel to make use of geospatial images and information otherwise made available, including by analyzing open source data.¹⁶⁴ As one group of experts working for the U.S. Department of Energy observed:

Through the emergence of location-based services and online social networking technologies, user-generated content containing geospatial information, termed Volunteered Geographic Information (VGI), has become a ubiquitous part of the digital information landscape. These data vary from geotagged images and geographically referenced Tweets to place name references and aerial images in media reports. This “citizens as sensors” phenomenon has been exploited aggressively by emergency response, humanitarian aid and human rights organizations. And because data exhibit extensive global coverage with potentially high locational accuracy, and are generated in rapid response to events, these data may be important to the detection of undeclared [nuclear] activities.¹⁶⁵

Before exploring how the mediation of sense through automated analysis of geospatial image data—specifically, satellite imagery—might change the distribution of capacity described in the previous section, it is important to note another shift in the approach to NPT verification and monitoring occurring alongside this change in technical practice, and related to it. As in previous instances, this shift in practice followed from an experience of “crisis” for the IAEA: namely, the discovery of previous undeclared nuclear material and activities in Iran in early 2003, and the revelation by Libya later that same year that it had been developing uranium enrichment capability for more than a decade (both states being parties to the NPT; neither state having a safeguards agreement in place at the time under the 1997 Model Additional Protocol known as INFCIRC/540).¹⁶⁶

In the wake of this experience, the IAEA consolidated a more tailored, state-specific approach to verification and monitoring, building on practices of state-level implementation developed throughout the 1990s: an approach that became known as the “state-level concept.”¹⁶⁷ Rather than evaluating the implementation of safeguards on a facility-by-facility basis, and being guided by states’ declarations in doing so, the IAEA resolved to take into

¹⁶³ 2014 Safeguards Symposium (Oct. 21, 2014), at <https://www.iaea.org/safeguards/symposium/2014/home/eproceedings/sg2014-slides/000042.pdf>.

¹⁶⁴ IAEA, IAEA SAFEGUARDS, *supra* note 162, at 21. According to the Union of Concerned Scientists (a U.S.-based nongovernmental organization), there were 1,419 operating satellites orbiting the earth as of June 2016. See UCS SATELLITE DATABASE, at <http://www.ucsusa.org/nuclear-weapons/space-weapons/satellite-database.html#.VoveHbZ97IX> (last visited Mar. 28, 2017). About 40 percent of those orbiting in 2014 were used primarily for commercial purposes. See David Yanofsky & Tim Fernholz, *This is Every Active Satellite Orbiting Earth* (Dec. 21, 2015), at <http://qz.com/296941/interactive-graphic-every-active-satellite-orbiting-earth> (last visited Mar. 28, 2017).

¹⁶⁵ BLEAKLY, HORAK & McDANIEL, *supra* note 161, at 15–16; *open source*, adj., OXFORD ENGLISH DICTIONARY ONLINE, at <http://www.oed.com> (last visited Mar. 28, 2017) (“designating software for which the original program files used to compile the applications are available to users to be modified and redistributed as they wish”).

¹⁶⁶ BLEAKLY, HORAK & McDANIEL, *supra* note 161, at 16 (endnote omitted).

¹⁶⁷ Laura Rockwood, *The IAEA and International Safeguards*, in ROUTLEDGE HANDBOOK OF NUCLEAR PROLIFERATION AND POLICY, *supra* note 90, at 142, 151–52.

¹⁶⁸ *Id.* at 150–54.

account the characteristics of each state as a whole and to develop a customized approach to verifying compliance by that state, including whether there may be undeclared material or activities anywhere within its territory. This prompted debate about the ambit of IAEA authority and allegations of overreach, to which the IAEA responded with reassurances and affirmations of continuity.¹⁶⁸ Recourse to analysis of satellite imagery is consistent with this effort by the IAEA to gain a more fulsome, yet finely grained overview of activities and materials located in any one state's territory (including those outside state control) and to do so as nonintrusively as possible (in light of tension surrounding its adoption of the state-level concept).

Let us now revisit the five characteristics of the sensory economy established by the NPT and related safeguards protocols—highlighted in Part III above—and consider the potential effect of recourse to the automated analysis of satellite image data upon each of these.

First, the use of satellite imagery represents a departure from the ocular, telescopic focus of the NPT and related instruments. Despite many commentators' analyses of satellite images' use in terms of photographic representation, computerized analysis of satellite image data is not an endeavor comparable to NPT inspectors' visual examination of nuclear facilities and reports. The fact that satellite and geospatial imaging may yield photographs for human scrutiny—in some instances, very powerful ones—is but one dimension of the analytical process in question, and arguably quite a peripheral one.¹⁶⁹ Satellite image data of the kind analyzed for the implementation of nuclear safeguards are not amenable to being encompassed by a single gaze or human imagination in a way comparable to, say, the satellite photographs of earth hanging in space first circulated in the 1960s.¹⁷⁰

Satellite image data do not “appropriate the thing photographed” in the mode of the photograph, creating “miniatures of reality that anyone can make or acquire.”¹⁷¹ Famously, for example, IAEA inspectors did not know what they were looking at when first scrutinizing satellite imagery indicating the movement of “large disc-shaped objects” away from the Tuwaitha facility in Iraq. Only later, in the aftermath of the First Gulf War, were these understood to be calutrons: a mass spectrometer developed during World War II to separate isotopes of uranium and, by the late twentieth century, a dated (and hence disregarded) type of technology used for uranium enrichment.¹⁷² Rather, for purposes of safeguards analysis, satellite image data comprise large quantities of unstructured data: they have no predefined

¹⁶⁸ Laura Rockwood, *The IAEA's State-Level Concept and the Law of Unintended Consequences*, ARMS CONTROL TODAY, at <https://www.armscontrol.org/print/6413>.

¹⁶⁹ E.g., Julian Ryall, *Satellite Imagery Reveals North Korea Is Refurbishing Nuclear Facility*, TELEGRAPH (Aug. 13, 2015), at <http://www.telegraph.co.uk/news/worldnews/asia/northkorea/11800088/Satellite-imagery-reveals-North-Korea-is-refurbishing-nuclear-facility.html>; *North Korea Shrouded in Darkness in Stunning New Photo from Space Station*, CBS News (Feb. 25, 2014), at <http://www.cbsnews.com/news/north-korea-shrouded-in-darkness-in-stunning-new-photo-from-space-station>.

¹⁷⁰ *Contra* David Shim, *Remote Sensing Place: Satellite Images as Visual Spatial Imaginaries*, 51 GEOFORUM 152, 159 (2014). See also Sheila Jasanoff, *Image and Imagination: The Formation of Global Environmental Consciousness*, in *CHANGING THE ATMOSPHERE: EXPERT KNOWLEDGE AND ENVIRONMENTAL GOVERNANCE* 309 (Clark A. Miller & Paul N. Edwards eds., 2001).

¹⁷¹ SUSAN SONTAG, *ON PHOTOGRAPHY 2* (1977). *Contra* Chris Perkins & Martin Dodge, *Satellite Imagery and the Spectacle of Secret Spaces*, 40 GEOFORUM 546, 548 (2009) (emphasizing the amenability of satellite image data to being “re-imagined and subverted” for “counter-hegemonic” purposes).

