Exploring Pet Video Chat: The Remote Awareness and Interaction Needs of Families with Dogs and Cats

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ABSTRACT

Many people have pets such as dogs and cats that they would consider to be family. Along with this comes a need to stay aware of one's pet and, possibly, interact with it when away from home. There has even been a recent push by companies to create video-mediated communication (VMC) systems to connect pet owners and pets over distance. Yet the problem is that we do not know how such systems should be designed to meet the real needs of pet owners. To investigate this, we conducted a survey with dog and cat owners that explores their needs for remotely monitoring and interacting with their pets. Our results show that many family members would value being able to maintain an awareness of their pets and interact with them over distance using VMC systems. Such systems would be particularly valuable when pet owners are away from home for extended time periods. However, VMC systems for pets must be designed cautiously to avoid issues of owner disembodiment and other ethical challenges.

Author Keywords

Awareness, interaction, pets, dogs, cats, video-mediated communication

ACM Classification Keywords

H5.3. Information interfaces and presentation: Group and Organization Interfaces – *Computer-supported cooperative work;*

INTRODUCTION

Family members naturally want to stay aware of one another when they are separated by distance [17]. For example, couples wish to stay connected when they travel and parents desire to know the whereabouts of their children throughout the day [17]. For many people, the idea of 'family' extends beyond just people to include pets. In fact, over 63% of households in the United States have pets [2] where 98% of pet owners consider their pets to be family or close friends [7]. The most commonly owned pets in the United States are dogs followed by cats [12].

Given the above need, researchers and companies have started to design systems that allow pet owners to monitor or interact with their pets over distance when they are not at home (e.g., [15,26]). For example, there now exists a plethora of commercial remote monitoring systems for pets such as dogs (e.g., Panasonic's Pet Cam). Such 'doggie cams' are focused at supporting remote awareness for family members who might be away from their home (and dog) for periods of time during the day [8], dog kennels where people leave their pets while traveling (e.g., [9,21]), and even dog groomers or spas [21]. Despite these initial attempts at creating useful technologies for pet owners and companies, it is not clear if they map to families' real needs for remotely monitoring and interacting with their pets.

Our paper addresses this by exploring the potential for family members to monitor and interact with their dogs and cats over distance through video-mediated communication (VMC) systems. By VMC systems, we refer to Skype-like 'video chat' systems that can provide two-way audio and video connections between locations [13,14]. This goes somewhat beyond the capabilities of existing pet cams to explore additional opportunities for remote interaction in addition to just awareness.

We conducted a survey with 86 family members who owned dogs and/or cats. Our results show that most pet owners like to know the same awareness information about their pets as they do about their family members: activities, location, and well-being. We also found that pet owners would value awareness and interaction features that could be incorporated within a VMC system, but that there is some concern with owner disembodiment as perceived by the pet. Thus, such video-based systems must be designed cautiously in order to avoid stress on the pet.

RELATED WORK

Recently, a number of studies have explored the use of VMC systems by families. Results showed that families appreciate the additional feelings of connectedness they received from being able to actually see their remote family members [1,13,14]. Yet VMC systems were found to be challenging to use with bootstrapping and connectivity issues [1,13,14]. Studies of children using VMC showed that parents must do a lot of "scaffold" work to keep children engaged in conversation [1] as children can easily lose interest in the remote people [25]. We expect that such

issues may extend to instances where VMC is used to monitor or interact with pets over distance. Researchers have also found that families with small children find benefit in leaving a video connection going for an extended period of time to show remote family members the children's activities [13]. Given the feelings many family members have for their pets, some of this knowledge is likely to extend to and apply in the context of connecting family members with their pets.

Turning to technologies for pets, we see a recent increase in the design of systems to support human-pet interaction. These include a game-like training environment for dogs called CAT (Canine Amusement and Training) [24]; Cat Cat Revolution (CCR) [18] which shows a moving mouse on an iPad that cats can follow; a dog-owner interaction system with sounds and a remote tennis-ball throwing device [15]; and a remotely monitored and controlled 'cat condo' with play activities [26].

