Technology

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Technology broadly refers to objects or actions that are linked to tekhne*, an ancient Greek term for ‘skill’ or ‘craftmanship’. Anthropologists of technology sometimes employ this understanding as a starting point, but many study technology in a much broader sense. They ask instead how humans and non-humans purposefully make or do things, and how such activity is shaped by broader sociocultural dynamics. Framing the topic in such terms allows anthropologists, among others, to think of technology beyond the machines of Western industrial-capitalism and engage with technologies across time and space—from stone tools to smartphones to satellites—and across human and non-human actors. Anthropologists have also promoted vernacular definitions of technology that emphasise technological effectiveness as understood by the actors involved in creating and using it. This has led them to challenge the analytical usefulness of the concept of ‘technology’ itself, highlighting concepts such as ‘technological systems’, ‘technical ensembles’, or ‘technics’, each time focusing on the complex interaction between technical objects such as tools, technical actions such as gestures, and the milieu or context in which technologies are embedded. Seeking to understand this complexity, anthropologists have highlighted that technologies have a rhythm that entangles diverse actors, resonates within particular milieus or contexts, and challenges the subject-object divide. Focusing on rhythmic resonance is one of several ways in which the study of technology offers unique insights into the dynamics that render some societies and their technological systems more resilient than others.*

Introduction

The anthropology of technology covers a variety of enquiries into the social life of action-upon-matter, be it the action of weaving a basket or of typing on a keyboard to arrange bits into digital texts. Technologies have been an essential part of being human for as long as humans have existed. The use of technology was even thought to be the distinguishing feature of humanity, until tool use—a central feature of many technologies—was witnessed amongst great apes, crows, and octopi, among others (cf. Joulian 1994). By some estimates *Kenyanthropys platyops*, who lived about 3.5 million years ago in current-day Kenya, were among the first hominids to use stone tools beyond the *Homo* genus (Harmand et al. 2015). Since then, tools and more broadly human-driven actions-upon-matter have proliferated. They have also exponentially increased in complexity and in transformative capacity, accelerating changes of not only the human condition but also the condition of earth itself. This happened to the point that particularly geographers (cf. Larsen and Harrington Jr 2020) as well as anthropologists (cf. Mathews 2020) have come to debate if humanity’s capacity for action-upon-matter has so radically changed the world that it warrants its own epoch, the Anthropocene, ‘a new planetary era… in which humans have become the dominant force shaping Earth’s bio-geophysical composition and process’.

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Anthropologists engage with technology across this vast spectrum of action, across time and space, and increasingly also across species and beyond humanity. From stone tools to ballistic missiles (Latour and Lemonnier 1994), the scope is as wide as the human and more-than-human experience itself. It is this vastness that defines the anthropology of technology and its complex, fluid, and expansive engagement with 'technology' as a gateway for understanding society as a whole, a powerful lens into the study of everything.

What is 'technology'?

So what is 'technology'? Unsurprisingly perhaps, anthropologists have no simple, or comprehensively agreed upon, definition. Technically, 'technology' refers to the '-ology' or study of *tekhne,* an ancient Greek term for 'skill' or 'craftmanship,' or more broadly, for the 'art' of 'making' or 'doing' (cf. Coupaye 2022b). In many ways, anthropologies of technology employ this understanding as a starting point. They are variously concerned with how people purposefully do things, how they make them, and with how such doing and making shapes, and is shaped, by broader societal dynamics (Naji and Douny 2009). However, the devil here lies in the definitional technicalities.

In English, 'technology' only really emerged as a term in the nineteenth century. It rose to prominence as a catch-all for scientific and engineering knowledge that is being industrially produced (Marx 1997). This association with industrial production facilitated the rise of 'technology' as a prominent noun, or category of things, that is deeply associated with 'modernity'. Simultaneously, the perceived link with industrial modernity, and the utopian promises surrounding industrial technologies (Moore 1990), enabled technology to be thought of as profoundly 'agentive', i.e. of producing effects in its own right. For example, by frequently promising to change the world, technology appears capable of acting autonomously, of 'determining the course of events' (Marx 1997, 968) without any substantive human involvement. When we insist on its agentive capacity, technology tends to project a veneer of neutrality and modernity (cf. Sigaut 2002). It promises to act on its own and to do so in a highly deterministic fashion, i.e. to bring about reliable, predictable change 'according to principles of mechanical functioning that are entirely indifferent to particular human aptitudes and sensibilities' (Ingold 1997, 131). It also promises to perform according to its designers' intents, largely irrespective of the context in which it is being used (cf. Orlikowski 2007).

