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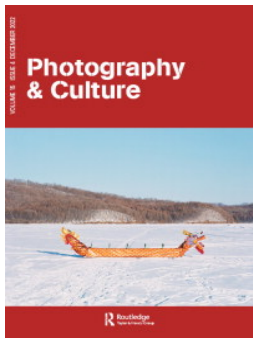
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Transhistoricizing the Drone: A Comparative Visual Social Semiotic Analysis of Pigeon and Domestic Drone Photography

Lauren Alex O'Hagan and
Elisa Serafinelli

Abstract

This article seeks to situate drone imagery within a more extensive lineage of practice by focusing on one particular form with which it is comparable: pigeon photography. Using a combination of visual social semiotic analysis, literature from Drone Studies, and archival research, it highlights four overarching characteristics shared between photographs taken by pigeons between 1908 and 1912 and contemporary drone visuals produced by hobbyists: verticality, geographical reimaginings, access to inaccessible places, and aerial self-portraits. In doing so, it aims to develop a better understanding of the social and material affordances/constraints of aerial photography, its meaning potentials and how they may have changed across space and time, and the social relations that are reflected in and shaped by its images. The article concludes by suggesting a nuanced perspective into the relationship between “new” and “old” media, arguing that images taken by drones and pigeons have similarities in their forms and functions, but their creation is guided by different ideological values and bounded by the potentials, norms, and traditions of the time. This perspective builds upon the recent turn in media studies toward transhistorical approaches to place seemingly novel contemporary communication technology within historical patterns of practice and use.

Keywords: drones, pigeons, photography, visual social semiotics, perspective, gaze

Introduction

Over the past ten years, the use of domestic and commercial uncrafted aerial vehicles, or drones, has increased dramatically (Crampton 2016,

137). No longer confined to a military context, drones are now employed by entrepreneurs, hobbyists, citizen scientists, and artists alike for a range of purposes, producing photography that reenvision landscapes and reshapes our geographical understandings of the world (Garrett and Anderson 2018). With these reimaginings also comes the potential to diversify the traditional meanings tied up with the view from above (e.g. panoptic surveillance, power asymmetry) and create a synesthetic space that transforms old forms of knowledge and shakes up conditioned ways of seeing the world, thereby achieving “countervisuality” (Monahan 2018).

However, although drone imagery – understood as a combination of visual stimuli and their broader mental representations and sociocultural meanings (Ohl 2015, 614) – is undoubtedly novel, caution must be exercised in overstating the extent of its novelty. Drone imagery does not mark a radical break in global visual culture; rather, it represents the latest in a long historical trajectory of aerial photography that extends as far back as the mid-nineteenth century when hot air balloons were first used for mapmaking and surveying (Adey 2010; Dorian and Pousin 2013; Kaplan 2018, 115; Padley and McCabe 2019; Richardson 2020, 859; Maurer 2021, 19). Thus, in order to defetishize the drone and better understand its impact on communities and social practices, we must historicize it. It is only by tracing historical continuities between past and present forms of aerial photography that we can truly understand their meaning, usage, and effects (Foucault [1975] 1977; Tagg 1988).

With this in mind, the current article seeks to situate drone imagery within a more extensive lineage of practice by focusing on pigeon photography as a suitable mode of comparison. Pigeons were the drones of the early twentieth century, revolutionizing people's knowledge of their surroundings through photographs that offered different perspectives, angles, and modes of seeing (Wilkinson 2013, 1–2; Fontcuberta 2018). Specifically, the study uses the theoretical

framework and methodological toolkit of visual social semiotics (Kress and van Leeuwen 2006; Ledin and Machin 2018, 2020) – which is concerned with how social meaning-making practices are conveyed visually – to compare the semiotic features and compositional structures of two datasets. The first consists of images taken by pigeons between 1908 and 1912 and archived in the Stadtarchiv Kronberg im Taunus and Deutsches Technikmuseum in Berlin, whereas the second is made up of contemporary drone visuals produced by hobbyists and collected from two months of participant observation on drone social media platforms. To account for the broader social practices and processes that underlie the production and reception of the images, the analysis is grounded in literature from the field of Drone Studies and supported by historical evidence provided by newspaper articles and archival records.

Overall, this comparison will enable a seemingly novel contemporary communication technology to be placed in a wider history of technologically mediated change, revealing similarities in the forms and functions of drone and pigeon photography, yet demonstrating that their creation is ultimately guided by different ideological values and bounded by the potentials, norms, and traditions of the time. This recognition of comparison and continuity is in keeping with the increased attention paid to trans-historical perspectives in studies of contemporary media and technology in recent years, which seek to identify antecedents in the communicative histories of individuals and communities that shape a text's creation (Tagg and Evans 2020).

Essential to this transhistorical perspective are considerations of affordance, provenance, and power (van Leeuwen 2005). In the context of social semiotics, affordance is the qualities or properties of an object that define its possible use, provenance describes an object's materiality and what it has been repeatedly used to mean and do, and power entails how the meaning potentials of an object can be framed by hierarchical relations and serve ideological interests. Thus, here, we aim to bring

together visual social semiotic analysis, literature from the field of Drone Studies, and archival research to answer three questions:

1. How did materiality, social availability, and individual creativity afford (or constrain) pigeon photography compared to drone photography?
2. What meaning potentials did pigeon photography have in the early twentieth century and how have these meanings changed (or stayed the same) across space and time?
3. Who produced and engaged with pigeon photography and how is this similar (or different) to now with drones?¹

To date, few studies have explored drones and drone imagery in relation to previous forms of uncrafted aerial vehicles and aerial photography (for exceptions, see Wilkinson 2013 and Fontcuberta 2018 on pigeon photography; Kaplan 2018 and Maurer 2021 on hot air balloons). Furthermore, while extensive research has been carried out on drone vision and visibility in military and non-military contexts (e.g. wildlife conservation, archaeological surveying, citizen activism, and journalism), scant attention has been paid to its usage by hobbyists (Gregory 2011; Maurer 2017; Campana 2017; Parks 2018; Garrett and Anderson 2018; Tuck 2018; Zuev and Bratchford 2020). Moreover, when drone vision and visibility have been investigated, researchers have focused predominantly on how drones affect human perception culturally and emotionally rather than unpacking the multimodal and multisensorial resources responsible for such reactions.² Greater attention to the visual sensory capacities of drones and how drone technology can be mobilized and reimagined for recreational and artistic purposes offers an important step forward in understanding how drones are reshaping sensory formations and transforming the visual field by producing images distinct from our daily imaginaries (Serafinelli and O'Hagan, 2022).

Indeed, leading drone scholars have argued that, to advance the field, there must be more concentrated studies on the types of visuals produced by

drones and their role in sense-making processes, geographical imaginations, and power mediation rather than the drone apparatus itself (e.g. Walters 2014; Kindervater 2016; Monahan 2018; Agostinho, Maurer, and Veel 2020). Greater consideration of the specific characteristics and aesthetics of drone visuals will foster a broader appreciation of the ways in which drones have transformed how we visualize and embody our world, acting as intermediaries between humans and nature (Benjamin 2020). This, in turn, will open up possibilities for people to rethink the aerial view and its association with pan-optic surveillance, demonstrating that it cannot be exclusively understood as "a scopic vertical mode of perception based on clear hierarchies, binaries, and oppositions" (Maurer 2021, 20). Here, we argue that this reappraisal can only be done effectively by placing drone visuals into a broader trajectory of patterned practices and uses, specifically early twentieth-century pigeon photography. Transhistoricizing the drone will, thus, help better understand the semiotic and material properties of drone imagery, as well as the sociohistorical practices and ideologies that it shapes and in which it is embedded (Walters 2014, 103; Kindervater 2016, 223–224). Doing so will not only connect the drone to earlier practices of aviation and aerial photography, but also foster a reflection on the purported novelty of drone visuals. In addition, offering a transhistorical approach to visual social semiotics will redress the field's overwhelming focus on contemporary multimodal texts and highlight how many practices that we consider novel are, in fact, familiar or reconfigured from past phenomena.

