Digital Humanitarianism and the Visual Politics of the Refugee Camp: (Un)Seeing Control

Rothe, Delf; Fröhlich, Christiane; Rodriguez Lopez, Miguel

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Digital Humanitarianism and the Visual Politics of the Refugee Camp: (Un)Seeing Control

Delf Rothe

Institute for Peace Research and Security Policy at the University of Hamburg

Christiane Fröhlich

German Institute for Global and Area Studies (GIGA)

AND

Juan Miguel Rodriguez Lopez

Universität Hamburg

Digital visual technologies have become an important tool of humanitarian governance. They allow the monitoring of crises from afar, making it possible to detect human rights violations and refugee movements, despite a crisis area being inaccessible. However, the political effects of such "digital humanitarianism" are understudied. This article aims to amend this gap by analyzing which forms of seeing, showing, and governing refugee camps are enabled by digital technologies. To this end, the article combines scholarship on the politics of the refugee camp with the emerging body of work on digital humanitarianism. It proposes the notion of a "visual assemblage of the refugee camp" to conceptualize the increasing adoption of visual technologies in refugee camp governance. Using the two paradigmatic cases of Zaatari and Azraq, two refugee camps for displaced Syrians in Jordan, the text outlines how this visual assemblage enacts the refugee camp in different ways—thus bringing about different versions of the camp. The case study reveals three such enactments of the refugee camp—as a technology of care and control; as a political space; and, as a governmental laboratory—and discusses how these interact and clash in everyday camp life.

Les technologies visuelles numériques sont devenues un outil important de la gouvernance humanitaire. Elles permettent de surveiller les crises à distance tout en offrant la possibilité de détecter les violations des droits de l'Homme, les mouvements de réfugiés, etc. malgré l'inaccessibilité de la zone de crise. Les effets politiques d'un tel « humanitarisme numérique » sont toutefois sous-étudiés. Cet article vise à combler cette lacune en analysant les formes de technologies d'observation à distance, d'affichage et de gouvernance qui seraient adaptées au cas des camps de réfugiés. Pour cela, cet article associe une étude portant sur la politique des camps de réfugiés aux travaux émergents sur l'humanitarisme numérique. Il propose la notion « d'assemblage visuel de camp de réfugiés » pour conceptualiser l'adoption croissante des technologies visuelles dans la gouvernance des camps de réfugiés. Ce texte s'appuie sur les deux cas paradigmatiques de Zaatari et Azraq, deux camps de réfugiés pour les Syriens déplacés en

Jordanie afin de décrire comment cet assemblage visuel représente les camps de différentes manières, en faisant ainsi apparaître différentes perspectives des camps. L'étude de cas révèle trois représentations des camps: Technologie de soins et de contrôle, Espace politique et Laboratoire gouvernemental. Il aborde ensuite la manière dont ces représentations interagissent et entrent en conflit dans la vie quotidienne des camps.

Las tecnologías visuales digitales se han convertido en una importante herramienta de la gestión humanitaria. Permiten observar las situaciones de crisis a distancia y, así, detectar las violaciones de los derechos humanos, los movimientos de refugiados y demás a pesar de que no se pueda acceder a la zona afectada. Sin embargo, los efectos políticos de ese "humanitarismo digital" no se han estudiado lo suficiente. En el artículo se intenta llenar este vacío mediante el análisis de qué formas de ver, mostrar y dominar las tecnologías remotas sirven en el caso de los campos de refugiados. Para esto, el artículo relaciona los estudios sobre las políticas del campo de refugiados con las nuevas investigaciones sobre el humanitarismo digital. Propone la noción de un "montaje visual del campo de refugiados" para conceptualizar la creciente adopción de tecnologías visuales en la gestión de los campos de refugiados. A partir de los casos paradigmáticos de Zaatari y Azraq, dos campos de refugiados para sirios desplazados en Jordania, el texto esboza cómo este montaje visual representa el campo de refugiados de diferentes maneras y da lugar a diversas perspectivas del campo. El estudio de caso revela tres de estas representaciones del campo de refugiados (como una tecnología de cuidado y control, como un espacio político y como un laboratorio gubernamental) y expone cómo estas interactúan y chocan en la vida cotidiana del campo.

Satellite imagery is the ideal technology to follow the constantly changing conditions that characterize many refugee camps. (Jan Kolomaznik, head of the emergency mapping team at Gisat | European Space Imaging 2013)

These kinds of images give us a way to visualize the invisible. (Christoph Koettl, senior satellite imagery analyst at Amnesty International in Bearak 2016)

UN organizations, NGOs, and private actors increasingly rely upon digital visual technologies—including satellite remote sensing,[1] aerial imaging with unmanned aerial vehicles (UAVs), digital mapping, and geographic information systems (GIS)[2]—in the governance of humanitarian emergencies (Brannon 2013; Turk 2017). Such "remote methods" (Duffield 2013) allow relevant actors to monitor humanitarian crises, human rights violations, or the growth of refugee numbers at a distance, thereby countering the problem of access denial or the geographic inaccessibility of crisis areas (Meier 2011; Sandvik et al. 2014). Scholars in critical international relations (IR) and security studies have discussed this development under the label of "digital" or "cyber humanitarianism" (Benton and Glennie 2016; Burns 2019; Jacobsen and Fast 2019). Some have pointed out the unequal power effects that come with the surveillance of vulnerable populations by humanitarian actors (Campbell 2014; Duffield 2016); others have criticized the assumed objective representation of local realities that is associated with such imaging technologies

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[1] In general, remote sensing denotes the generation of information regarding an object, place, or phenomenon on the Earth's surface through distant observation. Remote sensors (cameras or multispectral sensors) can be carried by different vehicles such as balloons, drones, planes, or satellites. In the following, we focus on satellite remote sensing, which today represents the dominant form thereof.

[2] GIS are software tools for the generation, management, analysis, and display of geodata. With the help of GIS software like ESRI, one can, for example, assemble satellite data with other sources of georeferenced data—such as population or environmental data—into multi-layered maps.

and emphasized the risk of dehumanizing phenomena such as migration through a technically mediated and distanced view from above (Dijstelbloem 2017; Rothe and Shim 2018).

In this article, we seek to further the debate on digital humanitarianism by studying the political effects of the increasing use of satellite technology and other remote methods in the governance of refugee camps. For this, we ask: Which forms of seeing, showing, and governing the refugee camp are made possible through the increasing use of remote technologies by humanitarian actors? Implied in this question is our core argument: visual technologies have a political effect. Not only do they frame refugees in certain ways and thus affect how these are perceived by humanitarian actors and the broader public; they furthermore reinforce a core governmental function of the refugee camp—that is, turning a (perceived) mobile anonymous mass into a knowable epistemic object (the camp population) (Ilcan and Rygiel 2015, 345). In this way, we consider how political interests can impact humanitarian action.

This article contributes to the literature on the politics of the refugee camp in critical IR and neighboring disciplines (Agier 2011; Ilcan and Rygiel 2015; Meiches 2015) by bringing it into dialogue with the emerging literature on digital humanitarianism. We propose the notion of the "visual assemblage of the refugee camp" to conceptualize the increasing adoption of visual technologies in refugee camp governance (cf. Rothe 2017). We hold that this concept is particularly suited to study how visual technologies become embedded in complex networks of regulations, discourses, technologies, and actors, and how agency—that is, the capability to see and show the refugee camp—is distributed across these heterogeneous elements.