¹⁷² JEFFREY RICHELSON, *SPYING ON THE BOMB: AMERICAN NUCLEAR INTELLIGENCE FROM NAZI GERMANY TO IRAN AND NORTH KOREA* 451 (2007).

organization and often combine many different data forms. Given their condition as such, “automated pre-processing, information extraction, and image information mining” are considered “essential” in order “to detect, analyze and manage significant features of interest” within those data.¹⁷³

Computerization has not, of course, dispensed with human involvement in the technical practice of satellite image analysis; this practice entails a plethora of human-nonhuman interactions.¹⁷⁴ Nonetheless, it is computer algorithms that are primarily responsible for extracting “interesting patterns and knowledge” from such data.¹⁷⁵ Algorithms are “well-defined computational procedure[s] that take[] some value, or set of values, as input and produce[] some value, or set of values, as output.”¹⁷⁶ Machine learning algorithms are those with capacity to modify their processing operations autonomously on the basis of newly acquired information.¹⁷⁷ Employing such algorithms, information extraction from satellite imagery typically entails computerized analysis of a “whole range of [data, including] . . . spatial, spectral (reflective, emissive), polarisation, temporal and semantic properties of image pixels or image objects.”¹⁷⁸ This commonly concerns data that are decentralized or “distributed”—that is, gleaned from a number of different, uncoordinated sites and sources.¹⁷⁹ These must then be linked and combined for purposes of analysis—a process that itself demands “a set of coupled algorithms, along with their respective input parameter files” capable of generating “computational ontolog[ies]” or models of locations and/or events.¹⁸⁰

The scope of what might be potentially “interesting” in data so processed—commonly defined in computer science literature as that which is “non-trivial, implicit, previously unknown and potentially useful”—need not be determined *a priori*; what is known as unsupervised or semisupervised data mining may itself generate a sense of what merits interest, as described below.¹⁸¹ This may involve, among other processes, the automated “aggregation of similar neighboring pixels into homogenous objects, also referred to as segmentation . . . based on different criteria . . .”¹⁸² In other words, even the determination of what constitutes an “object” for purposes of analysis and change detection is automated to a significant degree.

¹⁷³ Irmgard Niemeyer, Clemens Listner & Prashanth Reddy Marpu, *Treaty Monitoring from Space – Satellite Imagery Analysis for Verifying Treaty Compliance*, in SENSORS, SYSTEMS, AND NEXT-GENERATION SATELLITES XII, 7474, PROC. OF SPIE 74741U, 74741U-3 (Roland Meynart, Steven P. Neeck & Haruhisa Shimoda eds., 2009).

¹⁷⁴ See generally LUCY SUCHMAN, HUMAN-MACHINE RECONFIGURATIONS: PLANS AND SITUATED ACTIONS (2d ed. 2007).

¹⁷⁵ JIAWEI HAN, MICHELINE KAMBER & JIAN PEI, DATA MINING: CONCEPTS AND TECHNIQUES 6 (3d ed. 2012).

¹⁷⁶ THOMAS H. CORMEN, CHARLES E. LEISERSON, RONALD L. RIVEST & CLIFFORD STEIN, INTRODUCTION TO ALGORITHMS 5 (3d ed. 2009).

¹⁷⁷ IAN H. WITTEN, EIBE FRANK & MARK A. HALL, DATA MINING: PRACTICAL MACHINE LEARNING TOOLS AND TECHNIQUES (3d ed. 2011).

¹⁷⁸ Niemeyer, Listner & Marpu, *supra* note 173, at 74741U-4.

¹⁷⁹ Hillol Kargupta & Krishnamoorthy Sivakumar, *Existential Pleasures of Distributed Data Mining*, in DATA MINING: NEXT GENERATION CHALLENGES AND FUTURE DIRECTIONS (Hillol Kargupta, Anupam Joshi, Krishnamoorthy Sivakumar & Yelena Yesha eds., 2004); JURE LESKOVEC, ANAND RAJARAMAN & JEFFREY D. ULLMAN, MINING OF MASSIVE DATASETS (rev. ed. 2014).

¹⁸⁰ Humberto Garcia et al., *Integration of Facility Modeling Capabilities for Nuclear Nonproliferation Analysis*, 54 PROGRESS IN NUCLEAR ENERGY 96, 99 (2012).

¹⁸¹ TOM SOUKUP & IAN DAVIDSON, VISUAL DATA MINING: TECHNIQUES AND TOOLS FOR DATA VISUALIZATION AND MINING xxiii (2002); ADELCHI AZZALINI & BRUNO SCARPA, DATA ANALYSIS AND DATA MINING: AN INTRODUCTION 5 (2012).

¹⁸² Niemeyer, Listner & Nussbaum, *supra* note 162, at 100.

The prospect of inspectors “observ[ing]” phenomena within this data, as INF CIRC/153 contemplates, seems at considerable remove from these practices of analysis.¹⁸³ This may be especially the case when data mining of satellite imagery is unsupervised, or semi-supervised, as alluded to above.¹⁸⁴ Supervised data mining proceeds from a training set of data known to have certain features: a record of past successes and failures, or preidentified instances of the type of norm-deviating event of interest to the human (or nonhuman) supervisor(s). The goal is for data mining software to learn the signature, or generate a number of possible signatures, of points of interest in the training data and classify unlabeled data by employing those signature(s). Unsupervised data mining, on the other hand, commences without an initial model, hypothesis, or norm from which deviation must be sought. The aim is to: generate and explore regularities and anomalies; infer the properties of some function capable of predicting phenomena in the data; create a model on that basis; and continuously refine those inferences and the ensuing model.¹⁸⁵ Supervised mining offers a clear measure of success and failure (or degree of error) and a basis for redressing the latter; learning takes place through the detection and correction of errors. Unsupervised mining offers no ready way of evaluating the validity or usefulness of inferences generated; part of the process is continually revisiting and discarding hypotheses which the data mining practice itself will have generated.¹⁸⁶

Information gleaned from, or produced through, satellite image data analysis does, nevertheless, come from somewhere. There are particular groups of people and institutions that participate in this work, based at international organizations (such as the IAEA), national scientific and research institutions, universities, and corporations, in settings public, private, or hybrids of both.¹⁸⁷ Yet, with reference to the *second* feature of the sensory economy surrounding the NPT highlighted above, both the composition and role of a class of officials (charged with sensing for others) have changed as the expertise demanded of them has become both more intensely specialized and more disbursed. The authority of international law and policy continues to depend on the charismatic eliciting, intuitive interpretation, and measured circulation of sensory data by a class of professionals. However, that class can no longer be encapsulated by the figure of an IAEA director general or, for that matter, an IAEA inspector. Perhaps that figure might be better represented by a lead researcher in the safeguards group at the Forschungszentrum Jülich in Germany (a not-for-profit interdisciplinary research center—one of the largest in Europe—founded in 1956 by the German state of North Rhine-Westphalia and funded through a combination of state and federal government subsidies and income from consultancy or collaboration with industry): a figure unlikely to be publicly known.¹⁸⁸

¹⁸³ INF CIRC/153, *supra* note 62, para. 7.

¹⁸⁴ See generally Sunitha Abburu & Suresh Babu Golla, *Satellite Image Classification Techniques: A Review*, 119 INT'L J. COMPUT. APPLICATIONS 20 (2015).

¹⁸⁵ See generally LESKOVEC, RAJARAMAN & ULLMAN, *supra* note 179, at 415–17.

¹⁸⁶ TREVOR HASTIE, ROBERT TIBSHIRANI & JEROME FRIEDMAN, *UNSUPERVISED LEARNING* (2009).

¹⁸⁷ See generally Ola Dahlman, *How Can Science Support a Process Towards a World Free of Nuclear Weapons?*, 21 SCI. & GLOB. SEC'Y 95 (2013).

¹⁸⁸ FORSCHUNGSZENTRUM JÜLICH GMBH, at http://www.fz-juelich.de/portal/EN/Home/home_node.html (last visited Mar. 28, 2017).