There also exists a body of research that provides initial investigations into pet awareness. Studies of online social networking sites aimed at pets (e.g., Dogster) showed that pet owners use such sites to share pictures and information about their pets, view profiles of other pets, and receive advice [10]. Studies with hunters and typical pet owners showed that hunters desire location tracking of their pets, while everyday pet owners desire to know about their pets' well being while they were away from home and want ways to comfort them remotely [20]. Weilenmann and Juhlin describe a GPS dog tracking-device that allows hunters to track their dog's locations outdoors [24]. Paasovaara et al. explored dog monitoring via an enhanced collar containing indoor and outdoor location tracking and audio sensing [19]. They found that people valued the idea of monitoring their dog's activities and location (inside/outside the home) in real time. Participants also felt there was value in being able to see video recordings of their dogs.

Our research builds on the related work by exploring the situations when family members would value remote interaction systems and the needs they would have for these systems. We focus on pet awareness and interaction, as well as, video-based systems. We also extend the literature by exploring the needs for *both* dog and cat owners.

ONLINE SURVEY METHODOLOGY
We chose to use a survey for our study because we wanted to get an understanding from people who owned a variety of types of dogs and cats. We wanted to see if this would influence their thoughts on the topic (yet we actually found a large degree of similarities). We also value the depth of knowledge gained from interviews and, as such, structured our survey to be open-ended where we asked for stories of pet interactions and expected use (if any) of VMC systems.

Survey Questions and Topics
We asked for background information about the respondents and their pets, what their remote monitoring needs were when not at home with their pets, and how they would want to see or interact with their pets over distance (if at all). Examples of specific questions include: 'What would you like to know about your pet(s) when you are not with them?' and 'If you could interact with your pet(s) over the Internet when you are not at home, what would you like to be able to do with them?' As a cautionary note, our questions asked pet owners for their *opinions* on what technologies they felt would benefit their pets and themselves; thus, they used their own knowledge as a pet owner to comment on our survey as opposed to knowledge that might come from a trained expert on pets.

Respondents
We advertised our survey via snowball sampling where we emailed links to it to friends/family who then forwarded it on to others they knew. We also posted links to the survey on Twitter, Facebook, and online forums devoted to pet owners. We received completed surveys from 86 people (26 male, 59 female, 1 not said). Respondents varied from 19 to 65+ years; however, about half of our respondents were in their late 20s to mid 30s. Respondents' occupations varied heavily and only one had professional experience with animals (a veterinarian). All resided in the United States or Canada. Six people lived alone, and the rest lived with at least one other person. Nearly half of the respondents (42 of 86) had children where their ages and numbers varied. Respondents also had various numbers and types of dogs and cats: 25 had just cats, 37 had just dogs, and 24 had at least one of both. At the extreme, and likely outliers, one had 4 dogs, and another had 16 cats.

Analysis
We inductively analyzed our interviews using open, axial, and selective coding [22] to draw out the important themes from our data. Quotes have been carefully selected to present examples from our survey responses. Next to each quote is the gender and age range of the respondent and type and number of animals owned.

BEING AWAY FROM HOME
We first wanted to understand at what times it might be valuable for pet owners to maintain remote awareness of their pets or potentially interact with them.

Short Time Durations
Nearly all dog owners did not have issues being away from their pet for *short durations* of time, e.g., going to work, shopping, or visiting a friend. In fact, they were generally okay with being gone the length of a typical workday (e.g., 6-10 hours). This was the point at which most people felt that the dogs would be 'fine' physically. For example, they would not need to use the bathroom in this time period if they were trained to go outside. Beyond this time frame, there was a sense of guilt that they should be with their dogs for a portion of the day and return home.

"if we've been at work and a friend asks us to do something that will have us away the entire evening and we won't have

time to walk the dog, we'll usually say no." – F, 19-25, Basset Hound

In cases where pets had health issues or other concerns such as social anxiety, dog owners would ensure they came home more often, e.g., every 2 to 4 hours.

