ON THE ROLE OF TECHNOLOGY IN HUMAN-DOG RELATIONSHIPS: A FUTURE FILLED WITH DREAMS OR NIGHTMARES?

A Preprint

Dirk van der Linden1, Brittany I. Davidson2, Orit Hirsch-Matsioulas3, and Anna Zamansky4

1Northumbria University, 2University of Bath, 3University of Haifa
Corresponding author: dirk.vanderlinden@northumbria.ac.uk

February 7, 2022

ABSTRACT

Digital technologies that help us take care of our dogs are becoming more widespread. Yet, little research explores what the role of technology in the human-dog relationship should be. We conducted a mixed-method study incorporating quantitative and qualitative thematic analysis of 155 UK dog owners reflecting on their daily routines and technology’s role in it, disentangling the what-where-why of interspecies routines and activities, technological desires, and rationales for technological support across common human-dog activities. We found that increasingly entangled daily routines lead to close multi-species households where dog owners conceptualize technology as having a role to support them in giving care to their dogs. When confronted with the role of technology across various activities, only chores like cleaning up after our dogs lead to largely positive considerations, while activities that benefit us like walking together lead to largely negative considerations. For other activities, whether playing, training, or feeding, attitudes remain diverse. In general, across all activities both a nightmare scenario of technology taking the human’s role and in doing so disentangling the human-dog bond, as well as a dream scenario of technology augmenting our abilities arise. We argue that the current trajectory of digital technology for pets towards allowing dog owners to interact with their dogs while away—feeding, playing, and so on—is an example of this nightmare scenario becoming reality, and that it is important to redirect this trajectory to one of technology predominantly supporting us in becoming better and more informed caregivers.

Keywords Technology · Human–animal interaction · Pets · Dogs

1 Introduction

The human-dog relationship is one of our oldest known interspecies relationships (Shipman, 2021) and one could argue that we have used technology to each other’s benefit from the start. Studies of the human-dog relationship have built a rich understanding of how we co-exist (cf. Mullin, 1999; Walsh, 2009; Gray & Young; 2011; Shir-Vertesh, 2012; Blouin, 2013; Gee & Mueller, 2019; Westgarth et al., 2019; Turnbull, 2020; Hawkins et al., 2021). Over the past decade, research attention into digital technologies that inform and complement human-dog relationships has similarly intensified, exploring anywhere from communication technologies (Paldanius et al., 2011; Lemasson, Pesty, & Duhaut, 2013), to monitoring and quantification (Golbeck & Neustaedter, 2012; Paasovaara et al., 2011; Weiss et al., 2013), to technology-mediated dog to dog communication (Hirskyj-Douglas et al., 2019; 2021). A major point in this increase of academic focus on technology in the animal domain has been the emergence of the field of Animal-Computer Interaction and its guiding principle of ‘animal-centered’ design of technology (Mancini, 2011) encapsulated by the ethos of only designing technology that animals ‘want or need’ (Zamansky et al., 2017). Since its manifesto, a varied body of work has arisen designing technology for dogs, covering tangible, wearable, olfactory, screen-based, and tracking technologies (Hirskyj-Douglas et al., 2018).
Industry has caught up with, if not overtaken, the momentum of designing these technologies, with commercially built and marketed digital technologies for pets becoming more and more widespread, in particular smart feeders and toys and pet wearables (Wadhani & Gankar, 2020). Research has shown that consumers increasingly spend to support their dogs (Dotson and Hyatt, 2008) and in the context of pet wearables are partially driven by ensuring their pets’ physical safety (van der Linden et al., 2020). Commercial pet wearables, in particular, have attracted more research attention, covering aspects like the data they capture (van der Linden et al., 2019), their use in domestic (Vääätäjä et al., 2018; Zamansky et al., 2019; Jayawardene et al., 2021) and professional settings (Zamansky & van der Linden, 2018), and what consumers find important in them (Ramokapane et al., 2019).

To better understand whether technology could, and would, support us in our ethical duties towards our companion animals (Yeates and Savulescu, 2017), or deal with the challenge of being ‘responsible owners’ (Westgarth et al., 2019) we need to take a critical eye towards the fundamental role of technology in the human-dog relationship. Lawson et al. (2015; 2016) were among the first to do so through design fiction based on the then state-of-the-art, identifying consumers having a strong desire for the use of technology, as well as urging several words of caution. Technological progress is unrelenting, and many of the once hypothetical devices are now marketed to dog owners around the world and increasingly appearing in their homes. We thus need to reconsider carefully the triadic human-dog-technology interactions (van der Linden et al., 2019; van der Linden, 2021) that may occur and the socio-cultural context in which those daily human-dog routines are framed (Hirsch-Matsioulas & Zamansky, 2020).

As Haraway said regarding the fallacy of thinking about technology in absolute terms: “something is really seriously wrong and yet that’s not all that’s happening” (Gane, 2006). Technophobia is a common attitude as new technologies keep emerging (Davidson et al., 2019), but not particularly constructive. Rather, we need careful consideration of technology and its potential harms, or lack thereof, to formulate any informed direction (Orben, 2020). The purpose of this study is thus to carefully consider the role that technology is to play in the human-dog relationship without a priori technophobia or technophilia. We investigate the attitudes towards using technology across different activities that make up daily interspecies routines (e.g., feeding, walking, training) and the considerations that people make regarding its use.

## 2 Methods

### 2.1 Participants

As there are many cultural differences in human-pet dynamics (Gray and Young, 2011; Hurn, 2012), we specifically chose to study a sample focused on one country to ensure in-depth understanding of the same surrounding factors (e.g., devices marketed to people, typical range of affordances relevant to dog ownership, and similar restrictions to daily routines from Covid-19 restrictions, covid restrictions). We recruited 155 participants using a purposeful sampling method, recruited via Prolific academic, where the participant information sheet was made available. All participants volunteered, and were reimbursed £0.50 for their participation in line with fair payment principles. Inclusion criteria were (1) over 18 years of age, (2) a pet dog owner, and (3) British native english speakers.

### 2.2 Procedure and Online Survey

Data were collected in March 2021. We received ethical approval (ref. 29162) from Northumbria University. The online questionnaire provided a full participant information sheet detailing the study, and required participants to explicitly give consent before proceeding.