Our findings are also relevant for a broader IR audience interested in the visual politics of migration. Several scholars have studied the dehumanization, securitization, and victimization of refugees through images and other visual artifacts (Johnson 2011; Bleiker et al. 2013). Aesthetic interventions and visual ethnographic works have sought to render visible what remains invisible in popular depictions of refugees—for example, migrants' everyday agency or the death of refugees on the borders of the EU and the United States (Squire 2014; Lisle and Johnson 2019). We add to this literature by focusing on the refugee camp as a crucial site of the visual politics of migration.

To empirically study the visual assemblage of the refugee camp, we draw upon an analysis of two *paradigmatic cases* of "digital humanitarian governance": Azraq and Zaatari, two camps for Syrian refugees in Jordan. On the one hand, the two camps share certain characteristics that make them relevant for our research aims. Due to the (perceived) refugee crisis in Europe, both camps are high on the agenda of European actors and have received considerable media attention (Kimmelman 2014; Kingsley 2017). Both camps are embedded in a complex governance network comprising multiple actors, including governments, IOs, and INGOs. Most importantly, digital technologies have been extensively used by both policy actors[3] and Western media[4] to assess and monitor the two camps and to present them to a broader audience (Tomaszewski et al. 2016; Hoffmann 2017).

On the other hand, both camps differ considerably in their structure and social organization. Zaatari first opened on July 29, 2012, and quickly became the main destination for Syrian refugees. In April 2013, the UNHCR estimated the number of persons of concern living in Zaatari as being just above 200,000.[5] Variously labeled "chaotic," "squalid," or "crime-ridden" (Kimmelman 2014), the vast expansion

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[3] Available for different points in time here: https://unitar.org/maps/countries/98. Accessed October 13, 2020.

[4] For Azraq: BBC 2014. http://www.bbc.com/news/world-middle-east-27205291. Accessed July 25, 2019; for Zaatari: https://www.nytimes.com/2014/07/05/world/middleeast/zaatari-refugee-camp-in-jordan-evolves-as-a-do-it-yourself-city.html?mcubz=1. Accessed July 25, 2019.

[5] http://data.unhcr.org/syrianrefugees/settlement.php?id=176&country=107&region=77. Accessed August 31, 2020.

of Zaatari became an (in)famous symbol of the growing—and spatially advancing—so-called refugee crisis. Azraq, which opened on April 30, 2014, was planned by the Jordanian government and UNHCR against this background. Whereas Zaatari is often portrayed as the epitome of chaos and ungovernability, Azraq is presented as an orderly, planned, and well-managed place. This perception of the two camps, however, changes entirely when one shifts perspective from the bird's eye view of the UNHCR and other humanitarian actors to the people actually living in these two places. Notwithstanding the unacceptable living conditions in Zaatari, the resilience of many of the camp's inhabitants is high—as manifested in their inventiveness, optimism, and sense of community. In contrast, Azraq is fenced off with barbed wire, heavily guarded, and appears lifeless and empty (Lee 2015, 25). We use this structural variation between the two camps to study how visual methods and other emerging humanitarian technologies interact with the political realities of the camps at various levels.

We combine multiple methods to study, experiment with, and reenact different ways of seeing the two camps. First, we use a multimodal discourse analysis of official UNOSAT homepages to analyze (novel) forms of seeing and showing the refugee camp through visual technologies, and as a way to study the accompanying legitimizing discourses and political rationalities. Second, this is combined with our own cluster analysis of UNOSAT remote sensing data on both camps. Cluster analyses are a common method applied by humanitarian actors to study structures of order and disorder in inaccessible or distant spaces.[6] We thus "reenact" the ways of seeing the camp used by humanitarian actors. Third, we contrast this "view from above" with the "view from below," which is based upon our own participant observation through field visits to both camps in the fall of 2014.[7] Our approach is inspired by the recent call by Austin, Bellanova, and Kaufmann (2019) to do critique differently "by focusing on the "companionship" central to critical knowledge production." Understanding humanitarian actors, technologies, and related visual methods as "companions" that, like us, are involved in the production of (humanitarian) knowledge, we seek to go beyond a generalized critique of these actors. We hold that, as Western, white researchers, we are not located outside of, but are embedded within, the described visual assemblage of the refugee camp. By (self-)critically engaging with and re-enacting popular methods of visualization, we thus seek to develop a critique of digital humanitarianism *from within*.

The next section relates the literature on the refugee camp as a political space and a technology of government to the recent debate on digital humanitarianism and, on this basis, develops our notion of the camp as visual assemblage. The section continues by introducing remote sensing methods and related visual technologies as a process of reassembling the refugee camp. Section three turns to the cases of Azraq and Zaatari to discuss how ways of seeing and showing the refugee camp interact with the political realities within these spaces. The concluding section answers our research question, and develops proposals for further research.

The Visual Politics of the Refugee Camp

A growing body of literature in Critical Geography, IR, and neighboring disciplines deals with the refugee camp as a political space (Martin, Minca, and Katz 2019). In

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[6]For example, UNOSAT, the geospatial analysis unit of the United Nations Institute for Training and Research (UNITAR), provides geospatial analyses for humanitarian actors and researchers. The share of density-based cluster analyses in relation to the total number of analyses has risen from 0 percent to almost 50 percent from 2013 to 2017. See https://unitar.org/maps/countries/98?page=0. Accessed December 17, 2019.

[7]One member of our research team is experienced in the geospatial analysis of remote sensing data. Another member has conducted field research with, and about, refugees living in camps and informal settlements in the Middle East region. To achieve comparability, the remote sensing data used for our cluster analysis stem from the same time period as the field visits.

this literature, we distinguish between two analytical yet overlapping dimensions of the refugee camp. First, the refugee camp has been discussed as a technology of humanitarian governance (Turner 2015). As a form of spatial governance aiming to control mobility and movement (Minca 2015), refugee camps arrest the uncontrolled flow of people and reconstitute "mobile refugee and displaced populations into sedentary ones" (Ilcan and Rygiel 2015, 345). Humanitarian actors would use a whole range of knowledge practices and technologies, including statistics, maps, censuses, and surveillance technologies, to turn anonymous masses of refugees into knowable and thus governable camp populations (Turner 2015). As "blueprints of Tayloristic planning" (Minca 2015, 75), camps render refugee populations "legible." In doing so, the camp as a political technology supposedly fulfills its twofold function of providing protection and controlling refugees (Agier 2011).

Second, the refugee camp has been discussed as a political space. Such scholarship has criticized the notion of the camp as an extralegal space, or a mere technology of control, populated by anonymous masses devoid of any agency. Studies of the camp as a political space stress the agency of refugees and discuss the routinization of camp life as temporary shelters turn into quasi-permanent settlements and cities (Ramadan 2013; Bulley 2014; McConnachie 2016). Authors have described the manifold tactics and practices through which camp inhabitants, purposefully or unintentionally, resist control and repression (Johnson 2013; Fiddian-Qasmiyeh 2016). Through such forms of resistance, camp inhabitants contest the imaginary of the humanitarian field as an alleged apolitical space. Other authors have studied how humanitarian actors increasingly aim to mobilize this agency and self-reliance of refugees and to encourage them "to become self-governing in the management of the camp" (Ilcan and Rygiel 2015, 334).

Visual Assemblages, or How Do We See the Refugee Camp?

Drawing upon recent works on the refugee camp as a socio-material assemblage (Meiches 2015; Minca 2015), we seek to develop a novel concept of the refugee camp—one that does not replace, but rather transverses the abovementioned dimensions of top-down control and bottom-up contestation. The notion of assemblage understands refugee camps as complex networks of heterogeneous elements, including "buildings, homes, people, institutions, social relations and practices" (Ramadan 2013, 74). Taken together, these have a particular governmental effect without following an overall strategy. Assemblages emerge through the complex interplay of different political actors, who are quite often pursuing competing intentions and logics of action (Haggerty and Ericson 2000).