In the case of cats, all but one pet owner did not have concerns about being away from home for short durations of time. This is expected as most cats are trained to use a litter box indoors. Interestingly, compared to dog owners, cat owners did not report feelings of guilt associated with not being at home. For the one cat owner who did have concerns, it was because the cat had health issues. This is certainly an outlier yet still important, as it would likely generalize to all situations where a pet has health issues.

Long Time Durations
Most respondents (66 of 86) left home for vacations or trips several times a year where the trips spanned several days to a week or two. Sixteen people did not leave their home for more than a day and only four people had more extreme situations and would be gone from home repeatedly throughout the year for weeks or months at a time.

Knowledge of Pet Activities. Most people (50 of 86) said they didn't know what their pets did when they were gone for long durations of time and the pets were either at home (being fed by a friend or neighbor), at a kennel, or at another person's house. Yet the remaining 36 respondents had technology-based routines to stay aware of their pets while away. In these cases, people said that the person watching the pet would send updates while they were gone or the owner would contact them to get information. This might be over the phone, email, or Facebook, and sometimes even included the sharing of pictures.

"Yes. I ask the operator of the kennel about what the dog's schedule is to be. I also call the kennel frequently while I'm away." – F, 37-50, Yellow Labrador

"We sometimes email catsitter; he always leaves detailed report on time spent, what he did, what cats did." – M, 51-65, 3 Cats

Two people even talked about using Skype to connect with their dogs over VMC while away. For example:

"At the dog boarding facility we do not know what she's doing, but the facility provides a "schedule" of what the dogs do (i.e. go to the play area at 10am-noon, etc etc.). When the dog is staying with family, we sometimes video skype, or our family members will send pictures via phone, email, or Facebook." – M, 26-36, English Bulldog

One respondent described a situation where their dog kennel had previously provided an online webcam system for pet owners but had to discontinue it because it did not always capture what pet owners wanted to see:

"They use to have a webcam but stopped it as people would constantly call them and disrupt their routine to make petty

requests like they can't see the dogs water bowl on the webcam , to call back and say that wasnt their dogs blanket. It got too much so they had to discontinue it." – F, 37-50, Great Pyrenees and Black Labrador

REMOTE AWARENESS AND INTERACTION
Next we looked specifically at what information pet owners wanted to know about their pets when away and how they wanted to interact with their pets remotely, if at all. We asked general questions about remote awareness and interaction followed by questions asking if/how they might use a VMC system with a pet.

Awareness of Pets
A small number of people (5 dog owners, 2 dog/cat owners) were completely fine knowing nothing about their pets while away from home. On the other hand, the large majority of people (79 of 86) wanted details about their pets when they were not at home with them. This included knowledge of the pets' activities (35 people), temperament or mood (23 people), safety or health (17 people), and location (5 people) where each was desired by both cat and dog owners. Most respondents wanted to know this information simply out of concern for their pets' well being.

"what they are doing (especially my dog) and whether they miss us/have seperation anxiety" – F, 19-25, Pitbull and 2 Cats

"What they are doing, like how much they move around the house and where. It would be good to have a sense of how much exercise they get ... It would be nice to know that especially for the cat, since if she spends all her alone time cowering in a tiny hot corner of the attic… – F, 26-36, Pound Puppy and Cat

Some people wanted to be able discipline their pets based on this knowledge or ensure they were not misbehaving.

"I want to make sure she doesn't bark all day, want to know if she just sleeps, want to make sure she isn't trying to get into the frig or garbage." – F, 37-50, Retriever and Cat

"Does my Shiba Inu even hesitate before he chews on something that he knows he's not supposed to when we're not around? lol" – F, 26-36, Shiba Inu & 3 Cats

Remote Interaction and Viewing
Over half of respondents, 65 of 86 people, (28 dog owners, 18 cat owners, 19 dog/cat owners) thought that some form of remote interaction with their pets would be valuable.