The survey asked demographic questions regarding participants’ dogs and their relationship, and had participants describe their daily routine with their dog and their initial thoughts about using technology with them. Next, we described five different activities dog owners would engage in: (1) feeding their dog, (2) walking their dog, (3) playing with their dog, (4) cleaning up after their dog, and (5) training their dog. For each of these activities we gave a description of the activity and asked Likert scale questions whether they would be likely to use technology in that activity, how comfortable they would feel having that technology automate it, and open-ended questions (max 300 words) asking to explain their underlying rationales in detail. Finally, we used the Companion Animal Bond (CAB) scale (Poresky et al., 1987) to capture a measure of the strength of the bond between participants and their dog.

### 2.3 Analysis

Data were analyzed using Braun and Clarke’s (2017) Thematic Analysis protocol. These data encompassed a number of general questions including (1) people’s routines with their dogs, (2) their initial thoughts where they might use technology, and (3) their specific rationales why they might (not) use technology across the five investigated activities.
Table 1: Participant demographics related to their dog(s)

| Dog demographics | N of participants | % of participants |
|-------------------|-------------------|-------------------|
| Extra small (like Chihuahuas) | 3 | 2% |
| Small (like Corgis or Dachshunds) | 54 | 35% |
| Medium (like Bulldogs or Poodles) | 53 | 34% |
| Large (like Boxers or Retrievers) | 42 | 27% |
| Extra Large (like Great Danes) | 3 | 2% |
| Age of dog | N | % |
| Juvenile (Puppy) | 9 | 6% |
| Adolescent | 42 | 27% |
| Mature | 66 | 43% |
| Senior | 38 | 25% |
| Age of relationship | N | % |
| 0 to 3 months | 0 | 0% |
| 3 to 6 months | 2 | 1% |
| 6 to 12 months | 14 | 9% |
| More than a year | 139 | 90% |
| Social identity of relationship | N | % |
| Caregiver | 22 | 14% |
| Owner | 73 | 47% |
| Anthropomorphized | 53 | 34% |

We took an inductive approach to generating codes for these three aspects looking at them primarily through the lens of anthrozoology and cyberpsychology. All authors individually read through and became acquainted with the data, generating codes with initial definitions. We met three times to discuss and refine these codes, each time refining definitions, clarity, and scope, which led to integration, discarding, or creation of new codes based on theoretical insights. This led to a final codebook with 19 codes for people’s daily routines, 13 codes for people’s reflections where they might use technology, and 24 codes for people’s rationales why they might (not) use technology. Within the rationale codes, 11 codes related to technology resistance, 10 codes regarded technology receptiveness, and the remaining 3 codes were about technology ambivalence. Following finalization of the codebook, the first author re-codes all raw data. Following further collaborative analysis sessions, these codes were condensed into five core themes. The focus here was on unique findings related to how technology slotted into the human-animal relationship. The final themes were reviewed and agreed by all authors.

In addition to the qualitative analysis, we also conducted basic quantitative analysis over the entire data sample to assess whether dog demographic data could be linked to different attitudes and whether there were significant differences in attitudes towards using technology across different activities. This led to a number of descriptive and inferential statistics further described below.

3 Results and Discussion

3.1 Participants

Human participants were an average age of 36 years of age (σ=14, youngest 18, oldest 69). 67% were female, 32% male, 1% undeclared. All were UK nationals, spoke English as their first language and had pet dog(s). Relevant demographic details relating to the dog-human dyad are shown in Table 1.

The dog demographics shown in Table 1 indicate a fair spread across dogs of different size and ages, which should aid in stratifying data for the qualitative analysis. The age of the relationship between human and pet dog was decidedly skewed towards a mature (>1 years) relationship. The self-perceived social identity of the relationship showed an interesting split between those who self-identified as caregiver (i.e., perhaps indicating a moral or virtue ethical approach towards animal stewardship), owners (i.e., perhaps indicating a typical kind of ‘ownership’ accompanied with ‘property’ views of the animal as is deeply ingrained in UK society (Srinivasan, 2011), and anthropomorphized (i.e., indicating a relationship where the animal is incorporated into the human familial sphere (Shir-Vertesh, 2012). These three groups we used to further stratify data to assess differences in attitude towards technology use.
3.2 Activities

From a quantitative point of view, two of the five activities led to a polarized response: participants were generally unlikely (and distrustful) to use technology for walking their dog (M=1, σ=1.1), while they were generally likely (and trustful) to use technology for cleaning up after their dog (M=4, σ=1.3). The remaining three activities, feeding, playing with, and training dogs were ambivalent (M=3, σ=1.4, 1.3, 1.4) explained by a plurality of underlying rationales.

On average, the bond between participants and their dogs was strong (M=4.0, σ=0.57, N=155), with differences between the social identity of the relationship (caregiver M=3.6, σ=0.6, N=23; owner M=3.9, σ=0.5, N=73; anthropomorphized M=4.1, σ=0.5, N=59). Resultantly, participants who related to their dogs in an anthropomorphized way had, on average, a stronger bond than those who relate to their dogs as caregivers (two-tailed Mann-Whitney U=320, p<.000).

3.3 Social identity

We found some statistically significant differences between the three social identity groups for a number of codes. For feeding, significantly more (φ=.2) participants who self-identified as caregivers (35%) found technology unnecessary compared to those who identified as owners (16%) or anthropomorphized their relationship (17%) [χ²(1) = 9.03, p<0.01; χ²(1) = 8.42, p<0.01]. A similar significant difference (φ=.2; .3) arose for cleaning up after their dog [χ²(1) = 7.69, p<0.01; χ²(1) = 16.5, p<0.01].

For feeding, we found that those who self-identified as owners were less likely to consider technology harming their bond (3%) than those who identified as caregivers or anthropomorphized their relationship. (resp. 9% & 18%). While such findings certainly do not indicate any particularly generalizable claims that we would stand for, they draw attention to the need for further work on the potential mediating effects of social identity of the human in the human-dog dyad and the technologies they might use.

3.4 Themes

Through the qualitative analysis of the routine, techwants, and rationale data, we constructed five themes that build on the individual codes and explore how habitual entanglement as a result of the human-dog dyadic relationship plays an important role in our conceptualization of, and expectations towards, technologies we consider for our dogs.