Anthropologists have variously studied such industrially-produced technologies, be they smartphones (Hobbis 2020; Tenhunen 2018), robotics (Deturche 2019; Gygi 2018), or plastics (Dey 2023). However, they have also challenged the modernist focus on industrial production and its 'ethnocentric potential' (Sautchuck and Mura 2019, 4), i.e. the risk of unwittingly universalising our understandings of technology even though they are specific to our own time and circumstances. Instead, many anthropologists have proposed conceptualising technology in the widest possible sense. They have suggested we focus on our interactions with objects whenever we try to secure some desired result in a creative and roundabout

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manner, i.e. when we use 'a certain degree of *circuitousness* in the achievement of any given objective' (Gell 1988, 6; emphasis in original).

Such interactions with objects can include the aforementioned tools at various scales, from dresses (Richards 2009) to eel traps (Lemonnier 2012) to military checkpoints (Hammami 2019). Yet, tools themselves are not sufficient or even necessary components of technologies. Instead, anthropologists have emphasised that actions-upon-matter are, first and foremost, tied to 'techniques of the body' (Mauss 1973) such as swimming and whistling but also the handweaving of baskets (Bunn 2022), moving through space while using a mobile phone (Nova et al. 2012), or 'growing materials' as part of biofabrication (Cristi 2023). Such techniques may vary in their 'degree of technicality', meaning 'the number and complexity of the steps which link the initial givens to the final goal which is to be achieved' (Gell 1988, 6), yet the degree of technicality is, from an anthropological perspective, a point of investigation and does not indicate what counts as 'technology' and what does not.

Anthropologists of technology are also rarely concerned with the perceived rationality of given technical actions, the 'given objective', as implied in the industrial definition of the term. Instead, they tend to focus on '*vernacular* [i.e. locally, context-specific] efficacy [that] takes into account all acts considered appropriate by the actor, whether they are aimed at matter or at intangible entities or substances' (Coupaye 2022a, 42; emphasis in original). Consider for example how the Abelam people of Papua New Guinea grow and consume yams. Here, yams are anything but 'just' food, but are in fact symbols of society itself, and thus they are 'not only grown, they are also "made"' (Coupaye 2018, 17). Yams are centrepieces for social and cultural reproduction: their phallic properties semiotically represent and constitute masculinity and male hierarchy, and their ability to produce desired effects are closely embedded in relationships between spirits and humans (Coupaye 2013).

Based on this vernacular embedding, anthropologists have proposed an expanded understanding of technology that recognises technics, at various scales, as part of a multi-faceted 'technological systems' (Lemonnier 1989). Often embedded in particular, perhaps anachronistic, national research traditions, anthropologists have variously debated the specific boundaries of technology-focused terminologies including the difference between 'techniques' (French approaches) and 'skills' (English approaches) (cf. Brunn and Wahlberg 2022; Coupaye and Douny 2010; Sautchuk and Mura 2019). Still, roughly speaking, they agree that technological or technical systems usually involve (1) 'technical objects' like spears, dresses, or smartphones; (2) 'technical actions,' like the gestures used for basket weaving, which can either be 'effective', from the vernacular point of view of the actor, or 'traditional', based on historical dynamics of transmission and change (Coupaye 2021a, 49); and (3) their 'milieus,' such as the presence of spirits for the Abelam (Coupaye 2013) or the tropical ecologies of the Solomon Islands that undermine the durability of digital materials (Hobbis and Ketterer Hobbis 2021). 'Milieu' is here 'summarised as a global field in which an entity (living organism or technical object) is immersed and with which it interacts but also upon

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which its existence depends' (Coupaye 2021a, 51).