The redistribution of sensory capacity associated with reliance on satellite imagery for nuclear safeguards work is not just a matter of change in the types of people and institutions involved. It also entails transformation in the human-nonhuman alliances and sensory faculties in question. In particular, it involves a shift in emphasis away from the manual sense economy—the focus on handling things, documents, and instruments—emphasized above (the *third* of the features of the sensory economy surrounding the NPT remarked on earlier). IAEA inspectors continue, of course, to handle documents, reports, and instruments, and to be scrutinized publicly in their so doing. Questions of the authenticity of particular documents, and the sharing of documents, or failure to do so, remain at issue in public discourse surrounding the IAEA and the law and policy of nuclear nonproliferation.¹⁸⁹ Yet the credibility of the IAEA has come to rest far more on the public sense of their proximity to, and affinity with, the “latest kit”—that is, with “technologies to unearth work on clandestine nuclear weapons . . . more diverse and more powerful” than ever before—than on their mastery of documentation or manual instrumentation at particular sites.¹⁹⁰ In this way, the manual economy of nuclear nonproliferation earlier described seems to fold into or under a contemporary economy of “innovation” and “disruption” in which credibility, status, value, and success are evaluated and expressed in quite distinct ways (the broader dynamics of which lie beyond the reach of this article).¹⁹¹

A further shift discernible in the reliance on satellite imagery in nuclear safeguards work is a tendency to emphasize the revelatory potential of large-scale datasets, rather than the fecundity of the small sample, the latter being a *fourth* feature of the sensory economy earlier described as surrounding the NPT. Inspectors continue to take samples or “swipes’ from surfaces of equipment and buildings” and to make use of new technologies for their on-site and off-site analysis.¹⁹² Nevertheless, it is high-volume, large-scale data, and data drawn from a large number of sites and agents, that seem to be invested with greatest hope in contemporary discourse and practice surrounding nuclear safeguards. This was apparent in many of the papers given at the October 2014 IAEA Symposium on International Safeguards, where presenter after presenter emphasized the potential of “crowd-sourc[ed]” data to “expand the existing nuclear non-proliferation knowledge base,” “enlarge the view of the analyst on a universe of data,” and render the IAEA’s accounts of phenomena of concern far more credible than preexisting alternatives.¹⁹³ This reorientation toward the large-scale raises, in turn, the specter of a technology-driven loss of control—long a theme of politico-legal thought.¹⁹⁴

¹⁸⁹ Louis Charbonneau & John Irish, *Experts Urge Release of Details of IAEA Inspection at Iran Site*, REUTERS (Sept. 18, 2015), at <http://www.reuters.com/article/2015/09/18/us-iran-nuclear-parchin-idUSKCN0R105M20150918>.

¹⁹⁰ *Monitoring Nuclear Weapons*, *supra* note 153.

¹⁹¹ See generally Jill Lepore, *The Disruption Machine: What the Gospel of Innovation Gets Wrong*, NEW YORKER (June 23, 2014), at <http://www.newyorker.com/magazine/2014/06/23/the-disruption-machine>.

¹⁹² Amy F. Woolf, *The Role of Technology in Monitoring and Verification*, in ROUTLEDGE HANDBOOK OF NUCLEAR PROLIFERATION AND POLICY, *supra* note 90, at 349, 356.

¹⁹³ Frank Pabian, G. Renda, R. Jungwirth, L.K. Kim, E. Wolfart & G.G.M. Cojazzi, *Open Source Analysis in Support to Nonproliferation Monitoring and Verification Activities: Using the New Media to Derive Unknown New Information*, in IAEA Safeguards Symposium Proceedings, *supra* note 152, at 322; Cristina Versino, *Pattern Recognition by Humans and Machines*, in IAEA Safeguards Symposium Proceedings, *supra* note 152, at 330.

¹⁹⁴ LANGDON WINNER, AUTONOMOUS TECHNOLOGY: TECHNICS-OUT-OF-CONTROL AS A THEME IN POLITICAL THOUGHT (1977).

Fifth, and finally, the proprioceptive dimensions of the sensory economy surrounding nuclear nonproliferation remain significant, but have taken on new forms. The NPT, and related instruments and practices, continue to direct movement and organize peoples and things in space in an effort to “close[] off the easier roads to proliferation” and direct proliferators toward “more difficult and time-consuming paths.”¹⁹⁵ Placement in the NPT’s binary categories of nuclear-weapon states and non-nuclear-weapon states remains important for determining the extent of treaty obligations and IAEA authority. This categorization may, however, hold somewhat declining significance in light of the emergence of the state-level concept and the related notion that IAEA authority should “expand to verification of nuclear material cycles [in] states possessing nuclear weapons.”¹⁹⁶

Overlaying such ongoing geopolitical distributions in space and time, however, is the growing importance of the placement of phenomena (or of computational simulations of the same) in datasets derived from satellite imagery and other geospatial data drawn from a mostly undifferentiated pool of “citizen sensors.”¹⁹⁷ This is a form of placement that cannot be witnessed or experienced in conventional terms (much as citizenship of a state—and relationship to most of one’s co-citizens—cannot be experienced except in mediated representations of the same). Indeed, insofar as it arises in the course of unsupervised or semisupervised data mining, this proprioceptive proximity may be immune to human perception altogether unless and until it is deemed actionable and invoked as the basis for legal or policy action (such as an IAEA complementary access inspection, under an Additional Protocol corresponding to INFCIRC/153, to assure the absence of undeclared nuclear material and activities).¹⁹⁸ Even then, the relationship between a certain action and a particular assemblage of data will typically not be made apparent in any public arena.

To the extent that the sensory economy surrounding the law and policy of nuclear nonproliferation is becoming more reliant on this form of virtual or simulated distribution in space and time—one registered and expressed only algorithmically—this may be indicative, on the global plane, of the further deauthorization of a politico-legal order premised on “attentive-analytical vision” capable of being experienced in common, along the lines recounted by Yaron Ezrahi.¹⁹⁹ This article has earlier shown that, at least on the global plane, politico-legal authority’s justification has always involved mobilization of a greater array of sensory faculties than just the visual.²⁰⁰ Nonetheless, this article tells somewhat of a similar story to Ezrahi’s

¹⁹⁵ William Burr, *A Scheme of ‘Control’: The United States and the Origins of the Nuclear Suppliers’ Group, 1974–1976*, 36 INT’L HIST. REV. 252, 271 (2014).

¹⁹⁶ Monica Dreicer, Clemens Listner, Cliff Chen, Gotthard Stein & Irmgard Niemeyer, *Applying State-Level Approaches to Arms Control Verification* (Presented at Ann. Mtg. of Inst. Nuclear Materials Mgt., July 17, 2014), available at <https://e-reports-ext.llnl.gov/pdf/778138.pdf>.

¹⁹⁷ BLEAKLY, HORAK & McDANIEL, *supra* note 161, at 15–16.

¹⁹⁸ Nikolai Khlebnikov, Davide Parise & Julian Whichello, *Novel Technologies for the Detection of Undeclared Nuclear Activities*, IAEA-CN-148/32 (2007), available at http://www.npolicy.org/books/Falling_Behind/Ch3_Khlebnikov-Parise-Whichello.pdf (discussing “techniques and instruments that will be used for the implementation of additional protocols, including the conduct of complementary access,” such as satellite image analysis).

¹⁹⁹ YARON EZRAHI, *THE DESCENT OF ICARUS: SCIENCE AND THE TRANSFORMATION OF CONTEMPORARY DEMOCRACY* 275 (1990).

²⁰⁰ This is in contrast to many accounts of law’s “privileging of the visual,” the prevalence of which is something on which Emily Graham remarks. See Emily Graham, *Shaking Mr. Jones: Law and Touch*, 5 INT’L J. L. IN CONTEXT 343, 344 (2009).

insofar as it suggests that the redirection of sensory data, and its production and processing in new ways, may signal the decline of structures and rituals of global public sense, with associated challenges for international law and policy. It remains to be seen whether the promise of “crowd-sourcing,” and the translation and circulation of crowd-sourced sensory data, will prove capable of backfilling the foundations of a global sensorium that international law and policy have struggled so long and hard to maintain.