Transhistoricizing the drone

Throughout history, technological advances in aeronautics and optics have created new and potentially disruptive ways of seeing the world (Mangold and Goehring 2019). Drone vision extends this long lineage of aerial perspectives dating back to the 1840s when hot air balloons were first used in the Napoleonic Wars (Richardson 2020), but also

further beyond to the concept of the God's-eye view, present in biblical discourses and referring to God's all-seeing gaze (Amad 2012; Brighenti and Pavoni 2020). These religious and militaristic origins of the aerial view have led to its association in the public consciousness with panoptic surveillance, air supremacy, territorial defence, and human annihilation (Chow 2006; Kaplan 2018). Such views have also been consolidated by the work of Foucault ([1975] 1977) and Tagg (1988) who see photos and visualities (i.e. sense of vision coupled with power) as articulations of institutional power that produce certain regimes of truth. These connotations persist today, even though drones are used increasingly in the domestic sphere. As Kaplan (2017) argues, even when drones are "remediated," they always remain entwined with war, which becomes absorbed into the fabric of our daily communications.

Despite the entanglement of aerial perspectives and military strategy, Mangold and Goehring (2019) point out three ways that domestic drones challenge this view: by revealing previously invisible entities, by unsettling scale, and by attracting viewers to political content previously considered repellent. Sandvik and Jumbert (2016, 14) also support the reappraisal of the drone, arguing that they are not predestined to be "good" or "bad"; rather, they are tools that their owners choose to use in "good" or "bad" ways. Massey (2007, 107) takes this further, stating that drone imagery only becomes problematic when verticality becomes bound up with truth. Considering drone photography as just one view of reality and not centred, singular, or representative of an indexical truth allows for a recognition of the range of new, creative, and rebellious forms that cultivate multiple lifeworlds (Azar, Cox and Impett 2021). This is not to deny that aerial perspectives can be problematic, but rather to foster room for a more critical reflection of the social, cultural, historical, and political connotations of drones, particularly in a hobbyist context. Comparing drone imagery with early twentieth-century pigeon photography will showcase how both can acquire new realities

and take on demilitarized meanings. Both drones and pigeons move lines of sight from the street to the air, but this does not necessarily entail a relocation of boundaries between the public and private sphere. In fact, by disrupting our understanding of everyday environments, both can open a space in which to unravel the link with systems of control (Hildebrand 2019a). In other words, by unsettling conditioned ways of seeing world, drones and pigeons have the potential to challenge the ideological order (Monahan 2018; Grayson and Mawsley 2019).

Drone culture is heavily inspired by birds and bird flight. Drones are morphologically and aesthetically made to resemble birds and are often given avian names (e.g. Eagle, Hawk, Parrot, Snowgoose), while during drone research and design, scientists study the physiology and flight patterns of birds in order to determine more effective ways for drones to navigate tight and narrow spaces (Wilkinson 2013, 4). The influence of birds is particularly evident in recent ornithopter drones, which have flapping wings and can even emulate the way that birds overlap their feathers to change wing shape for improved steering and balance (Chahl 2020). In her study of drone trade-shows, Jackman (2021) notes that promotional materials often accentuate drones' birdlike features by portraying them in landscapes associated with wildlife photography to normalize them and detach them from the negative associations of surveillance and warfare. By making drones appear as "natural" in an aerial scene, their flight circles, shadows, and flecks of colour are fetishized and make them easily mistakable for birds. Given all of these factors, viewing the drone as a "powerfully mechanized equivalent" of birds does not seem too far-fetched (Wilkinson 2013, 4).

Asides from the visual similarities between drones and birds, the connection between aviation and birds has been a central part of the cultural imagination for many decades. This is well-documented by Pong (2019) in her work on the symbolism of birds in warfare, which draws attention to the



Figure 1. The pigeon camera. Source: Stiftung Deutsches Technikmuseum Berlin, Historisches Archiv. Photo: Julius Neubronner.

image of doves as German dive-bombers in T.S. Eliot's *Little Gidding* (1942) and falcons as Spitfires in the film *A Canterbury Tale* (1944). However, the connection dates back even earlier to 1903: a year that saw the Wright Brothers fly the world's first motor-operated airplane and Julius Neubronner invent the pigeon camera – the focus of this study.

For many years, Neubronner, a German apothecary, had been delivering medication to patients in rural locations using carrier pigeons. When one of his pigeons got lost in fog and failed to return to the dovecote after four weeks, Neubronner came up with a canny idea: to equip his pigeons with light miniature cameras to trace their paths (Figure 1). These cameras weighed 75 g and were strapped to a pigeon's breast by means of a harness and an aluminium cuirass (Dempsey 2019). The pigeons were released 100 km from home and would fly at a height of 50–100 m. The camera had two lenses and a pneumatic system; it was activated by inflating the left chamber and as the air slowly escaped from the capillary at the bottom, the piston moved back towards the left triggering the exposure. This happened every 90–120 s, which meant that thirty

photos could be taken on 3 × 6 cm negatives during a 1-h flight (Deutsches Technikmuseum 2020).

At first, Neubronner was refused a patent for his pigeon camera as the Patent Office argued that a pigeon could not possibly carry a 75 g camera. After using photographic evidence to counter this objection, he was granted the patent in 1908 (Public Domain Review 2017). Neubronner immediately recognized the commercial potential of the pigeon camera, given the strong public interest in aviation and photography at the time. He promoted it at the 1909 International Photography Exhibition in Dresden and the 1910 Kronberg Carnival, carrying out live demonstrations, producing on-site postcards from the pigeons' photographs, and even selling his own cameras to the public (ibid). The press reported enthusiastically on the pigeon camera, calling it a unique invention that provided new views of the world, granted access to "secret and inaccessible places," and even had the potential to "revolutionize warfare" with its aerial view, low flight path, and economic cost (Anon 1908, 1909a, 1909b). These descriptions bear a striking resemblance to modern-day responses to the drone (cf. Garrett and Anderson 2018; Jablonowski 2020) and highlight

how both apparatuses perform and construct ways of seeing that can potentially transform vision and visibility, making them suitable for comparison.

Data and methodology

The data for this study consists of a collection of 84 photographs taken by pigeons between 1908 and 1912 that are held at Stadtarchiv Kronberg im Taunus and Deutsches Technikmuseum in Berlin, as well as 500 contemporary drone visuals, which were collected from the social media accounts of 16 drone hobbyists over two months of participant observation. The pigeon photographs were captured by the pigeons of German chemist Julius Neubronner using a Doppel-Sport panoramic camera – a pneumatically delayed timer camera that had a focal-plane shutter and swing lens with a rotation of 180°. The camera film came from ADOX and had an estimated film speed of ISO 25/15°–40/17° and a shutter speed of 1/60 s–1/100 s (Wittenburg 2007). The drone visuals, on the other hand, were taken largely by multi-rotor drones (quadcopters DJI Mavic two Pro, DJI Phantom three Pro, DJI Spark), which, as the name suggests, have multiple lift-generating rotors, as well as fixed-pitch blades. Multi-rotor drones are the easiest and cheapest option for amateur aerial photography because they have simpler rotor mechanics for flight control, offer increased maneuverability to move up and down on the same vertical line, back to front, side to side, and rotate on its own axis, thereby granting greater control over position and framing, and enabling users to fly much more closely to structures and buildings.

