

# Seeing It from Other Eyes: How First-Person Data Reshapes the Role of the Applied Ethnographer

MARIA CURY, *ReD Associates*

ERYN WHITWORTH, *Meta Reality Labs Research*

ARIEL ABONIZIO, *ReD Associates*

GABRIEL COREN, *ReD Associates*

MAYA POTTER, *ReD Associates*

TAMARA MOELLENBERG, *ReD Associates*

MIKKEL KRENCHEL, *ReD Associates*

*This paper argues that first-person data—video, audio, and other data that is recorded from the research participants' point of view through wearable technology—affords new possibilities for anthropology and the social sciences to capture and work with longitudinal, immersive, behavioral data at scale. We position first-person data capture as an ethnographic method, complimentary and adjacent to others. Collecting detailed data on what people see, hear and experience through wearable technology opens a new way of understanding people, communities, and societies that has the potential to fundamentally change the social sciences as researchers gain access to nuanced, real-time interactions and behaviors. We also show the value of ethnography in informing the development of wearable technology, as well as engineering and research to develop next-generation technology across areas like computer vision and foundational AI. The paper draws on a series of projects the authors conducted for Meta Reality Labs Research during 2018–2024, which resulted in 1000+ hours of first-person footage that were analyzed alongside participant observation, semi-structured interviews, and diary studies.*

## Introduction: The Potential of First-Person Data

Ethnography, the backbone of anthropological research, has traditionally relied on methods such as participant observation and interviews to delve deep into the lived experiences of individuals and communities. In the context of applied research, these methods have provided rich, nuanced understandings of human behavior and social dynamics. Over the past decade, the advent of wearable technology offers new opportunities to enhance and expand these traditional methods. In this paper, we argue that first-person data—video, audio, and other sensing input recorded from the participants' point of view using wearable devices—can be a powerful ethnographic tool that not only complements but also transforms and elevates the practice of applied ethnography.

First-person data, sometimes also termed egocentric data, refers to information captured from the perspective of the individual experiencing it. This type of data is collected through wearable devices such as action cameras, body cameras, smart glasses, and audio recorders, providing an immersive and situated viewpoint of the wearer's environment and interactions. First-person data can take the form of images and videos that capture visual aspects of the wearer's surroundings from their viewpoint, audio recordings that document conversations and ambient sounds, and self-narration where individuals verbally recount their thoughts, feelings, and experiences as they occur, from their point-of-view.



*Figure 1. Three still-images of first-person video data captured using a wearable device during one of our studies; all are from the embodied vantage point of the person wearing the camera, simulating what they are seeing. The left image shows their hand holding a book as they are seated, the center image shows their hands at a kitchen sink washing a pan, and the right image shows them drawing on a tablet at a desk covered in art supplies.*

Although wearable recording devices have existed for years (e.g., GoPro, Meta Ray Bans), the use of these kinds of devices for research has largely remained contained to fields like cognitive science, computer vision, and ergonomics, the data analyzed mainly quantitatively and often for the purposes of improving the underlying technology. However, recent developments in wearable technology—from lighter form factor to longer battery life to AI-enabled software for processing and analyzing the captured footage—have made first-person data capture methods more accessible and practical for applied ethnographers.

This paper examines the potential of first-person data and how it might transform and expand the role of applied ethnography in the future. We argue that first-person data affords new possibilities for anthropology and for the social

sciences more broadly, to capture and work with longitudinal, immersive, behavioral data at scale. This paper has the dual purpose of reframing first-person data as an ethnographic method and showing the value of ethnography in informing the development of nascent wearable technologies. Collecting detailed data on what people see, hear and experience through wearable technology opens a new way of understanding people, communities, and societies that has the potential to fundamentally change the social sciences as researchers gain access to nuanced, real-time interactions and behaviors previously beyond reach. The rise of this kind of first-person point-of-view data, viewed through the ethnographic lens of understanding people, culture, interpersonal dynamics, meaning, and human experience, also invites applied ethnographers to engage with and influence the core engineering and research sciences emerging from fields like computer vision and foundational AI—and we'll argue, to help shape how and in what directions next generation technologies like these develop.

We draw on methodological learnings accumulated from projects the authors conducted for Meta Reality Labs Research between 2018-2024, which used first-person data capture as a method to inform the development of next-generation wearable devices. These projects resulted in 1000+ hours of first-person footage, which were analyzed alongside participant observation, semi-structured interviews, and diary studies. Instead of detailing the findings from these individual studies, our focus in this paper is to position first-person data capture as a method that is adjacent and complementary to traditional ethnographic methods. Additionally, we show how both traditional and egocentrically augmented ethnographic methods have a critical role to play in the development of nascent wearable technologies.

## **There are Four Objectives to This Paper**

First, we aim to lay a provisional foundation for ethnographers to experiment with first-person data capture as a technologically mediated method. By integrating first-person data with methods like participant observation, contextual inquiry, surveys, interviews and diary studies, our paper argues that first-person data collection has the potential to become a critical tool in any social scientists' toolbox—and invites other ethnographers to experiment with and further define this nascent method. We frame first-person data capture as a new and complementary method to traditional ethnographic methods that have had a long lineage of experimentation with different kinds of media and points of view in anthropology, and as a method that allows great depth and breadth of data collection and elicits new forms of ethnographic analysis. We do this by providing an overview of the use

of wearable technology and first-person data in research within other disciplines and within anthropology specifically, and by outlining the approaches we took to collect first-person data across our studies.

Second, we aim to discuss the methodological benefits surrounding the use of first-person data capture devices in ethnographic research. Whereas, at first glance, wearable devices might appear “participant-less” and voyeuristic, we argue that researcher participation is taking a different form—the researcher is not absent, but their presence is transposed into the wearable glasses, carrying its own positionality. The displacement of the researcher into wearable recording devices affords new modes of engagement. For instance, we argue that researchers gain the ability to participate in moments of participants’ everyday lives that would have been unavailable to them had they been physically present—intimate conversations with loved ones, heated family discussions, and late-night insomnia bouts. Moreover, we argue that first-person data enables researchers to gain a new temporally grounded perspective of the lives of their participants by watching their context and lives unfold from their perspective. Unlike traditional ethnographic methods, which center the research participant as the subject of study, first-person data centers the participants’ context, as seen by both the researcher and the participant. This approach challenges the conventional dichotomy of observer and observed, suggesting a hybrid model where observation has the potential to become a shared, co-constructed experience, especially when the data is analyzed in co-constructed ways as we will outline as a core tenet of working with this kind of data. Some of the highlighted benefits include the ability to capture longitudinal data of different kinds (audio, visual, including objects, environments, people), the scalability of the data collection, and the emphasis on showing what people do, not just what they say, and more intimate reflections in what they say. We argue that this can unlock insights with a greater scale of validation, with the ability to inform what drives behavior and behavior change, and with the ability to shed light on the gaps in understanding that might exist between, e.g., institutions and individuals.

Third, we lay out some of the risks of this approach. We highlight how the frame of a video or still image risks inflicting data with a dangerous aura of objectivity, reifying research participants’ lives. Additionally, there is a risk that, in focusing on a first-person perspective, the research findings default to an individualistic view of the world. There is also the risk of privacy and confidentiality, given the immediacy and intimacy that first-person data affords. To address these risks, we posit that, like other ethnographic methods such as participant observation, first-person data capture is a method that is still historically situated and contextual. First-person and

ethnographic data are not just captured but rather constructed in the act of observation and sensemaking. First-person data, in that way, continues to be a form of situated and relational knowledge: the viewpoint, however technologically mediated, continues to be from somewhere and it carries its own biases and limitations. First-person data still requires analysis, and indeed even a new analytical skillset. We outline some of the emerging elements of this analysis.

Fourth, we aim to explore the implications of this new method for applied ethnographers – for the kinds of skillsets ethnographers would benefit from having (e.g., technical literacy, analysis triangulating different kinds of data) and for the kinds of impact ethnographers are poised to have (e.g., new ways to work at scale, new ways to address behavior change). We also argue for the presence of ethnographers in early-stage wearable technology development: We show that ethnographers have a role to play informing the very kinds of sensors and capabilities that next-generation wearables should have to collect and surface data that is meaningful to people. The ethnographer’s first-person data collection centers participants’ experiences, social interactions, real-world context, and inner states, and applies anthropological frameworks to these, in ways that may be novel and beneficial to the engineers and research scientists who are often already collecting forms of first-person data (e.g., in labs, for dedicated tasks) to shape how these technologies develop. This collaboration allows ethnographers to become critical nodes in the design of high-quality, specialized data collection circuits, rooting innovation in real-world human experiences, and potentially leading to more empathetic, useful, and socially meaningful technologies. Doing so requires greater literacy in how AI systems work, new partnerships with engineers and developers, and new types of outputs that are legible and relevant to early-stage product development.

We conclude by reflecting on what it might take for first-person data collection to become a mainstream research practice for applied ethnographers, not only in terms of technological readiness, but also the skills, costs, ethical frameworks, and partnerships that will have to be developed by the community. As we navigate an era where wearable technology increasingly intertwines with daily life, this exploration hopes to serve as a call to action for more discussion about, and experimentation with, how first-person data might both expand and transform the role of applied ethnographers.

## **Overview of Wearables and First-Person Data in Research**

The use of first-person data in research has a history that spans several decades, evolving in tandem with advancements in wearable technology. First-person point-

of-view footage has been used extensively in scientific research, predominantly within medical research, with GoPros capturing surgery footage as one prominent example (Ganry et al. 2019; Graves et al. 2015; Huang et al. 2024). In tech-forward domains such as computer vision, robotics, and ergonomics, first-person data has been extensively explored to enhance machine learning algorithms, improve hardware interfaces, and develop AI systems; these studies have often focused on informing the design of wearable devices.

Beyond the scope of technology development research, first-person data has been used to observe naturalistic behaviors and contexts in situ since the 1960s and 1970s. In ergonomics, for example, wearable cameras have been used to analyze workers' movements and interactions with their environment, leading to improvements in workplace design and safety protocols (Charbonneau and Doberstein 2020; Rane et al. 2023). Similarly, in health sciences, wearables have facilitated the monitoring of patients' daily activities and behaviors, contributing to better personalized healthcare solutions (Tyler et al. 2020). In psychology and cognitive science, first-person data provided an unprecedented window into human behavior outside of laboratory settings (Yoshida and Smith 2008; Tangen et al. 2022). And in the environmental sciences, teams of animal behaviorists have employed egocentric video and audio capture along with wearables and sensors to document real-time naturalistic behavioral patterns of difficult to access—and often endangered—species, such as sea turtles (Seminoff et al. 2006). For these fields, the integration of wearable technology into research methodologies expanded the possibilities for capturing rich, real-time data, enhancing the depth and breadth of behavioral studies.