By emphasising the enmeshment of these three technical features, some anthropologists not only reject modernist definitions of 'technology' but also the distinction of subject- or object-centric engagements with technology. They focus on techniques, or technical actions, to highlight the fluidity of subject-object relations, and to consider technologies as relations between movements. To them, it is conceivable that humans as well as non-humans '*are* their movements' rather than 'beings that move' (Ingold 2011, 168; emphasis in original). 'Techniques' here emerge as the contextually-embedded, vernacular, and malleable binding agent between subjects, objects, and their milieus. They thereby stress the connections between humans and the rest of the living world, the denial of which is common in modernist and agentive engagements with technologies (Leroi-Gourhan 1993, 400). Simultaneously, the 'technical' is more than the 'material' (Latour 2014) revealing how even a bodily action upon its own self-as-matter is culturally inflected and connected to larger social processes.

Accordingly, 'technology' can be understood as a lens into everything social. Studying it creates new empirical sensibilities and allows for perceiving and dealing with relations and processes that go beyond the usual topics and methods of the social sciences (Sautchuk and Mura 2019, 5). Thus, anthropologists have variously shown the complex interplay between how societies make technologies and how technologies make society, or 'that human and social reality is as much as a product of machines as of human activity' (Escobar 1994, 216). Anthropologists have, in their engagement with this technology-society dialectic, highlighted the fluid rhythm of technologies that entangles diverse actors beyond the subject-object divide, asking how technical rhythms resonate within particular milieus or contexts. Moreover, they have asked what rhythmic resonance may teach us about the resilience of some societies and their technological systems.

The rhythms of technologies

Several anthropologists have uncovered and showcased the 'rhythmic dimensions of technical relations' (Sautchuk and Mura 2019, 10; cf. Leroi-Gourhan 1993; Stiegler 1998). Take the technical actions involved in breadmaking such as kneading, for example. Kneading involves forming and orienting an elastic gluten structure that is necessary to contain air produced during fermentation processes within bread. Effective kneading requires repetitive, or rhythmic, actions that include the stretching, lifting, and folding of usually ball-shaped dough. It is the consistency and particular patterns of the rhythm that distinguishes a 'great' baker (or a great kneading machine) from a 'good' or 'bad' one, according to culturally specific norms. Rhythmic kneading entwines the baker's body (or kneading machine) in a particular way with the dough, its various ingredients, as well as the surface on which the kneading takes place. Thus, it plays a central role in the broader technical actions that bring bread into being. Multiple actors are at play in these processes. For example, while the baker, with or without the use of machines, may attempt to 'control' the

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behaviour of yeast, as a key ingredient, it is the yeast itself that acts based on and in response to various factors, including its age, the surrounding temperature, and the kneading rhythms. Yeast operates, in this case, according to its own particular rhythm within the broader technological system involved in making bread. Such a rhythmic plurality also marks how guide dogs engage their human counterparts (von der Weid 2019) or how the Dogon in Mali consider the sheen from wild silk as being imbued with a living force (Douny 2013).

By recognising the agency of non-human actors, such as yeast, in technological systems, the anthropology of technology supports broader efforts aimed at transgressing common epistemic dichotomies, including that of nature vs. culture or human vs. non-human (e.g. Descola 2013, Vivieros de Castro 2004; Vilaça 2016). It foregrounds the role of rhythmic techniques in human attempts to 'control' or 'manipulate' non-human actors, but also the non-human actors' resistance to, and diverse engagement with, such attempts. For example, the technical processes involved in extracting latex from rubber trees involves applying a toxic chemical solution of ethrel and water to the 'last cut' of a tree in order to prolong the sapping period. The ratio of ethrel to water, and the frequency of its use, are interpreted in a moral framework in the relationship between employer and tapper. Bad employers use lower ratios and apply more frequently than their more perceivably benevolent counterparts. Latex extraction thus includes attempts at controlling or, in this case, 'taming' trees through working rhythms that maintain this tamed status over multiple days. These rhythms, in turn, account for the characteristics of the rubber tree as an agentive being while also reflecting the rhythmic relations between tappers and their employers (Di Deus 2019). Thereby latex extraction reveals 'a complex interactive human-plant dynamic' (Die Deus 2019, 17) that '[surpasses] a purely metaphorical dimension of the idea that plants have "agency"' (Di Deus 2019, 18).