Furthermore, from an assemblage perspective, the camp is not an enclosed container or fixed space (Meiches 2015). Rather, in the study of refugee camps, "space must be addressed as a process and not as a frozen materiality. It is never static, but ... always in constant motion and fluid" (Martin 2015, 14). An assemblage perspective draws on a processual ontology that stresses the emergent characteristics of social realities. This includes novel actors, technologies, or practices, and the spatial reconfiguration of the camp. According to Meiches (2015), contrary to other—more static—spaces of containment, the camp is characterized by its elasticity, enabled by the use of flexible technologies and materials such as tents or barbed wire. Furthermore, the refugee camp extends far beyond the boundaries of the physical camp space itself (Bulley 2014, 69). The camp space is part of a broader humanitarian assemblage that involves an increasing number of actors (from international organizations to transnational NGOs, private businesses, and researchers) as well as practices and technologies (from satellite remote sensing to big data, machine learning, and biometrics). Finally, this analytical focus also stresses that refugee populations play an active role in the assembling and re-assembling of the camp—for example, by changing its infrastructure, establishing
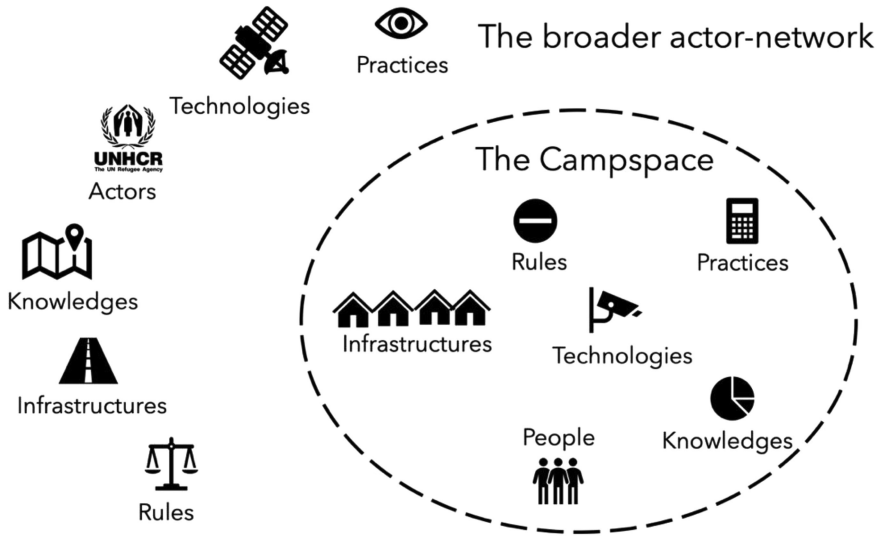
Figure 1. The visual assemblage of the refugee camp.
Source: Authors' own illustration.

commercial relations with the local population, or simply by leaving. Figure 1 shows an ideal-typical representation of the assemblage of the refugee camp.

While we follow Meiches (2015) and Martin (2015) in their understanding of the refugee camp as an assemblage, we hold that the dimension of visuality needs more attention. We argue that the governance of the refugee camp crucially involves practices and technologies of seeing and showing. First, the material infrastructure of the camp itself—an improvised or planned arrangement of wood, steel, carbon, fabric, and other resources—shapes both how refugees perceive their environment and how they are seen by others. The inside of refugee camps is characterized by heavy security infrastructures: walls, security checks, and barbed wire cut the camp off from its direct neighborhood, making it a nonspace that remains hidden from its surrounding communities and the wider public. At the same time, the spatial infrastructure of the camp renders the phenomenon of migration visible for other actors—including humanitarian NGOs and the hosting national governments. For this, a whole range of surveillance technologies are used—from census to video surveillance, aerial imaging, satellite remote sensing, and digital mapping. We, therefore, hold that what differentiates refugee camp infrastructures from other spaces of containment are not only their elasticity (Meiches 2015), but also their *selective transparency*: the inside of the camp is hidden from the eyes of direct neighbors, but visible to the satellite image analyst in Europe.

We propose the notion of the visual assemblage of the refugee camp to grasp both the visual dimension of the refugee camp and its embeddedness in broader actor networks that facilitate or prevent certain ways of seeing and showing. With this concept, we embrace works on visual (Tidy 2017) and scopic regimes (Grayson and Mawdsley 2019) that study how technologies such as drones enable certain forms of seeing, sensing, and witnessing political phenomena. The assemblage perspective adds to such concepts by, first, focusing on the relational forms of agency, which are distributed across the human and non-human elements of the assemblage, that make these ways of seeing possible. For example, the material features of the camp space—such as the shape and reflective characteristics of tents—influence how it can be sensed by satellites from space. This becomes politically relevant at the very moment when refugees start to manipulate this material infrastructure—thus

actively intervening in the visual assemblage of the refugee camp. Second, the notion of assemblage stresses the processual dimension of the camp. The processual ontology of the assemblage concept lets us conceptualize humanitarian actors' increasing reliance on remote methods as a process of reassembling the refugee camp.

Reassembling the Refugee Camp through Remote Methods

Both global humanitarianism and humanitarian technologies such as the refugee camp have a longer history (Barnett 2011; Lester and Dussart 2014). During European colonialism, camps—as ad hoc structures for the management and control of displaced populations—became a key instrument of imperial warfare (Meiches 2015; Minca 2015). After the end of World War II, camps as a technology of managing mass displacement became increasingly formalized and globalized (Malkki 1995, 497; McConnachie 2016, 404). Under the legal framework of the Geneva 1951 Refugee Convention and its 1967 protocol, the UNHCR became the main organization tasked with the coordination and administration of refugee camps (Ilcan and Rygiel 2015, 335). While technology has always played a key role in the provision of humanitarian assistance (Weizman 2011, 4)—and the camp as a crucial site of it—there was a proliferation of such technologies after the end of the Cold War. In the context of the humanitarian crises of the 1990s, the humanitarian field grew exponentially and a whole new moral economy emerged that centered on humanitarian reasoning (Fassin 2011, 7). Simultaneously, geospatial and information technology evolved quickly (see, e.g., Meier 2011; Sandvik et al. 2014; Sandvik 2015). As argued by Duffield (2013, 18): "Since Katrina in 2005, each major disaster, like the Haiti earthquake, Pakistan floods, New Zealand earthquake, the Japanese Tsunami and Hurricane Sandy, appear[s] as [a] cyber-humanitarian laborator[y], each producing new and better ways for extracting, analysing and applying humanitarian intelligence derived from remote technologies."

The figure of the refugee has been the focus of digital humanitarianism from the very beginning (Jacobsen 2017). In 2001, the UN established UNOSAT as a special unit of UNITAR—dedicated to the analysis and distribution of satellite remote sensing data. In 2011, UNOSAT and the UNHCR signed an agreement to foster collaboration on the use of satellite-derived data in migration governance (UNITAR 2011). This collaboration has intensified since the advent of the Syrian civil war: "UNOSAT experts maintain satellite derived monitoring of several important refugee camps in neighbouring countries so that UNHCR and other humanitarian entities can plan their response and monitor their impact" (UNITAR 2013).