Talking with Pets. About a third of our respondents (28 people) wanted to be able to talk with their pets while away from home using some type of VMC system. These respondents felt that by being able to talk to their pets they might be able to calm them, if needed, or provide comfort and companionship through their voice when they weren't able to physically be there. Some people even wanted to be able to tell their dog specific things related to obedience or discipline through an audio connection.

"Let them hear my voice and the inflection they hear daily when i converse with them ... I know when using FaceTime with the iPhone they respond VERY positively to sound alone." – M, 26-36, Shepherd, Dalmation, and Corgi Mix

"We have a webcam and it's frustrating to watch her chew on the couch or generally get into things without being able to do anything about. Maybe if we had a way to talk to her or let her see our image, we could stop her behavior remotely." – F, 37-50, Husky Mix

Watching Pets. Another one-third of our respondents (27 people) wanted to be able to watch or see their pets and saw benefit in this. Here VMC was seen as a means to know what activities their pets were doing to ensure they were not getting into trouble or to check to make sure they were safe. Thus, people saw a VMC system as a way to ensure peace-of-mind when away from home.

"We've actually used Skype before to keep an eye on the animals for fun. We just setup an open laptop with a restricted skype account that would accept any call from a specific account. It was kind of fun, but mostly my dog just sleeps. We just used it to see what she was up to at random times of the day and to see if she ever barked at people outside, etc." – F, 19-25, Bassett Hound and Cat

Providing Play or Exercise. A small number of people (9 of 86) said they would like to be able to play with their pets over distance through some form of physical interaction; this was without prompting and we note that some may simply have not realized it was possible to do this. Respondents felt that these interactions would allow them to engage with their pets while remote so that the pets would not feel lonely. They also saw this as a means to provide needed exercise or mental stimulation. Here the focus was mostly on remotely controlled toys.

Additional Activities. We also had four people say they would like some mechanism that would allow them to touch or pet their animal, though these could be considered outliers. Additionally, two people wanted to open and shut doors to let pets inside and outside.

No Need or Desire for Remote Interaction

On the other hand, 21 people (10 dog owners, 6 cat owners, 5 dog/cat owners) said they would not use remote interaction technologies with their pets. Respondents were either uninterested, did not think they would have enough time, or, in some cases, they saw issues with such technologies that would complicate their usage.

In the case of VMC systems, some respondents did not think their pet would stay near a computer display with a VMC system long enough for it to be useful. Others were concerned about their own disembodiment, as perceived by the pets. That is, if pets heard their owner talking through a VMC system, they might not understand where the voice was coming from, or why they did not actually see the physical presence of their owner. Thus, respondents felt pets may be confused and receive no benefit from the

system and, even worse, it may cause increased loneliness or anxiety. Respondents also felt that seeing a live video stream of their owner may additionally confuse pets. For some pet owners who had tried existing VMC systems with their pets, this was indeed the case:

"we tried talking to the dogs when we had the laptop set up, but they found that confusing, so we just observed" – F, 37-50, Mutt

"I would like to see them but I don't think interaction is fair because they don't understand and if they hear my voice they would be confused as to why I'm not there with them. THey want me to touch them and play with them and I can't do that over the internet." – F, 26-36, Entlebucher

A few dog owners even expressed strong opposition to remote interaction because of this. For example:

"I dont want to interact with them over the Internet and I strongly feel that this is a mistake. Their communication with me is extremely strong and at a level totally inappropriate for remote or disembodied contact. Disembodied contact would in fact DAMAGE my relationship and effect the girls adversely ... It would be far far better to be able to manage water, food, shelter, toys than dogs." – M, 51-65, 2 German Shepherds

In the case of remotely controlled toys, some pet owners felt that their pets might be afraid of them or could easily damage them (e.g., energetic or large animals).

DISCUSSION

Compared to the existing research on family communication [17], we see that pet owners largely want to be able to know the same types of information about their pets as they would their family members or close friends (e.g., activities, location, and well being). These findings are similar to past studies [19,20]. Reactions varied but there was generally positive responses for viewing and interacting with pets. Long trips are when people feel especially detached from their pets; this suggests value for VMC systems in these times.