Recent technological advancements have made collecting first-person data in research increasingly possible and feasible, as wearables become smaller, their battery lives become longer, and the quality of the recording increases. Numerous companies are heavily investing in wearable technologies that capture first-person data, including devices like the Tab, Humane AI Pin, Limitless Pendant, Rabbit, Meta Ray Ban, the Tobii Pro Glasses and Meta's Project Aria – the latter two which are used for research purposes. These wearables promise often continuous, real-time data from the user's perspective, enabling detailed documentations of daily activities and interactions.

Combined with AI capabilities to process the vast amounts of data collected (e.g., transcript and summary generation, object and scene recognition, labelling), first-person data opens new kinds of analyses. Major corporations are developing AI models capable of visual analytics, promising capabilities such as object detection,

action classification, and contextual understanding of user intent. Notable examples include IBM Watson Visual Recognition, Google Video AI, Microsoft Azure Video Analyzer, and Amazon Rekognition Video. Whereas wearable devices facilitate new forms of data collection, emerging software with AI tools promises to analyze this data in ways previously unattainable through traditional methods.

Despite the growing body of research using first-person data capture in various tech-forward fields, and the growing possibilities enabled by technological advancements, a significant gap remains in its application within the social sciences, particularly in ethnography. The social sciences have been slower to adopt these technologies, and there is a paucity of literature that examines the methodological, theoretical, and practical implications of first-person data capture for ethnographic research. We explore some precursors and parallels to this kind of data, in the following section.

This raises some key questions: what does this new kind of data mean for applied ethnographers? What kinds of analyses become possible through ethnographic approaches to first-person data? This exploration challenges ethnographers to think beyond conventional methods and consider how first-person data can be harnessed to provide richer, more nuanced understandings of human behavior and social interactions.

In the sections below, we recontextualize first-person data as a valuable tool for applied ethnography, rooting it within existing discussions in anthropology and exemplifying how first-person data was collected and analyzed in recent applied ethnographic studies we conducted. Then, we highlight some of the methodological benefits and limitations of first-person data as a method. We hope to show how this approach not only broadens the scope of questions that ethnographic research can address but also positions ethnographers to contribute more significantly to the design and development of emerging technologies.

## **Precursors and Parallels to First-Person Data as Ethnographic Data: Experimentation with Positioning, Point of View, and Media Across Anthropological Practice**

First-person data presents a profound shift in ethnographic research methods and goals. Yet although it seems radically new, anthropologists have long experimented with emerging technologies for data capture in the field, with positioning themselves relative to their subjects, and with exploring diverse recording methods and media. We posit that first-person data possesses precursors and parallels to historical approaches of capturing ethnographic data. We here examine

examples of fieldwork, autoethnography, visual anthropology, and sensory ethnography to position first-person data within a lineage of ethnographic practices, and to show that experimentation with media technologies to capture human experience is a staple of anthropology.

### **Fieldwork’s Inauguration Was about ‘Being There’ to Collect a New Form of Data about Human Experience—and the Role of the Ethnographer was Partly to Provide a First-Person Point of View**

When in the late 19th century ethnologists began fieldwork to study non-European cultures, neither the data they captured nor their methods for collecting it had been considered adequate for exploring ethnographic questions. Only in the early 20th century, Franz Boas and Bronislaw Malinowski formalized fieldwork as a core anthropological method. While Boas codified the culture concept that shaped academic anthropology, Malinowski, marooned in Melanesia, emphasized immersive fieldwork—being there with one’s subjects, immersed in their worlds, observing their practices firsthand—as a foundation for ethnography (Boas 1911, Introduction; Malinowski 1922). Malinowski highlighted the distinction between raw data and its interpretation, positioning the ethnographer as the principal medium for recording and rendering ethnographic data.

By 1930, the ethnologist and surrealist intellectual Michel Leiris also argued that seeing firsthand is the way of making sense of strange surrounds, and that the ethnographer’s eye, their first-hand witnessing, is like a skein that mediates between familiar and strange, self and other, universal and particular, self and world (Leiris 1930).

This approach made the ethnographer’s experience integral to the aptness—and the authority—of their data, introducing reflexivity into ethnographic research. While traditional ethnographic monographs remained dominant, post-structuralist literary theory and decolonial contexts led to a reevaluation of ethnographic representation among a post-war generation of anthropologists. Clifford Geertz’s *The Interpretation of Cultures* (1973) elevated ethnographic data to layer up into a “thick description” of the symbols and meaning that play out in cultural contexts – establishing a new standard.

Geertz’ students, such as Paul Rabinow and Keith Dwyer, further pushed ethnography by bringing their subjects’ voices directly into ethnography itself, triggering a wave of criticism about ‘raw’ ethnographic data and its purposes (e.g., Clifford and Marcus 1986; Crapanzano 1986; Dwyer 1982; Fabian, 1983; Nader 1972; Ortner 1974; Rabinow 1977). A hard-won disciplinary unity about what



ethnographic data was—as well as how it was to be collected and given form—dissolved. But the possibilities for what ethnographic research and representation could ultimately be and become radically opened as well. Since then, within academic anthropology but increasingly in applied anthropological contexts as well, what ethnographic data could teach us and others about our changing world, the variety of sites, spaces, and subjects it could be drawn from, and the kinds of questions and problems it could be relevantly applied to, has expanded greatly. This is especially true when it comes to emerging phenomena at the intersection of science, technology, and society.

The use of personal experience as a primary source of data for making sense of cultural phenomena has been part of the ethnographic enterprise at least since Malinowski (and through and beyond his “children”). Carolyn Ellis’ work, “The Ethnographic I: A Methodological Novel about Autoethnography” (2004), however, gave it a name. The practice has been in many ways perennial: for example, Franz Boas’ student, Zora Neale Hurston, was the first anthropology graduate student to return to the community in which she was reared in order to conduct a form of self-study, leveraging one’s identity and experience to gain access to—and to apply one’s insider/outsider positioning among—a peoples and a place one intimately knows (Hurston 1935, 1938).

Working with first-person data has a kinship with self-study, in that it also relies on a first-person point of view to generate rich, contextual data. However, unlike autoethnography where the researcher’s first-person perspective is primary, first-person data as we explore in this paper allows for the centering of participants’ perspectives, which expands the scope of what is possible ethnographically but shifts the role of the ethnographer with respect both to that data and to the subjects whose lives it derives from as well.

### **Despite Text’s Predominance for Presenting Ethnographic Findings, Emerging Media Technologies Have Been Vital Tools for Capturing Ethnographic Data and Experimenting with Perspective**

From the start, ethnologists carried cumbersome media technologies into the field as instruments of documentation, integrating visual media (film, photography) into their processes of collecting and rendering ethnographic data. Of this overlap of the ethnographer’s eye with the camera’s lens, Michaela Schauble observes that it “not only indicates that the two forms of data and knowledge acquisition are highly compatible but also shows that the pioneers of the discipline recognized the

potential of the film and photo camera as a technical extension of the ethnographic eye very early on” (Schäuble 2018, 1).

Documenting ethnographic data visually was about more than equipping ethnographers with technical prostheses. By the 1930s, photographic technologies were serving at least one of two additional functions for the ethnographic fieldworker, which we continue to find elements of in first-person data capture technologies. First, as a method for visual fieldnote taking—a kind of visual duplicate to verbally dictated ethnographic data, rendered in a different form. Second, as a critical authority-establishing device, intended for the publication of ethnographic findings following fieldwork. Photos from the field possessed an ‘I-was-really-there’ aura which wooed audiences—academic and popular—from the onset. Margaret Mead and Gregory Bateson exemplified the visual fieldnote method by carrying film and cameras to Bali and New Guinea from 1938 until the late 1940s, rigorously recording all the while developing an analytical armature for integrating visual data into ethnographic research and reporting (as outlined in, for example, their introduction to *Balinese Character: A Photographic Analysis* (1942)). Claude Lévi-Strauss helped popularize the ‘I-was-there aura’ when he carried his own photographic equipment into the Amerindian interiors of South America, the documentary artifacts for which were exhibited to much fanfare (and critique) at the Musée L’Homme in Paris.

Ethnographic film, however, had from the start less academically acceptable purposes than photography. Unlike still images, moving pictures could not quite be cast as back-up note-taking nor quite establish an ‘I-was-there’ authority for the ethnographer, since unlike photographs, film couldn’t be integrated into the textual media format of ethnographic monographs. Perhaps ethnographic film’s resemblance to the media of popular, mass entertainment—rather than to contemporary artistic media—had something to do with its casting aside by the bulk of academic anthropology’s establishment.

Nonetheless, many imaginative ethnographers recognized film as technology for ethnographic research of a uniquely valuable kind. David MacDougall (2006) has glossed video ethnographic data as uniquely suited for examining “temporal,” “corporeal,” and “personal” aspects of human experience – aspects which we position first-person data (often in video form) as uniquely suited to examine as well today. Marcel Griaule’s filmic studies of the Dogon in Mali Griaule showed what was possible along these lines and inspired many others. One exemplary legatee of Griaule’s, from a generation later, was Jean Rouch, who mobilized ethnographic filmmaking to explore genre-defying ways of capturing, engaging with, and

presenting ethnographic data while also instantiating what he called “ethnofictions,” or what many ethnographic filmmakers today call “the participatory approach” (see Taylor 1996). Of note is also the enduring power of Robert Gardner’s work, especially *Dead Birds* (1964), and the breathtaking, if controversial, collaborations between film maker Tim Asch and anthropologist Napoleon Chagnon, taken of and among the Yanomami throughout the 1960s and 1970s (Asch 1961, 1974; Asch and Chagnon 1971, 1974, 1975; Chagnon 1974; Harper 2003).