Theme 1: Human and dog routines are deeply entangled. ("Entanglement")

The notion of human and non-human lives becoming entangled is well established in anthropology (Mullin, 1999; Hamilton & Taylor, 2012; DeMello, 2012; Hurn, 2012) and multi-species ethnography (Kirksey & Helmreich, 2010; Pacini-Ketchabaw, Taylor, & Blaise, 2016). Our daily routines with pet dogs consist of a variety of recurring activities that lead to a strong habitual entanglement of our lives. From eating, napping and relaxing together, going for walks, or simply spending time together, many participants describe such activities as being undertaken together, painting a picture of a deeply intertwined routine, where dogs are very much considered as a fundamental member of the household: “we watch tv together as a family with him and then he goes to bed,” (P022). Often their dogs were perceived as agents that actively choose if, when, and in which ways they want to entangle with us, too: ‘she likes to ‘help’ in the garden by digging up holes while I’m planting veg /.../” (P078). Both prior examples provide an insight into the anthropomorphization some pet owners place upon their pets. Further, dogs are often actively drawn into human habits and routines such as eating at certain times (“we go for another walk before tea, then he has his tea [tea as a term is often used in lieu of ‘dinner’ or an evening meal in British English]”, P048) or entertainment (“he likes listening to classical music with me”, P086).

It is not only our habits that entangle us, but our physical and temporal context and the social affordances it brings, both in private and public space, further entangle our lives. Our study focused on UK citizens, which did highlight a few fairly British cultural examples. For example, the affordance of many living in houses with private gardens or having green spaces nearby in more urban and city areas allowing convenience for dogs to dictate toileting and exercising times (“they wake me up usually to go for a wee in the garden /.../ then go for a proper walk”, P064). Effectively, our dogs equally decide over our lives through the expectations they set for us, like when to go for walks (Holmberg, 2019), and even where to go for those walks (Dunnett, Swanwick, & Woolley, 2002, p. 43).

However, these routines naturally adapt as required, for instance, during the COVID-19 pandemic as participants spent increasing amount of time at home thus causing changes to our outdoor activities, where for months in the first lockdown we were not permitted to be outside for more than 30 minutes at a time (e.g., “Pre COVID we would drive for a long 2-3 hour walk in the hills a few times a week but at [the] moment it’s a hour long walk in surrounding
This of course impacted indoor activities, too (e.g., “I’ve been at home through both lockdowns and he is back in the habit of sitting with me all day”, P088).

**Theme 2. Entanglement builds close multi-species households. (“Closeness”)**

Entanglement may initially be observed only as habitually and physically co-located events with human and animal involved, but they allow for multispecies households to emerge in their own right where pets actively participate in “doing” and being family (Irvine & Cilia, 2017). At the same time, dogs’ body and disciplined performance mirror cultural constructions of ‘home’ and ‘homemaking’ (Power, 2012). Whereas some people might only ‘feed’ their dogs, many participants noted actively ‘eating’ together (“he then sits and eats lunch and dinner with me”, P106), and similarly, other activities become actively animal-initiated with dogs increasingly (perceived as) expressing their agency and interest, from obtaining food (“in the evening he asks for treats when he comes into the living room,” P153) to engaging in play (“and play with her whenever she asks”, P027). Dogs, in our intimate relationships, very much decide over our life by setting out requirements for when we do things (Holmberg, 2019).

Animals in multispecies households bring out affectionate behavior in humans (Walsh, 2009). We found this clearly in our study with many participants talking about the amount of physical affection they gave to their dogs throughout the day (“play and cuddle with my dogs whenever I have a spare moment”, P007), to showing affection deemed appropriate to them in other ways (“talking to her and tickling her ears (she is very old)”, P143). Equally so, dogs show affection and emotional closeness or trust towards humans through seemingly simple acts as being comfortable enough to snooze around humans working from home (“he then sleeps under my desk while I work”, P075).

These seemingly mundane joint activities—especially when not simply co-located in time and space, but are perceived as emotionally joint activities create intimate human-dog bonds as we share dissonant but overlapping rhythms (Holmberg, 2019). This closeness becomes important to consider, as it brings with it a host of additional expected behavior and considerations in terms of our duty of care and the role that technology may play in it.

**Theme 3: Our entanglement and closeness lead to a priori conceptualizations of technology as things that ought to support us in our duty of care. (“Support”)**

When participants were asked to consider what kind of activities in their daily routines they might want to use technology for, a number of different potential roles came up, primarily in supporting our caregiving and easing our own worries stemming from our entangled lives and closeness as well as the responsibility humans took on themselves, personally as well as legally, once they became ‘owners’.

When it comes to easing our worries, technology is perceived as something that could help us keep track of our pets when we cannot be there for them (“I would like a camera so I can check in on her when I am out of the house /.../”), to still ensure they are safe (“/.../ and an app that links to [the] door would be good so she can go in the garden when I let her and I know she is back inside safe”, P007). Although occasionally, those with experience with such technology did express concern about its unsettling effect from the dog’s point of view: “I have a dog camera where you can communicate with your dog /.../ although when I did use it he was confused and a tad disconcerted as he didn’t know where I was!” (P140).

Indeed, technology should support us, and complement our caregiving abilities, but not negatively affect our emotions by, for example, compelling us to face our physical absence: “I do not think I would like a visual device to monitor her whilst I am at work, as this would make me sad as I do not like leaving her.” (P045). Beyond the immediate easing of worries, technology was more typically primarily conceptualized of as something that should help with our caregiving and understanding of our pets, either through providing us with quantified other (Nelson & Shih, 2017) information: “we would love to try technology which measures her fitness levels as this is something we would like to improve upon,” (P069), or by supporting us in the very interspecies activities we engage in and our own limitations therein.

Such limitations may be temporal, such as in the case of multispecies households where some participants noted the difficulty of juggling caregiving roles and responsibilities: “twice a week I look after my grandchildren in their own home and often return after her dinner time so a device would be a great help to me but as she’s a GSD it would have to be sturdy!” (P042), or to do with our own limitations in providing our pets with the stimulation they deserve: “[i would like] a laser projector that doesn’t require human operation, since [my dog] loves chasing the laser. I don’t mind playing with him with the laser, but he would be able to play with it more often if it didn’t always require human operation.” (P092). In effect, technology is a priori conceptualized as something that should maintain and promote our entanglement, and thereby, closeness, bringing with it the potential for strong reactions depending on whether it is seen to (dis)entangle.