Yet the more one attempts to incorporate interaction into a VMC system for pets, the more problematic the topic becomes. For example, showing a video feed of an owner may cause confusion for the pet (if the video is presented in a pet-viewable way). Similarly, pets may not understand where a voice is coming from if it is sent over an audio link. Thus, if owners want to truly interact with their pet by talking to it, akin to how they might in person, disembodied voices could be problematic. This suggests that VMC systems for pets be designed and used cautiously. For example, one should carefully consider whether audio links are critical to a VMC design, if interaction is desired. Similarly, owners should be careful to monitor and understand their own behavior over such systems to ensure that it is not causing distress to their pets. The 'safest' designs, in terms of not causing distress to the pet, may simply be those that allow pet owners to monitor their pet

from afar using a video link, where the owner sees the pet, but not vice-versa, and the interaction is limited.

Reflecting on the CSCW literature, we can see that the challenge with disembodiment is certainly not new. Research on the design of VMC systems for human-human communication has shown that the disembodiment of people can also be problematic [4]; however, in the human-human case, it is because people may not know who is able to see or hear them over a video link (e.g., someone standing outside of the camera's view). It is also clear that another challenge with designing VMC systems for pets is that pets have few ways to actually control how they participate in a system. In human-human communications, people are able to regulate their autonomy and choose how and when they participate in a VMC system [4,6]. For example, they can start and stop the video call at the push of a button. This type of interaction is so pivotal that it has garnered decades of CSCW literature exploring it and the privacy implications (e.g., [4,5,6,11]).

Yet pets are not people. With pets, this control is lost and it is left in the hands of the pet's owner. For example, if a pet becomes confused or anxious because of a VMC system, the pet cannot turn it off to alleviate the feelings. One might imagine being able to design system features that *could* allow a pet to turn a VMC system on and off; however, it is unlikely that most dogs or cats could be trained to perform such an action (while understanding it). Like children using VMC systems [1], pets will require some type of 'scaffolding' by others to interact and work the system. Yet in VMC systems for pets, the scaffolding will need to occur at the remote location by the pet owner (for children, this occurs in a collocated fashion by parents [1]). This might involve the remote pet owner monitoring the pet to observe anxiety levels or trying to 'coax' them to come in front of a system. It would likely also include mechanisms for the pet owner to easily close a video connection if distress is detected, or selectively stopping the features that might be causing the distress.

Because of challenges like these, ethical issues certainly arise for the design and use of VMC systems for pets. Ethical review boards have strict rules governing the study of animals [16] and the Special Interest Group on Animal-Computer Interaction provides similar guidelines [3]. These include (in the least) not causing unnecessary distress or pain and stopping procedures if this occurs. The challenge, however, is that detecting mental confusion or anxiety in pets could be very difficult, especially for technology researchers. For example, in the case of designing a VMC system for pets, it would be difficult to know just how much distress seeing or hearing a remote owner would cause. One could also imagine issues with systems that support interaction through physical devices (e.g., a remotely controlled ball thrower). For example, a pet could easily be injured by such a system if it did not fully understand how the system worked and an owner was

not present to monitor it. Issues such as these and more should be carefully thought about by researchers exploring designs for remote pet awareness and interaction.

CONCLUSION
Our paper has reported on the awareness and interaction needs of families with dogs and cats through an online survey. We have specifically focused on understanding when and how families might value a video chat system designed for them to monitor and interact with their pets. Our findings show potential benefits for such systems, yet there are also challenges that must be overcome such as owner disembodiment and ethical concerns. We hope that our work provides designers and practitioners with a new understanding for designing solutions that mitigate these concerns while still providing owners with the benefits that such systems may offer. We also recognize that there are many other types of pets beyond dogs and cats and hope that other researchers will continue this area of exploration to understand how systems may be designed to best meet the needs of these pet owners.