While still photographs are artifacts of an encounter, when audiences encounter photographs — embedded and printed with captions alongside ethnographic texts or hung on a museum’s walls — they tend to experience these as if they were raw, unmediated renderings of culture captured in action. Despite being by-products of an individual’s experience, still photographs nonetheless can easily feel like remnants of an objective third-person observation. Ethnographic films, in contrast, cannot conceal that they are made with media consciously introduced into an ethnographic encounter and carefully reconstructed afterwards in editing. The process is visible in the product: that is, the raw data and its interpretation can’t be untangled. Although academic anthropology has tended toward discomfort with this fact and often honored that discomfort by disavowing the appropriateness of film as a medium for ethnographic outputs, artists, audiences, and many anthropologists have recognized the distinctive advantages that data in film form can afford. As Schäuble observes, “visual ethnographic practices comprise reflexive, interactive, participatory techniques that provide access to specific local and/or embodied forms of knowledge and perception that would otherwise be difficult to access or that [would] remain invisible” (2018, 2). As will become clear in our discussion of some of the mixed methods that we have developed for working ethnographically with first-person data—the raw files of which overwhelmingly anchored in digital film recordings—the access Schäuble suggests traditional video recording techniques allow are further intensified by always-on wearable technology. And yet at the same time, as we will later outline, the perceived objectivity of the outputs are a risk (and illusion) with first-person data as with photographs.

From the vantage of our current ethnographic work with first-person data, the film medium continues to invite innovations around reflexive, interactive, and participatory methods. But even before wearable tech and ubiquitous cameras on personal devices, ethnographers imagined and were playing with the shifts in perspective that film as a medium for ethnographic data production could conceivably afford. In some instances, they were rendering visible not the ethnographer’s observations of their interlocutor’s worlds but the traditional ethnographic subject’s first-person field of view instead. We note the “Navajo Film

'Themselves' projects that Sol Worth, John Adair, and Richard Chalfen contrived in 1973, handing the cameras over to the former subjects of an ethnographic gaze, to see how they saw themselves and the world—and what they captured of it from their first-person points of view. And indeed, by empowering people to make ethnographic media that depicts their experiences from a direct and personal, engagement is likelier to extend *beyond* the ethnographic encounter, since media can be consumed or re-experienced alongside audiences or in contexts that continue to be meaningful for the former subject's everyday lives. This kind of first-person data production and continued engagement is observable in indigenous media like Maori TV and National Indigenous TV in Australia (see Ginsburg 1994), indigenous radio (see Fisher 2016), and Nanavut Independent TV.

Anthropologist and experimental film-maker Lucien Castaign Taylor, who beginning in the 1990s founded the Sensory Ethnography Lab at Harvard University, set about using film to render multisensory experience in sight and sound. As Castaign Taylor puts it: if “anthropology is to create a space for the visual” it “would entail a shift from the attempt to convey ‘anthropological knowledge’ on film...to the idea that ethnography can itself be conducted filmically” (1996, 86). Taylor poses the questions: “What if film not only constitutes discourse about the world but also (re)presents experience of it? What if film does not say but show? What if film does not just describe, but depict? What then, if it offers not only ‘thin descriptions’ but also ‘thick depictions?’” (1996, 86). The Lab's filmic collaborations, from *Sweetgrass* (2009) to *Leviathan* with Verena Paravel (2012), model how a sensory medium can indeed “embody” ethnographic knowledge, blurring the boundary between subjects, technology, viewers, affect, and experience. The way we see it, first-person data can similarly enrich ethnographic research, providing a unique embodied viewpoint that traditional third-person observations cannot achieve.

### **From Ethnomusicology to Anthropology Composed of Sounds, Sensory Data Beyond the Visual Has Been a Powerful Medium for Tapping into and Capturing Emotions, Affect, and Memory**

Lastly, there is sound recording—sensory ethnographic data beyond the visual—which less depicts than evokes lives and worlds, experiences and perceptions. The first-person data that we will describe in the next sections is just as much oriented towards audio as towards visual input from a person's daily life, so we provide a brief review of sound's role in ethnography over time here. As with cameras, phonography was experimented with in the field by early anthropologists as soon as the technology emerged. From Frank Hamilton Cushing in the nineteenth century, to Benjamin Ives

Gilman and Walter Fewke's recordings of Zuni Melodies (1891), to Alice C. Fletcher's and J.C. Fillmore's "Study of Omaha Music" (1893), American ethnologists sought to capture the sounds of people's languages, music, and song: impressions in wax, aural grooves of social life and human expression. Herzog's studies of plains ghost dance rituals and the sound worlds of the great basin were especially instructive in this regard (1935, 1936).

Folklore and phonography formed the basis for the emergence of ethnomusicology, which sought to develop archives of cultural production that in some ways (unintentionally) parallel and precede the development of datasets of various kinds used for training artificial intelligence today. Carl Stumpf in Germany founded the Berlin Phonograph Archive not long before Alan Lomax (sometimes joined by Zora Neale Hurston) set out in emerging radio days to record the sounds of ethnic and of folk peoples across America, producing an archive that became the basis for the National Archives and Library of Congress in D.C.

More recent anthropological studies using sound have taken a more dynamic and participatory approach to data collection – echoes of which are in the methodology we will outline below. For example, the work of anthropologist, ethnomusicologist, linguist, sound engineer, and composer Steve Feld shows us how sensory data, especially sound, offer unique possibilities for making sense of people and their worlds—and the role of audio in amassing first-person data sets of promise and possibility. In his 1982 monograph of about the sound-worlds and Kaluli language of the Bosavi people of Papua New Guinea, Feld captures vocalizations alongside ethnographic audio recordings of the rainforest worlds—the soundscapes—that compose their sense of being in and of their place among their worlds: waterfalls, birds, soulful lamentations, non-linguistic utterances (Feld 2012a). The kind of first-person data through sound that Feld invites the Bosavi to record in audio (and remix and edit and compose further) helps constitute what Feld calls "acoustemology," an orientation and a type of sensory data rife for "investigating the primacy of sound as a modality of knowing and being in the world (Feld 2012a, 2012b, 2015).

From their first forays into fieldwork to traditions in visual ethnography, sensory ethnography, and anthropology in and through sound, we see anthropologists experimenting with first-person data, exploring the avenues of access into human experience and perception its different varieties afford. We situate our work with first-person data as issuing from this tradition of anthropologists innovating with data forms and formats and experimenting with new media and new technologies as they emerge. In what follows, we outline the direction that we have taken in our own recent ethnographic work with first-person data and its current generation of devices for self-capture.

## **Seeing the World from Someone Else's Perspective: Overview of First-Person Data Collection and Analysis**

The aim of this section is two-fold: to illustrate the ethnographer's experience of working with first-person data and to offer core tenets for engaging with it.

This paper draws on methodological insights from a series of studies conducted in the United States between 2018 and 2024 for Meta Reality Labs Research. Throughout these studies, which broadly sought to inform the development of next-generation wearable and personal assistive devices, our teams collected over 1000 hours of multimodal first-person point-of-view data using a range of technology to capture footage. Study participants represented a diverse range of adult ages, ethnicities, genders, occupations, and living arrangements. They were compensated for their contributions, which included capturing first-person data during both targeted exercises and normal daily life. They were made aware of the purposes of the studies, the identities of the organizations conducting the research, and could withdraw from the studies at any time. Our teams obtained consent from the research participants and other individuals in their social ecologies who participated (e.g., those in view during the recordings or whom we interviewed).

We have published on aspects of some of these studies in previous EPIC Proceedings (Cury and Whitworth et al. 2019; Cury and Kim 2021), and here outline two of the main studies:

### **Study: Internal States during Goal-Oriented Tasks**

This study set out to map relationships between what is observable in context and what is subjectively experienced by an individual, in particular their experience of mental effort. Providing our research participants with a pair of eye-tracking wearable glasses used in academic and commercial research at the time, we studied and subsequently patterned the diverse individual experiences of goal-oriented domestic activities. We investigated how the same kinds of domestic tasks, like washing, chopping and sauteing vegetables, which may outwardly look the same across two individuals, can feel or be experienced totally differently across the individuals – one person might be happily in a groove as they cook, while the other might be distractedly worrying about something else. What were some of the observable or machine-readable clues of the participants' subjective states and experiences of mental effort? How could recognition of how someone was experiencing their context inform the kinds of interventions or support they would find meaningful? To answer these questions, we conducted full-day ethnographies

with 18 people in the great New York and Seattle areas. Participants recorded their experience in twenty to thirty-minute intervals and were asked to describe their mental effort in-the-moment using experience-sampling techniques, scales and metrics common in psychology. The outcome was a framework informing how and when next-generation AR/AI assistants should surface information to users, and how a machine-learning model might detect these instances.

### **Study: Detecting and Encoding Personal History Information That People Find Most Meaningful**

This study set out to help identify what kinds of sensors wearable devices would need to have to collect meaningful personal history information to help people better navigate everyday life. From the human perspective, what information from their pasts (whether that was yesterday or many weeks ago) do people need, resurface, and have questions about in-the-moment? From a technology perspective, what would future technologies need to sense in-the-moment to make sense of the situation and ultimately service those needs? Our role as ethnographers was to inform engineering decisions by observing people in their contexts. We employed traditional ethnographic methods like contextual inquiry, participant observation, and diary studies alongside first-person data capture using the Aria device, a non-commercially available wearable developed by Reality Labs for the purposes of research (Engel et al. 2023). Our 13 participants recorded with the Aria devices for 4-6 hours per day over approximately two weeks, indoors in their homes with the consent of others with whom they shared their home environment, with the option to self-narrate their experiences with their description of what they were doing, why they were doing it, and how they felt about what they were doing. Participants were also given specific ‘missions’ to capture data using Aria on areas of interest, such as memorable moments, significant objects, and daily challenges, tailored to the study's goals. This work resulted in a framework for the information most relevant to people throughout their everyday lives and a minimum viable list of sensory capabilities that a hardware device would need in order to sense that information. This framework informed how wearable-enabled AI systems sense and encode observable reality based on what information is relevant to people.

### **What First-Person Data Looks and Feels Like**

Across our studies wearables captured a range of moments such as:

- Social interactions, e.g., super bowl parties, family dinners, heart-to-hearts, heated debates, family milestones, pillow talk, divorce announcements...

- Religious rituals, e.g., Havdalah service, Bible study, Muslim prayer...
- Leisure activities, e.g., dog training, sewing, painting nails, crafting, board game nights, Oscar watch parties, yoga sessions, baking, cooking, dance party, pancake night, writing projects...
- Household activities, e.g., dishes, childcare, gardening, meal preparation...
- Professional activities, e.g., remote work, finalizing book drafts, composing lectures, networking calls, planning a workshop, discussing career changes...
- Personal hardships, e.g., crying, arguments with family, saying goodbye to a foster dog, insomnia nights, dealing with the loss of a parent...