To explore these visuals, we adopt a qualitative approach that draws upon the theoretical perspective and methodological toolkit of visual social semiotics (Kress and van Leeuwen 2006; Ledin and Machin 2018, 2020). Visual social semiotics sees sign-making as a social process and semiotic resources (e.g. image, colour, typography, texture, layout, composition) as socially shaped over time to become meaning-making resources that articulate specific ideas, values, or identities demanded by the requirements of a person or community. These

resources have meaning potentials – defined as the affordances or constraints of modes – that are deeply embedded in existing sociocultural norms and sociohistorical settings (Machin and Mayr 2012, 4). In the context of this study, the tools of visual social semiotics can unpack the different semiotic resources at work in pigeon photographs and drone visuals, as well as their social and material possibilities/limitations, meaning potentials as signifiers and how they may have changed across space and time, and the social relations that are reflected in and shaped by the images (van Leeuwen 2005, 4–5).

In the initial phase of the study, the drone visuals were collected from social media platforms and grouped into categories based on their key semiotic features and compositional structures. Then, the pigeon photographs were obtained directly from Stadtarchiv Kronberg im Taunus and Deutsches Technikmuseum in Berlin using the digital search functions on the institutions' website and email correspondence with the curators. The pigeon photographs were subjected to qualitative content analysis to identify any similarities in their forms and functions to drone visuals. Following guidance by Bell (2004) and Ledin and Machin (2018, 2020), the content analysis focused largely on the depicted setting and represented participants in images, as well as the use of colour, angle, salience (degree to which an element of a composition draws attention to itself), and framing (how elements in a space are connected or disconnected). This process identified four overarching shared characteristics between pigeon and drone visuals that can be grouped into the following categories: verticality, geographical reimaginings, access to inaccessible places, and aerial self-portraits. Verticality concerns the top-down angle used in photography; geographical reimaginings refer to how pigeons/drones enable a revisualization of the world around us; access to inaccessible places emphasizes the ability of pigeons/drones to open up places that were previously unreachable for humans; and aerial self-portraits describe images of humans taken from the sky. It must be noted that these four categories have, as

Wittgenstein (1953, 66) calls it, “fuzzy boundaries.” In other words, there are interlapping elements between the characteristics of each category, which is common when dealing with multimodal texts. For the purposes of this categorization process, Rosch’s (1999) prototype theory offers a helpful solution because it recognizes items in a category as being either closer or more distant from other categories based on their central and peripheral features. Thus, in this case, photos were assigned to a category as a result of their shared central features rather than requiring all peripheral features (*ibid.*, 61).

In what follows, prototypical drone and pigeon visuals from each of the four categories are subjected to visual social semiotic analysis to explore their similarities and differences. As visual social semiotic approaches have been criticized by some scholars for being too subjective or anecdotal (*cf.* Aiello and Parry 2019, 372), the analysis is also informed by drone theory, as well as historical newspaper articles and archival records on the development of pigeon photography from the Stadtarchiv Kronberg im Taunus and Deutsches Technikmuseum. This ensures that the visuals are deconstructed in meaningful and predictive ways through empirical research rather than theoretical assumptions and considered as part of a wider dialogue with the social world that help (re)produce culture and knowledge. The analysis is followed by a concluding discussion that refers back to the three questions posed at the beginning of this article to provide deeper engagement with the visuals and their broader sociohistorical meanings.

Pigeon and drone visuals: a comparative visual social semiotic analysis

In this section, we analyze and discuss each of the four previously mentioned shared characteristics of pigeon and drone visuals in turn, drawing upon salient examples from the dataset. Both sets of visuals show vertical and oblique angles which, as Sekula (1975) rightly points out, have different aestheticized readings. Vertical angles often lack specific

meaning for untrained viewers and only gradually reveal information upon a specialist read. Oblique angles, on the other hand, are less vulnerable to abstraction and showcase more “grounded” and “human” views of the land (Kaplan 2011). These points will be picked up on throughout the analysis. The analysis is embedded in visual social semiotic analysis, as well as literature from Drone Studies, and evidence from archival records and historical texts to ensure that norms, context of creation, and canons of use are taken into account. We argue that examining drone visuals through the lens of historical aerial photography fosters a better understanding of the way in which semiotic resources work together to convey certain knowledge and representations of the world because it situates “novel” communicative features in a broader historical context and highlights how contemporary drone visuals are shaped and reshaped by past discourses. Overall, we demonstrate that many of the “novel” characteristics of drone visuals can, in fact, be found in pigeon photography (albeit in less sophisticated forms); however, their differences lie in the technological affordances, meanings associated with the aerial views, and accessibility to users.

Verticality

A key characteristic of contemporary drone imagery is verticality. The drone’s remotely-operated movements and interchangeable lenses enable it to generate vertical images that vary considerably from our everyday experiences (Christiansen 2020). Vertical angles have been historically regarded as in tension with views from below due to their associations with war and panoptic surveillance, which generate an unbalanced power dynamic between the producer and viewers (Amad 2012, 67; Ledin and Machin 2018, 59). However, as Noy (2015, 14) notes, reading the vertical as a site of pure domination underestimates the complexities and tensions that surround verticality in the context of domestic drones. While it is true that vertical images often require “expert eyes” to interpret correctly, their planarity, or “flattening” as Kaplan (2011) and



Figure 2. Verticality in drone photography. Source: Corey Thompson, @ctvisions2020 Instagram.

Maurer (2021) call it, dissolve hierarchical boundaries between subject and object and, in fact, offer opportunities for artistic expression. The flattening offered by the vertical angle, thus, expands the world into an “indefinite and diffused space without clear, fixed boundaries” (ibid, 28) and grants an “intimate and reciprocal *mélange* between the ground and the sky” that diversifies verticality as an exercise of power and reassembles new and old forms of knowledge and expertise (Pauschinger and Klauser 2020, 462). Vertical images can make landscapes feel more tactile than visual because angle is distorted and increased attention is paid to the textures of the landscape, which produces views that are distinct from those we perceive from ground level. Thus, a synesthetic space is created that establishes an alliance between power and visibility, offering viewers opportunities to reimagine the visuality of the view from above as that of dominance, power, and control (ibid 2020, 463).

The way in which domestic drones are transforming our understanding of verticality and, by the same token, visuality, can be seen in Figure 2, which captures downtown Atlanta (USA) at twilight from a top-down perspective. Ledin and Machin (2018,

109) note how spaces are infused with the discourses that tend to dominate a society at a certain point in time (e.g. neoliberalism, capitalism, post-modernism) and that these discourses are realized through the materials, colours, and textures that are used in such spaces. However, the top-down angle in this image shakes up the regulation of space and unsettles viewers as they try to orient themselves in relation to it. From this angle, the city’s buildings are flattened into a 2D plane, losing any sense of relief or contrast. 2-D images are typically associated with “low modality” because they show unrealistic images of the world³ (Kress and van Leeuwen, 2006:164). Thus, here, the 2D enables the suspension of reality, turning the buildings into a large circuit board, with the power generators and drainage systems on their roofs taking on the form of switches, wires, and cables. This varies significantly from the ground view, which captures the sheer height of the skyscrapers and encourages viewers to look up at their imposing presence on the cityscape (Harrison 2003, 48). The verticality of the image, therefore, provides a privileged position of sight for viewers, creating a sense that they are participating in an actual flight and “standing on top of the world.”