Refugees and the Redistribution of Sense

In contrast to the stories of crisis and institutional self-flagellation recounted above (with reference to the IAEA’s limited, flawed, or misdirected sensory capacity), the UNHCR had by the mid-1990s developed quite an extensive, agonistic vocabulary and set of “best practices” surrounding its recording of the incidence and distribution of refugees. This will have become apparent from the account of the 1994 and 1997 UNHCR Guides presented above. Unlike the IAEA and the law and policy of nuclear nonproliferation, the authority of the UNHCR, and associated law and policy, has never seemed to hinge on the institutional ability to make preemptive revelations, nor even to ensure the global circulation of accurate data, so long as the UNHCR remains responsive to manifest human need and may be seen to be so. Accordingly, the “framework of attestive [sensory] culture” in which a “skeptical yet discerning” global audience may “presume to witness [or otherwise perceive] the actions of political agents” and international organizations might seem more likely to remain intact in the law and policy on refugees, notwithstanding the technical transformations just described. The sensory economy surrounding the work of the UNHCR since the mid-1990s is, however, also undergoing transformation, as the next section will indicate.

Biometric Sense

In the early years of this century, the UNHCR initiated a program (the UNHCR Program) for biometric registration and deduplication of Afghan refugees living in camps in Pakistan and applying for humanitarian assistance for repatriation.²⁰¹ The UNHCR Program was initiated in the context of the mass-repatriation of Afghan nationals from refugee camps in Pakistan back to Afghanistan, after the fall of the Taliban in 2001. From 1988 onward, the UNHCR concluded a series of agreements with Pakistan, and later with Afghanistan too, providing for the voluntary repatriation of Afghan refugees located in camps in Pakistan with screening, supervision, and material assistance to be provided by the UNHCR; these agreements afforded the legal basis for the UNHCR Program.²⁰²

Between 2001 and 2005, the UNHCR facilitated the return of over three million refugees to Afghanistan.²⁰³ As part of this process, the UNHCR determined that every returnee should receive “transport assistance ranging from \$5 to \$30—depending on his [or her] final destination—a UNHCR family kit with plastic tarpaulin, soap, and hygiene items, as well as wheat

²⁰¹ Katja Lindskov Jacobsen, *Experimentation in Humanitarian Locations: UNHCR and Biometric Registration of Afghan Refugees*, 46 SEC’Y DIALOGUE 144, 149 (2015).

²⁰² Zieck, *supra* note 5, at 256–65.

²⁰³ Daniel Kronenfeld, *Afghan Refugees in Pakistan: Not All Refugees, Not Always in Pakistan, Not Necessarily Afghan?*, 21 J. REFUGEE STUD. 43 (2008).

flour from the World Food Programme.”²⁰⁴ In distributing this humanitarian aid, the UNHCR used traditional identification methods to try to distinguish “genuine” first-time claimants from “recyclers” claiming multiple assistance packages, but found these methods wanting.²⁰⁵ At the UNHCR’s request, commercial technology vendor BioID Technologies (BioID), in cooperation with Iridian Technologies, developed a biometric registration facility and mobile registration units for the organization’s deployment of preexisting iris recognition technology, the operation of which was described as follows:

All centers have a network of Iris Recognition cameras (ranging from 2–9 depending on the required capacity). The individual is asked to sit down in front of one the cameras and is briefed by the operator. A series of enrollment images are taken and sent to the server in the network. This system converts the appropriate image into an IrisCode (a digital representation of the information that the iris pattern constitutes) and checks the entire database whether that IrisCode matches with one already stored. If that is not the case, the individual is enrolled, the IrisCode stored in the database and a Customer Information Number (CIN) is returned to the particular workstation confirming that the enrollment has been successful. . . . If the individual is found in the database, the system returns an alarm to the workstation with the message that a recycler has been found and also returns the CIN number that individual was originally enrolled with. The whole process from the moment the person sits down, is briefed, up to completion of enrollment takes less than 20 seconds.²⁰⁶

The mandatory participation of all returning Afghans seeking assistance from the UNHCR (from the age of six) in this biometric screening process thereafter came to be enshrined in Article 15(2) of the Agreement Between Pakistan, Afghanistan and the UNHCR Governing the Repatriation of Afghan Citizens Living in Pakistan 2007 (extended in 2010 and 2013) (Tripartite Agreement).²⁰⁷ This agreement provides that: “Iris recognition processing will be mandatory for all returning Afghans wishing to obtain travel and reintegration assistance”²⁰⁸ In contrast, the predecessor to this Tripartite Agreement, concluded in 2003, provided only for verification of identity documents.²⁰⁹

²⁰⁴ *Afghan “Recyclers” Under Scrutiny of New Technology*, *supra* note 3.

²⁰⁵ *Id.*; *UNHCR Gears Up for 2003 Afghan Repatriation*, UNHCR NEWS STORIES (Feb. 24, 2003), at <http://www.unhcr.org/3e5a38924.html>; *Afghanistan: Iris Testing Proves Successful*, UNHCR BRIEFING NOTES (Oct. 10, 2003), at <http://www.unhcr.org/cgi-bin/texis/vtx/search?page=search&docid=3f86a3ac1&query=Return%20to%20Afghanistan>. Barbara Harrell-Bond, Eftihia Voutira, and Mark Leopold suggest that disputes over numbers between the UNHCR and its donors may put pressure on the organization to improve its official statistics, and that enumeration practices often proceed on the “assumption that ‘refugees always lie.’” See Harrell-Bond, Voutira & Leopold, *supra* note 96, at 213.

²⁰⁶ BioID Technologies, *UNHCR Refugee Identification System*, at <http://www.bioidtech.co.uk/BioID/UNHCR.html> (last visited Mar. 28, 2017).

²⁰⁷ *Afghanistan: Iris Testing Proves Successful*, *supra* note 205; UNHCR, Agreement Between the Government of the Islamic Republic of Pakistan, the Government of the Islamic Republic of Afghanistan, and the United Nations High Commissioner for Refugees Governing the Repatriation of Afghan Citizens Living in Pakistan (2007), at <http://www.unhcr.org/46c98acd2.pdf> [hereinafter Tripartite Agreement].

²⁰⁸ Zieck, *supra* note 5, at 264; Tripartite Agreement, *supra* note 207.

²⁰⁹ UNHCR, Agreement Between the Government of the Islamic Republic of Pakistan, the Transitional Islamic State of Afghanistan, and the United Nations High Commissioner for Refugees Governing the Repatriation of Afghan Citizens Living in Pakistan (2003), Art. 15, at <http://www.unhcr.org/3f5d97524.html>.