**Theme 4: Reflecting on the role of technology in our entangled co-existence leads to nightmares of technology’s potential disentangling effect. (“Nightmares”)**

While only one activity, dog walking, received mostly negative views towards the use of technology, all activities had considerations on the negative impact using such technology could have. This seemed to occur, regardless of
activity, primarily when the use or deployment of technology was seen as something that threatened our entangle-
ment—specifically our bond by either replacing us, or reducing our involvement and responsibility and thereby slowly disentangling our routines. Some participants would clearly consider all technology to be unwanted for this reason, because “if you are going to use technology in some way, then you are giving up quality time an owner usually spends with their pet.” (P096) or even because “if there is technology doing the jobs you should be doing as an owner, it means you may take less responsibility for the dog.” (P132).

For most people, though, the reasons why technology is thought of as disentangling us varies on the activity and the context, having to do with factors related to more specific fears of (1) technology not being able to handle things, (2) technology replacing us in our role as caregivers, and (3) losing out on benefits gained through activities (e.g., improved fitness).

Several activities are seen as being too complex to bother with technology. When it comes to feeding, issues with portion management, or type of feed are considered as impossible for technology to deal with: “my dog requires a very specific diet of dry and wet food that I don’t believe the dog food dispenser could give out” (P107). Such fears for critical technology might be well grounded as there have been cases of pets going hungry when smart feeder infrastructure broke down (BBC, 2020). In other activities, it is the dog’s inherent agency and capacity to decide what and when to do that complicates matters, as for example, one participant noting that “my dog usually goes straight outside after eating to go to the toilet. If we were out there wouldn’t be anybody here to let her out.” (P096) When it comes to training our dogs, participants note that it is too complex of an affair to leave it up to technology, and that “human teaching is always going to be more beneficial, as we can adapt to the dogs behaviour and what it needs, rather than following a designated protocol. Using a device to do so, would work for some instances but not all, and it would probably cost a lot of money.” (P081) While ‘becoming with’ the dogs, owners learn the needs and desires of the dogs and the dog’s repetitive behaviors throughout the day (Corkran, 2015). In this sense, owners perceive themselves as a knowledge authority about the dog, one that technology cannot replace.

Among those people who accepted that technology could work, other concerns became apparent across different activities again. Rather than fearing that a smart feeder would break down or not handle feeding well, some were concerned about losing the interspecies interaction per se: “my dog gets excited for her breakfast and dinner and I love how she gets all happy around the same time each day and sits where her food is kept. I love how pure that is and I wouldn’t want lose that to some technology on my phone.” (P047) Training, in particular, is seen as an activity that shapes and strengthens the bond (“i would rather train my dog myself, as it becomes more comfortable with the people who look after it during training”, P015) and something where even if technology “sounds helpful and time saving, but would my dog then respect and listen to me or the device? I would be cynical about this.” (P056)

Finally, the last fear participants raised across several activities was technology taking away benefits gained through doing these activities. Even though most dog owners would gladly let technology clean up after them, many also wondered “It is not the nicest job [cleaning up after our dog], but it can be a big indication something is wrong. I would worry about relying on technology too much, I would miss a sign it was maybe runny or a different colour, or not as frequent.” (P017). There are also benefits to ourselves we fear we might miss out on, as many participants noted that dog walking has benefits for their own fitness, so much that “the main reason I have a dog is to get outside and get me exercising” (P010) was a recurring sentiment.

Technology, effectively, is conceptualized as a negative force with the potential to lead to a nightmare scenario where it disentangles us and takes away the benefits that our multispecies households give us—the companionship, entertainment, and protection that provides us with a mutual multi-faceted security in our own mental and physical lives (cf. Turnbull, 2020).

**Theme 5: Reflecting on our role in the multispecies household leads to dreams of technology’s potential to increase our affordance for caregiving. (“Dreams”)**

Views on technology are not always negative. Across different activities, positive conceptualizations on technology’s role in our relationship occurred, having to do with its potential to support us in our caregiving and deal with our own limitations.

For example, when it comes to walking our dogs, for some technology “would be a godsend as sometimes my illness limits my walking” (P014), while others similarly realized that “[my dog] would have (in her youth) enjoyed more walks than what any human could have given her.” (P143) Other physical activities like play are similarly seen as something where we feel that we could do better for our dogs: “I can’t always give him the amount of play that he needs, so any sort of play device is great” (P014) who could always use more (“I am capable of playing with my own dog, but he would never turn down more play time!”), P016, and establish affordances taken away by our need to e.g., work, as “my dog sometimes wants to play when I’m trying to work, so this may come in handy” (P029) Technology is similarly conceptualized as something that could help us ensure consistency in caregiving, like ensuring that “he is
getting food at the exact same time every day” (P075), especially if we cannot guarantee doing so: “I am terrible at remembering to feed my dog at set times. So I would like a device that does it automatically.” (P023)

Most positive conceptualizations of technology seem to center on what the above reveals: helping us deal with our shortcomings, whether those arise due to physical disabilities, lack of time, or knowledge. Technology, quite understandable from the fears we identified, should reinforce our entanglement and increase our affordance for caregiving. And perhaps, indeed, contrasting fear of technology disentangling our bond, whether we would use technology is really related to different activities, as when it comes to cleaning up after them, “your dog doesn’t care who does it.” (P143). Even with good passages, however, we see that there is a limit to how much we are willing to rely on technology to address our own in- or disabilities before we perceive the technology to replace us and in doing so disentangle our relationship.

4 Discussion

Our thematic analysis led us to construct a theoretical understanding for the role of technology in the human-dog relationship. As Figure 1 shows more clearly, human and dog routines are strongly entangled (even more so following the significant change to our routines during the Covid-19 pandemic) which has, and continues to, lead to arguably closer multi-species households to emerge. Within such households, from a human point of view, technology is conceptualized a priori as having a potential to support and inform caregiving, which leads to hope for technology’s potential to increase our affordances and abilities for caregiving but perhaps causes even more of a shock with much of the technology available on the market which seems to rather allow to replace us and disentangle our relationship and household.

It is this theoretical understanding that raises significant concerns when we look at what technology for dogs is built to do, and what trajectory it is progressing along.