Figure 3. Verticality in pigeon photography. Source: Stadtarchiv Kronberg im Taunus.

Details on the tops of buildings that may never be engaged with directly in real life – tiles, window-panes, generators – are presented close-up, encouraging textural engagement with their metal, ceramic, and glass (Ledin and Machin 2018, 157). Through the top-down angle, a “personalized aerial space” (Hildebrand 2019a, 399) is fostered that not only distorts our typical understanding of cityscapes and expands human vision, but challenges us to remake our existing relationship with our geographical surroundings. Thus, here, subject and object are not in opposition to one another, but rather merge to become a “conjoined machine of seeing” (Maurer 2021, 31).

Similar disruptions of the association between verticality and visibility can be found in examples of early twentieth-century pigeon photography. Although the fixed position of the camera on the pigeon’s breast meant that its movements and range were more limited than those of drones, these restrictions did not result in solely low or high oblique angle shots; as pigeons soared or swooped in the air, perched on rooftops, or even bent over to eat, they could activate the camera and inadvertently produce vertical images. In such images, the new organization of space in terms of tactility allows a new sensory formation to be enacted and, thus, a reperspectivization of image (Christiansen 2020, 296), with the pigeon as a partner, rather than a medium of control or negative influence in the

world-making process (Haraway 2007, 241). The material encounter between the birds, technology, and the environment directly involves viewers, transforming pigeons from objects to be looked at into co-makers of visual material, subjects with agency in a narrative process (Mikkola 2020, 208).

A case in point is Figure 3, which shows a vertical perspective of the city of Kronberg im Taunus. Shot while the pigeon was in mid-flight, the camera presents a view of the houses, trees, and streets below that is not clearly stratified, nor correlated with typical human embodiment (Christiansen 2020, 296). The unusual shapes and contours of the land seen from above create a juxtaposition between intimacy and chaos that challenges and disrupts the visibility of the vertical angle as that of order and strategy (Ledin and Machin 2018, 59). The distorted representation of individuals on the ground subverts the image of the photographer as a “God-like figure with all-seeing eyes,” physiologically blending subjects with the apparatus and, consequently, turning them into “data” or information readable by “machines” (Maurer 2021, 30). Thus, here, this mode of vision is presented as a new form of relational experience (McCosker 2015) that encourages us as viewers to embody the pigeon temporarily as we look down at the vertiginous view of street life below and, in doing so, gain a new perspective on the world (Ledin and Machin 2020, 82). Like the drone, the pigeon engages in both

processes of “vertical mediation” and “vertically-mediated visibility,” having the potential to alter or affect the air, spectrum, and ground around it (Parks 2016, 232). However, unlike the drone, humans have limited control of the birds and the images they produce, meaning that their mediating work does not carry the same negative connotations as drones in the way they materially “rewrite and reform life on earth” (ibid). Nonetheless, whether intentional or unintentional, the vertical angle still offers a multisensory and critical examination of the world below through what Mikkola (2020, 207) has termed a “more-than-human” gaze.

Geographical reimaginings

Another potential of the vertical angle is its ability to capture views that can reveal interesting patterns, shapes, and contours in the land that are not possible to gauge from ground level or offer enhanced visual experiences of nature, weather, and landscapes through tricks of light and shadows. In doing so, they defamiliarize the familiar, disrupting our typical understandings of the world around us and capturing everyday scenes from new perspectives. The drone camera, the data it produces, and the wider practices and infrastructures through which it operates form an assemblage that produces a new mode of perception that challenges the notions that seeing is centred and all images are human made (Azar, Cox, and Impett 2021). In other words, the way we see things and the meanings we ascribe to them (i.e. their *visuality*) are affected by what we know or what we believe. However, when familiar scenes are presented from new perspectives, this can often result in new, distributed, and sometimes contradictory forms of knowledge (Berger 2001, 8). The drone hobbyists who participated in our study consider reimaginings as a core goal of their photography (“you can create abstract art, a tiny planet, a wormhole, so that people look at your image and it takes them a few seconds to realize what they are looking at”), thereby demonstrating how the complex histories attached to aerial view are not at the

forefront of their minds when using drones (Serafinelli and O'Hagan, 2022).

The way in which drone photography can be used to reimagine geographical landscapes can be seen clearly in Figure 4, which was taken in Borrego Palm Canyon (USA) and captures two dinosaur sculptures from a top-down perspective. Through the vertical angle and the position of the sun, the two inanimate statues are brought to life in enlarged shadow forms, which become the focal point of the image. The figures stand across from one another, arms raised and mouths open, as if facing off in a fight. Their positions are symbolic of what Kress and van Leeuwen (2006, 119) call an act of “offer”: the figures do not know they are being observed and, thus, an imaginary barrier is erected that creates a sense of disengagement with the viewer who adopts the role of invisible onlooker. Their oversized appearance and imposing stance make the figures seem out of place, strange intruders on this otherwise peaceful scene. This feeling is heightened by their sharp tonal contrast against the sandy desert floor, the black shadows changing the mood of the photograph and suggesting a feeling of forebodement (Ledin and Machin 2020, 99). As we scrutinize the image, its perspective and shading also evoke a strong sensory effect as detailed tracks and marks in the sand can be made out, adding to the sense that the figures are alive. This further unsettles the scene, which has the potential to transform viewers' own emotions as they engage with the image and reveal new visual imaginaries and new sensations that would not be possible to gauge from a ground-level perspective. Thus, the vertical angle encourages a playfulness as viewers see the image as a fun puzzle that they must decipher rather than any overt attempt at exerting dominance (Cosgrove and Fox 2010).

Although pigeons have less sophisticated motility and purposeful movement than drones, given that they are animalized apparatuses rather than machines, they can still use vertical angles to offer up geographical reimaginings of their surroundings. In some cases, this can occur due to weather



Figure 4. Geographical reimaginings in drone photography. Source: Eric Hanscom, @dronezoneclub Facebook.

conditions: the effects of sun, wind, rain, or snow can alter the way we see a landscape and even transform seemingly mundane views into spectacular sights. In other cases, these reimaginings are the result of tricks of light or shadow play, which can change tones and perspectives, thereby transforming viewers' emotions as they are exposed to subtle details of a site's geography. In others still, it is the framing or angle that can confuse our sense of spatial orientation and, therefore, thrust us into an atmospheric space in which we struggle to orient ourselves and must search for what is held within the image (Wilkinson 2013, 11).