As with satellite imagery analysis for nuclear safeguards work, data mining is central to the sensory mechanics of the UNHCR Program. The data assembled for this purpose does “not correspond to any sampling plan or experimental design.”²¹⁰ Rather, data collection is conducted at multiple sites, under often challenging and highly variable conditions, at rates contingent on refugee flows. In the UNHCR Program, the particular data mining technique used by BioID to classify phase information (that is, a numeric expression—in the form of a “bit stream”—of a pattern extracted from a set of iris images) has not been described publicly by either BioID or the UNHCR.²¹¹ Nonetheless, published descriptions of iris recognition techniques suggest that this may involve a type of data mining model known as a neural network, employing machine learning.²¹² While neural networks vary widely, they are all predicated on the processing of numeric input through a series of interconnected nodes (some of which are hidden) and the attribution to connections among those nodes of associated weightings, with each layer of these nodes being comprised of the weighted sum of values in the preceding layer. In many instances, the weighting attributed to nodal connections is learned through the processing of, and verification of performance against, a training set of input data.²¹³ Alternatively, it may be that this iris recognition is carried out using a decision tree: another type of predictive data mining model used for classification, again employing machine learning.²¹⁴ Decision trees are “[t]ree-shaped structures” that represent sets of binary tests on the basis of which data is divided and classified at each “branch.” After training and validation of outputs, the tree can be used to “generate rules for the classification of a dataset” without supervision.²¹⁵

After a year of this system’s operation, and the processing of just over 200,000 refugees, the UNHCR reported that approximately 1,000 people trying to claim multiple assistance packages had been detected, “in addition to more than 70,000 families . . . rejected [during the same period] . . . under other screening methods . . .”²¹⁶ Those other screening methods—maintained alongside iris recognition—included “interviewing potential returnees and

²¹⁰ Liane Colonna, *A Taxonomy and Classification of Data Mining*, 16 SMU SCI. & TECH. L. REV. 309, 316 (2013); AZZALINI & SCARPA, *supra* note 181, at 8.

²¹¹ See generally John Daugman, *How Iris Recognition Works*, 14 CIRCUITS & SYSTEMS FOR VIDEO TECHNOLOGY, IEEE TRANSACTIONS 21 (2004).

²¹² Liam Lye, Ali Chekima, Liau Chung Fan & Jamal Ahmad Dargham, *Iris Recognition Using Self-Organizing Neural Network*, Student Conference on Research and Development, SCOReD 2002 (July 2002), available at <http://ieeexplore.ieee.org/xpls/icp.jsp?arnumber=1033084>; Wenming Cao, Jianhui Hu, Gang Xiao & Shoujue Wang, *Iris Recognition Algorithm Based on Point Covering of High-Dimensional Space and Neural Network*, in MACHINE LEARNING AND DATA MINING IN PATTERN RECOGNITION (Petra Perner & Atsushi Imita eds., 2005); Fadi N. Sibai, Hafsa I. Hosani, Raja M. Naqbi, Salima Dhanhani & Shaikha Shehhi, *Iris Recognition Using Artificial Neural Networks*, 38 EXPERT SYSTEMS WITH APPLICATIONS: INT'L J. 5940 (2011); Kevin Bowyer, Karen P. Hollingsworth & Patrick J. Flynn, *Image Understanding for Iris Biometrics: A Survey*, 110 COMPUT. VISION & IMAGE UNDERSTANDING 281 (2008); MARK J. BURGE & KEVIN BOWYER, HANDBOOK OF IRIS RECOGNITION 79–80 (2013).

²¹³ RICHARD ROIGER & MICHAEL GEATZ, DATA MINING: A TUTORIAL-BASED PRIMER 45–47, 245–64 (2003).

²¹⁴ BURGE & BOWYER, *supra* note 212, at 300; Nathan D. Kalka, Jinyu Zuo, Natalia A. Schmid & Bojan Cukic, *Image Quality Assessment for Iris Biometric*, in SPIE 6202: BIOMETRIC TECHNOLOGY FOR HUMAN IDENTIFICATION III PROCEEDINGS 6202:D1–D11 (2006).

²¹⁵ S. SUMATHI & S.N. SIVANANDAM, INTRODUCTION TO DATA MINING AND ITS APPLICATIONS 402 (2006); ROIGER & GEATZ, *supra* note 213, at 9–11.

²¹⁶ *Iris Testing of Returning Afghans Passes 200,000 Mark*, UNHCR NEWS STORIES (Oct. 10, 2003), at <http://www.unhcr.org/3f86b4784.html>; *Afghanistan: Iris Testing Proves Successful*, *supra* note 205.

examining their family photos.”²¹⁷ The iris recognition system was said to have performed “flawlessly,” despite the risk of data corruption posed by “the heat and dust of Pakistan’s border territories with Afghanistan,” and without reference to error rates associated with factors such as: image compression; contact lens use; pupil dilation; and corneal bleaching, scarring, inflammation, and other pathologies.²¹⁸ According to the UNHCR, concerns that use of the technology might intimidate, raise traditional objections to women being photographed, or compromise privacy also proved unfounded: “only the eye is seen onscreen”; “[t]ests on women and children are done by female refugee agency workers”; and “the code describing the iris has no link to the name, age, destination or anything else about the refugee.”²¹⁹

Let us return to the six features of the sensory economy earlier described, surrounding the work of the UNHCR and related law and policy, to explore how these may have been affected by the introduction of the UNHCR Program.

First, recall that the 1994 and 1997 UNHCR Guides sought to enroll refugees in a reflexive sensory practice, seeking their long-term participation in the processes of registration and distribution for which those manuals provided. The shift in sensory practice discernible in the UNHCR Program likely makes it difficult, however, to sustain this commitment to addressee involvement. Emphasis is placed, in public explanations of the UNHCR Program, on its speed and definitiveness. According to BioID’s account, “[t]he whole process . . . takes less than 20 seconds.”²²⁰ Refugee participation is envisaged, accordingly, in terms of delivery and acceptance; the body is to be delivered up as a site of data collection and then quickly set aside, to make way for the next. In place of active participation, passive curiosity seems to be the disposition encouraged by the UNHCR Program: “How can they argue now, the machine can’t make a mistake,” a UNHCR staff person, Rifaat Tajik, stated with apparent relief.²²¹

The tactile dimensions of the sensory economy of UNHCR work and policy comprised the *second* feature highlighted above. The UNHCR Program seems, however, to dispense with most, if not all, recourse to touch. Photographic representations of the process of registration featured in publications of the UN and the UNHCR show enrollees sitting before cameras, alone, with camera operators at some distance from them, while “only the eye is seen onscreen.”²²² In place of the contacts for which the 1994 and 1997 UNHCR Guides provide—marking bodies with dye, adorning bodies with wristbands, passing tokens from palm to palm, estimating and counting in sometimes tightly packed conditions—the UNHCR Program insists on distance in the course of detecting and registering a refugee body. This likely helps to reinforce assurances of privacy and physical safety: the process “involves no risk to the eye” and “the digital code for each iris is stored without any personal

²¹⁷ *Afghan “Recyclers” Under Scrutiny of New Technology*, *supra* note 3.

²¹⁸ *Afghanistan: Iris Testing Proves Successful*, *supra* note 205. For discussion of error rates in iris recognition generally, see Mayank Vatsa, Richa Singh & Afzel Noore, *Improving Iris Recognition Performance Using Segmentation, Quality Enhancement, Match Score Fusion, and Indexing*, 38 SYSTEMS, MAN & CYBERNETICS, PART B: CYBERNETICS, IEEE TRANSACTIONS 1021 (2008); BURGE & BOWYER, *supra* note 212.

²¹⁹ *Iris Testing of Returning Afghans Passes 200,000 Mark*, *supra* note 216. Commentators have, however, been critical of the UNHCR’s failure to disclose the risk of false matches likely to arise in large-scale applications of biometric technology, or to put in place measures “to detect and correct for such false matches,” especially in view of the fact that data anonymization might hinder their detection. See Jacobsen, *supra* note 201, at 151–52.

²²⁰ BioID Technologies, *supra* note 206.

²²¹ *Afghan “Recyclers” Under Scrutiny of New Technology*, *supra* note 3.