As implied in the tapper-employer relationship, the rhythmic dimensions of technical actions are not necessarily harmonious, equal, or deterministic. On the contrary, anthropologists contend that technologies and their rhythms are not fixed but open to allow for context-specific adaptations (cf. Fisch 2018; Simondon 2017). In other words, the rhythms of technical actions are inherently flexible. They allow for a continuous renegotiation of the relationship between the actors involved, including not only humans, animals, plants, or spirits but also machines. This holds true for various technological relationships, whether these involve bakers and dough, workers and rubber trees, or machine-centric technological systems such as Tokyo's commuter train network. Michael Fisch (2018), for example, has shown how Tokyo's commuter train network operates reliably, whilst working nearly always 'beyond capacity' (2018, 1). It works not because of a strict, inflexible, and controlling insistence on having 'zero errors'. Instead, its tight schedule is made possible because Tokyo's train system is open to rhythmic changes between the humans that operate and use it, as well as its machines, from subtle and finely tuned infrastructural configurations to abrasive techniques of employees shoving passengers into cars before doors close. Regularity in technical systems such as the commuter train network can, thus, emerge through irregular flows between various actors.

Studying technology's more fluid rhythms thus confronts the myth that technologies are functional because they are external to humans and non-human actors. It challenges the 'rational linear determinism' (Coupaye 2022a, 37) of modernist understandings of technology and foregrounds the importance of studying complex socio-technical entanglements.

The resonance of technologies

The rhythmic movements that underlie technologies further generate resonances between technical objects, technical actions, and their milieus. For example, among the Panará in southern Amazonia, hunters' use of particular weapons such as firearms resonates with 'the territory, or the land (terra)' (Bechelany 2019, 20) that they move through. By how a firearm is positioned next to the hunter's body while moving through the forest, the firearm facilitates circular movements of the hunter, 'guiding him to always walk towards the same side, taking him back to the point from whence he started off' (Bechelany 2019, 8). Simultaneously, firearms as a 'thing of the whites' (Bechelany 2019, 8) embed the hunt in broader Panará relationships with 'the whites,' because firearms, including ammunition, need to be purchased. Firearms, thus, resonate differently than bows in Panará lifeworlds. Bows facilitate different movements through space and, as self-made hunting tools, creating a less dependent relationship with 'the whites'. Resonances surrounding the 'technical ensemble' (Simondon 2017) of the hunt, thus, reveal something bigger about the Panará than 'just' how they hunt. They show shifting relationships between the Panará, animals, other (white) humans, and their territory.

Anthropologists of technology have further argued that similar to technical rhythms, technological resonances are not predetermined. Technical actions or objects may be designed to achieve particular goals. However, the achievement of such goals is never guaranteed. A mobile phone may be designed to allow for telecommunication, but telecommunication may not be the dominant function that is being used, if it is at all. Among the Lau speakers of Solomon Islands, for instance, mobile phones were, in 2014 and 2015, used most frequently as flashlights or calculators (Hobbis 2020). Reasons for such deviation from designers' intent and objects' primary tendencies are diverse. They depend on context and are rarely explainable solely through arguments that focus on people's need for resources. When the Lau, an Indigenous language group of approximately 15,000 people in Solomon Islands, needed to make a phone call in 2015, their access to the necessary monetary funds to pay for, and make, phone calls was limited. This facilitated a 'metered mindset' (Donner 2015) with many Lau choosing to use mobile phone functions that did not incur additional expenses such as the aforementioned flashlights, which served as primary light source at night in off-grid villages (Hobbis 2020). Simultaneously, money alone did not explain a general reluctance towards making phone calls: phone calls were also discouraged due to perceived possibilities for immoral actions such as the facilitation of extramarital affairs (Hobbis 2020).

In other words, as particular technical actions or objects interact with, or better resonate within, a specific

milieu, the actors involved situate these actions and objects in the interests, needs, and values of the milieu as reflected in the Lau's concerns with the immorality of mobile phones. Technologies may, thus, have some built-in 'tendencies' (Leroi-Gourhan 2013), meaning they are *likely* to be used for a particular purpose (e.g. phones have a tendency to be used to make phone calls). However, anthropologists of technology have shown that usage patterns are not predetermined. Instead, there is substantive diversity in how people engage with technical objects such as mobile phones or how they engage in technical actions, from fire management (Fagundes 2019) to mathematical techniques (Vilaça 2018). Put another way, technologies resonate in unique ways in particular milieus, and technological capacity is only one of multiple factors that determine how they are produced, used, and discarded.