The dramatic effect of weather conditions and light on visibility can be seen in Figure 5. Here, the combination of fresh snow and the early morning winter sunshine form a striking image in which the row of fir trees is reflected onto the ground, revealing bold, long shadows that dominate the photograph. Kress and van Leeuwen (2006, 165) argue that these types of images provide new "sensory

definitions of reality" because they question modality (i.e. discourses of truth) and allow the viewer's imagination to wander. Here, the strong tonal contrast between the white, unblemished snow and the black, jagged shadows signals a change in the atmosphere and creates an ominous feeling as the trees are enlarged, lengthened, and almost personified into a gang of people (Ledin and Machin 2020, 105). This adds depth to the image and imbues the place with a sense of drama and action. Caught in this light, the trees shift from inanimate objects into living beings. This distortion is further emphasized by the curvature of the horizon and the tilted low oblique angle. The sunlight bouncing off the white snow, coupled with the sporadic footprints on the ground and fallen branches, create a "more-than-optical" feeling that combines a multitude of senses and produces multisensory knowledge (Agostinho, Maurer, and Veel 2020, 251). These features also invoke our presence, encouraging us to immerse ourselves in the scene as we attempt to interpret it. Thus, the



Figure 5. Geographical reimaginations in pigeon photography. Source: Stadtarchiv Kronberg im Taunus.

shadows foster a deeper encouragement with our surroundings, making us think of and interact with them in new ways, but at the same time, they also produce a “symbolic suggestive process” (Kress and van Leeuwen 2006, 106), capturing an “essence” or “mood” rather than a specific moment. This emphasis on human emotion and how aerial photography can affect thoughts and behaviors shows that “vertical mediation” (Parks 2016) is not necessarily a force for evil and can, in fact, encourage positive reactions when used in a domestic context. This is in line with Amad (2012, 25) and Mangold and Goehring’s (2019, 29) belief that the aerial view is always situated between the dialectical poles of “science and art, rationality and imagination, abstracted and embodied knowledge, visibility and invisibility.” In other words, it is in these liminal areas that a range of rhetorical and imaginative, rather than problematic and threatening, potentialities emerge from the photographic encounter.

Access to inaccessible places

Another major characteristic of drones is their ability to open up access to places that are inaccessible or too dangerous for humans. Until recently, this access was tied up with warfare and the bombardment of remote locations from a safe distance. However, the increased use of domestic drones is starting to change this perception, with drones used for wildlife conservation, natural disaster responses,

and the study of dangerous creatures, as well as photojournalism of large crowds, virtual tourism, and deliveries in areas with poor infrastructure (Sandbrook 2015; Beninger and Robson 2020; Butcher 2021). As Benjamin (2020) notes, these multifaceted uses help redefine our relation to and perception of the earth, but they also have a deterritorializing effect, cutting across conventional geographical divisions and replacing them with flight paths, vectors, the machinic gaze, and new simulated territories.

Such images are predominantly taken from high or low oblique angles, which date back to the Renaissance discovery of linear perspectives and the vanishing point (Kaplan 2011, 157) and are more in line with traditional aerial photography. While oblique images by drones share many characteristics of traditional aerial photography (e.g. small area of coverage in a trapezoid shape, undistorted perspective, discernible but distorted relief, lack of horizon, inability to measure scale, distance or direction), they also show affordances made possible by the drone camera’s high-quality optical zoom lens. Colour, texture, and patterns in the landscape, for example, are all accentuated in ways that trigger strong emotional responses in viewers not attainable from the more distanced, detached, and scientific perspective of traditional aerial photography (Agostinho, Maurer, and Veel 2020, 25). Thus, these types of images are often perceived as more realistic



Figure 6. Access to inaccessible places in drone photography. Source: Eric Hanscom, @dronezoneclub Facebook.

and truthful and, therefore, less problematic in their interpretation than balloon or plane photography.

A prototypical example of a previously inaccessible site taken from an oblique angle can be seen in [Figure 6](#). It shows a bird's eye view perspective of Tiger Cave Temple, a Buddhist temple in Krabi, Thailand. The surrounding tropical rainforest envelops the building, the trees interweaving with the stairway leading to its summit. Viewed from this perspective, the temple becomes a secret hideaway, concealed amongst the forest of green and only accessible to "those in the know." The large golden Buddha stands out against the green hues, offering a strong tonal contrast and serving as a symbol of knowledge, enlightenment, happiness, and freedom. This integration of the sacred and nature visually

connotes the key Buddhist values of peace, purity, and tranquility, giving added meaning to the image of the temple (Ledin and Machin 2020, 182). This bird's eye perspective also enables the temple to be understood within its broader geographical and social context: we see the fields where the Buddhist monks grow their crops and the roads that they use to travel, offering us a sense of the mechanisms of daily life that would not be possible from ground level. This panoramic view encourages a form of "performative cartography" because our experience-based and location-oriented practices are performed through mapping and seen in a 3D rather than flat 2D perspective (Verhoeff 2012, 13). Thus, the panoramic view foregrounds the drone as a complex material "assemblage" of the sky in its

ability to establish relations between a range of actors, institutions, and knowledge (Crampton 2016, 137), yet also emphasizes its "embodied objectivity" as it is engaged in both action and affective motion in relation to its surroundings (Haraway 2001, 191). Here, the spherical perspective of the sky, coupled with its angled clouds and mountains, make the landscape more tactile than visual (Christiansen 2020, 290). Viewed as a whole, the framing creates a "rhythm of existence" (Merleau-Ponty 2002, 248) that extends the human gaze and becomes in deep communion with the environment, thereby encouraging viewers to redefine their relation to and perception of their surroundings. Seeing, therefore, becomes a performance tied up with both symbolic and narrative processes and has the potential to produce "countervisuality" (Monahan 2018) as everyday features of a landscape acquire powerful, new meanings that disrupt the ideological order of the view from above.

Likewise, pigeons offered the potential to access and photograph areas that had been previously out of bounds to the general public. However, in a reverse trend to that of drones, what began as an efficient way to deliver medicines to remote locations and record the route home through photographs acquired military purposes after the German Minister of War heard about Neubronner's experiments. In 1908, Neubronner was invited to exhibit his invention in Reinickendorf before the army aero station corps. Major Gross, the commander, asked him to supply a series of photos of the Tegel water mill and its surrounding buildings. The pigeons successfully photographed the plant in its entirety, including its water course, water wheels, factories, and shops (Anon 1908). The intelligence service quickly recognized that, in times of war, pigeon photography could show the arrangement of a large army, the number of cannons it possessed, and whether the troops were preparing to attack. While the military already employed balloonists to do this, balloons were much more expensive and far easier to shoot down than pigeons. Therefore, the German army continued to pilot Neubronner's

technology, asking him to acquire photographs of the long stretch of steel-turreted fortifications along the French and German frontier. According to newspaper reports, the government was "keeping [the photos] to itself," but it was widely rumoured that the pigeons were able to reveal the number, position, and strength of these forts, which were hidden from ground level and inaccessible to the general public, and even provide details of the construction of new warships in building yards (Anon 1909a).