REFERENCES
1. Ames, M., Go, J., Kaye, J., Spasojevic, M., Making Love in the Network Closet: The Benefits and Work of Family Videochat, *Proc. CSCW,* ACM Press (2010).

2. AAPMA National Pet Owners Survey, American Pet Products Manufacturers Association (2008).

3. Animal-Computer Interaction, http://www.open.ac.uk/blogs/ACI

4. Bellotti, V. Design for Privacy in Multimedia Computing and Communications Environments, in *Technology and Privacy: The New Landscape*, MIT Press (1998) 63-98.

5. Bellotti, V., and Sellen, A. Design for Privacy in Ubiquitous Computing Environments, *Proc. ECSCW*, Kluwer Academic Publishers (1993), 77-92.

6. Boyle, M., Neustaedter, C., and Greenberg, S. Privacy Factors in Video-based Media Spaces, *in Media Spaces: 20+ Years of Mediated Life,* Springer (2009).

7. Cain, A. Pets as Family Members, *Pets and Family,* Hawthorn Press (1985), 5-10.

8. Dogs in Canada, Furveillance, http://dogsincanada.com/furveillance-the-latest-on-pet-cams

9. Downtown Dog Lounge, downtowndoglounge.com

10. Golbeck, J. The more people I meet, the more I like my dog: A study of pet-oriented social networks on the web. *First Monday*. 16(2), February 7, 2011.

11. Harrison, S., *Media Spaces: 20+ Years of Mediated Life,* Springer (2009).

12. Household Pet Ownership: 2001, *US Census Bureau.*

13. Judge, T.K. and Neustaedter, C., Sharing Conversation and Sharing Life: Video Conferencing in the Home. *Proc. CHI*, ACM Press (2010), 655-658.

14. Kirk, D., Sellen, A., and Cao, X., Home Video Communication, *Proc. CSCW,* ACM Press (2010).

15. Mankoff, D., Dey, A., Mankoff, J., Mankoff, K. Supporting interspecies social awareness: using peripheral displays for distributed pack awareness, *Proc. UIST,* ACM Press (2005).

16. National Research Council, Guide for the Care and Use of Laboratory Animals: Eighth Edition, The National Academies Press (2011).

17. Neustaedter, C., Elliot, K. and Greenberg, S., Interpersonal awareness in the domestic realm. *Proc. OzCHI*, ACM Press (2006), 15-22

18. Noz, F. and An, J. Cat cat revolution: an interspecies gaming experience. *Proc. CHI*, ACM Press (2011).

19. Paasovaara, S., Paldanius, M., Saarinen, P., Hakkila, J., and Vaananen-Vainio-Mattila, K. The Secret Life of My Dog – Design and Evaluation of Paw Tracker Concept, *Proc. MobileHCI,* ACM Press (2011).

20. Paldanius, M., Tuula Kärkkäinen, Väänänen-Vainio-Mattila, K., Juhlin, O. and Häkkilä, J. Communication technology for human-dog interaction, *Proc. CHI*, ACM Press (2011), 2641-2650.

21. Playful Paws, www.playfulpawskennel.ca/

22. Strauss, A. and Corbin, J. Basics of Qualitative Research, 2nd Edition, Sage Publications (1998).

23. Weilenmann, A., and Juhlin, O. Understanding People and Animals: The Use of a Positioning System in Ordinary Human-Canine Interaction, *Proc. CHI,* ACM Press (2011).

24. Wingrave, C.A., Rose, J. Langston, T. and LaViola, J.J. Early explorations of CAT: canine amusement and training. *Proc. CHI EA.* (2010), 2661-2670.

25. Yarosh, S., Inkpen, K.M., and Brush, A.J. Video Playdate: Toward Free Play across Distance. Proc. CHI, ACM Press (2010), 1251-1260.

26. Young, J., Young, N., Greenberg, S. and Sharlin, E. Feline Fun Park: A Distributed Interface for Pets and Owners, *Video Proc. Pervasive Computing,* (2007).