The root of the issue with technology’s role in the human-dog relationship Lawson’s et al. (2015; 2016) words of caution were in large part spurred by having observed a then strong desire for technology among dog owners which they argued had the potential to “undermine human-animal bonds.” In particular, they warned against assuming “relatively simple” technology can usefully enhance our co-evolved innate ability to interpret cross-species behavior and psychological states. Technology, they warned, should not substitute human interpretive aspects of the human-dog relationship with technology. However, this may be an oversimplification, as while some evidence shows untrained people can identify dog emotions (Bloom and Friedman, 2013), when it comes to identifying behavior, those without theoretical knowledge frequently perform poorer in identifying behavior or behavioral cues (Tami and Gallagher, 2009; Bloom and Friedman, 2013; Demirbas et al., 2016). We should thus not discount technology that supports people in understanding their dog’s behavior.

Our findings extend Lawson et al.’s understanding in two important ways. First, we found no clear evidence for people still having a strong desire for pet technology—even though more advanced technology has come on the market. While technology to support in chores, like cleaning up after them, is welcomed, dog owners’ attitude to using technology in most other activities (e.g., training, playing) is ambivalent or even negative, with technology primarily conceptualized as augmenting our caregiving capabilities, that is, adding to our own interpretation, rather than substituting it. As the market of pet technologies is growing (Wadhwani & Gankar, 2020), this difference from Lawson’s earlier observations may be related to these technologies becoming more mainstream and the initial hype cycle around it having faded (Linden & Fenn, 2003).

Second, through our thematic analysis, we built a clearer understanding from our participants’ perceptions how and why human-dog bonds may be undermined through technology. Our findings show that dog owners conceptualize technology as augmenting their caregiving capabilities, rather than fulfilling them in our place. This echoes insights from research on technology augmenting our own abilities beyond what we can physically do (whether due to physical, environmental, or temporary disability) and in doing so (re)gain autonomy and a certain extent of control and responsibility (Moser & Law, 1999). These traits (our abilities, autonomy, control, and responsibility) are part of the traits that we perceive as being owners of dogs: our duty of care to our dogs means we are supposed to do things with them and for them, to decide for them, and to control them. Technology, then, can be perceived as our own material and symbolic extension and to increase our own abilities.

However, this augmentation can only work if passage from disability to ability is smooth, or a “good passage” from disability to ability (ibid, 1999). If the technology we rely on fails, for example, by not being tuned to the dog’s needs, infrastructural failures (cf. BBC, 2020) or other technological and material idiosyncrasies, it will not only not extend our own ability, it will create new disabilities that challenge some of the socially constructed characteristics of western dog ownership (e.g., dogs bonding with technology instead of us). Drawing from Perry, Scott, & McKinley’s (1997)
Figure 1: Synthesis of the thematic analysis’ most salient insights: entangled multispecies households and a priori assumptions of technology being for caregiving lead to parallel nightmares of being replaced by technology, and dreams of being supported by technology.
work on accessibility, we conceptualize disability in the context of dog-human dyads as an impairment in our ability to pick up relevant sensory information (e.g., noticing our dog’s behavioral cues), perform some action involving movement (e.g., throwing a ball, filling a feed bowl), or performing some cognitive function (e.g., understanding our dog’s behavioral cues). Technology can provide a passage from such disabilities to ability by augmenting our physical and mental abilities.

An important distinction to make is that of our inabilities in the dog-human relationship. Inabilities are anything a person cannot do (ibid, 1997). In the context of human-dog relationships, while there may be inabilities rooted in our own physical or mental disabilities, by and far the most common inabilities is simply that we are not capable of being there. For example, because we have to work, or travel, or are otherwise occupied. Technology can, and does, provide some passage from this inability to ability, but in doing so does not meaningfully augment the human’s capabilities in the dog-human dyad but rather temporarily replaces them, thereby fulfilling the nightmare of disentanglement.

Bad passages, thus, we would argue, are much more likely to happen when technology is designed from the start not intending to bridge a gap from disability to ability (e.g., help us provide a better diet, play for longer), but to move from inability rooted in us not being there to ability directly (e.g., feed our dog through a device when we leave them at home alone while at work or even on vacation). This recalls Weizenbaum’s (1976) apprehension of our growing reliance on technology in lieu of social innovation. Consider his later reflections on his own work introducing technology to “improve” banking efficiency: “What the coming of the computer did, ‘just in time,’ was to make it unnecessary to create social inventions, to change the system in any way. So in that sense, the computer has acted as fundamentally a conservative force, a force which kept power or even solidified power where it already existed.” (Ben-Aaron, 1985)

Some ACI research has argued along similar lines, noting that social change in the domestic sphere could be argued to be more beneficial to the animal, as “in an animal-centered approach, this problem might be solved such that dogs are never socially isolated, rather than the development of a technological solution to employ while they are left alone” (Grillaert & Camenzind, 2016). Yet, this has had little effect on the trajectory of technology designed since then.

The problematic trajectory of technology for the human-dog relationship The current trajectory of technology for the human-dog relationship does little to address the root of this issue. While market research indicates that the trajectory of technology for dogs is driven by an increased spending on digital technology centered around health and wellbeing (Wadhwani & Gankar, 2020), in practice it results in pet wearables, smart pet toys, and smart pet feeders & bowls growing the most—all of which essentially enable remote monitoring and remote engagement with dogs, rather than supporting “in the scene” support. This is exactly the kind of technology that could be used in our stead, rather than support us. During the Covid-19 pandemic many people adopted dogs, leading to many new multi-species households (Morgan et al., 2020; Jezierski et al., 2021; Holland et al., 2021) where dogs diminished our feelings of isolation and loneliness (Bussolari et al., 2021). Yet, now with increasing attempts at a “return to normal”, that is, returning to our places of work and leaving dogs at home alone, many might seek for technology that could minimize the emotional pain that typically results from our separation (Kanat-Maymon et al., 2020), regardless of its longer-term effect on the human-dog relationship, as we have also seen in emotion-driven choices for privacy-infringing dog technology (van der Linden et al., 2020).

For example, new technologies occur that aid in training, promising that “when it’s time for you to take them for a walk, you can focus on the good times” (Companion, 2021), which may sound beneficial given the benefits of dog walking (Campbell et al., 2016; Koohsari et al., 2021), but seem to conflict with our finding that many dog owners would fear this technology replacing them during vital bonding moments of training and undermine the relationship. Another recent development is a smart camera-enabled ball for remote play promising to allow you to “interact with your pets from anywhere” (PlayDate, 2021). Yet, again, our findings would show such technology hits uncomfortably close to the nightmare theme of using technology to replace our inability to play with our dogs, rather than complement our ability to play more with our dogs.