Nongovernmental actors also increasingly rely upon the data offered by UNOSAT (REACH Initiative 2015a, 2015b; Dijstelbloem 2017). The R&D project EO4HumEn (EO-based Services to Support Humanitarian Operations) is a good case in point.[8] It draws on high-resolution satellite imagery to develop GIS products that allow for the monitoring of the size, structure, and environmental impact of refugee camps on the basis of change detection and time-series analyses. The aim is not only to develop more accurate tools to visualize these features at a distance, but also to automatize the process of extracting information from satellite imagery through object detection algorithms. Furthermore, by applying geospatial statistics, similar to our approach used below, EO4HumEn provides information on the population and dwelling structures of refugee camps.[9]

We would argue that the increasing reliance on remote sensing and related digital technologies reassembles the actor network of the camp. The application of

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[8] See http://eo4humen.sus4.eu/. Accessed July 11, 2019.

[9] See https://cartong.org/sites/cartong/files/Stefan%20Lang%20-%20GIS%20and%20satellite%20remote%20sensing%20for%20humanitarian%20operations%20support.pdf. Accessed October 12, 2020.

drones, satellites, or mapping techniques reproduces "previous thinking on colonial air power ... where drones are portrayed as the solution to the problems of ill health, poverty and immature markets" (Sandvik, Jacobsen, and McDonald 2017, 327). Until the end of the Cold War, aerial surveillance technologies remained firmly in the hands of a few nation-states, while today every NGO can, in theory, operate its own drone, satellite, or mapping program (cf. Rothe 2017). The resulting process of reassembling the camp works at different levels. First, the growing reliance on remote sensing technologies brings novel actors—including satellite imagery providers, analysts, and researchers—into the visual assemblage of the refugee camp. This resonates with and reinforces the decentralization and privatization of refugee camp governance, as described by Bulley (2014) and others. Second, with the very help of space infrastructure, cloud-based web platforms, digital mapping software, object detection algorithms, and other technical devices, the refugee camp is rendered increasingly mobile (Hind and Lammes 2016), as the resulting visual artifacts, such as satellite images or digital maps, circulate through the vast networks of news media, bureaucracies, research agencies, and NGOs. Third, the visual products circulated in this extended actor network not only provide novel insights into refugee camps, but also present them in a manner that is accessible to a broad range of stakeholders—including the camp inhabitants themselves. Fourth, these developments offer not only new possibilities of controlling and surveilling refugee camp populations, but also of politicizing the everyday life of the camp—for example, when the chaotic and miserable living conditions in Zaatari become a matter of public debate. This links the logic of the camp, as a humanitarian technology of relief and protection, to another humanitarian logic—that is, bearing witness (Weizman 2011, 42–45).

Seeing Refugee Camps

In this section, we study the manifold ways of seeing the refugee camp, which are enabled or foreclosed by visual technologies, including top-down satellite imagery, bottom-up fieldnotes, GIS, cameras, or videos. Our aim is decidedly not to contrast the "detached" satellite view with our "embodied" perspective on the ground. Rather, we study how different ways of sensing the camp allow different forms of governmental intervention and, in interacting with other parts of the camp assemblage, enact the refugee camp in competing ways. Concretely, we identify three different enactments of the camp: as a space of protection and control; as a lived space; and as a space of experimentation.

The Camp as Technology of Control and Care

The ESRI StoryMap, "Al Zaatari Refugee Camp: 4 years of Displacement,"[10] by UNOSAT is a multimedia tool that explains the crucial role of geospatial technologies in the governance of Zaatari camp to a broader audience.[11] It is based on WorldView-3 Imagery by Digital Globe and ESRI, and illustrates "satellite-detected shelters and other buildings" in Zaatari over a period of four years. The map consists of two layers: a satellite image of the camp and a data layer that illustrates satellite-identified shelters (orange), camp infrastructure buildings (light blue), and camp district boundaries. It allows zooming in and out, scrolling through the imagery, and switching between November 2012, January 2013, April 2014, April 2015, and June 2016 (see figure 2). The map is accompanied by multimedia and textual materials, including three embedded YouTube videos and an infographic with population

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[10] ESRI StoryMaps allow the combining of "authoritative maps with narrative text, images, and multimedia content." See https://storymaps.arcgis.com/en/. Accessed January 18, 2019.

[11] Available online at https://unosat.maps.arcgis.com/apps/MapSeries/index.html?appid=67a88f4302a748c4bfd61e57801ce81c. Accessed September 30, 2020.

Figure 2. UNOSAT interactive map of Zaatari's growth from 2012 to 2016. Reprinted with kind permission of UNITAR-UNISAT, copyright 2016 (Accessed August 31, 2020). *Source:* https://unosat.maps.arcgis.com/apps/MapSeries/index.html?appid=67a88f43 02a748c4bfd61e57801ce81c.

statistics. Together, they narrate the story of the camp's transformation from an ad hoc, chaos-ridden site to a permanent, city-like settlement.

The StoryMap is a good example of the reassembling of the refugee camp through geospatial technologies, discussed above. It illustrates how visual artifacts produced and circulated by the visual assemblage of the refugee camp link up with established humanitarian discourses to enact the refugee camp as a space of control and care.

Satellite Technology and Humanitarian Discourse

The three UNOSAT videos that accompany the ESRI StoryMap further elaborate the logic of humanitarian remote sensing. The first is an official UNHCR video, in which Special Envoy Angelina Jolie interviews two female camp inhabitants about their experiences with the Syrian war and their flight.[12] It begins with a black-and-white satellite image of the very early days of the camp, showing a barren, dusty, and dry environment. On the upper-left side of the image, one can observe the emergence of early camp structures: tents in more or less uniform rows adjacent to what looks like a road. A female speaker says: "Less than one year ago, Zaatari refugee camp was desert and dust" (TL 00:01).

This is followed by a satellite image on which the even rows of tents have turned into more disorderly structures. New tent structures have emerged. The voiceover explains: "It was meant to house 20,000 refugees" (TL 00:06). In the next images, the camp keeps growing until the entire camp space is populated. The speaker underscores this visual impression: "Now Zaatari is home to more than a 120,000 ... the second-largest refugee camp in the world" (TL 00:12–00:14). The video fades away from the satellite view to a scene of a lively and packed street. Market stalls are located on both sides of the crowded street (TL 00:13–00:17), which is traversed by a dense web of powerlines. After a scene change (00:17–00:19), we can see a number of tents with the UNHCR imprint on them and with the contours of a larger building in the background. The buildings and tents look rather improvised

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[12] See https://youtu.be/dBxRiiSXNnc. Accessed September 30, 2020.

and hastily cobbled together. Initially, there are no people visible. A young girl then walks from left to right in the camp environment.

Over an aerial view of a larger city with apartment buildings of different sizes (00:21–00:24), the speaker states: "But the majority of refugees live elsewhere." The video shows laundry hanging on a line in a backstreet, and a larger apartment building with veiled windows. After a scene change, we see two older girls looking out of a window, but only one of their faces is visible, followed by a younger boy who is looking—almost staring—down from a barred window. Sucking his thumb, he sneaks through the clothes hanging in front of the window. The female speaker explains: "Those not in camps are invisible. Refugees are struggling to survive in villages, towns, and cities across the region (00:25–00:30)." After this, the interview begins.

This short introductory scene illustrates how the satellite images function as visual proof of the statements made by the speaker about the size and growth of Zaatari camp. The distance and remoteness of the satellite view create a sense of objectivity and neutrality. The close-up scenes from within the camp instead work on a more emotional level and are used to visually and textually create antagonism between the camp inhabitants and the "majority of refugees" that are living elsewhere. The latter are presented as helpless victims, that is, as innocent children that are staring out of barren and partly covered windows (on the visual construction of refugees' helplessness, see Malkki 1996, 388). Being invisible, according to the video's narrative, makes refugees more vulnerable. By implication, the transparency of the refugee camp increases the safety of its inhabitants.