Here are video stills of first-person data collected from a wearable device to exemplify the kinds of footage our research participants recorded:



*Figure 2. Two still-images of first-person video data captured using a wearable device during one of our studies; both are from the embodied vantage point of the person wearing the camera, showing what they are seeing. The left image shows their hands as they handwash clothes at the kitchen sink. The right image shows one hand holding a vase they are filling with water and one hand holding the plant that will go in the vase. Not shown is how in these recordings the individual was also narrating actions, thoughts, and motivations.*

Here is an excerpt of one of our ethnographic fieldnotes as we review the first-person video data collected by research participant Ryan in one of our studies – note that this is written from the point of view of the researcher, not the participant who recorded the footage, but includes quotes of some of the audio of what was said in the recorded footage:



It's day 3 of the study and I'm watching Ryan playing with his 6-month-old baby Leo. The father and son are sitting on the living room carpet with an assortment of colored ducks. Leo puts the ducks in his mouth, then drops them. Ryan picks them up and gives them back. He seems to be focused on Leo, who is examining the red duck. Although I can't see Ryan face, his tone of voice makes me think he is smiling.

Although I've interviewed Ryan in-person, it is strange to watch his pov footage. It's as if I'm sitting on his shoulder. Ryan and his wife Amy are new parents and just moved into their first home. Their days are packed. They take turns working and caring for their son in shifts. They balance his feedings, diaper changings and naps with host of household chores: cooking their own meals, clean up, dishes, laundry.

Ryan exhales sharply as he gets up. Ryan had mentioned his accident and his nerve issue during the interview—but I had not realized it was this bad until I began to watch his footage. Now, I see how unrelenting and the agony he endures day-to-day as he writes emails, cooks dinner, even plays with his son. It feels intimate to watch him in physical pain—in the moments when he is alone.

I now know his 'tells'—signs that he indicate he is experiencing some kind of smarting, tightness or numbness. I know the sounds: his sharp exhales, whimpers, grunts. I know what he does—the stretching, massaging, shaking, or knocking—to find some relief. I know his triggers too: when he bends over or puts weight on his arm. While I have learned these patterns, I imagine that a machine would pick up on many more.

Later that night, Ryan stands in the doorway. I think he may be using the doorframe to stretch. He exhales. His pain seems acute. His wife, Amy, who is in the other room looks up. 'Babe, you ok?' She knows too. My arm is numb as shit.' he says.

Moments like this one in the fieldwork helped inform the kinds of personal information that people find relevant and have questions about in their day-to-day – in this case, what might be causing a recurring event and how that might be changing over time.

### **Core Tenets for an Ethnographic Approach to First-Person Data**

To provide methodological guidance for ethnographers engaging with first-person data, we offer three tenets that have proven to be critical to our own studies' data collection and analyses. The first tenet of engaging with first-person data is to contextualize it using additional ethnographic methods to gain a richer, more

rigorous understanding. The second is to encourage participant self-reflection at different timescales to capture the evolving or layered nature of experience. The third tenet is to co-interpret first-person data alongside participants to ensure analysis remains deeply rooted in participant perspectives.

### **Tenet 1: Collect and Triangulate First-Person Data with Traditional Ethnographic Methods**

For the applied ethnographer, the value of first-person data emerges when it can be triangulated with other ethnographic methods during collection and analysis. Across our studies, we collected first-person data alongside several other ‘kinds’ of ethnographic data to contextualize participant’s experience that they had captured with wearable technology.

Here is an excerpt of our ethnographic fieldnotes as we review the first-person video data collected by research participant Amy in one of our studies. Moments like this one brought together a range of ethnographic data alongside the first-person recordings, and informed our understanding of the motivations behind the kind of personal history data people wish to collect, and the implications this might have for how people might wish to access and engage with it:

Amy is standing at the kitchen counter cutting an orange. Her husband Ryan (also a participant) is in the living room holding her son, Leo. As I review the couple’s respective footage, I watch them navigate jam-packed days taking turns working full-time jobs and caring for Leo. They also balance his feedings, diaper changings and naps with host of household chores: cooking, dishes, laundry.

Amy holds out a piece to her husband. “Should we give him a taste?” she asks. As Leo begins sucking on the orange piece, Amy exclaims gleefully: “This is Leo’s first experience with a citrus fruit.”

The next day, in the digital diary, Amy wrote: “Leo explored so many different foods today! He loved the banana pancakes Ryan made for him. But did NOT like avocado. Nope. And he drank water (first time) from his baby cup—more Leo Firsts. His baby tooth just popped through his gums! YAY!”

Amy, like many parents, clearly values her son’s milestones. From my initial interview with Amy, I know these recording milestones have a deeper significance. Amy is the daughter of refugees. Her parents fled Vietnam before she was born. The trauma that plagued her family’s past meant that

her parents and elder siblings rarely spoke about ‘the old days’. Amy has no stories or photos from her own infancy and very few from her childhood.

Amy takes me on a tour of her world—her house and her phone. She shows me the family group chat as well as her treasures: a photo of her parents on the altar, who both passed away last year. They never met their grandson. Amy tells me: “I don’t know what my first word was. Or what foods I liked or didn’t like as an infant. So I guess I want to record these for him. It’s his story, so I want him to have it.”

There are many ways to combine first-person data collection with traditional ethnographic methods. Here is an example of the fieldwork structure closely mirroring one of our studies, which interspersed first-person data collection with other ethnographic approaches to data collection and interim analyses:

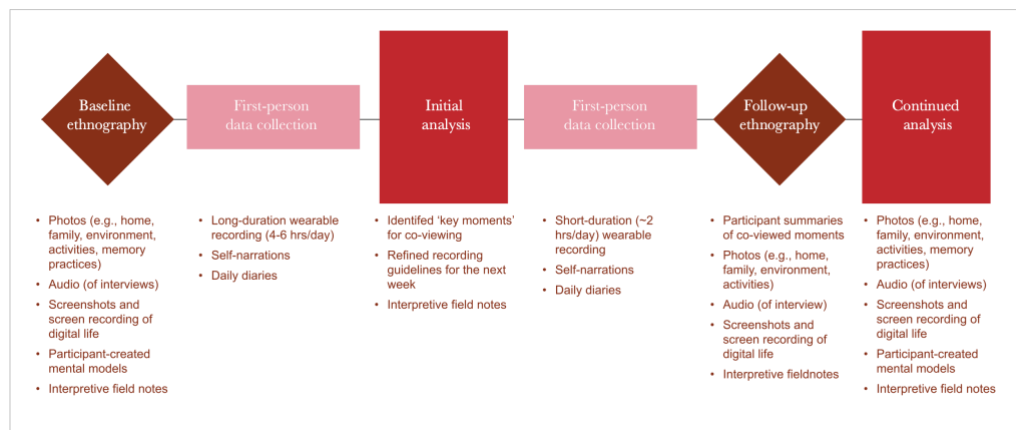


Figure 3. A schematic of the sequence of fieldwork activities in one of our studies – from baseline ethnography to first-person data collection, initial analysis, more first-person data collection, follow-up ethnography, and continued analysis.

Under each of these sequenced activities we include bullet points for the kinds of data captured (e.g., in baseline ethnography we list photos, audio, screenshots of digital life, participant-drawn mental models, and fieldnotes). These bullet points closely follow what is already in the description of the methods and activities in this section of the paper.

Here are example ethnographic methods we triangulated with first-person data:

### *Foundational interview*

Across studies, we conducted an initial ethnographic interview which provided baseline insights into the participants’ lives, including their social circles, daily routines, home environment, profession, and values. A foundational interview helped us make sense of and interpret the first-person data that participants subsequently captured with the wearable research devices we equipped them with.

### *Rapport-Building Embedded with Tech Support*

As with any traditional ethnographic engagement, building rapport with participants is critical. Atypical to traditional ethnographic practice, yet necessary to ethnography predicated on the collection of first-person data, was the need to onboard participants to the wearable research devices they'd be donning for the bulk of the study as part of the rapport-building. This also included helping to 'socialize' the devices in the context of their households and family life and providing ad hoc technical support to participants. Based on our own piloting of the wearables, we drafted user manuals for the devices and troubleshooting guides addressing the kinds of challenges one might encounter using these devices in home environments rather than in controlled lab settings, such as internet bandwidth issues or where to safekeep the devices while charging. In the initial onboarding, we described our own experiences with the technology (having tested it ourselves), acknowledging how different it might feel, at least at the outset, to wear the equipment while going about one's day-to-day activities.

### *Digital & Physical Tours and Artifacts*

To ensure that the ethnographer would have enough background to situate participant-collected first-person data in the context of participants' everyday life, we gathered extensive contextual data, largely in the form of personal artifacts, both physical and digital. This included detailed tours of their homes, favorite belongings, and physical environs, with the participant describing origin stories and layers of meaning in an archeology of their possessions and living spaces—all documented photographically. We toured their digital environs: the spaces they navigate and inhabit online, their self-representation, the information ecologies and info-storage practices that constitute the digital layer of their lives and which shaped the everyday experiences of each participant. We compared the relationship between their physical surroundings and their digital surroundings. We asked participants to only share with us what they felt comfortable sharing.

### *Fieldnotes*

The 'fieldnotes' composed in the wake of the initial ethnographic encounter with each participant—intended to forge a baseline context for the participant's lived experience—were by necessity multi-media and multi-modal, comprising photographic images, screen shots, video clips, lists, quotes, transcripts, drawings, and the ethnographer's own interpretive text. Fieldnotes drawn from the aggregation

of these sources resembled ‘data packets’ more than the traditional ethnographer’s scribbles—informational archives that could be analyzed many ways.

## **Tenet 2: Encourage participant self-reflection at different timescales**

Participant self-reflection is critical to attuning the first-person data to what matters most in the scene, from the point of view of the participant, otherwise it can be difficult to assess what is happening (beyond the obvious) and what might be most meaningful.

Here is an excerpt of our ethnographic fieldnotes as we review the first-person video data collected by research participant Mark in one of our studies – the self-narration from Day 2 and Day 3 helps the researcher understand the meaning behind what was happening in the scene in the recording from Day 1:

Day 1

Mark is an avid photographer and I watch as he reviews past photo albums.