From a non-military perspective, one of the achievements that was reported most enthusiastically in the press was the pigeons' ability to grant public views of the royal palace and gardens of Friedrichshof in Kronberg im Taunus – the home of Princess Margaret of Prussia – for the first time. As we see in Figure 7, the pigeon approaches Friedrichshof from the southeast, swooping over its vast private gardens and capturing the layout of the English-style park, trees, and pathways from a high oblique angle. From the ground, these areas were gated off and protected by security, but from the air, they are made unrestricted and approachable, offering a sense of intimacy as a window is opened onto the royal family's personal space (Ledin and Machin 2020, 50). Through perspective and framing, viewers are offered an illusion of exclusive access, emphasized also by the palace itself at the furthestmost point of the image, poking out mystically amongst the trees at the end of a long path (Harrison 2003, 48). This affects perception, creating an "intensity of sensation" because we feel as if we are intruding into a space that is not our own (Petersen 2020, 323). Therefore, we use these subtle visual cues to construct our own understandings of the image, drawing on interpersonal rather than ideational meaning (Kress and van Leeuwen 2006, 155). In other words, the image does not express absolute truths or falsehoods; rather, it produces shared truths that serve to create an imaginary "we" and align viewers with some statements and distance them from others. However, the inclusion of the pigeon's wings within the frame emphasises that



Figure 7. Access to inaccessible places in pigeon photography. Source: Stadtarchiv Kronberg im Taunus.

what we see does not actually represent what the pigeon sees because the camera is strapped to its breast, not its head. Therefore, our image can only ever be an imaginary as the pigeon's wings accentuate its position in a reality of which we can never really be part due to our inability to fly (Wilkinson 2013, 10). In this way, the pigeon's view never represents one truth, but rather certain things, places, and ideas that are always partially bound in fantasy (Ledin and Machin 2020, 65). Other photos in the same series show close-ups of the palace, indicating how the pigeon successfully navigates the private gardens in the guise of an innocent bird rather than a surveilling apparatus. In doing so, it makes visible structures of power (i.e. the royal family) that typically operate through invisibility, thereby reversing the gaze in a symbolic sense or, as Paglen states, turning "the masters of surveillance" into the "surveilled" (cited in Wilkinson 2013, 12).

Aerial self-portraits

The development of social media saw the selfie grow in popularity as a form of self-portrait. Civil drones have taken the possibilities of selfies further by capturing self-portraits from the air, known as "dronies." Taken from both vertical and oblique angles, the dronie combines the "aesthetic characteristics of the selfie and of aerial videography" (Jablonowski 2017, 99). However, whereas normal selfies are considered to be embodied and gestural,

the dronie "abstracts from the individual" by focusing on the broader landscape in which the person is situated (Richardson 2020). In many ways, the dronie can be said to have demilitarized and democratized the drone by removing it from the context of surveillance and warfare and turning the condition of being watched "from a menace into a temptation" (Lyon and Bauman 2013, 23). However, both Kaplan (2011) and Parks (2016) warn that, even if people participate willingly in such technological practices, it does not undo the fact that they remain modalities of surveillance with subtle military mandates that permeate our everyday lives and atmospherics. Despite these caveats, it is clear that such images imbue the drone with a touch of playfulness and bring about a sense of empowerment as it is used as an "ego-technical" device, which actively develops a self across social, technological, and media settings, rather than a "xeno-technical" device, which shifts away from the self (Solterdijk, cited in Jablonowski 2017, 99–100).

The jocular potentialities of aerial self-portraits can be seen in Figure 8, which captures a group of swimmers participating in World Swim Day in Bouley Bay, Jersey from a vertical angle. The men and women are holding hands to form a colourful circle, while two figures lie in the centre, arms raised and feet to feet. All swimmers lift their heads to the sky above, smiles on their faces as they pose for the camera in acknowledgement of being observed.



Figure 8. Aerial self-portraits in drone photography. Source: Paul Lakeman, @paullakemandronephotography Facebook.

This brings about a sense of empowerment as the individuals “hijack surveillance” (Jablonowski 2017, 103) and retain certain agency in the face of the aerial gaze. Although people are the focus of the image, the drone is more concerned with capturing the patterns that they make rather than the individuals themselves. In other words, cinematic views are foregrounded with the camera ascending away from the people in a zoom-out effect. This means that little attention is paid to the gestures, facial expressions, and appearance of the depicted people, which reverses the relationship between humans and their surroundings found in typical selfies. These aesthetics also disrupt our understanding of traditional image acts and gaze because the participants do not form “vectors” (i.e. eyelines) with the viewer, nor do they “offer” or “demand” anything or carry out material actions (Kress and van Leeuwen 2006, 117); rather, they are turned into abstract still life images with a dense, three-dimensional sense. This

encourages a deeper engagement with the patterns they create and, thus, deeper interactions with one's surroundings in new ways that can reshape sociocultural imaginaries (Brighenti and Pavoni 2020, 430).

Perhaps surprisingly, similar examples of aerial self-portraits can be found in early twentieth-century pigeon photography. Although it is clear that these types of images are not pre-meditated like dronies and occur involuntarily when the weight-bearing ball in the camera drops, they, nonetheless, show similar aesthetics. Like the dronie, these types of images focus on the broader panorama within which the depicted people are captured rather than the specific details of the people themselves. The two forms of self-portrait have some differences, however. One such difference lies in orientation. Unlike drones, pigeon self-portraits are often taken from high oblique angle shots descending downwards towards the person, as if the camera were zooming in, rather than ascending away/zooming



Figure 9. Aerial self-portraits in pigeon photography. Source: Stiftung Deutsches Technikmuseum Berlin, Historisches Archiv, photo: Julius Neubronner, I.4.052 195-01-I.

out. Despite this difference in orientation, the focus still remains on the landscape. Another difference between the two types of self-portraits is recognition. In pigeon images, the people are often caught unsuspectingly as they carry out their daily activities and react with surprised or curious gazes when they notice the camera strapped to the bird, whereas in drone images, individuals usually wave and smile at the camera. Nonetheless, as the pigeon cannot intentionally enact unequal power distributions, just as with verticality, its images emphasize the “more-than-human” gaze, co-creating meaning and knowledge alongside the people it captures with its lens (Mikkola 2020, 208).

A case in point is Figure 9, which depicts two men standing on the rooftop of a building, caught unaware by the camera as the pigeon swoops forward. Despite featuring in the center of the image, the men are just one small component of the larger panorama that includes the rooftop, its surrounding buildings, and a forest of trees. The men are dressed in work clothes, boots, and hats and appear to have been fixing the chimney. The man in the background has his head bowed, continuing his work unaware, while the man in the foreground has noticed the pigeon and stands to attention, hands at his side and one foot forward, ready to be photographed and seemingly embracing the novelty of the camera. His full-frontal angle and direct gaze create symbolic

contact with viewers, engaging in a form of “demand” that asks something of them (Kress and van Leeuwen 2006, 127). Although unintentional, the image captured by the pigeon resembles “spectacle of the other” photographs of the period, which portray people who exist outside the cultural framework of the photographer and are, thus, seen as “exotic” or “authentic” (Madden 2017, 96). These types of images operate through binary relations of ordinary versus extraordinary and self versus other, and offer a way for photographers to acquire a sense of power over their subjects (Urry 1990, 1). However, as the pigeon lacks any premeditated mental ability, the effect is mitigated and instead fosters a re-examination of the scopic dimensions of aerial technologies – hypervisibility, visual immersion, and invisibility – and how humans and their landscapes are interconnected (Maurer 2017). As the man’s enthusiastic response to being observed indicates, these interconnections do not always have to be negative and can foster creative ways of engaging with the view from above. Thus, pigeon photography offers a new perspective on aerial self-portraits as it provides a way of seeing that is not anthropocentric nor defined by human needs (Mikkola 2020, 210). In doing so, it creates a different interpretation of the city landscape, deterritorializing cities as only human habitats and renarrativizing geography as it reframes the

anthropocentric gaze and brings focus to non-humans who use the same space (Mikkola 2020, 212).

Concluding discussion: drones and pigeons – a transhistorical perspective

In their article on the technological politics of warfare and governance, Wall and Monahan (2011, 241) describe drones as “a combination of the new and the old”: they offer a new form of seeing from above with capabilities not offered by conventional air power, yet their speed, verticality, vision, and visuality provide an older cosmic view of air mastery. In line with this argument, the current study has emphasized the drone as the latest in a broader historical trajectory of aerial photography and perspectives on vision and visuality by situating it in proximity to early twentieth-century pigeon photography. In doing so, it has drawn attention to the commonalities between the two forms of visuals produced and the processes by which geographical space comes to be organized, represented, and experienced.