The second video[13] was produced by UNITAR-UNOSAT. It consists of a slideshow of nine satellite images captured in intervals between September 3, 2012, and November 24, 2014 (TL 00:07–00:50). When the final image from November 24 is shown, the camera zooms in on the center of the camp; then it zooms out, scrolls down, and zooms in again on the Southern boundary (TL 00:40–00:50). The end credits present the captured dates and ownership of the satellite images (TL 00:56), provided by DigitalGlobe and Airbus Defence & Space. Apart from this, the video does not feature any written or spoken text. Instead, it is accompanied by the sound of howling winds, which acoustically accentuates the absence of any narration. In other words, the video lets the "facts" of the satellite images speak for themselves, thereby demonstrating the power of the gaze from above: that is, not only to render the inside of the refugee camp visible at a distance, but to zoom in on details and to scroll visually through the site. Thus, satellite remote sensing of the camp is constructed not only as a passive activity of witnessing, but also as an active way of monitoring the camp over time.

The third UNOSAT video[14] further elaborates on this power of satellite remote sensing in the humanitarian governance of Zaatari. It is accompanied by orientally coded "world music," interrupted by short snippets from an interview. The screen splits into four parts, with alternating short clips of the Syrian civil war—including, for example, an explosion in a large apartment building; men running on a street; a woman crying and yelling in the middle of ruins; children playing with jerrycans; and people standing around body bags (TL 00:00–00:06). The rapid sequence of the videos and the movement within create a very stark contrast to what follows: an interview with Andrew Harper, UNHCR Representative and Humanitarian Coordinator in Jordan, in his office.

We see a European middle-aged man in a suit. Harper states: "We are using the imagery that UNOSAT is providing in the context of the Syria crisis, where we are seeing schools and villages engulfed in a conflict in southern Syria. As a result, hundreds and hundreds of thousands are fleeing toward Jordan" (TL 00:08). A

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[13]https://youtu.be/g2h-UEdgiQs. Accessed September 30, 2020.
[14]https://youtu.be/MYFR02L1V9s. Accessed September 30, 2020.

true-color satellite image of Zaatari is then slowly zoomed out from. Several satellite images are overlaid with each other, producing the impression of the camp growing in one and the same image. Harper explains: "We are using it to map out the refugee camps in Jordan. We have been seeing the progression of the Zaatari camp over several months" (TL 00:20). Another layer with red, yellow, and blue dots is overlaid with the satellite image. Harper adds: "And we also use the analysis which is provided by UNOSAT to describe how many tents have been set up just in the last month" (TL 00:28). The camera scrolls toward the upper-right corner of the camp, which is still empty. An inscription reads "Preparation of ground for new shelters." Harper continues: "To have a calculation of how much land is still available to construct additional tents and sites" (TL 00:38). The image zooms out, and one can see that it is part of an official UNOSAT map. Harper concludes that: "It is extremely useful to see this type of service from UNOSAT. Not only the satellite imagery, but the analysis. Whether it be it from the planning process, to the response, to the evaluation, satellite imagery is indispensable and will become the norm rather than the exception" (TL 00:50).

In short, the first episode of the video sets the context of Zaatari refugee camp—an exceptional and extreme situation. The detailed close-up shots of the chaos of the civil war, including the images of dead bodies and grieving witnesses, form a stark contrast to the neutral and detached views of the refugee camp. The camp not only appears as a safe space, but satellite surveillance becomes furthermore justified—through the statements of the UNHCR representative—as a way of stabilizing it. Technologies of satellite remote sensing and related ways of seeing and showing the camp thus become related to a broader humanitarian discourse of care and control (Pallister-Wilkins 2015). The growing technical surveillance of inhabitants, and the ethical issues connected to it, are legitimized through the increased efficiency of this humanitarian care.

Seeing Azraq and Zaatari from Above

Having identified the humanitarian discourses that justify the reassembling of the camp through visual technologies like remote sensing, we now dig deeper into the particular ways of seeing the camp, which are made possible by these visual technologies. For this, we conducted a cluster analysis of Azraq and Zaatari based on remote sensing data provided by UNOSAT (see figures 3 and 4). By re-enacting this popular method of spatial statistics,[15] we seek to unpack how the visual assemblage of the camp translates physical camp infrastructure into mobile visual products. For the cluster analysis, we used satellite-generated and georeferenced data of camp infrastructure for both camps. We identified two structure types: tents and administrative buildings. With the help of GIS-software (ArcGIS), we applied a Getis-Ord cluster analysis to statistically describe the spatial distribution of these two building classes across the camp spaces. The clusters are described as statistically significant hot and cold spots.[16]

What do we see on the resulting visualizations and what can we learn from them? A first general finding is a high degree of imbalance between tents and administrative buildings as spatial distortion, noise, and disorder in Zaatari (figure 3). We observe a strong accumulation of tent hot spots on the center-left side of the refugee camp; in fact, the concentration of tent clusters is so high that the entire area

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[15] Spatial statistics are one way of turning geospatial data into information; they include a number of statistical methods to analyze the spatial distribution of geographic data, for example, by identifying clusters (hot and cold spots) as well as statistical outliers. Spatial statistics thus describe a phenomenon through probabilistic analysis. Contrary to the subjective interpretation of satellite imagery, they claim to describe physical structures of order and disorder in an objective manner.