²²² *Iris Testing of Returning Afghans Passes 200,000 Mark*, *supra* note 216.

information,” the UNHCR insists.²²³ Capturing the iris image does require those seeking assistance to remain briefly in a small space together with “[a]id workers operating the machines,” but any contact in the course of this is fleeting and unremarkable according to UNHCR reports.²²⁴ “Refugees . . . have been very co-operative and have adapted to the new verification technology without causing a fuss,” one UNHCR account states.²²⁵

Third among the features of refugee law and policy’s sensory economy mentioned above was a tendency to elicit, and apportion capacity and incapacity among, group configurations, “populations” especially. In the UNHCR Program, however, this orientation toward collective agency and representation breaks down. Those enrolled in the UNHCR Program continue to be identified as Afghans, and sometimes as Pashtun or Shinwari.²²⁶ Nonetheless, the aim of the UNHCR Program seems to be to cut through the murkiness and inflexibility of group relations as repositories of sensory data and experience. Much is made, for example, by the UNHCR of the Program’s capacity to liberate people from the burden of family obligation, as in the following report:

One woman who was turned away admitted she had been through the process eight times. Her husband had forced her and their five children to come back again and again to try and get another cash grant. She expressed her gratitude for the new technology, hoping it would make her husband give up the exhausting exercise.²²⁷

Indeed, automated detection of a body and its evaluation as eligible or ineligible for assistance (on the basis of matching IrisCode) need not engage a subject as such, let alone a subject’s relations with other subjects, in order to yield a definitive, actionable predicate. The unit of analysis with which data mining is concerned may not be recognizable as a place, person, or thing that registers as familiar.²²⁸ Data searches typically address a much lower or more fragmentary level of analysis, namely mathematical correlations between bits of data. In order for these mathematical correlations to be made useful and actionable for policy purposes—or potentially so—no occasion need arise for a legal subject as such to be “hailed.”²²⁹ That is, there is no need, as part of such processes, to invite some groups, entities, or beings to experience themselves and others as embodied legal persons, with all that that implies (usually, possession of a more or less coherent will as well as a relatively stable identity and specifiable location in space and time). The IrisCode generated and stored under the rubric of the UNHCR Program does not call forth a subject as such, let alone a subject with any particular qualities, capacities, vulnerabilities, or propensities. It does not signify flawed or virtuous character or capture any particular circumstances that might explain why an applicant might seek multiple assistance packages. All it demands and makes actionable is a

²²³ *Afghan “Recyclers” Under Scrutiny of New Technology*, *supra* note 3.

²²⁴ *Id.*

²²⁵ *Id.*

²²⁶ See, e.g., BioID Technologies, *supra* note 206; *Afghanistan: Iris Testing Proves Successful*, *supra* note 205.

²²⁷ *Afghan “Recyclers” Under Scrutiny of New Technology*, *supra* note 3.

²²⁸ Cf. Louise Amoore, *Lines of Sight: On the Visualization of Unknown Futures*, 13 CITIZENSHIP STUD. 17, 18 (2009) (observing that “items of data” need not comprise “a picture or a snapshot of a person” in order to be made actionable in counterterrorism operations, but rather “a projected line of sight” or a “digital alter ego . . . a projected person”).

²²⁹ Louis Althusser, *Ideology and Ideological State Apparatuses (Notes Towards an Investigation)*, in LENIN AND PHILOSOPHY AND OTHER ESSAYS 121, 160–65 (Ben Brewster trans., 2d ed. 1977).

mathematical relationship (meeting certain specified thresholds) between data gleaned from one set of processed images of an iris and data gleaned from a second set. The precise way in which IrisCode matching intersects with “other screening methods” attentive to group dynamics (interviews and family photos’ scrutiny, for instance) is unclear, but it appears to draw the latter to a perfunctory close.²³⁰ According to one UNHCR report: “if the test reveals that the refugee has been enrolled before—and only about half of one per cent are found to be ‘recyclers’—the person is refused assistance.”²³¹

As well as eliciting and being oriented around collective identities (with which the UNHCR Program more or less dispenses), the sensory economy that the 1994 and 1997 UNHCR Guides sought to maintain was shown above to be transactional or organized around negotiated deals in data; this was the *fourth* of its features highlighted in Part III. This is not, however, a feature of the UNHCR Program, at least according to published reports of its operation (and recognizing that it still operates within broader parameters of UNHCR policy and practice, of which this may still be a feature). UNHCR publications reporting on the UNHCR Program certainly convey a sense that refugee applicants for assistance must be persuaded of the Program’s virtues, if their continued participation is to be secured. Nevertheless, the embeddedness and inscrutability of the parameters on the basis of which applicants for humanitarian assistance may be disentitled make the prospect of factoring negotiation into this encounter difficult to realize. Recall the UNHCR staff person’s remark, quoted above: “How can they argue now, the machine can’t make a mistake.”²³² That person continued as follows:

Previously when we registered people, we had to recognise refugees we might have seen before. It was very hard. People would say that we were not treating refugees fairly, and you could really doubt your own judgement This will make it much better.²³³

The emphasis in the UNHCR Program thus seems to rest less on negotiation and more on definitive—albeit mostly unexplained—outcomes. Even though the algorithms in question will likely have been trained using a set of correct and false matches between batches of IrisCode (verified as such by nonautomated means), the precise algorithmic derivations of that training set used to identify a match will have been generated through machine learning. As such, these are the outcomes of automated inquiry rather than its predetermined starting points. They will have emerged, and will continue to emerge, in ways that may not always be explicable, even to those well versed in relevant data-mining techniques. Research and practice in data mining tends to make far more of search efficiencies realized than explaining, and opening to general scrutiny, the precise features and components of different data-mining algorithms:

In many papers, the descriptions of the model structure [that is, the high-level way that a data set is represented], the score function [a way of numerically expressing the preferenceability of one model over another according to specified aims], and the search method

²³⁰ *Afghan “Recyclers” Under Scrutiny of New Technology*, *supra* note 3; *Afghanistan: Iris Testing Proves Successful*, *supra* note 205.

²³¹ *Afghanistan: Iris Testing Proves Successful*, *supra* note 205.

²³² *Afghan “Recyclers” Under Scrutiny of New Technology*, *supra* note 3.

²³³ *Id.*

[computational methods used for model- and pattern-fitting in data-mining algorithms] are abstrusely intertwined.²³⁴

For these and other reasons, it is often “hard to explain how the system reached a decision” with respect to any particular association or match detected.²³⁵ Accordingly, scenarios in which these sensory practices—questions of their fairness in particular—are made negotiable are hard to envisage.

As a *fifth* noteworthy feature, the sensory economy of the 1994 and 1997 UNHCR Guides has involved trade in perceptions of, and faith in, “good sense,” much as the NPT and related instruments have done. Expectations have been sustained by international law and policy that the work of detecting changing worldly phenomena would or should be informed by accumulated human knowledge and experience, both empirical and intuitive. In the case of the UNHCR, this has elicited sustained, ongoing effort on the part of the institution and its workers to “know refugees” in their particularities, in ways not confined to what may be extracted from them by way of verifiable data.

In contrast, the “sense” of an applicant for humanitarian assistance likely to be generated by the UNHCR Program is oriented around a singular, brief encounter and thereafter memorialized only in digitized, anonymized form. At least as far as the UNHCR Program itself is concerned, the “knowledge” that this program yields arises from momentary co-occurrence between data so recorded, the broader significance of which will often be unclear. The finding of a match between X and Y in IrisCode does not import presumptions of: cause and effect; common purpose or normative commitment; proximity in time or space; identitarian similarity; commonality of predicament, experience, or history; or affective or communicative connection as between code sequence X and code sequence Y or the humanoid sources of those sequences. Their association is based only on analysis of a large data set having generated, for the time being, a greater probabilistic affinity (or lower dissimilarity measure) between code sequence X and code sequence Y, or particular subsets of the same, than between code sequence X and all other sequences that may be assembled from the database at the relevant time (and that affinity otherwise satisfying applicable thresholds).²³⁶ As additions and eliminations are made to and from the database, the relevant thresholds may be modified.