While technologies always 'have reciprocal relationships with the social systems to which they belong' (Lemonnier 1989, 156), the degree of such resonance is not always the same. Some technologies, specifically some technical objects, resonate more intensely than others in a given context. As 'compositional objects' (Hobbis 2020)—objects that uniquely connect diverse actors within specific milieus through particular technical actions—they have a unique 'blending power' (Lemonnier 2014) or ability to engage with processes of social reproduction and enable to share ideas and build social relations. They do so, for example, through their origin myth, and physical modes of use (Lemonnier 2014, 538). These objects may be exceptional in their visibility such as Gawa canoes (Munn 1977) or Kwakwąkąʼwakw totem poles (Boas 1955), but they may also be seemingly 'mundane objects' (Lemonnier 2012) such as pottery among the Marakwet of Kenya (Derbyshire et al. 2020) or yams among the Abelam of Papua New Guinea (Coupaye 2013).

Insofar as they seem mundane, compositional objects can disappear into the background of everyday life, remaining ostensibly insignificant. Yet, they can be anything but inconsequential. The mortuary drums of the Ankave of Papua New Guinea are a good example. When playing and hearing the drums during a mortuary drum beating ceremony, the Ankave have been shown to witness their recently deceased relatives leave the Ankave 'realm of the living' (Lemonnier 2012, 72). As this happens, those present at the drum beating ceremony recall their mythic origins and in so doing the drums invoke a whole network of associations in the minds of the participants, 'connecting cannibal monsters, shamanism, the various origins of illnesses and the ways to cure them, the management of mourning, the representation of life, and the proper conduct in the presence of maternal kin' (Lemonnier 201, 72–3). The drum beating ceremony, as a technical ensemble marked by redundancy, emphasis, and technical resonance, communicates what words could not about a key dynamic of Ankawe lifeworlds. It brings into being highly idiosyncratic key values and key characteristics of social relations, such as 'the unspeakable status of maternal kin as gentle life-givers and detestable killers and cannibals' (Lemonnier 2012, 75). During the ceremony, the drums serve as 'perissological resonators' (Lemonnier 2012, 127), i.e. as objects that can achieve something in social relations that words seem unable to do (Weiner 1983).

There are some technical objects that can resonate perissologically across diverse contexts. They are 'supercompositional' (Hobbis 2020, 217) in that they 'bridge social networks and cultural meanings on a sociocultural *and* technological level' (Ketterer Hobbis and Hobbis 2024, 5). Smartphones seem to have such a capacity. 'As purely technological system they are assemblages of constituent materials that act on matter' (Hobbis 2020, 217), no different in principle from, for example, a hammer (cf. Lemonnier 1992). However, they are special compared to other compositional objects in that their sociality and cultural meaning-making are built into them at a technological level. Smartphones are designed to facilitate social relationships through, for instance, the call function or through social media apps. In addition, they condense cultural meanings through their capacity to store, consume, and produce material cultures such as music (Hobbis 2020). People may choose not to use these social and cultural features of smartphones, yet they still resonate in contextually-specific ways (cf. Horst and Miller 2006; Tenhunen 2018). Hence, some technical objects such as smartphones are particularly interesting for uncovering resonances that are both context specific and that occur in 'shared worlds', allowing us to 'take account of the evident and effective connections between peoples—even those who seem very different from one another' (Hirsch and Rollason 2019, 10).

The resilience of technologies

Anthropologists of technology also speak to the broader study of continuity and change, as for example in religious conversions (cf. Macdonald 2020) or non-modern people's encounters with modernity (cf. Robbins and Wardlow 2005). In doing so, they often focus on the idea of resilience, highlighting that technological systems are marked by 'both stability and transformation' and that their change is never fully chaotic (Redman 2005, 72) but usually governed by 'technological choices' (Lemonnier 1993). Such choices are made by persons or groups of people at all stages of technological processes including design, production, consumption, and disposal. This necessarily challenges deterministic narratives in broader technological discourses and research which often predict 'rupture' with a *status quo* following the emergence, development, or adoption of new technologies.