[16] Within the analysis, a positive value is added to significant hot spots and a negative value to significant cold spots. Using subtracting the significance values as standard method, we identify the exact number of points of divergence and overlap between tents and administrative buildings.
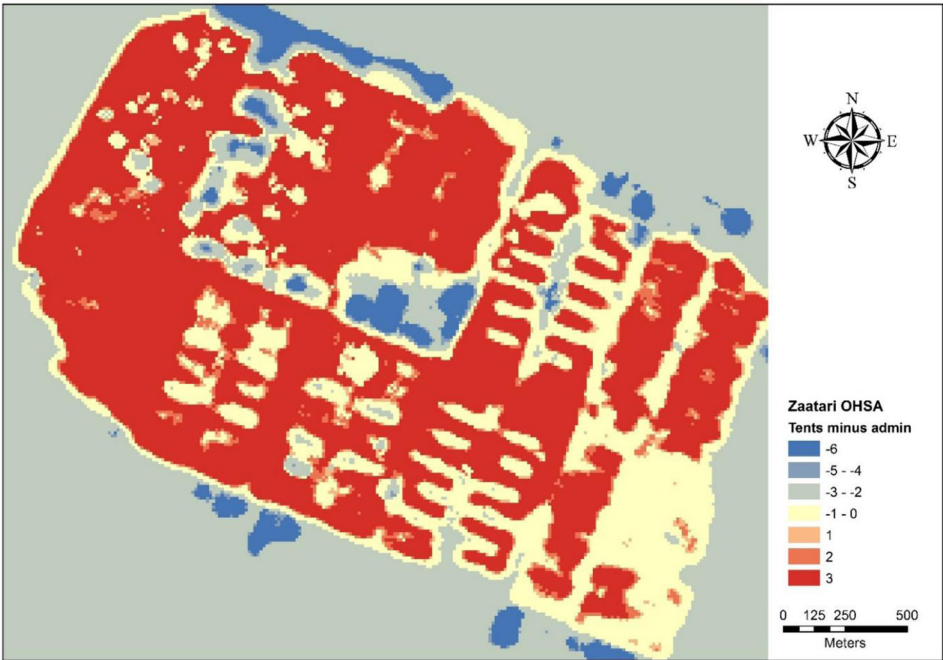
Figure 3. Zaatari OHSA (Date specification: October 12, 2015).
Source: Authors' own calculations.
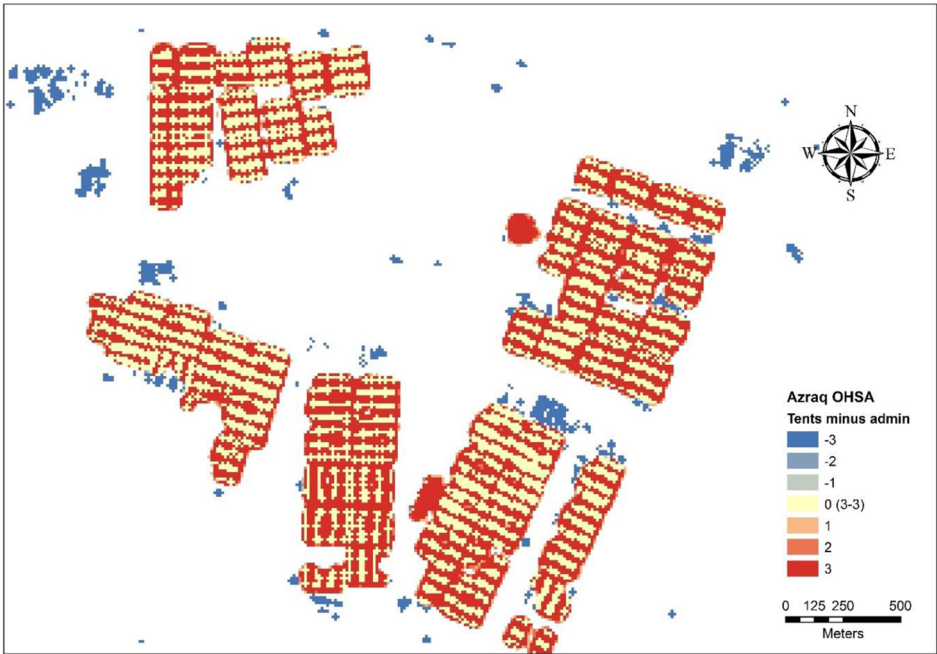
Figure 4. Azraq OHSA (Date specification: November 3, 2015).
Source: Authors' own calculations.

outside the camp statistically represents a cold spot. Conversely, in Azraq the analysis identifies very few cold spots; many hot spots of tents (red) and administrative buildings (yellow) can be identified, however. The rest of the picture remains statistically insignificant (white).

Looking at each cluster map independently, figure 4 shows large red clusters in the upper center and on the left side of the camp. The absence of yellow and blue areas means that tents are statistically overrepresented here, while facilities are statistically underrepresented. Camp inhabitants living in these areas of Zaatari are thus left without proper access to washrooms, toilets, or other public services. Instead, we find the camp facilities and services clustered in a few administrative islands (in blue) at the outer edges and at the center of the camp. The very high values for these hot spots of administrative buildings can be explained by their role as statistical outliers. The lower center and right-hand parts of the camp are remarkably different from the rest of the space. Here we can observe that the tent clusters are traversed by yellow lines. These represent rows of facility buildings (these appear in yellow due to their proximity to the tent infrastructures). The lower-right part of the camp is yellow, which can be explained by the fact that this part of the site was still evolving at the time of satellite data capture. In contrast, the cluster map of Azraq (figure 4) shows an evenly spaced distribution of housing and administrative buildings in repeated clear geometric shapes. One can further see that the rows of housing and administrative buildings are structured in five larger clusters, each striated by orderly lined huts clustered in larger blocks. This confirms Lee's assertion that Azraq's "physical camp design communicates a sense of order and rigidity, what scholars call "a panoptic city"" (Lee 2015, 29). What is remarkable is the large empty space between the different parts of the camp. This demonstrates, on the one hand, how densely populated Zaatari camp is and, on the other, how far apart the different parts of Azraq are.

As it circulates through the visual assemblage of humanitarian remote sensing, the camp infrastructure becomes translated into a set of digital data and data visualizations. With their universalist ontology (Reid and Sieber 2019), which draws on mathematical representations of space, such ways of seeing enact the refugee camp as a social space characterized by structures of order and disorder. As the satellite gaze can only visualize social phenomena "via proxy," that is through the interpretation of changes to their physical environment, the refugee becomes a problem of environmental interpretation (Duffield 2013, 14). In the present case, this implies inferring from the physical (infra)structures of refugee camps to social order and disorder. Following this logic, the satellite gaze of the two camps of Azraq and Zaatari reveals a problematic disorder in the Zaatari camp, in which we find heavily overpopulated areas, with apparently inappropriate access to camp facilities. Azraq, on the contrary, appears as a well-planned and clearly ordered space. This coheres with representations of both camps by Western media and policymakers (see above).

The Camp as Lived Space

We now shift perspectives toward a view from below, in order to better understand the camp as a lived space. We do this by drawing on observations in both camps made by one of the authors during field visits in 2014, as well as on (imagery in) media reports, secondary literature, and continuous communication with inhabitants of Zaatari. It is important to note here that while on-the-ground research like this provides a different perspective which can add empirical depth to the data presented above, it is still embedded in overarching power asymmetries between a European, white, comparatively well-situated researcher and the researched population of the two refugee camps (Tuck and Guishard 2013; Tuck and Yang 2014; Kaplan, Kuhnt, and Steinert 2020). We are aware of the limitations and ethical

considerations connected to the individual positionality of us as researchers, including the possibility that we as academics may actually reaffirm and perpetuate the very power asymmetries we are criticizing here. Furthermore, just like the satellite gaze, our view on the ground is mediated by a set of (visual) technologies, including cameras, field notes, or smartphones. The claim is, thus, certainly not that the gaze from below would enable an unmediated, or undistorted view of the camp.

Nevertheless, the field visits rendered visible forms of agency that cannot be seen from above, such as a sense of community or new avenues for carving out livelihoods. A switch in perspective thus also uncovers one in translation: where possible, inhabitants of the refugee camp reassemble its space through interaction with its physical infrastructure—for instance by repurposing UNHCR tents, by dismantling public bathrooms to create private ones, or by creating a new wastewater disposal system. Zaatari is an example of this reassembling, whereas Azraq was built explicitly to avoid such agency: it is an empty space that is perfectly "legible," as it offers little space for modification and thus appropriation, leading to unexpected consequences.

Seeing Azraq and Zaatari from Below

First, we invite the reader to journey with us to Zaatari camp, about 1.5 hours by car from the sandstone buildings of Amman in the direction of the Syrian border, as it turns into more sparsely populated and increasingly dry terrain. The drive by car already illustrates Zaatari's isolation, as without a common source of income and requiring a permit to leave the camp, Amman is out of reach for many of its inhabitants. A white, Western researcher, however, is privileged enough to make (read: pay for) the journey with a driver/fixer and to receive a permit from the Jordanian Ministry of the Interior. In 2014, the latter was relatively easy to obtain via email (and at no cost), even though the permit only allowed six visits with a mandatory end before 4 pm.