In addition, many of the patterns or relationships produced in data mining will be presumed superfluous and subject to winnowing. In the course of mining data, there are often many meaningless associations discovered.²³⁷ Algorithms designed to find relationships in data will tend to do so regardless of whether there are any significant relationships “naturally” present in the data.²³⁸ This subordinates the process of gaining “good sense” to an

²³⁴ DAVID J. HAND, HEIKKI MANNILA & PADHRAIC SMYTH, *PRINCIPLES OF DATA MINING* 163 (2001).

²³⁵ Stanley Loh, José Palazzo M. de Oliveira & Mauricio A. Gameiro, *Knowledge Discovery in Texts for Constructing Decision Support Systems*, 18 APPLIED INTELLIGENCE 357, 358 (2003).

²³⁶ Daugman, *supra* note 211, at 27–29 (discussing the “decision environment” for iris recognition).

²³⁷ Yanhong Li, *A User-Guided Association Rules Mining Method and its Application*, Fifth Int'l Conf. on Comput. & Info. Tech. (Sept. 21–23, 2005), available at http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=1562643.

²³⁸ Anil K. Jain, *Data Clustering: 50 Years Beyond K-means*, 31 PATTERN RECOGNITION LETTERS 651, 656 (2010).

expectation of continual, ubiquitous tinkering and shedding of data.²³⁹ What may be deemed useful and usable, from a mass of relationships represented, will depend to a significant degree upon the happenstance of design features' confluence and interaction with data.²⁴⁰

The sorts of fleeting associations foregrounded in data mining, and the relationships of proto-people and bit streams that they draw together, are not configurations to which international law and policy have been well attuned to date. Certainly, international lawyers have been concerned with practices of counting, enumeration, and measurement in international law, and justifiably so.²⁴¹ Nonetheless, international law and policy have mainly traded in global associations presumed much thicker, more meaningful, and more durable than those instantiated in data in the ways described above. Patterns appearing momentarily in data have not typically been a basis for action or inference in international legal affairs, but they are becoming more so. It is for this reason that the redistribution of the sensible described above signals a potential undermining of international legal authority. International legal order's perceived correlations with good sense and good judgment have depended, in large part, on its organization around, and articulation through, relationships that many people find meaningful and comprehensible. To the extent that its operation becomes premised on relationships less accessible to experience, its capacity to inform global common sense (for good and for ill) may come under threat.

Sixth, and finally, the 1994 and 1997 UNHCR Guides discussed above advanced a particular relationship to uncertainty in the work of detecting worldly phenomena—as a condition to be “lived with” collaboratively and agonistically. The UNHCR Program, however, fosters a very different disposition toward uncertainty. Uncertainty endemic to iris recognition (reflected in false rejection rates, for example) cannot be eliminated and tends to be exacerbated by a range of factors mentioned above (including image compression and corneal bleaching).²⁴² Nonetheless, once quantified and cabined within biometric registration infrastructure and practice, this uncertainty comes to appear relatively untroubling. Recall that, after operating for some time, the UNHCR Program technology was said to have “performed flawlessly.”²⁴³ To the extent that uncertainty (expressed as a false match rate or equivalents) is acknowledged, it seems most likely to be addressed according to a logic of technical “optimiz[ation] . . . for best performance” in the UNHCR Program, rather than through the thrashing out of differences of power and perspective contemplated by the 1994 and 1997 UNHCR Guides.²⁴⁴

The introduction of the UNHCR Program thus suggests that significant shifts in the sensory economy surrounding the policy and practice of refugee registration may be underway. Yet its effects are not, by any means, wholly negative. Perhaps, as UNHCR publications suggest, the Program will help ensure that scarce resources are distributed more equitably, with greater efficiency, so that “assistance is reaching those who really need the help of UNHCR to repatriate.”²⁴⁵ The concern of this article is not to evaluate the UNHCR Program. Rather,

²³⁹ CLAUDIO CIBORRA, THE LABYRINTHS OF INFORMATION: CHALLENGING THE WISDOM OF SYSTEMS (2002).

²⁴⁰ HAND, MANNILA & SMYTH, *supra* note 234, at 295, 440–41 (2001).

²⁴¹ THE QUIET POWER OF INDICATORS, *supra* note 25.

²⁴² Vatsa, Singh & Noore, *supra* note 218; BURGE & BOWYER, *supra* note 212.

²⁴³ *Afghanistan: Iris Testing Proves Successful*, *supra* note 205.

²⁴⁴ BURGE & BOWYER, *supra* note 212, at 6.

²⁴⁵ *Iris Testing of Returning Afghans Passes 200,000 Mark*, *supra* note 216.

what is of interest here is how the UNHCR Program seeks to generate and sustain a sense that all (or some population that serves as a proxy for “all” in the UNHCR’s daily practice) are confronted by and working with the same basic facts about the world—how it seeks to sustain, in other words, a global sensorium. The techniques that the UNHCR Program employs for so doing differ quite markedly from those that the 1994 and 1997 UNHCR Guides sought to foster. In place of a population, across which vulnerability, capacity, and need were to be distributed iteratively and through constant negotiation (according to the aforementioned Guides), the UNHCR Program produces and acts upon a computational ontology of interlocking datasets, the human-nonhuman navigation of which follows parameters and patterns inscrutable to most.

To the extent that the UNHCR Program and institutional accounts of this initiative manage to sustain an experience of shared, credible, common sense at work, this seems to have been achieved (to date) mostly through the dazzle of technology: an expectation that “the machine can’t make a mistake.” However, this is an expectation unlikely to withstand scrutiny, given popular and scholarly critiques of technological determinism long in circulation.²⁴⁶ The “machine” clearly can make a mistake, as UNHCR staff would probably acknowledge if pressed on the issue. What needs to be better understood in this context, then, is how those participating in the UNHCR Program have come to disengage so from the complexities and instabilities of their distributive predicament, in contrast to the more agonistic approach that they were encouraged to take in the era of decision-making described in Part III. The description of sensory practice set out in this Part IV has offered some clues as to how this disposition has been cultivated amid mundane practices in the field.

CONCLUSION

Much has been made of principles, reasons, structures, and interests underpinning international law’s force and operation as law. Little has been made of the sensory dimensions of international legal work. This article has elucidated a sensory economy that international law helps to maintain, and by which international law is (at least in part) maintained. It has shown how that sensory economy is currently undergoing transformative change and suggested some of what may be at stake in that change—namely, redistribution of the power to establish and contest the condition of the world. In so doing, it has highlighted the limits of preceding scholarly analyses in a number of respects, among them: the limits of extending twentieth century critiques of statistical thinking to contemporary practices involving machine learning; the limits of focusing on the accumulation, organization, and dispensation of abstract knowledge as such, without attending to mundane sensory practice in the field; and the limits of any parochial, privacy-fixated formulation of the field of inquiry known as “law and technology.” In examining shifts in the way that two international institutions have sought to record and verify certain worldly phenomena, this article aims to foster more wide-ranging debate about

²⁴⁶ E.g., MERRITT ROE SMITH & LEO MARX, DOES TECHNOLOGY DRIVE HISTORY? THE DILEMMA OF TECHNOLOGICAL DETERMINISM (1994) (mapping the meanings associated historically with the concept of technological determinism, including recurrent challenges to it). *But see* Sally Wyatt, *Technological Determinism Is Dead; Long Live Technological Determinism*, in THE HANDBOOK OF SCIENCE AND TECHNOLOGY STUDIES 165 (Edward J. Hackett, Olga Amsterdamska, Michael E. Lynch & Judy Wajcman eds., 2007) (arguing that, despite relentless critique of technological determinism in science and technology studies, it remains pervasive in business and policy circles).

the ramifications and distributional implications of technological developments for international legal order than has occurred to date, despite many decades of thinking around the idea of technology as a politico-legal phenomenon.²⁴⁷ Those ramifications far exceed the range of concerns on which relevant international legal scholarship has mostly dwelled, namely: privacy and due process considerations; prospects for cyber-warfare and robotic battlegrounds; data protection; and intellectual property issues.