Day 2

(morning)

I watch Mark down sit down in his bedroom armchair with his laptop and iPhone. He narrates: “I’ll be starting to draft that letter to my ex. Here will be the last communications that we’ll ever have. The phone call I got from my friend this morning—he said to wait. My parents gave me different advice. At least I can get some of my thoughts down. This all stems from looking at those pictures yesterday.”

(evening)

I read Mark’s end-of-day digital diary. He writes: “This day was mostly at home...let me list some notable accomplishments from the day:

I drafted a deep and heartfelt letter to my soon-to-be-ex-wife

I went grocery shopping twice

I cooked an enchilada casserole

I played a game of chess with my daughter

Two forms of participant-generated self-reporting at different time scales anchored our analysis of first-person data: in-the-moment ‘self-narration’ of what they were doing and why, and what they were thinking and feeling during their recordings, and daily end-of-day diary entries for reflections.

## Self-Narration

‘Self-narration’ served two primary methodological purposes: first, to add a contextual layer to first-person data, while also offering an emotional and affective layer to the first-person data as it arose in situ for participants; second, to provide the ethnographer with a contextual foothold into the first-person recordings they’d be analyzing – researchers could easily scan through the audio and transcripts to find key moments to analyze in more detail.

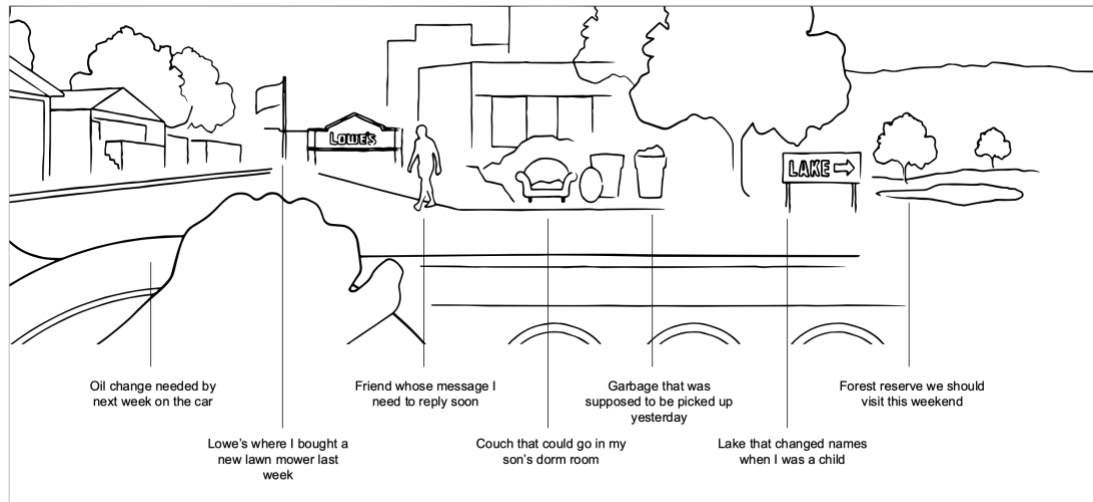


Figure 4. A line-sketch developed by ReD Associates, illustrating a scene someone would see from the windshield while driving: their hand at the wheel, and in front of them tree-lined streets, a hardware store, a pedestrian, a couch left out by the garbage for donation, and a sign pointing to a nearby lake and a forest. Lines from each of these elements lead to a short inlayed text description of what might be meaningful about these elements for the person whose point-of-view is embodied in this sketch. E.g., the steering wheel might make them think about the oil change they need on the car next week, the pedestrian crossing the street might remind them of the friend they need to message, and the couch might be an item they could take for their son. This sketch is meant to show the kinds of meaning and relevance that self-narration can reveal as part of first-person data collection.

## Diaries

The daily diaries, a reflection on what was and was not captured in the first-person footage that day as well as the participant’s point of view on what was memorable for or notable to them, directed the researcher to ‘moments’ of first-person data recording that were potentially rich with personal meaning for the participant, and which warranted in-depth analysis.

### Tenet 3: Co-interpret first-person data alongside the participant

First-person data requires a filter to digest large amounts of ‘raw’ data (video footage, audio recordings) — to add weight to specific events or periods of time and to draw connections. While the self-reflections do part of the work in this, also

revisiting the recorded first-person data with participants during analysis offers an opportunity for the ethnographer to go beyond what was done, said, and reflected on in-the-moment, and for the research participant to exert more agency and control over how their footage is being interpreted, thereby giving them more of a voice in the outcomes of the study.

Here is an excerpt of our ethnographic fieldnotes as we review the first-person video data collected by research participant Aisha in one of our studies – the co-interpretation with Aisha was critical for understanding what happened in the moment, which could have otherwise gone misinterpreted:

I meet with Aisha for a follow up interview and to review some of the first-person footage she recorded. I tell her that I have pulled out some ‘specific moments’ from the past week—and that we are going to watch them together. I say that I want to hear about her experience in that moment. Aisha pipes up, “Oh, are we going to watch the fight?”

“The fight?” I don’t remember watching a ‘fight’.

“Yeah, the fight. You know, the argument in the kitchen.” I did not see an argument in the kitchen. However, one of the clips I pulled was a moment where Aisha’s mother seems to be scolding her in Fula. Aisha is quiet, washing dishes as her stepmother employs a stern tone. Half of what I witnessed was in Fula.

While I thought she was being reprimanded, to Aisha, this was a dispute.

We rewatch the scene together and she explains the ins-and-out of their dynamic—its cultural dimensions and their relationship.

### *Co-Summarization*

Across our studies, we summarized relevant moments from the first-person data to begin to draw out patterns and insights. We took notes about what the participants were doing, experiencing, feeling, and how that might matter to the participant in the context of the moment they had captured. In addition, we drew out what meaning it might hold within the broader context of the participant’s lived experience beyond the frame of the first-person data captured in that moment, and what learnings and implications the moment had for our focus areas of study. To pressure-test ethnographers’ initial accounts with participants, we conducted focused ethnographic follow-up sessions with each participant. A central activity for these revisits was co-viewing and co-summarizing selected ‘moments’ or recordings with the participant. We cued a clip or string of clips and asked: “what’s going on?” and recorded what the participant said. We asked what we were missing, gathering more

context and artifacts to support the participant's summary. We shared our own summaries with them, and then co-summarized the clips upon reviewing once more, ensuring that together we reached the best possible summaries of first-person data moments. We outline more of this method in Cury and Whitworth et al. 2019: 262-3.

The three tenets outlined above are not meant to be exhaustive, and we imagine more will surface as first-person data continues to be used in applied ethnographic research.

## **Benefits of First-Person Data Capture**

We contend that by viewing the world from the participants' perspectives, researchers can access aspects of their lives that are typically hidden, gain longitudinal insights, rethink the observer-observed dichotomy, remain more attuned to the participants' contexts, and combine qualitative and quantitative data collection at scale. These benefits collectively enhance the depth and breadth of ethnographic research, making it more robust and reflective of real-world human experiences.

### **Benefit 1: Access to Aspects of Participants' Lives Unobservable through Traditional Methods**

One of the primary benefits of first-person data capture is the ability to access aspects of participants' lives that would have been unobservable through traditional ethnographic methods alone. The presence of a researcher often influences participant behavior, as they may alter their actions when being observed. While the researcher's skills in building rapport and triangulating observations address this inherent aspect of ethnographic fieldwork, the addition of first-person data capture with a wearable device while the researcher is not present provides more of what participants do alongside what they say and provides instances that might be difficult to be present for otherwise, like morning wake-up routines or moments of boredom. At first the participants from our studies found the wearable technology novel and the equipment captured their attention. However, we spent considerable time ensuring tailored fitting of the devices for comfort, providing clear and careful instruction in relatable terms and in different formats (e.g., videos, written guidance, live demonstration and testing), demystifying how the devices work by explaining the technical details that might not be readily apparent (e.g., the extent to which the participant could view and interact with their recordings), and emphasizing that the participants were in control of deciding when to record and when not to record. After a few tries or over a few days, the wearable devices integrated into daily



routines, allowing participants to act more naturally over time. This normalization enabled the capture of spontaneous and genuine interactions, such as intimate family moments, conversations, and personal routines. For instance, one participant, Linda, talked about her interest in crafts and making furniture when we first met her. In her first-person recordings, we observed there was more to this: Linda coped with insomnia by engaging in crafting and furniture-making throughout the night. In her in-the-moment self-reflection, Linda described how she developed this practice by noting patterns in which activities made her sleepy. This, alongside other examples of participants describing how they discovered hidden patterns in how seemingly unrelated activities shaped their wellbeing, helped form one of the key findings in one of our projects, related to the kinds of information people find meaningful.

## **Benefit 2: Gaining Longitudinal Insights by Seeing Lives Unfold in Real Time**

First-person data capture allows researchers to gain longitudinal insights by observing how participants' lives unfold in real time, over time. Unlike traditional methods that often rely on sporadic and isolated data points, first-person data provides a continuous stream of contextual information. This continuous observation helps researchers understand the temporal dynamics of participants' lives, such as what ruptures and enables consistent daily routines, how behaviors become habits, and how experience changes over time. By recording daily activities repeating across several instances over time, researchers can identify patterns and shifts in behavior, offering a more comprehensive view of how people navigate their environments, build their perceptions, and interact with others. For example, one participant Raquel initially described playing backgammon on her phone as a minor and unimportant part of her day-to-day. We could not have easily observed her playing backgammon because she played in interstitial moments of boredom. In her first-person recordings that she shared with us, we observed that she played the game much more frequently than she had initially described. When we revisited Raquel for a follow-up interview, this recurring footage over time allowed us to talk more openly about her habits and routines, and she described the ways in which she felt stuck, lonely, and uncertain about her future. This kind of longitudinal data can reveal what people are unaware of as they build habits slowly over time and enables us to explore the ways actual experiences might not match needs or aspirations. We can also more closely examine how specific actions might contribute to general feelings, e.g., of belonging or loneliness.