Academia similarly seems on a trajectory towards technology that may further disentangle the bond—with increasing numbers of AI-driven technologies that may automate parts of the human-dog relationship, such as automating the identification and rewarding of good behaviors (Stock & Cavey, 2021), workshops to build technology while considering using Skype for remote interspecies communication as “doing activities together” (Viätäjä et al., 2017), rather than entrenching physical separation. Such ideas do not remain as design fictions, as DogPhone, a recently designed prototype for dogs to (allegedly) initiate video-calls to their owners (Hirskey-Douglas et al., 2021) shows. To reiterate, our findings clearly show that such technology would fall into nightmare scenarios of replacing us, increasing our own anxiety at not being there for our dogs, and normalizing not having to be there for them. Interestingly, in the extensive media coverage given to DogPhone’s promise a tension between wanting to do right, and perhaps not having considered how technology plays a role in the human-dog relationship becomes apparent.

In an interview with The Guardian the DogPhone’s creators justified its design and contrasted it from other technology on the market because “All this [existing] technology allows you to measure your pets’ steps or ring your pets or...
remotely give your dog food, but your dog doesn’t really have any choices” (Davis, 2021). We would disagree with the notion of dogs not having a choice, given the research showing how much power dogs have to dictate our routines (Holmberg, 2019), let alone operate in the human world and use its infrastructure in their own right (Lemon, 2015). More importantly, though, in the same interview, the authors also admitted that “the device had actually caused her [the author] some anxiety” (Davis, 2021)—reinforcing the point that this technology was made, likely with the best of intentions to do good for the dog, but could have benefitted from more upfront anthrozoological research into the role of technology in the human-dog relationship. Coverage of DogPhone in the New York Times (Chung, 2021) showcased the challenge of media in covering these technologies while having to oversimplify for space and audience, as while the behavioral experts they cited who questioned how such technology could realistically help with isolation and separation anxiety, little space or time was left to question the dearth of research on the role of technology in the human-dog relationship upfront and address the elephant in the room: why do so many pets need to be left at home, and is telepresence technology really the best way to address that?

Rather than accept its current trajectory spelled out by the lack of clear grounding in an understanding of human-dog relationships, and the use of technology to jump from inability from not being there to ability, we should work to redirect it. Technology’s role in the human-dog relationship should be to positively and constructively address the issues we face together. For just one example, it should attempt to tackle the epidemic of dog obesity (Courcier et al., 2010; German et al., 2018) and its likely relation to our own weight and diet (Linder et al., 2021). Not by taking us out of the equation and automating our dogs’ diets and exercise through some technological artifact, but by making us more informed and attentive caregivers, by understanding the underlying challenges we have in coping with pet food insecurity (Arluke, 2021), motivating us to become more active together (Zamansky et al., 2019), and perhaps through sharing data it captures for clinical and academic research (Lee & Lee, 2015). It should support our ability to physically engage with our dogs as we both grow older. It should help us train them well. It should help us understand their behavior and needs. But none of this should require having to replace ourselves, even momentarily, with technology.

Rather than go with the current trajectory of technology that replaces us and allows us to avoid having to make hard decisions regarding our moral duty towards our dogs, we should strive to understand better how technology could lead to better functioning and more equitable human-dog relationships. To make it very clear: the bottom line of our argument here is not driven by an underlying acceptance of abolitionism (Francione, 2018). It is reflecting on what we owe to our dogs, accepting that indeed, “the planet is lousy with pets,” (McWilliams, 2016) and from there accepting that at the very least we ought to stop bringing dogs into domestic spheres where we need technology to provide adequate care for them. Is that too much to ask?

Acknowledgment

The authors thank Andrea “Quello Nuovo” Menichini for the original comic artwork commissioned to describe our results far better than we could. A special thank you to all the owners who participated in this study.

References

Arluke, A. (2021). Coping with Pet Food Insecurity in Low-Income Communities. Anthrozoös, 34(3), 339-358. https://doi.org/10.1080/08927936.2021.1898215

BBC. (2020). Pets 'go hungry’ after smart feeder goes offline, 25 February 2020, https://www.bbc.co.uk/news/technology-51628795

Bloom, T., & Friedman, H. (2013). Classifying dogs’ (Canis familiaris) facial expressions from photographs. Behavioural processes, 96, 1-10. https://doi.org/10.1016/j.beproc.2013.02.010

Blouin, D. D. (2013). Are dogs children, companions, or just animals? Understanding variations in people’s orientations toward animals. Anthrozoös, 26(2), 279-294. https://doi.org/10.2752/175303713X13636846944402

Bussolari, C., Currin-McCulloch, J., Packman, W., Kogan, L., & Erdman, P. (2021). “I Couldn't Have Asked for a Better Quarantine Partner!”: Experiences with Companion Dogs during Covid-19. Animals, 11(2), 330. https://doi.org/10.3390/ani11020330

Campbell, K., Smith, C. M., Tumilty, S., Cameron, C., & Treharne, G. J. (2016). How does dog-walking influence perceptions of health and wellbeing in healthy adults? A qualitative dog-walk-along study. Anthrozoös, 29(2), 181-192. https://doi.org/10.1080/08927936.2015.1082770

Companion (2021). Companion - Give your dog the gift of understanding. [online] https://joincompanion.com/ [Last accessed: 06/12/2021]
Hirskyj-Douglas, I., Piitulainen, R., & Lucero, A. (2021). Forming the Dog Internet: Prototyping a Dog-to-Human Video Call Device. Proceedings of the ACM on Human-Computer Interaction, 5(ISS), 1-20. https://doi.org/10.1145/3488539

Holland, K. E., Owczarczak-Garstecka, S. C., Anderson, K. L., Casey, R. A., Christley, R. M., Harris, L., ... & Upjohn, M. M. (2021). “More attention than usual”: A thematic analysis of dog ownership experiences in the UK during the first COVID-19 lockdown. Animals, 11(1), 240. https://doi.org/10.3390/ani11010240

Holmberg, T. (2019). Walking, eating, sleeping. Rhythm analysis of human/dog intimacy. Emotion, space and society, 31, 26-31. https://doi.org/10.1016/j.emospa.2019.03.002

Hurn, Samantha (2012). Humans and Other Animals – Cross-Cultural Perspectives on Human-Animal Interactions. London, UK: Pluto Press.