The camp is sealed off from its surroundings by fences and barbed wire, as well as two security gates, which testifies to the selective transparency of the refugee camp. The first security gate is right off Baghdad International Highway, heavily guarded by the Jordanian military, and followed after a few hundred meters by a second one, overseen by Jordanian police officers. Only the police want to see the research permit, talking on the phone to—assumedly—a supervisor of sorts; they then wave the car through and order its passengers to immediately take a left after entering the camp in order to visit the police offices located there. Before the turn, one gets a first glimpse of what the camp inhabitants call the Champs-Élysées: a paved street leading onward from the security gate and lined with all sorts of businesses, from small kiosks to more spacious huts, selling everything from produce and clothes to mobile phones and even pets. On another paved road, the car passes by the buildings where the UNHCR, IOM, and camp authorities register new arrivals, and where the occasional bus filled with returnees leaves back to Syria—an indicator of the shift in hospitality and tolerance soon to come among Syria's neighboring states.

The car parks in front of what is called "Base Camp." There, the researcher and driver/fixer make straight for the offices of the Jordanian police. Again, the permit is examined; pleasantries are exchanged in Arabic, and after about thirty minutes both are free to go explore the camp. No official accompanies them; in fact, apart from the two contact points with Jordanian police, their only interactions are with camp inhabitants. They take the car back to the main entrance, turn left and left again, into a dirt street lined with more selling huts, then right into a more "residential" area. The car parks again, this time in front of the house of the translator who will work with the researcher during the interviews. The different buildings in

this part of the camp merge into each other, sharing walls and each looking different. The streets are without tarmac and narrow, bustling with pedestrians. The heat is still intense in late September. The driver and the researcher enter the translator's house, which consists of two trailer-like aluminum huts/shipping containers with a small yard between them and a private self-constructed toilet. One hut serves as a living room during the day and a bedroom at night, the other doubles as a kitchen and bedroom. A constant trickle of visitors continues to arrive, neighbors, business partners, acquaintances, illustrating a keen sense of community. The hosts take pride in offering refreshments and even extend an invitation to stay overnight.

By car, the driver, the translator, and the researcher then make their way through the camp, stopping again and again to talk to passersby. It is striking how many people are out and about, moving around freely and interacting with each other, and how diverse the building structures are. Where in some parts, buildings lean onto each other, reminiscent of a slum or favela with their narrow alleys and uneven rows, in other parts huts are separate and further apart. All of the buildings leave room for appropriation; tent cloth is repurposed as makeshift doors or awnings, laundry hangs drying from self-constructed washing lines, and passing by large community bathroom structures, it is explained that these buildings are mere empty shells: camp inhabitants have taken apart the built-in toilets and sinks in order to add private bathrooms to their own homes. The car also passes by a building site where camp inhabitants are building wastewater disposal channels connecting the new bathrooms to existing infrastructure. One family patriarch opens the makeshift door to a shaded courtyard between three rectangularly arranged aluminum huts, where he cultivates vegetables and flowers, creating an unexpected oasis from the bustling heat outside.

Agency goes well beyond creating an individual living space, however; in the conversations with camp inhabitants, it becomes clear that families have managed to reunite in the camp, adjusting their housing accordingly to accommodate more individuals. People also explain that they leave the camp on a daily basis to work, in one case even commuting to Iraq. All of this proves the messiness of the assemblage of the camp, with inhabitants resisting their translation into an anonymous mass or a governable population, claiming instead their agency as human beings. What is on display here can be described as a bottom-up urbanism of sorts; the camp has evolved into a city.

The picture is much different in the newer camp, Azraq. As access is much more restricted there at the time of the research, only one visit is possible. Azraq is located about two hours southeast of Amman, on the road to Saudi Arabia. Similarly to Zaatari, it is marked out by fences and barbed wire—but here, the entrance is deserted except for security personnel. No one is going in or coming out. To enter the camp, we have to pass through a building complex that is reminiscent of security checkpoints on the Israel–Palestine border; every movement is monitored and visitors are accompanied by a UNHCR representative and a police officer at all times, citing security and service as reasons. Before entering the camp proper, the permit is examined and the purpose of the visit is discussed; only then are visitors allowed in.

The first stop of the small party of visitors, consisting of a UNHCR official, a police officer, a (different) translator, a driver/fixer, and the researcher, is a communal area where some inhabitants of Azraq have gathered. The rest of the camp is virtually empty; the distances between the different "villages" are extensive, and there are no self-constructed shops or similar infrastructures to be seen. No one is out on the street, and half of the houses we visit are empty, surprising the UNHCR representative who had navigated the group here. Neighbors tell about people leaving to go back to Syria or elsewhere; "We won't stay here either," they often add. The housing structures are not connected to the electricity grid,

severely restricting movement after nightfall; everything seems to be designed to keep inhabitants in their huts at all times. "There is no life here," one respondent says; meanwhile the officials accompanying the group continuously point out the state-of-the-art building structures and the fact that, unlike Zaatari, Azraq has not seen any major social upheaval or clashes so far. However, while the space's design may benefit the desire for stringent monitoring, fractures and failures of the camp as a political technology still exist: inhabitants resist monitoring by simply leaving the camp without the knowledge of the actors governing it, thereby illustrating how the fixed camp infrastructure actually sabotages its monitoring (Hoffmann 2017).

Refugees' Agency and Everyday Resistance

The refugee camps of the field visits differed considerably from those in our analysis of the remote sensing artifacts above. This corresponds to another reality of the visual assemblage of the camp—one that is not captured by the notion of the camp as a technology of care and control. Namely, that the camp is a lived space, populated by political subjects (Agier 2011, 137–46; Ramadan 2013; McConnachie 2016). The development of informal economies can be considered a coping strategy by inhabitants, exploiting this very exceptionality of the camp space (Martin 2015). The informal economy around the Champs-Élysées of Zaatari is a case in point. What appears as *noise* and *distortion* on satellite images and cluster maps turns out to be an important source of *agency* and *resilience*. Furthermore, camp inhabitants also actively resist their marginalization (Ramadan 2013) and employ different tactics to circumvent surveillance or control mechanisms—such as using fictitious identities, entering their names twice on lists, or registering in different villages of the same camp (Bulley 2014).

The visual assemblage of the camp not only forecloses refugees' agency—by subjecting them to remote control—but also enables forms of agency. As our research in Zaatari shows, refugees manipulate and reconfigure infrastructure to make the camp a more livable place. However, these acts can also be considered practices of camouflage that boycott camp surveillance: buildings that look like functioning toilets and washrooms in satellite images turn out to be empty shells, while their interiors have been integrated into self-constructed living areas. James Scott (1985) uses the notion of "infrapolitics" to describe such acts of everyday and silent resistance against structures of authority. The practices observed in Zaatari could, in this sense, be understood as visual infrapolitics. Through these acts of resistance, inhabitants actively contribute to the *reassembling* of the visuality of the refugee camp.