Rethinking drones through the lens of pigeon photography reveals clear similarities between the two media in terms of how their visuals reimagine geographical landscapes, provide access to inaccessible places, and capture aerial self-images. Moreover, it showcases the instability of meanings associated with the aerial view, unsettling and reformulating our understandings of verticality, power relations, and self-determination. Yet, at the same time, it recognizes how the role of technology can shape and change meanings over time, whether through perspective, colour, or angle, enabling the drone to take further many ways of seeing pioneered by the pigeon camera. Ultimately, it has made clear that, to fully understand the drone, more attention to its visual capabilities, semiotic features, and the effects that they make possible are necessary. One way that this can be done effectively is by approaching the drone from a transhistorical perspective. A transhistorical perspective not only enables us to

connect the drone to earlier practices of aviation and photography and appreciate the relevance of historical phenomena to current debates around drone visuals and their affordances, but also allows us to critique the drone as a practice that falls squarely within the history and development of perspectives on vision and visuality. Returning to the three questions posed at the beginning of the article helps explore this point further.

(1) How did materiality, social availability, and individual creativity afford (or constrain) pigeon photography compared to drone photography?

Drones are often framed as complex material “assemblages” of sky and vertical space that “gather and produce subjects, objects, discourses, politics, terrains, and, especially, atmospheres or airspaces” (Richardson 2020). Their advanced technology undoubtedly grants them visual and mobile affordances for networked communication, connected presence, and mobile place-making that were not possible in earlier forms of aerial photography and opens a space to develop or revise the scope of technological intervention and reconstructions of reality (Hildebrand 2019a, 2019b). Despite the early twentieth-century pigeon camera’s more primitive form, it can equally be viewed as an assemblage that brought together multimodal and multisensorial components: birds, cameras, and humans (Mikkola 2020, 208). When gliding through the air, pigeons emphasized both action and affective motion in relation to the environment, meaning that their visions had an “embodied objectivity” that was strongly attached to their surroundings and offered certain ways of seeing and knowing the world (Haraway 2001, 191). Thus, like the drone, the pigeon camera challenged the limitations of human senses and produced images that defied human perceptions.

Equally, notwithstanding their evident differences in technological functionalities, the fundamental movement, range, and autonomy offered by camera-carrying pigeons is echoed in contemporary drones (Wilkinson 2013, 3). Both pigeons and

drones had/have their own self-determination once in the air and the images produced are dependent on their flight path, air currents, weather, and light conditions. In the case of drones, they can crash, malfunction, fly off course, or go rogue, while pigeons become "relinquished from human authority" (ibid, 4) once released from their dovecote and have full autonomy to travel wherever they wish. This emphasizes how for both drones and pigeons, experience-based and location-oriented practices can be performative, embodied, and participatory. In addition, like drone imagery, the images produced by pigeons also showed similar angles (whether vertical or oblique) and framing, using sharp, high contrast. Despite the limitations of black and white, pigeon visuals could also be extremely tactile: the new organization of space afforded by verticality, close-up details of buildings, shadow play, and tricks of light all offered multisensorial experiences for viewers. There has been a recent turn in Drone Studies to the sensorial experience of drones and their "more-than-optical" ability to connect with different human and non-human agents and create new relations between sensed and sensing bodies (Agostinho, Maurer, and Veel 2020). However, this "synesthetic sensorium" that produces and reproduces multisensory knowledge and new visual syntaxes can clearly be found already in the early twentieth-century pigeon camera. Nonetheless, we must recognize that contemporary drones have some considerable advantages over pigeons, particularly in their multidirectional motility that can capture 360° shots and extreme close-ups thanks to their sophisticated technology and optical zoom lenses.

At the same time, we must also recognize, however, that pigeons had certain benefits over contemporary drones. Pigeons determined their own flight path and any variations, which, in turn, dictated the location and outcome of the photograph. Furthermore, the images produced required no human intervention and, therefore, could incorporate or be obstructed by part of the pigeons' wing as they swooped too low or turned too sharply, giving

them an active role in meaning-making processes. As the camera and the pigeon combined, the camera was turned into part of its "body schema" (Merleau-Ponty 2002, 102). Thus, the pigeon's body and camera were literally and metaphorically entwined and both were reliant on one another for production (Wilkinson 2013, 7). Pigeons, therefore, resist the notion of apparatuses as separate from living beings. Instead, they emerge as agents with their own minds and intentions beyond human control or needs rather than just non-human cameramen or companion species and, ultimately, provide a way of seeing that does not place human beings at its centre (Haraway 2003; Mikkola 2020, 207). Moreover, as pigeons are animate, they became an active character for viewers to follow, fostering a re-examination of animal life and agency, as well as human narratives and perception (Smaill 2017, 18). More specifically, the pigeon view created different interpretations of city landscapes and everyday environments, revealing cities as places not just inhabited by humans and, in doing so, offering new narratives on geography that challenged the anthropocentric gaze and drew attention to animals within the same space. Ultimately, the pigeon view demoted humans and humanized their environment, yet this demotion did not distance; instead, it forced a critical examination of the interconnection between nature and mortality (Amad 2012, 75). As drones take on increasingly more varied forms and functions and become more autonomous through sensors and built-in controls, we see similar discussions occurring on the shift in relationship between object and subject, image and vision, ways of seeing and being seen, and embodiment and identity. However, the pigeon camera makes clear not only that these debates were already taking place in the early twentieth century, but that these shifts in relationships do not have to be negative and can provide opportunities for "reaction, redistribution and resistance" (Pauschinger and Klauser 2020, 463).

(2) *What meaning potentials did pigeon photography have in the early twentieth century and how*

have these meanings changed (or stayed the same) across space and time?

The fundamental meaning potential that connects pigeon and drone visuals and changes across space and time is in relation to the aerial view and visuality. Aerial views date back to the concept of the God's-eye view – an omniscient and omnipresent perspective grounded in Judeo-Christian discourse – and have been historically associated with control, superiority, and unequal power relations (ibid, 67). Military drones particularly carry these negative connotations, with Maurer (2017) emphasizing their three scopic dimensions of hypervisibility, visual immersion, and invisibility and how they serve to configure violence as a form of manhunting. However, the recent growth of domestic drones, coupled with their widespread employment in such fields as environmental and wildlife conservation, agriculture, and disaster responses, is challenging this hierarchical perspective and suggesting creative ways for people to engage with the view from above. We see this particularly with dronies, which are bound up with interactivity and performativity, and hand greater control to the person on the ground. We also see this in vertical shots, which reframe the relationship between the ground and sky and diversify the meanings of verticality as viewers immerse themselves in scenes and construct illusory experiences. While it is undeniable that drones will always carry certain associations with warfare and panoptic surveillance, even when used in domestic settings, the drone visuals in this study undermine the singular notion of the panoptic gaze, thereby suggesting the need to reappraise drones and the way that their multiple complex practices, materials, and representations help democratize the three-dimensionality of the world (Jensen 2020).