Irvine, L., & Cilia, L. (2017). More-than-human families: Pets, people, and practices in multispecies households. Sociology Compass, 11(2), e12455. https://doi.org/10.1111/soc4.12455

Jayawardene, W., Huber, L., McDonnell, J., Curran, L., Larson, S., Dickinson, S., ... & Johnston, J. (2021). ‘Tracking Together’—Simultaneous Use of Human and Dog Activity Trackers: Protocol for a Factorial, Randomized Controlled Pilot Trial. International Journal of Environmental Research and Public Health, 18(4), 1561. https://doi.org/10.3390/ijerph18041561

Jezierski, T., Camerlink, I., Peden, R. S., Chou, J. Y., & Marchewka, J. (2021). Changes in the health and behaviour of pet dogs during the COVID-19 pandemic as reported by the owners. Applied Animal Behaviour Science, 241, 105395. https://doi.org/10.1016/j.applanim.2021.105395

Kanat-Maymon, Y., Wolfson, S., Cohen, R., & Roth, G. (2021). The benefits of giving as well as receiving need support in human–pet relations. Journal of Happiness Studies, 22, 1441-1457. https://doi.org/10.1007/s10902-020-00279-9

Kirksey, S. E., & Helmreich, S. (2010). The emergence of multispecies ethnography. Cultural anthropology, 25(4), 545-576. https://doi.org/10.1111/j.1548-1360.2010.01069.x

Koohsari, M. J., Yasunaga, A., Shibata, A., Ishii, K., Miyawaki, R., Araki, K., ... & Oka, K. (2021). Dog ownership, dog walking, and social capital. Humanities and Social Sciences Communications, 8(1), 1-6. https://doi.org/10.1057/s41599-021-00080-y

Lawson, S., Kirman, B., Linehan, C., Feltwell, T., & Hopkins, L. (2015, April). Problematising upstream technology through speculative design: the case of quantified cats and dogs. In Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems (pp. 2663-2672). https://doi.org/10.1145/2702123.2702260

Lawson, S., Kirman, B., & Linehan, C. (2016). Power, participation, and the dog internet. Interactions, 23(4), 37-41. http://dx.doi.org/10.1145/2942442

Lee, M., & Lee, M. R. (2015). Beyond the wearable hype. IT Professional, 17(5), 59-61. https://doi.org/10.1109/MITP.2015.78

Lemasson, G., Pesty, S., & Duhanut, D. (2013, December). Increasing communication between a man and a dog. In 2013 IEEE 4th International Conference on Cognitive Infocommunications (CogInfoCom) (pp. 145-148). IEEE. https://doi.org/10.1109/CogInfoCom.2013.6719230

Lemon, A. (2015). MetroDogs: the heart in the machine. Journal of the Royal Anthropological Institute, 21(3), 660-679. https://doi.org/10.1111/1467-9655.12246

Linden, A., & Fenn, J. (2003). Understanding Gartner’s hype cycles. Strategic Analysis Report Nº R-20-1971. Gartner, Inc, 88, 1423.

Linder, D. E., Santiago, S., & Halbreich, E. D. (2021). Is There a Correlation Between Dog Obesity and Human Obesity? Preliminary Findings of Overweight Status Among Dog Owners and Their Dogs. Frontiers in Veterinary Science, 736. https://doi.org/10.3389/fvets.2021.654617

Mancini, C. (2011). Animal-computer interaction: a manifesto. interactions, 18(4), 69-73. http://doi.acm.org/10.1145/1978822.1978836

McWilliams, J. (2016). Citizen Canine, Comrade Cow: Toward a New Kind of Animal Rights. Virginia Quarterly Review, 92(3), 206-214.

Morgan, L., Protopopova, A., Birkler, R. I. D., Itin-Shwartz, B., Sutton, G. A., Gamliel, A., ... & Raz, T. (2020). Human–dog relationships during the COVID-19 pandemic: booming dog adoption during social isolation. Humanities and Social Sciences Communications, 7(1), 1-11. https://doi.org/10.1057/s41599-020-00649-x
Moser, I., & Law, J. (1999). Good passages, bad passages. The Sociological Review, 47(S1), 196-219. https://doi.org/10.1111/j.1467-954X.1999.tb03489.x

Mullin, M. H. (1999). Mirrors and Windows: Sociocultural Studies of Human-Animal Relationships. Annual Review of Anthropology, 28, 201-224. https://doi.org/10.1146/annurev.anthro.28.1.201

Nelson, J. K., & Shih, P. C. (2017). CompanionViz: Mediated platform for gauging canine health and enhancing human–pet interactions. International Journal of Human-Computer Studies, 98, 169-178. https://doi.org/10.1016/j.ijhcs.2016.04.002

Orben, A. (2020). The Sisyphean cycle of technology panics. Perspectives on Psychological Science, 15(5), 1143-1157. https://doi.org/10.1177

Paasovaara, S., Paldanius, M., Saarinen, P., Häkkilä, J., & Väänänen-Vainio-Mattila, K. (2011, August). The secret life of my dog: design and evaluation of paw tracker concept. In Proceedings of the 13th International Conference on Human Computer Interaction with Mobile Devices and Services (pp. 231-240). https://doi.org/10.1145/2037373.2037409

Pacini-Ketchabaw, V., Taylor, A., & Blaise, M. (2016). Decentering the human in multispecies ethnographies. In Posthuman research practices in education (pp. 149-167). Palgrave Macmillan, London. https://doi.org/10.1057/9781137453082_10

Paldanius, M., Kärkkäinen, T., Väänänen-Vainio-Mattila, K., Juhlin, O., & Häkkilä, J. (2011, May). Communication technology for human-dog interaction: exploration of dog owners’ experiences and expectations. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (pp. 2641-2650). https://doi.org/10.1145/1978942.1979329

Perry, J., Macken, E., Scott, N., & McKinley, J. L. (1997). Disability, inability and cyberspace. Human Values and the Design of Technology, CSLI Publications & Cambridge University Press, Cambridge, UK, 65, 89.