One good example for such resilience is the adoption and adaptation of data-driven digital technologies. Dominant discussions on digital economics in media studies and adjacent fields suggest that digital technologies, especially smartphones, by design spread the values and practices of capitalism to anyone who uses them, because the data that they collect can be commodified and used to advance capitalist interests (cf. Couldry and Mejias 2019; Sadowski 2020). In other words, societies that have long resisted absorption into industrial-capitalism such as Indigenous hunter-gatherers in Amazonia or horticulturalists in Melanesia, are thought to unavoidably become more, if not completely, industrial-capitalist as a result of their embrace of the smartphone (Hobbis 2021). However, longstanding economic systems and values are much more resilient. Rather than simply assimilating to the economic values embedded in digital designs

and submitting to data-driven commodification, Solomon Island horticulturalists have decided to adapt, for instance, Facebook buy-and-sell groups in such a way that they extend and strengthen longstanding reciprocal systems of exchange (Hobbis and Ketterer Hobbis 2023). More so, they undermine the capitalist business practices of urban brick-and-mortar retail stores, while obscuring and disrupting the commodification of their individual data (Hobbis and Ketterer Hobbis 2023). Similarly, in neighboring Vanuatu and Papua New Guinea, Melanesian mobile phone users have resisted the capitalist economics of international copyright laws to continue longstanding music sharing practices as 'a constituent part of social relations' (Stern 2014, 2). Here, music tasks and sharing networks increasingly expand beyond immediate kin, enabled by mobile phones (Crowdy and Horst 2022). In other words, because of digital technologies, Melanesian systems of circulation, sharing, and exchange are changing, but this change is resilient. It builds on existing systems and values, rather than simply dismantling them.

Anthropologists of technology have engaged with this resilience by interrogating context-specific knowledge or 'social representations' (Lemonnier 1989) regarding the choices and constraints of particular technologies (Lemonnier 1992). These social representations are crucial for understanding why some technologies succeed, and others fail, and why success and failure are disconnected from the modernist focus on technological tendencies for performing an intended task. Studying social representations allows us to understand the resilience of particular ways of making and doing things as contextually more 'effective' even if not more 'efficient'. Consider, for example, the commercial failures of some airplanes, such as the Mitsubishi MU-2. The Mitsubishi MU-2 was, in terms of its performance as a machine, superior to its competitors (Lemonnier 1989). However, it encountered two problems in its social representation: It had an unusual shape, and its design 'required new piloting procedures' (Lemonnier 1989, 167). Because of these problems with social representation, this particular type of airplane not only failed to achieve its commercial potential, but also shaped design possibilities over the long term. Once a particular design fails, it is unlikely to be re-introduced. 'Designers themselves, at least most of them, only produce machines that fit their own representation of what [a technology] should look like' (Lemonnier 1989, 168). An already-failed design is basically the opposite, a context-specific representation of what a technology should *not* look like.

Of course, technological choices also reflect context-specific power relations. As designers or funders of particular technologies that are being developed or implemented decide on their design, they not only consider material functions 'but also [consciously, or not] express and coercively reinforce beliefs about the differential allocation of power, prestige, and wealth in society' (Pfaffenberger 1992, 283). For example, when Indonesia launched its first satellite system in 1976, it not only served the purpose of transmitting telephone and TV signals, but also advanced the political visions of government actors, engineers, and entrepreneurs within the Suharto regime (Barker 2005). Satellites were here discursively embedded in nationalist struggles, the defeat of Japanese and Dutch colonialism, and the promise of a unified Indonesia

through control over ‘electronic media’ with ‘communications signals [passing] as the truest and purest medium for the new nation’ (Barker 2005, 711). These nationalist unification discourses gave shape to Indonesia’s satellite programme ever since. They were the reason why a particular satellite system was developed, why Indonesia became the first so-called ‘developing country’ to have its own satellite system, and they have informed how satellite technologies in the country have evolved since (Barker 2005). Simultaneously and importantly, these nationalist satellite discourses were closely aligned with pre-existing localised discourses surrounding technology and nationalism, rather than creating a fundamentally new techno-political system. Satellites in Indonesia, thus, exemplify the resilience of broader socio-technical dynamics, even when seemingly fundamentally new technologies are introduced in a particular context.