### **Benefit 3: More Participatory Research**

First-person data capture challenges the traditional observer-observed dichotomy by creating a more immersive and participatory form of observation. The wearable devices act as an extension of the researcher, allowing them to ‘be present’ without physically intruding on the participants’ space. When combined with methods of co-interpretation of the footage alongside the research participant, as described above in the core tenets, this transforms observation into a shared, co-constructed experience, where the boundary between the observer and the observed becomes fluid. (We note that first-person footage alone, without some element of co-interpretation, would likely not provide this.) This hybrid model fosters a deeper connection between researchers and participants, allowing for greater rapport-building and the ability to ask deeper follow-up questions (as with the example immediately above with Raquel). And it creates space for the participant to interpret and articulate their experiences in applied studies that may ultimately shape products or services they might one day use. As we describe in a prior paper, “[p]roviding research participants more opportunities to articulate their internal states, including what they need and what they don’t need, rather than assuming or inferring from observations alone, seems particularly important for determining the relevance, helpfulness, and boundaries of an assistive technology in everyday contexts” (Cury and Whitworth, et al, 2019:264). In a study in which we asked participants to record first-person footage focused on their hands to inform future haptic technology development, we asked participants to replay the footage with us and describe, moment-by-moment, why they made certain actions and how they learned to make those actions; this allowed participants to surface aspects of skill-acquisition and the value they placed on their hands, in ways that they might not have articulated before (Cury and Kim 2021).

### **Benefit 4: Centering and Attuning Researchers to Participants’ Contexts**

By centering the data collection on the participants’ point of view, first-person data capture makes researchers more attuned to the participants’ contexts. This approach mitigates the researcher bias to psychologize participants by focusing on their subjective experiences (e.g., stated preference, beliefs, and judgments). With wearable data, researchers can observe how participants navigate their daily lives, interact with their surroundings, and behave in different contexts. This contextual sensitivity allows researchers to develop a holistic understanding of the participants, grounded in their lived realities rather than abstract self-perceptions alone. In one prior study, analyzing the contextual elements (e.g., objects, environment, social

dynamics) in the first-person data allowed us to meaningfully group aspects of context that seemed to correlate with participants' needs, moods, and what kind of task assistance they might be open to versus might reject (Cury and Whitworth et al. 2019; Zax and Cury 2020).

### **Benefit 5: Combining Qualitative and Quantitative Data at Scale**

First-person data capture provides a novel way for researchers to collect qualitative data at scale while also incorporating quantitative elements. Most basically, a single researcher can have several participants recording first-person data at once, so that considerably more data is collected than if the footage came primarily from the one researcher. Moreover, the continuous and comprehensive nature of first-person data allows for the collection of large volumes of rich, detailed information per participant. Certain wearable devices can capture quantitative metrics, such as movement patterns, eye direction, and environmental data, which can be integrated with qualitative insights, and which will likely become more easily accessible and analyzable as AI assistance via software improves. This combination of data types enables a more robust analysis, bridging the gap between qualitative and quantitative research methods and enhancing the overall rigor and depth of ethnographic studies. Particularly in situations in which volume of findings or translating of insights into 'hard' and comparable metrics (e.g., correlations to elements in the environment) matter for the validity of the insights or for teams' abilities to work with the insights, first-person data can lend more credibility, authority, and relevance to ethnographic data. For instance, we hypothesize that if first-person data captured exactly how many times a person experienced pain in their shoulder over a five-hour period, that could serve as part of compelling evidence in a healthcare study pertaining to what contributes to quality of life or where there are gaps between physician and patient understanding.

### **Summary of Benefits**

The integration of first-person data capture into ethnographic research offers numerous benefits that enhance the depth and breadth of understanding human experiences. By providing access to previously unobservable aspects of participants' lives, enabling longitudinal insights, rethinking the observer-observed dichotomy, centering researchers on participants' contexts, and combining qualitative and quantitative data at scale, first-person data transforms the practice of ethnography. Moreover, through the specific examples provided for each benefit above, we also show how these advancements position applied ethnographers to contribute more

significantly to the development of emerging technologies, ensuring that these innovations are deeply rooted in real-world human experiences and ultimately leading to more empathetic and socially meaningful advancements. We hypothesize that the benefits are applicable not only to studies with a technology-oriented outcome, but also studies related to health and wellness, behavior change, group collaboration, to name a few.

## **Risks of First-Person Data Capture**

While first-person data capture offers numerous benefits for applied ethnographic research, it also presents several challenges and ethical considerations that must be addressed. These include the potential for perceived objectivity and reification of participants' lives, the risk of defaulting to an individualistic view of the world, and privacy concerns inherent in capturing intimate, first-person data – each of which we will explore here, but which do not form an exhaustive list. As this form of data collection becomes more widely used, we anticipate more risks will arise.

We argue that understanding the historical and contextual situatedness of first-person data is crucial to integrate this method ethically and effectively into applied ethnographic practices. Concretely, we suggest that embedding reflexivity in the analysis process, encouraging participant-driven self-narration, providing clear protocols for data collection, and maintaining transparency about data use can help applied researchers can mitigate these risks and uphold the integrity of their work. Some of these concrete ways to mitigate the risks of first-person data capture are also part of the core tenets of the method, which we outlined above.

### **Risk 1: Potential for Perceived Objectivity and Reification of Participants' Lives**

One of the primary risks associated with first-person data capture is the potential for perceived objectivity and reification of participants' lives. The immersive nature of first-person footage can create an illusion of objectivity, where the recorded data is seen as a complete and unbiased representation of reality. In that way, first-person data capture shares characteristics with adjacent methods such as video- and photo-ethnography, which also involve visual documentation of participants' lives. As with video- and photo-ethnography, first-person data requires a critical awareness of the power dynamics and ethical considerations involved in representing others' experiences, and of the wider context of the data collection beyond what is in view. By situating first-person data within this broader methodological context, researchers

can draw on (and hopefully also expand) established ethical frameworks and best practices to guide their work.

We had several ways of addressing this risk. We leaned into participant-driven self-narration (as described above) which can bring ethical integrity to the research by allowing participants to control the narrative and highlight aspects of their lives that they deem important and wish to foreground or background. Additionally, we played back key recordings of participants' lives back to them, bringing them in as co-researchers of their own experiences.

Overall, in both working with the data and presenting the data to other teams, researchers must remain critically aware of their interpretive role and avoid presenting first-person data as an unmediated reflection of reality. Instead, they should emphasize the co-constructed nature of the data and the ongoing dialogue between the researcher and participants.

## **Risk 2: Defaulting to an Individualistic View of the World**

First-person data capture inherently focuses on the individual's perspective, which can lead to an overly individualistic view of the world. This focus risks neglecting the broader social and cultural contexts that shape participants' experiences.

To address this, we integrated first-person data with other ethnographic methods that capture collective and communal aspects of life, such as participant observation and contextual inquiry about participants' pasts, their future aspirations, and aspects of social life not immediately in view. Also, while our participants recorded in private indoor settings they often included consenting individuals with whom they shared their daily life and physical spaces, e.g., roommates and spouses, and we sought to include these and other individuals, e.g., friends, extended family, in the participant observation and contextual inquiry portions of the fieldwork. In one study, we also mitigated some of this risk by recruiting 'dyads,' meaning we had two people collect first-person data within a single social ecology so that we could compare their points of view and better observe social dynamics.

With mitigations like these in place, we argue that researchers can balance the individual point of view with a more comprehensive understanding of the social and contextual dynamics at play.

## **Risk 3: Privacy and Consent Concerns**

The intimate nature of first-person data raises ethical considerations particularly regarding privacy and consent. To navigate these challenges, we provided guidelines

on what is permissible to record, to ensure that the data does not inadvertently include sensitive information like addresses, financial documents, health records, or nudity. We established clear protocols guiding research participants on how to obtain the consent of any individuals they might have recorded. We showed participants how they could review and delete any recordings that included sensitive information, or simply any moments they did not wish to share in retrospect. Participants could not record outdoors or in public spaces – we focused on indoor, private spaces, with limited social interactions. As mentioned above, we maintained transparency about the uses of the data, the identities of the organizations conducting the studies, and the goals of the research, to foster trust and accountability between researchers and participants. This meant going over consent forms in detail, multiple times, and in multiple formats (i.e., individual time to read, followed by a verbal walk-through of the content with time for questions), and also going beyond the consent forms to discuss what kinds of moments each participant anticipated they might encounter that they would not be able to record or would not want to record, beyond the basic guidelines, and providing them with tailored guidelines and strategies for these. It also meant continued checking-in with the participants throughout the recording period to ensure they understood, could comply with, and felt comfortable with, the protocols for data collection.

## **A New Role for the Applied Ethnographer: First-Person Data Allows Access to New Aspects of Human Experience, but Embracing It Means Ethnographic Practices and Roles Will Require Change**

With access to new aspects of human experience as detailed above, first-person data can transform ethnographic practice and has the potential to increase the impact of applied ethnographers. We believe first-person data can impact the field of anthropology because it is a good tool for understanding people, particularly when combined with other traditional ethnographic methods. We also believe that the integration of first-person data into anthropology might shift the discipline's influence among the social sciences. And we believe first-person data can change the role of the applied ethnographer in engineering. But this new role for the applied ethnographer requires new skillsets.

## **Expanding Ethnographic Tool Kits to Get at Previously Inaccessible Dimensions of Human Experience**

The emergence of wearable devices for capturing first-person data is watershed, at least from the point of view of anthropology's modern mandate to examine what being human is and means today and tomorrow. First-person data offers a different kind of access to (and angle into) human experience. If it remains, generally, that the organizing mission of anthropology is to get as rich, varied, and deep a glimpse into human experience and the conditions that structure its possibility today, then first-person data is a novel platform for that mission's continuance—a lens and a depth of view that wasn't possible before. And for anthropologists who are interested in the figure of the human taking shape in relationship with powerful net-new technologies like AI, first-person data offers an especially valuable vantage because it works with the same kinds of inputs that AI-enabled wearables in the future likely will have: sensors capturing and recording context from the user's point of view to serve up personal assistance in-the-moment or later on. This parallel allows these future inputs and their value in human-device interactions to be simulated and studied anthropologically with today's wearables. We believe that with the availability of this exceptional lens into human experience, ethnographic attention to and experimentation with these new tools and data will be a necessity, not an option, for ethnography's continued relevance – just as the integration of video and photography proved crucial to the discipline.