While meanings surrounding the aerial view are slowly beginning to change as a result of the growing use of domestic drones, as an animal and part of the natural world, the pigeon camera carried more positive associations from the get-go. Furthermore, unlike drones, the pigeon camera started as a commercial rather than military enterprise, meaning that

it was immediately associated with utopian notions of technological and boundary-defying progress rather than dystopian fears of violence and terrorism. While the aerial view tends to create a landscape and perspective that are removed from ordinary human vision, with pigeon cameras, technology served as a partner in the world-making process rather than as a medium of control or negative influence (Haraway 2007, 249). Transforming the pigeon into an apparatus created a strong material encounter with technology and the environment, directly involving rather than distancing viewers and encouraging a co-creation of meaning through a unique narrative process that connected the human gaze to the pigeon's movements and camera. While aerial self-portraits taken by pigeons were not pre-meditated and could not intentionally enact unequal power distributions, they could catch people unaware. However, in these cases, the bird's eye view became a "more-than-human" gaze, unrelated to power and omnipresence and fundamental in reorganizing the forms of knowledge and social practices that shape humans (Mikkola 2020, 207). This "more-than-human" gaze is also apparent in its reimaginings of landscapes that opened up previously unseen perspectives to viewers and, in doing so, encouraged a relational experience in which viewers embodied the images and, thus, gained control over what they saw. The fact that these images were made widely available through postcards that were distributed nationally and internationally shows the success of the pigeon camera in democratizing the aerial view.

(3) Who produced and engaged with pigeon photography and how is this similar (or different) to now with drones?

A fundamental difference between pigeons and drones is that only a select group of people had access to the pigeon camera in the early twentieth century. It was pioneered and patented by Julius Neubronner who exhibited it across Germany, and it was reported widely in the national and international press. However, only a small percentage of

enthusiastic spectators purchased Neubronner's prototypes and used them to carry out their own photography. At a time when any practice or event surrounding flight was fascinating to the general public, the pigeon camera served as an exciting, carnivalistic curiosity rather than an apparatus that could have long-term uses and implications for ways of seeing the world. While the pigeon camera had a small uptake amongst the middle classes in other countries across Europe (particularly the United Kingdom), who had the pecuniary wealth and liked to be on the cutting edge of technology, it did not gain momentum until it was trialed by the German army and subsequently militarized in 1918.

As the First World War broke out, the German army issued a decree that all pigeons and cameras across the country should be made available to them. However, after several unsuccessful attempts at military surveillance, the Army informed Neubronner that his invention had little value and discontinued the use of the pigeon camera. Nonetheless, pigeons continued to be used by both the Central Powers and Allies throughout the War in their original role as messengers. After an exceptional performance in the Battle of Verdun, one French pigeon was even awarded the "*Croix de Guerre*" for heroic service (Deutsches Technikmuseum 2020). Across Europe, armies continued to conduct experiments with pigeon photography up until at least the 1930s and, even as late as the 1970s, pigeon photography was used by the Central Intelligence Agency in the USA for reconnaissance missions. However, it never regained popularity outside of the military sphere and, after the 1970s, even in this context, it was replaced with planes, helicopters, and, later, drones. As Neubronner himself reflected shortly before his death, "If mankind's centuries old desire to fly had come to fruition a few years later, everything would have turned out differently. It was a strange coincidence that just at the moment that birds started to become human, humans became birds" (ibid).

Drones, on the other hand, show a reverse trend, starting as a military technology before

gradually becoming commercialized and taking on other functions, even mimicking pigeons in their delivery of products and essential goods. Although money will always be a determinant in access to technology, the wide range of drones on the market and their varied price ranges has, nonetheless, made them accessible to a wider audience of potential users than the pigeon camera. However, studies suggest that they particularly attract male users between 35 and 65 years of age, possibly as a result of their continued association with warfare and surveillance in the public zeitgeist (Olson and Labuski 2018; Joyce et al. 2021). The predominance of aerial images taken by men poses interesting questions about the formation of worldviews and has led many drone scholars to see aerial interrogations as a feminist project (Parks 2016; Kaplan 2018; Clarke 2018; Jackman and Brickall 2022). Where there is not space to explore this issue further here, the scarcity of female drone hobbyists or the difference between male and female drone imagery are important avenues for future research that will help diversify accounts of the actors, embodied experiences, and everyday contexts of domestic droning.

The multifunctionality of drones, the quality of images they produce, and their ability to cross human and bird boundaries, coupled with the multibillion-dollar market around them, make it likely that, unlike pigeon cameras, they will have a lasting place in society rather than be a passing trend. Like the pigeon cameras before them, drones are shaking up our visual imaginaries, revealing secrets of our geographical surroundings and producing unexpected perspectives of the world. However, they are doing so with greater social and technological affordances. They have truly become the cat among the pigeons.

Conclusion

Drones are the latest in a long historical trajectory of visual technologies that are shifting and extending visual practices, knowledges, and means of control. However, to date, extant academic literature has tended to frame drone photography as novel and unique. With the aim of offering a more nuanced

approach to the novelty of drone photography, this article has approached the topic from a transhistorical perspective, placing it within a broader trajectory of patterned practices and uses. Specifically, through comparisons with early twentieth-century pigeon photography, it has identified many similarities in their semiotic features, compositional structures, and purposes. However, at the same time, it has also demonstrated how images are guided strongly by the meaning potentials afforded by technology, as well as specific sociohistorical ideologies, norms, and traditions. Overall, it indicates that it is the greater social and technological affordances of the drone that distinguish it from its pigeon counterpart, yet both are complex multimodal and multisensorial assemblages that challenge human senses and produce images that offer different ways of seeing and understanding our geographical surroundings. Transhistoricizing the drone, thus, encourages us to reflect on who truly benefits from propagating narratives that situate drones as new (Kaplan 2017) and to maintain a critical distance from such claims.

This study has laid the groundwork for further important transhistorical research in the area, such as comparisons between drones and other historical modes of aerial photography (e.g. hot air balloons, kites, blimps) or utopian, dystopian, and heterotopian perspectives on the “view from above” in visual artefacts (e.g. postcards, advertisements, cartoon vignettes). These areas of research will further embed our understanding of the motivations and connections between semiotic choices in drone visuals, their meaning-making practices (i.e. their visuality), and their sociocultural effects in a historical context, thereby moving beyond a transient focus on the here-and-now or fascination with the “new” and fostering a critical reflection on the sociohistorical antecedents of contemporary drone visuals.

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Notes

1. These questions develop from suggestions for transhistoricising multimodality made by Adami (2020).
2. A 2020 special issue of *The Senses and Society* “The Sensorial Experience of the Drone” offers the first attempt to explore how drone technology affects human perception and transforms the human sensorium.
3. Modality is a term used in visual social semiotics to describe the truth value of linguistically realized statements about the world.

Dr Lauren Alex O'Hagan is a Researcher in the School of Humanities, Education and Social Sciences at Örebro University, Sweden. She specializes in performances of social class and power mediation in the late 19th and early 20th century through visual and material artefacts, using a methodology that blends social semiotic analysis with archival research. She previously worked as a Research Associate on the “Drones in Visual Culture” project at the University of Sheffield.

Dr Elisa Serafinelli is a Researcher in the Department of Sociological Studies at the University of Sheffield. Her research interests include digital and mobile media and visual communication. She is currently leading a research project entitled ‘Drones in Visual Culture’ funded by the Arts and Humanities Research Council, which explores whether and how drones are changing the way we see the world. She is the author of *Digital Life on Instagram: New Social Communication of Photography* (Emerald, 2018) and is currently working on her second monograph for Bloomsbury, provisionally titled *Drones in Visual Culture: Developing a New Theory of Mobile Visual Communication*.

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