In the case of Azraq, in which camp infrastructures are fixed and immutable, refugees resist governmental humanitarian logics simply by leaving. As Lee (2015) observes, about half of the 14,000 refugees in Azraq left the camp over the course of several months—either legally or illegally. This leads to a situation where parts of Azraq mirror a Potemkin village: a perfectly planned structure of robust but empty buildings. One could argue that it is the fixed infrastructure itself that is sabotaging camp surveillance in Azraq. In other camps, it is exactly the elasticity of infrastructures that makes the monitoring of the hosted refugee populations possible by proxy. In such camps, the increase of tents in a given area and time span can be used to calculate the growth of camp populations. In Azraq, however, the fixed and static structures do not offer reliable information about which of the buildings are actually occupied. The selective transparency of the camp assemblage, thus, not only renders refugees increasingly visible, but also opens up possibilities of situated and highly contextualized practices of resistance (Johnson 2016).
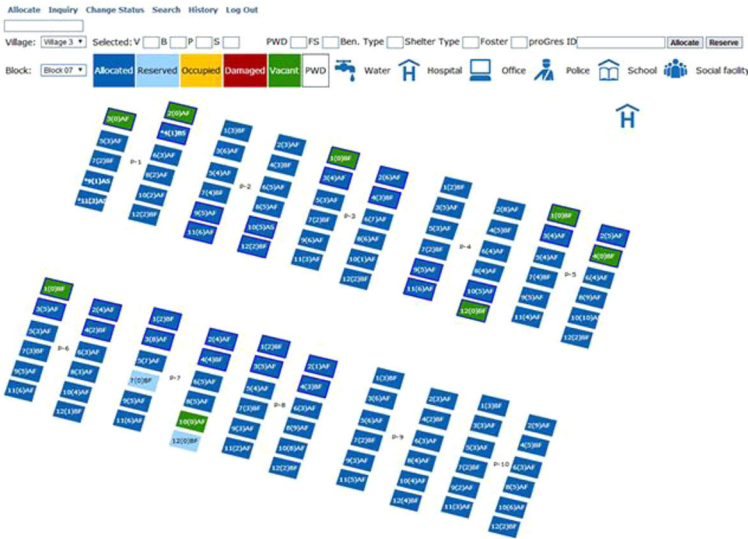
Figure 5. Screenshot of the GIS shelter allocation system for Azraq.
Source: UNHCR Innovation (2016).

The Camp as Governmental Laboratory

Different ways of seeing and showing the camp not only produce competing discursive frames or representations of the space, but are also embedded within competing enactments of the camp as a technology of control and care and as a political space. These competing versions often clash with and collapse into each other, resulting—from the perspective of humanitarian actors—in a number of governance failures. However, we would argue that the examples of Zaatari and Azraq demonstrate how apparent glitches of the visual assemblage are used in a productive way to test innovative approaches, thus pointing to a third reality of the camp: as a "space of experimentation" or "humanitarian laboratory" (Jacobsen 2015; Martin 2015). In Azraq, for example, the failure to monitor the camp population remotely via satellites and the lack of reliable population data led camp administrators to experiment with new forms of digital surveillance (see Hoffmann 2017; Lee 2015). Iris scanners are used to control the identities of camp inhabitants, which are also required for purchases in the camp's only centralized shop. In another project, UNHCR has used GIS technology to map shelter allocations in the camp (see figure 5). Yahya Hassune, who worked as Associate Field Officer in Azraq in 2016 and first developed the idea of using GIS, explains in an article why the camp is the perfect place for testing this technology: "Unlike other camps where refugees were housed in tents, Azraq was given sturdier transitional shelters made of zinc and steel to resist harsh weather conditions. Because the t-shelters were not mobile, they were given a physical address, which could be used in a GIS program" (Lee 2015, 27). In other words, these experiments became possible because of—or were developed in reaction to—the problems of Azraq; that is, its low population, static infrastructure, and lack of social life.

In Zaatari, on the other hand, the Center for Geographic Information Science & Technology at Rochester Institute of Technology teamed up with the UNHCR and Al-Balqa and Princess Sumaya Universities in Jordan to develop GIS solutions to camp management problems. As put by the leader of the project, Brian Tomaszewski: "I was quickly struck by how geographically complex Zaatari camp was ... Officials at Zaatari had some maps of the camp, but they struggled to keep

Figure 6. Results of the stakeholder mapping exercise in Zaatari.
Source: Tomaszewski (2018).

up with its ever-changing nature" (Tomaszewski 2018). To change this situation, Tomaszewski and his team decided to approach those with the most intimate knowledge of the camp: its inhabitants. With backing from the UNHCR Innovation Fund and the support of ESRI, the team established a "Zaatari GIS lab" to train them in the use of this software and to empower them to produce their own maps of the camp (see figure 6).

As stressed by the project leader, the exercise was not (only) about the production of more reliable spatial data on the camp or mobilizing refugees for their own surveillance. More importantly, the exercise sought to activate their self-help potential and to empower them to "create a better future for themselves and their future homes" (Tomaszewski 2018). Visual technologies here function as tools to mobilize the agency of refugees and to harness this agency for the governance of the camp. The example, thus, illustrates how visual technologies become assembled with neoliberal political discourse and related ideas of self-responsibility and self-government (cf. Ilcan and Rygiel 2015).

Conclusion

In this article, we have explored how humanitarian actors' increasing reliance on digital visual technologies changes the governmental logic of the refugee camp. We asked which ways of seeing and showing the camp such technologies enable, which alternative ways of seeing exist, and what political interventions ensue. To answer these questions, we have proposed the concept of the visual assemblage of the refugee camp. We have argued that this concept has a number of analytical merits. With its relational understanding of agency, it allows for the study of the impact of visual technologies without reverting to a naïve technological determinism.

Instead, it shows how these visual mediums link up and become assembled with other technologies, discourses, and practices.

The processual ontology of the assemblage perspective stresses the fluid and dynamic character of the refugee camp as a space in becoming. This allows us to make sense of the increasing reliance on visual technologies and remote methods as a process of assembling and reassembling the refugee camp. Our theoretical perspective, furthermore, has enabled us to show that visual technologies do not simply frame refugees and refugee camps in particular ways. Rather, they enact the refugee camp in different ways as part of a broader visual assemblage—thus bringing about different versions or realities of the camp that are marked by different degrees of transparency and visibility. In the empirical section, we have described three such enactments of the refugee camp: as a technology of humanitarian government and control; as a political space and lived reality; and as a space of experimentation or humanitarian laboratory.

First, satellite remote sensing with its view from above plays a growing role in the camp as a *humanitarian technology*. Through our analysis, we have shown that these visual mediums resonate strongly with humanitarian discourses of care and control and become assembled with other technologies and related scientific theories—including GIS object detection algorithms and machine learning as used in our empirical analysis above. A complex mesh of physical camp infrastructure, multi-spectral remote sensors, mathematical theories of space, remote sensing analysts, humanitarian organizations, and GIS software together all translate the refugee camp into a geometric, machine-readable space. Second, via participant observation, we have shown how camp inhabitants interact with this visual assemblage in complex ways—for example, by altering and manipulating the physical camp infrastructure. In so doing, they not only alter the ways in which the camp can be seen, but moreover enact it as a *political and lived space*. Third, these two versions of the refugee camp continuously contradict and clash with each other, thereby making fissures and failures its inherent characteristics. The two cases studied in this article illustrate this. While Azraq, with its planned and orderly structure, is a paradigmatic example of the camp as a technology of control and care, it is a terrible living space that constrains refugees' agency. Zaatari on the other hand, chaotic and unplanned, allows for inhabitants' creative adaptation and thus resilience. In both camps, humanitarian actors have used these fissures and failures to justify a range of technical innovations and experimental forms of governance. In Zaatari, this involves experimentation with participatory GIS and mapping to mobilize the self-help potential of the refugees—in line with a logic of resiliency humanitarianism. In Azraq, this includes experimental use of GIS and satellite data for tent allocation, as well as a number of other surveillance measures including biometric registration, iris scans, and similar.

Further research is required to scrutinize these governmental logics of the refugee camp and their enactment through emerging technologies. This could involve extending the empirical focus to include other technologies such as drones, big data, AI, and the use of voluntary geographic information in the governance of refugee camps through fieldwork. Another avenue would be to inquire more deeply into the visual politics of the refugee camp, by tracing the circulation of related artifacts and further unpacking their visual grammar.

Funder Information

Acknowledgments

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