## **Reconfiguring Anthropology's Role Relative to the Social and Behavioral Sciences**

If ethnographers do embrace first-person data, leveraging it as equipment for diving deeper and differently into contemporary human experience than previously possible, we believe this could drastically shift present power dynamics among the human, social, and behavioral sciences. Relative to the social and behavioral sciences, anthropology (both academic and applied) anchored in ethnographic research has remained a stubbornly empirical science. This has meant mounds of data based on direct observation, on one hand, and tentative interpretation of it, on the other (especially since the reflexive turn of the 1980s). Theory is borrowed; methodological and conceptual innovation is favored. Trends and institutional norms across sociology, psychology, economics, however, have tended towards appropriating the methods and mien of the experimental sciences, supplanting qualitative observation with variants of quantitative and statistical methods, on one hand, and with broad-based theorizing on the other. Seriously integrating first-person data into

ethnographic practice, however, may dissolve the distinction between qualitative and quantitative data; at the least it blurs the distinction between human observation and interpretation and non-human/technical modes of observation and interpretation. The type of technologies, computational abilities, and data sets that are emerging will enable practitioners of this new ethnographic approach to pose and answer questions that no discipline-specific researcher or research program could have previously: for example, accounting for behavioral change individually or socially and at scale, less restricted by the effects of being observed.

### **Elevating Applied Ethnographers' Role Relative to Data Science and Engineering**

The implications for applied ethnographers of working with first-person data extend beyond impact within the social and behavioral sciences. We hypothesize that ethnographers taking up this kind of data will not just increasingly impact but also become integral to the (r)evolutions in data and computer sciences and engineering currently underway. While ethnographers using first-person data via wearable devices gain new kinds of social science insights, they at the same time gain an understanding of how people meaningfully use and interact with first-person data and wearable devices and become versed in how to translate sensor data into aspects of reality that are meaningful to people. This, in turn, could be helpful in shaping how wearables capturing first-person data (for purposes other than applied ethnographic research, e.g., commercial or for tech development) are built.

Whether working traditionally or experimentally, academically or applied, ethnographers make sense of the irreducibly different. And today, data scientists, technologists, and engineers in fields like computer vision and artificial intelligence would benefit from anthropologists and ethnographers as collaborators, fieldworkers, and experimental partners to engineer, train, apply, and design the systems (and sciences) they are dreaming into reality. Systems that are non-human, but which can both sense and make sense of human experience and culture can best be pursued with anthropologists mediating between machine intelligence and humans' experience, between experimental technology for capturing novel human datasets and the human beings participating in its production.

Furthermore, this reconfiguration between anthropology and engineering heralds a landmark repositioning of human sciences and ethnographic methods, for these would no longer be pursued or consulted downstream of engineering (e.g., in UX). Instead, ethnographers engaging first-person data can collaborate laterally with engineers, enabling while humanizing their ambitions. Collaborating with engineers



(rather than being downstream) means that ethnographers embedded in tech and engineering companies would not be just engaging with teams in product, marketing, and some strategy; working hand in glove with engineers to envision, develop, apply, refine, and humanize future technologies would allow anthropologists to reach new audiences of decisions-makers within technology companies.

### **This Requires Revamping the Applied Ethnographer's Skills, Learning New Tools, and Reorienting to Their Subjects of Study**

Meaningfully integrating new technologies and kinds of data into ethnographic practice, however, means expanding the tool-kits ethnographers are used to. This includes:

- Working with new data formats and media (e.g., mixtures of quantitative and qualitative data, of observational and artifactual data, physical and digital data, and of raw and coded data)
- Learning about engineering infrastructure, practice, process, and language to collaborate with engineers
- Working with nascent wearable technology and AI-enabled software that helps to organize and process collected data

It also means that ethnographers must revamp their skills in ways that include reorienting to their subjects of study, the locus of the interventions, the venues in which they work, and the types of instruments and technologies they engage for doing so. This includes:

- Helping participants (i.e., device-wearers) take on a lot of the data collection and gathering capacities that an ethnographer would traditionally conduct
- Allowing computer vision and sensors to encode information from the environment and working with those formats and limitations
- Gathering through and working in dialogue with sensing technologies and AI systems to scale data collection, to amass and interpret large data sets
- Interfacing with multiple research participants at once, without sacrificing the rapport-building that matters and the interpretive responsibilities and sensitivities

While the ethnographer can extend observation and data collection through emerging technologies, we firmly believe ethnographers must remain wholly accountable for analysis and interpretation and to the experience of research participants who are not just participants but co-researchers as well. We argue that at its best, technology s never displacing human prowess (or judgement), analytical

acuity, empathy, or engagement, but rather augmenting what is possible and extending ethnographic capacity into depths and details previously inaccessible and could scale it to previously unimaginable reaches.

Embracing first-person-data means ethnographic practices and roles will require change – expanding tool kits and revamping skill sets, repositioning the role of the researcher in relation to the participants and the equipment, reconfiguring the role relative to the social sciences and to engineering, and extending through emerging technologies to create impact with new audiences.

## **Conclusion**

First-person data capture can significantly impact applied ethnography by transforming and expanding its scope. Traditionally, ethnographers have relied on methods such as participant observation and interviews to gather data. While these methods define the field and provide valuable insights, they are often limited by the presence of the researcher and the sporadic nature of data collection. First-person data collection overcomes these limitations by enabling continuous and immersive data collection from the participant's perspective. This allows ethnographers to explore new dimensions of human experience, capturing nuanced, real-time interactions and behaviors that were previously beyond reach.

## **Redefining What Applied Ethnography Can Be**

First-person data broadens the set of questions that applied ethnography can answer by providing researchers with access to meaningful data that would have otherwise been inaccessible. High-quality wearable technology and new means of extracting, processing, and analyzing hours of footage provide the ability to capture intimate, everyday moments for a deeper understanding of participants' lives. This access to rich, contextual data enables ethnographers to investigate complex social phenomena, such as group dynamics, personal routines, and interpersonal interactions, with a level of detail that was previously unattainable. By redefining the boundaries of what applied ethnography can explore, first-person data opens new avenues for research and discovery. We hypothesize that first-person data can be helpful for applied questions that require a detailed and longitudinal understanding of the day-to-day, such as, how can people better adhere to health goals and regimens? How might teams collaborate better? What gets in the way of sustainability efforts?

## **Expanding the Role of the Applied Ethnographer**

First-person data also expands ethnography's role in the engineering of future technologies. Historically, applied ethnographers have been excluded from critical early conversations in hardware development and training dataset design, often relegated to post-hoc analysis rather than active participation in the design process. However, the insights gained from first-person data captured through wearable devices provide ethnographers with valuable information about the types of sensors and capabilities needed for future wearable devices to be socially meaningful in real contexts. This knowledge allows ethnographers to become critical nodes in the design of high-quality, specialized data collection circuits that are critical to technology development (e.g., for training machine learning algorithms on real world data, or testing the capabilities and value of sensors). By contributing to the foundational stages of technology development, ethnographers can ensure that devices are designed with a deep understanding of human behavior, needs, and social dynamics, ultimately creating more user-centered and effective technologies.

## **Broader Challenges and the Need for Critical Engagement**

The integration of first-person data into ethnographic research and into engineering presents broader challenges that require ethnographers to critically engage with emerging technologies like wearables and AI. One of the primary challenges is the need for ethnographers to develop technical fluency and an understanding of the capabilities and limitations of these technologies. This knowledge is essential for effectively integrating ethnographic insights into the design process and for advocating for ethical and socially responsible technology development. Additionally, ethnographers must navigate the ethical considerations and privacy concerns associated with first-person data capture, ensuring that their research practices uphold the highest standards of integrity and respect for participants.

## **Call to Action**

We hope this paper inspires applied ethnographers and social scientists more broadly, to continue to experiment with, and discuss, first-person data, and to find ways to shape the early development of wearable technologies that will continue to capture first-person data for a range of purposes. By transforming and expanding the role of ethnographers, providing access to previously inaccessible data, and positioning ethnographers as critical contributors to technology development, first-person data has the potential to reshape the field of applied ethnography. However,

these advancements also present new questions and challenges that necessitate a critical and informed engagement with emerging technologies. By navigating these challenges thoughtfully, ethnographers can harness the power of first-person data to deepen their understanding of human experiences and contribute to the creation of more empathetic and socially meaningful technologies.

## About the Authors

**Maria Cury** is a partner at ReD Associates. She studies the role of new technology and media in daily life to advise on product development, visioning, and strategy. She has led projects on AR/VR, haptics, and autonomous vehicles, and has conducted foundational studies on topics such as the smart home, computing, the role of entertainment media and books in people's lives, and the human senses in tech. She has background in anthropology, the arts, and cultural institutions.  
mcu@redassociates.com

**Eryn Whitworth** is a member of the Project Aria team at Meta's Reality Labs Research. Eryn leads UX/UI efforts across multiple surfaces and topics, including interaction design, hardware evaluation, and responsible innovation. As a practitioner, Eryn blends ethnographic and laboratory methods to create insights from qualitative and quantitative data triangulation.

**Ariel Abonizio** is an anthropologist, artist, and business strategist who specializes in advising global technology companies on product and corporate strategy from inception to implementation. At ReD Associates, Ariel informs product, engineering and business leaders on how to design for thorny human concepts like trust, misinformation, cultural representation, and intimacy.

**Gabriel Coren** is a senior consultant with ReD Associates. As an anthropologist of science interested in emerging relationships between living nature and technology, he has conducted ethnographic work with biologists and engineers around the world. He earned a PhD in cultural anthropology from the University of California, Berkeley.

**Maya Potter** has worked across the worlds of emerging technology and cultural fandoms for companies across industries. She holds a bachelor's degree in anthropology and a master's degree in World Heritage Studies. Prior to joining ReD, Maya worked with NGOs and development organizations in South Asia.

**Tamara Moellenberg** is a senior manager at ReD Associates, leading mixed methods projects to define the future of emerging technologies and services. She has a background in literary and cultural studies. Prior to joining ReD, she completed her doctorate on conceptions of childhood in West African literature as a Clarendon Scholar, focusing on themes of socio-cultural identity and agency.

**Mikkel Krenchel** is a partner at ReD Associates. For over a decade, Mikkel has helped build ReD's presence in North America, advising executives while building the firm and the practice of human science in business more broadly. He focuses on how ideas around disruptive technologies shape our lives, for better or worse. He also serves as an advisor and thought partner to leaders at some of the

world's largest social media companies, telecom providers and electronics manufacturers, as well as clients across the finance, energy, and industrials sectors. Mikkel holds a degree in Sociology and International Studies from Yale University and is a former Danish national team rower.  
mkr@redassociates.com

## Notes

Acknowledgements: The authors would like to thank Richard Newcombe, Mingfei Yan, Kevin Hannan, Lambert Mathias, Laird Malamed, Saransh Solanki, Wang-Chiew Tan, Zhaoyang Lv, Faraz Kamili, Maddy Bowen, and Yan Xu at Meta Reality Labs for their intellectual contributions and support in the work that shaped this paper. The authors would also like to thank Natasha Jessen-Petersen, Fred Guo, Tine Walravens, Matthew Janney, and Matt Kay at ReD Associates for their support in the development of this paper.