PlayDate (2021). PlayDate: Play with your pet dog or cat. Anytime. Anywhere. [online] http://www.startplaydate.com/ [Last accessed: 07/12/2021]

Poresky, R. H., Hendrix, C., Mosier, J. E., & Samuelson, M. L. (1987). The companion animal bonding scale: Internal reliability and construct validity. Psychological Reports, 60(3), 743-746. https://doi.org/10.2466

Power, Emma R. (2012). Domestication and the Dog: Embodying Home. Royal Geographical Society, 44(3), 371-378. https://doi.org/10.1111/j.1475-4762.2012.01098.x

Ramokapane, K. M., van der Linden, D., & Zamansky, A. (2019, November). Does my dog really need a gadget? What can we learn from pet owners’ amotivations for using pet wearables?. In Proceedings of the Sixth International Conference on Animal-Computer Interaction (pp. 1-6). https://doi.org/10.1145/3371049.3371054

Shipman, P. (2021). Our Oldest Companions: The Story of the First Dogs. Harvard University Press.

Shir-Vertesh, D. (2012). “Flexible personhood”: Loving animals as family members in Israel. American Anthropologist, 114(3), 420-432. https://doi.org/10.1111/j.1548-1433.2012.01443.x

Srinivasan, Krithika (2012). The Biopolitics of Animal Being and Welfare: Dog Control and Care in the UK and India. Transactions of the Institute of British Geographers, 38(1), 106-119. https://doi.org/10.1111/j.1475-5661.2012.00501.x

Tami, G., & Gallagher, A. (2009). Description of the behaviour of domestic dog (Canis familiaris) by experienced and inexperienced people. Applied Animal Behaviour Science, 120(3-4), 159-169. https://doi.org/10.1016/j.applanim.2009.06.009

Turnbull, J. (2020). Checkpoint dogs: Photovoicing canine companionship in the Chernobyl Exclusion Zone. Anthropology Today, 36(6), 21-24. https://doi.org/10.1111/j.1467-8322.12620

Vääätäjä, H., Majaranta, P., Törnqvist, H., Ainasoja, M., Surakka, V., Juhlin, O., & Mancini, C. (2017). Technology for Bonding in Human-Animal Interaction. In Proceedings of the Fourth International Conference on Animal-Computer Interaction (pp. 1-5). https://doi.org/10.1145/3152130.3152153

Vääätäjä, H., Majaranta, P., Isokoski, P., Gizatdinova, Y., Kujala, M. V., Somppi, S., ... & Surakka, V. (2018). Happy dogs and happy owners: Using dog activity monitoring technology in everyday life. In Proceedings of the Fifth International Conference on Animal-Computer Interaction (pp. 1-12). https://doi.org/10.1145/3295598.3295607

van der Linden, D., Davidson, B. I., & Zamansky, A. (2019). The not so secret life of pets: pet owners’ privacy concerns for pet location data. In Proceedings of the Sixth International Conference on Animal-Computer Interaction (ACI’19). Association for Computing Machinery, New York, NY, USA, Article 5, 1–6. https://doi.org/10.1145/3371049.3371052
van der Linden, D., Zamansky, A., Hadar, I., & Craggs, B. (2019). Developing for non-human users: Reflecting on practical implications in the ubiquitous computing era. Journal of Industrial Information Integration, 14, 50-58. https://doi.org/10.1016/j.jii.2018.07.001

van der Linden, D., Zamansky, A., Hadar, I., Craggs, B., & Rashid, A. (2019). Buddy’s wearable is not your buddy: Privacy implications of pet wearables. IEEE Security & Privacy, 17(3), 28-39. https://doi.org/10.1109/MSEC.2018.2888783

van der Linden, D., Edwards, M., Hadar, I., & Zamansky, A. (2020). Pets without PETs: on pet owners’ underestimation of privacy concerns in pet wearables. Proc. Priv. Enhancing Technol., 2020(1), 143-164. https://doi.org/10.2478/popets-2020-0009

van der Linden, D. (2021). Interspecies information systems. Requirements Engineering, 26, 535-556. https://doi.org/10.1007/s100766-021-00355-3

Wadhwani, P. & Gankar, S. (2020). Pet Tech Market Size By Product (Pet Wearables [Smart Collar, Smart Vest, Smart Harness, Smart Camera], Smart Pet Crates & Beds, Smart Pet Doors, Smart Pet Feeders & Bowls, Smart Pet Fence, Smart Pet Toys), By Application (Pet Healthcare, Pet Owner Convenience, Communication & Entertainment, Pet Safety), By End-Use (Household, Commercial), By Distribution Channel (Physical Pet Store, Online-Only Retailer, Physical Mass Merchant Store), COVID19 Impact Analysis, Regional Outlook, Growth Potential, Price Trend Analysis, Competitive Market Share & Forecast, 2021 – 2027. Global Market Insights. [online] Available from https://www.gminsights.com/industry-analysis/pet-tech-market [Last accessed: 06/12/2021]

Walsh, F. (2009). Human-Animal bonds II: The role of pets in family systems and family therapy. Family process, 48(4), 481-499. https://doi.org/10.1111/j.1545-5300.2009.01297.x

Weiss, G. M., Nathan, A., Kropp, J. B., & Lockhart, J. W. (2013, September). WagTag: a dog collar accessory for monitoring canine activity levels. In Proceedings of the 2013 ACM conference on Pervasive and ubiquitous computing adjunct publication (pp. 405-414). https://doi.org/10.1145/2494091.2495972

Westgarth, C., Christley, R. M., Marvin, G., & Perkins, E. (2019). The responsible dog owner: the construction of responsibility. Anthrozoös, 32(5), 631-646. https://doi.org/10.1080/08927936.2019.1645506

Yeates, J., & Savulescu, J. (2017). Companion Animal Ethics: A Special Area of Moral Theory and Practice?. Ethical theory and moral practice, 20(2), 347-359. https://doi.org/10.1007/s10677-016-9778-6

Zamansky, A., Roshier, A., Mancini, C., Collins, E. C., Hall, C., Grillaert, K., ... & Wirman, H. (2017). A report on the first international workshop on research methods in animal-computer interaction. In Proceedings of the 2017 CHI conference extended abstracts on human factors in computing systems (pp. 806-815). https://doi.org/10.1145/3027063.3052759

Zamansky, A., & van der Linden, D. (2018). Activity trackers for raising guide dogs: Challenges and opportunities. IEEE Technology and Society Magazine, 37(4), 62-69. https://doi.org/10.1109/MTS.2018.2876213

Zamansky, A., van der Linden, D., Hadar, I., & Bleuer-Elsner, S. (2019). Log my dog: perceived impact of dog activity tracking. Computer, 52(9), 35-43. https://doi.org/10.1109/MC.2018.2889637