Technological change also opens up opportunities for challenging dominant systems, as the practices and discourses surrounding adoption and adaptation processes are rarely, if ever, unified. Instead, they are sites of ‘technological dramas’ that allow for the renegotiation of (power) relationships around new technical objects and related technical actions through ‘user appropriation, user modification, sabotage, and revolutionary alterations, as a series of counterstatements in a historical discourse’ (Pfaffenberger 1992, 285). For example, as mobile phones are being integrated into the contested milieu of religious conversions to Pentecostalism in Kinshasa, they have become a new battleground over morally acceptable femininities and intimate relations (Pype 2016). In rural India, access to smartphones among Bagdis, the lowest caste group, has facilitated an uneasiness among elites, alongside a somewhat contrarian pride in lower classes over inclusion in hi-tech India (Tenhunen 2022, 348–9). Importantly, though, these contestations exist by no means outside of particular, context-specific social representations. Instead, they all reflect broader societal dynamics, such as those surrounding Pentecostal conversion. Each actor inside of these technological dramas ‘[infuses]’ technologies ‘with their own logic’ (Mahias 1993, 158) seeking to assert their own respective vision for new technological futures, that are inevitably both stable and transformative, resilient in a context of change.

Finally, anthropologists of technology have variously highlighted how resilience is visible in the continuities of some technologies, and specific technical objects and actions, across long periods of time. Lithic technologies, for instance, not only predate the existence of *Homo sapiens* (Harmand et al. 2015) but are present today, in the technological systems surrounding pestle and mortars in kitchens, laboratories, and pharmacies. Similarly, dry stone masonry, commonly used in medieval architecture across the British Isles as well as medieval Great Zimbabwe, continues to exist as a construction technology, with new dry stone trends emerging in urban locales or as feature of tourist spaces (cf. Mhairi 2015; Sagiya 2022). Such resilient technologies persist even when seemingly ‘better’ technical objects or actions are available. A group of Amazonian lake fishermen, for instance, agreed to, and even pushed for, a ban of nets to catch the Pirarucu fish, even though nets combined with motor boats are much more efficient at catching Pirarucu than the longstanding combination of canoes, paddles, and harpoons (Sautchuk 2019). This rejection of the

net and resilience of the harpoon is at least partially due to the rhythmic relations between harpooner and fish and how these rhythmic relations resonate within a broader '(harpoonmorphic) subjectivity in these lakes' (Sautchuk 2019, 188). By choosing the 'effective' harpoon over the 'efficient' net, fishermen sought to maintain broader human-non-human relations expanding far beyond the technical object itself. They reveal the fundamental entanglements between rhythm, resonance, and resilience.

Conclusions

The anthropology of technology continues to make significant contributions to understandings of human-non-human relations. By carefully dissecting the complex meanings of 'technology', anthropology demonstrates how dangerous it is to conflate 'technology' with 'hi-tech', i.e. with 'advanced' tools and machinery. Such conflation is widespread, as when hearing someone say 'I hate technology', when what they are really saying is 'I hate digital technology'. Anthropologists study 'technology' in all its diversity, without imposing hierarchies such as 'low-tech' and 'hi-tech' from the start. This allows for valuing and thinking critically about how old, even ancient, technological systems continue to contribute significantly to lives around the world. It also enables the use of the notion of 'technology' as a jumping off point to intervene in broader, interdisciplinary debates on what the term 'technology' may mean. Anthropologists of technology tend to recognise that the technical always entails an interplay between material, conventions, and beliefs, often according to vernacular values and logics.

By searching for the interplay between constraints and choices through a focus on actions-upon-matter, anthropologists' understanding of ways of being, social continuities, and change are unavoidably grounded in the materialism of technical systems: to open up a wine bottle without a corkscrew, for example, clever means must be devised (Lemonnier 2014). Investigating technologies through an emphasis on action-upon-matter opens up insights into a quintessential part of the anthropic—that is to say, human—experience. While economic anthropology has (and critiques) *Homo economicus*, the self-interested, rational person (cf. Yan 2020), the anthropology of technology has *Homo habilis*: the 'handy' person, a point in physical anthropology wherein our distinctive humanity was established through tool use. A better name may be *Homo transformatio*, the 'transforming' person, because, that is what technology, and being human, is really about: transformative processes through actions-upon-matter that rhythmically and resiliently resonate with and between human and non-human actors, and that continuously shape and remake the world.

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