## References Cited

- Adair, John, and Worth, Sol. 1973. *Through Navajo Eyes: An Exploration in Film Communication and Ethnography*. Bloomington: Indiana University Press.
- Asch, Tim. Dodoth Morning. Documentary Educational Resources, 1961. 20 minutes.
- Asch, Tim. Arrow Game. Documentary Educational Resources, 1974. 10 minutes.
- Asch, Tim, Neal, James, and Chagnon, Napoleon. Yanomamö: A Multidisciplinary Study. Documentary Educational Resources, 1968. 45 minutes.
- Asch, Tim, and Chagnon, Napoleon. Climbing the Peach Palm. Documentary Educational Resources, 1974. 9 minutes.
- Asch, Tim, and Chagnon, Napoleon. A Man Called "Bee": Studying the Yanomamö. Documentary Educational Resources, 1975. 40 minutes.
- Boas, Franz. 1911. Handbook of American Indian Languages. *Bureau of American Ethnology Bulletin*, 40 (1), 1–1069.
- Charbonneau, Étienne and Carey Doberstein. 2020. "An Empirical Assessment of the Intrusiveness and Reasonableness of Emerging Work Surveillance Technologies in the Public Sector." *Public Administration Review*, 80: 780-791. <https://doi.org/10.1111/puar.13278>
- Cury, Maria, Eryn Whitworth, Sebastian Barfort, Séréna Bochereau, Jonathan Browder, Tanya R. Jonker, Kahyun Sophie Kim, et al. 2019. "Hybrid Methodology: Combining Ethnography, Cognitive Science, and Machine Learning to Inform the Development of Context-Aware Personal Computing and Assistive Technology." *Ethnographic Praxis in Industry Conference Proceedings*: 254-281. <https://www.epicpeople.org/hybrid-methodology-ethnography-cognitive-science-machine-learning/>

- Cury, Maria and Kahyun Sophie Kim. 2021. "Hands Are People Too: Reflections on the Value of Hands (and How to Study Them)." *Ethnographic Praxis in Industry Conference Proceedings*: 342-343. <https://www.epicpeople.org/hands-are-people-too/>
- Chagnon, Napoleon. 1974. *Studying the Yanomamö*. New York: Holt, Reinhart, and Winston.
- Clifford, James and Marcus, George (eds.). 1986. *Writing Culture: The Poetics and Politics of Ethnography*. Berkeley: University of California Press.
- Crapanzano, Vincent. 1986. *Tuhami: Portrait of a Moroccan*. Chicago: University of Chicago Press.
- Dwyer, Keith. 1982. *Moroccan Dialogues: Anthropology in Question*. Baltimore: Johns Hopkins University Press.
- Ellis, Carolyn. 2004. *The Ethnographic I: A Methodological Novel about Autoethnography*. Walnut Creek: AltaMira Press.
- Engel, Jakob, Kiran Somasundaram, Michael Goesele, Albert Sun, Alexander Gamino, Andrew Turner, Arjang Talattof, et al. 2023. "Project Aria: A New Tool for Egocentric Multi-Modal AI Research." arXiv: 2308.13561. <https://doi.org/10.48550/arXiv.2308.13561>
- Fabian, Johannes. 1983. *Time and the Other: How Anthropology Makes its Object*. New York: Columbia University Press.
- Feld, Steven. 2012a [1982]. *Sound and Sentiment: Birds, Weeping, Poetics and Song in Kaluli Expression*. Duke University Press.
- Feld, S. 2012b. *Jazz cosmopolitanism in Accra: Five Musical Years in Ghana*. Duke University Press.
- Feld, S. 2015. "Acoustemology". In *Keywords in Sound*. Novak and Sakakeeny, eds. Durham: Duke University Press (12-21).
- Fisher, Daniel. 2016. *The Voice and Its Doubles: Media and Music in Northern Australia*. Durham: Duke University Press.
- Fletcher, Alice, and Filmore, J.C. 1893. Study of Omaha Music. *Archæological and Ethnological Papers*, Peabody Museum, Harvard University, 1(5).
- Ganry, Laurent, Nicolas Sigaux, Kyle S. Ettinger, Salam O. Salman, Rui P. Fernandes. 2019. "Modified GoPro Hero 6 and 7 for Intraoperative Surgical Recording-Transformation into a Surgeon-Perspective Professional Quality Recording System." *Journal of oral and maxillofacial surgery: official journal of the American Association of Oral and Maxillofacial Surgeons* 77 (8): 1703.e1-1703.e6. <https://doi.org/10.1016/j.joms.2019.03.026>
- Gardner, Robert. *Dead Birds*. Film Study Center of Peabody Museum, Harvard University, 1964. 84 minutes.

- Geertz, Clifford. 1973. *The Interpretation of Cultures: Selected Essays*. New York: Basic Books.
- Gilman, B. I., & Fewkes, J. W. (1891). *Zuñi Melodies*. Houghton, Mifflin and Company
- Ginsburg, Faye. 1994. "Embedded Aesthetics: Creating a Discursive Space for Indigenous Media." *Cultural Anthropology* 9 (3): 365-382.
- Graves, Steven Nicholas, Deana Saleh Shenaq, Alexander J. Langerman, David H. Song. 2015. "Video Capture of Plastic Surgery Procedures Using the GoPro HERO 3+." *Plastic and Reconstructive Surgery. Global Open* 3 (2), 312. 6 March. <https://doi.org/10.1097/GOX.0000000000000242>
- Harper, Douglas. 2003. "Scenes in the Anthropological Life of Tim Asch," in *Tim Asch and Ethnographic Film*. Ed. E.D. Lewis. Routledge.
- Herzog, G. (1935). "Plains Ghost Dance and Great Basin Music." *American Anthropologist*, 37(3), 403-419.
- Herzog, G. (1936). *Research in Primitive and Folk Music in the United States: A Survey* (No. 24). American Council of Learned Societies.
- Huang, Xin-Yue, Zhe Shao, Nian-Nian Zhong, Yuan-Hao Wen, Tian-Fu Wu, Bing Liu, Si-Rui Ma, Lin Lin Bu. "Comparative analysis of Gopro and Digital Cameras in Head and Neck Flap Harvesting Surgery Video Documentation: An Innovative and Efficient Method for Surgical Education." *BMC Med Educ* 24, 531 (2024). <https://doi.org/10.1186/s12909-024-05510-2>
- Hurston, Zora Neale. 1935. *Of Mules and Men*. New York: Perennial Library.
- Hurston, Zora Neale. 1938. *Tell My Horse*. Philadelphia: J.B. Lippincott Co.
- Leiris, Michel. 1930. "L'oeil de l'ethnologue (a propos de la Mission Dakar-Djibouti) [The Ethnographer's Eye (concerning the Dakar-Djibouti Mission)]." *Documents* 7: 404-14.
- MacDougall, David. 2006. *The Corporeal Image: Film, Ethnography, and the Senses*. Princeton: Princeton University Press.
- Malinowski, Bronislaw. 1922. *Argonauts of the Western Pacific*. London: Routledge and Sons.
- Mead, Margaret, and Bateson, Gregory. 1942. *Balinese Character: A Photographic Analysis*. New York Academy of Sciences.
- Nader, Laura. 1972. "Up the Anthropologist: Perspectives Gained from Studying Up." Washington D.C.: U.S. Department of Health, Education, and Welfare.
- Ortner, Sheri. 1974. "Is Female to Male as Nature Is to Culture?" in *Feminist Studies* 1 (2): 5-31.
- Rabinow, Paul. 1977. *Reflections on Fieldwork in Morocco*. Berkeley: University of California Press

Rane, Nitin, Saurabh Choudhary, and Jayesh Rane. "Leading-edge Wearable Technologies in Enhancing Personalized Safety on Construction Sites: A Review" (November 13, 2023). Available at SSRN: <http://dx.doi.org/10.2139/ssrn.4641480>

Schäuble, Michaela. 2018. "Introduction. Mining Imagination: Ethnographic Approaches Beyond the Written Word." *Anthrovision* 4.2 (2016). <https://doi.org/10.4000/anthrovision.2407>

Seminoff, Jeffrey A., T. Todd Jones, and Greg J. Marshall. 2006. "Underwater Behaviour of Green Turtles Monitored with Video-Time-Depth Recorders: What's Missing from Dive Profiles?" *Marine Ecology Progress Series* 322: 269-280. <https://doi.org/10.3354/meps322269>

Tangen, Steffen, Alexander Olsen, and Ellen Beate Hansen Sandseter. 2022. "A GoPro Look on How Children Aged 17–25 Months Assess and Manage Risk during Free Exploration in a Varied Natural Environment" *Education Sciences* 12, no. 5: 361. <https://doi.org/10.3390/educsci12050361>

Taylor, Lucien Castaign. 1996. "Iconophobia: How Anthropology Lost It at the Movies." *Transitions* (No. 69): 64-88.

Taylor, Lucien Castaign. Sweetgrass. Cinema Guild, 2009. 101 minutes.

Taylor, Lucien Castaign, and Paravel, Verena. Leviathan. Sensory Ethnography Lab and Arrête ton Cinéma, 2012. 87 minutes.

Tyler J, SW Choi, and M Tewari. Real-time, Personalized Medicine through Wearable Sensors and Dynamic Predictive Modeling: A New Paradigm for Clinical Medicine. *Current Opinion in Systems Biology* 2020 Apr (20):17-25. <https://doi.org/10.1016/j.coisb.2020.07.001>. Epub 2020 Jul 7. PMID: 32984661; PMCID: PMC7515448

Yoshida, Hanako and Linda B. Smith. 2008. "What's in View for Toddlers? Using a Head Camera to Study Visual Experience." *Infancy*, 13: 229-248. <https://doi.org/10.1080/15250000802004437>

Zax, David and Maria Cury. 2020. "The Moonshot Tech Challenge of Our Era is Context." *Red Associates Perspectives*. Accessed 4 August 2024. <https://www.redassociates.com/all-perspectives/the-moonshot-tech-challenge-of-our-era-is-context>