The creative challenges that such a broad-ranging debate would pose for international law and policy are significant. A new or adapted politico-legal vocabulary or set of rituals is required to ensure that sensory data assembled and deployed in the ways described in Part IV may be translated and circulated along a broader array of pathways, and among a greater diversity of publics, than has occurred to date. This was made clear in the discussion of changing IAEA practice in Part IV. Placement in patterns algorithmically discerned from multi-source datasets is becoming as, if not more, crucial in nuclear nonproliferation verification than establishing location in physical space. Yet sensory perceptions manifest in digital data (typically ever-shifting and part-classified data)—and the practices by which they are assembled—are far harder to make credible to a public than map coordinates. The former have not yet found a place within prevailing politico-legal imaginaries.

Broader circulation of, and unruly participation in, sensory work has already taken place in many areas of international law and policy in prior decades, including technically complex areas. As Part III made clear, nonexperts have frequently been enrolled in international law's sensory economy, including self-attesting refugees called upon to participate in UNHCR registration and distribution practices. Nevertheless, who may be vested with capacities and dispositions considered proper to the task of rethinking prevailing politico-legal vocabularies and rituals in the latest automated settings, and who will not: this remains to be negotiated. The experiences recounted in Part III and Part IV suggest that the range of people and institutions considered so qualified to date has, in many instances, been quite narrow, and that this range may be getting even narrower.

Though the “we” that is evoked by the sensory economy of international legal work varies according to the type of work in question, that “we” tends to be marked by sharply differentiated investments of capacity and reliability. This was exemplified by the differing attribution of “responsibility” to NPT states parties and the differing expectations of more or less “vulnerable” refugees seeking UNHCR assistance, as discussed in Part III. The redistribution of the sensible described in Part IV raised the prospect of those many constituencies being further reassembled, with new modes of enfranchisement and disenfranchisement emerging in processes of worldly verification. This in turn raises questions about who or what will come to trade under the name of the “international community,” what properties and propensities will be ascribed to different sections of that “community” and those cast outside it, and how that ascription may be verified.

What can be sensed by and for international law by machine and otherwise, how, and among whom, are matters of particular concern for international lawyers. This is because answers to these questions are key to understanding international law's operation and effects, as much as the content or form of its doctrines, or the intent or interests of its proponents. The efficacy of both nuclear nonproliferation and refugee registration activities depends on the

²⁴⁷ See, e.g., WINNER, *supra* note 194, at 323.

degree to which the sensory output of those activities can be made plausible to those variably enrolled in its circulation, including both public and private constituencies. The capacity of international law and policy to evoke experiences of inhabiting a common sense-world (however variably, partially, and conflictually) is vital to legal norms carrying weight and force on the global plane, over and above any question of those norms' rightfulness, reason, or correlation with capital investment or social habit. To the extent that they shape conduct, thinking, and interaction on the global plane, international legal norms work not just through argumentative persuasion, interest alignment, routinization, rationalization, or socialization, as others have argued.²⁴⁸ They also work by fostering sensory experiences suggestive of coexistence on the global plane. That is, they make possible a perception that, however much people, places, and things may seem located in parallel universes, those universes intersect. It is the prospect of sustaining this possibility, as well as prospects for confronting some of the inequalities on which this possibility is premised, to which the rise of automation poses a threat.

In more schematic terms, this article has made three basic claims: (1) that international law and policy work entails struggle to sustain a sensory economy capable of being experienced in common, a prospect that is important for the discipline's maintenance of authority and efficacy; (2) that international law and policy contribute to unequal distributions of power, competence, and resources in the course of that struggle; and (3) that the capacity of international law and policy to sustain such a sensory economy, and to confront some hierarchies endemic in that economy, may be adversely affected by growing recourse to automated data analysis. On the basis of these claims, an argument has been made for broad-ranging, creative, and critical engagement in the international legal field with the techniques of sensing practice on the global plane.

These are not claims open to proof or disproof. One cannot put into operation some counterfactual scenario in which international legal and policy work does not entail the distribution of sense and sensory capacity, in order to evaluate the effects of such law and policy upon the world. This set of claims is put forward, therefore, in a speculative or polemical mode.

As highlighted above, these claims also comprise a political intervention in the field of international law and policy in a sense informed by the work of Jacques Rancière. In that work, politics is expressed as a deviation from the "normal order of things," whereby "human communities gather together under the rule of those qualified to rule—whose qualifications are legitimated by the very fact that they are ruling." Politics occurs insofar as its principal subject is "not the collection of members in a community" but rather "the supplementary part, in relation to any counting of parts of the population that makes it possible to identify the 'part of those who have no-part'" or that counts "the unaccounted-for."²⁴⁹ No single supplementary part emerged from the foregoing account, the inclusion of which might render international legal order complete, or its constituencies fully accounted for. Rather, this article shows international legal work to entail continuous grappling with, and anxiety

²⁴⁸ See, e.g., JEAN D'ASPREMONT, EPISTEMIC FORCES IN INTERNATIONAL LAW: FOUNDATIONAL DOCTRINES AND TECHNIQUES OF INTERNATIONAL LEGAL ARGUMENTATION (2015); JACK L. GOLDSMITH & ERIC A. POSNER, THE LIMITS OF INTERNATIONAL LAW (2007); Max Weber, *The Three Types of Legitimate Rule*, 4 BERKELEY PUB. SOC'y & INST. 1 (1958); RYAN GOODMAN & DEREK JINKS, SOCIALIZING STATES: PROMOTING HUMAN RIGHTS THROUGH INTERNATIONAL LAW (2013).

²⁴⁹ Rancière, Panagia & Bowlby, *supra* note 42.

around, that which is undetected or unaccounted for in many modes (from the numberless refugee to the stray portion of fissionable material). Moreover, *how* that grappling is conducted—or how international institutions and other international legal agents detect and arrange the “order of things” in their sensory work—matters for reasons other than accuracy or completeness; this is fundamental to the politics of global governance and the uneven distributions of global resources and authority that both flow from and frame that politics.

With reference to Rancière’s account of politics, the foregoing claims disturb the normal idea that people and processes by which authority is wielded in international law and policy—and, by implication, those deemed unfit for that purpose—do so or are so, because the ways of the world simply *require* it (that is, according to reason, sovereignty, capital, nature, culture, or some other logic). In lieu of that idea, this article has represented both the authority of law and policy on the global plane, and the worldly conditions under which that authority seems to make sense, as ongoing works in progress (and rather open-ended works at that). Many of the techniques of detection and verification described in this article—especially those described in Part IV—are difficult to understand and translate (especially for people, like the author, without relevant technical training). Even so, one aim of this article is to show that this difficulty need not be experienced as a kind of fortress of disqualification.

It is possible to query the technical terms and practices by which we know the world, and their distributive implications, in a way that confounds the patterns and parochialisms of prevailing debate—or so this article has sought to show. Amid the “plethora of specializations” by which the work of international law and policy is now marked, what has remained largely unaccounted for is the prospect of political engagement in specialized work by those who lack the resources and authority of specialty, or do not have and cannot lay any claim to any specialized jurisdiction.²⁵⁰ All cannot become—or plausibly claim to be—specialists, nor attach themselves to institutions that are repositories of specialized know-how and equipment. Yet the uninitiated may—indeed must—still engage politically with the technical terms and practices through which resources and authority are distributed on the global plane. This article has sought to stake out some jurisdiction for precisely that sort of engagement.

²⁵⁰ Martti Koskenniemi, *The Politics of International Law – 20 Years Later*, 20 EUR. J. INT’L L. 7, 10 (2009).