Work vs. Play: A Study of Guide Dog Team Interactions

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ABSTRACT

The visually impaired have been a longstanding well-recognized user group addressed in the field of Human-Computer Interaction (HCI). Recently, the study of sighted dog owners and their pets has gained interest in HCI. Despite this, there is a noticeable gap in the field with regards to research of visually impaired owners and their dogs (guide dog teams). This paper presents a study that explores the interactions of guide dog teams revealing differences between their work and off-work relationship. Our findings promote design interventions that address issues of awareness, pride, confidence, and trust present in guide dog teams at work but absent in off-work scenarios and uncover potential for the design of new computer-mediated technologies that can better support the needs of guide dog owners.

Keywords

Human-Canine Interaction, Guide Dogs, Visually Impaired.

1. INTRODUCTION

Research in Human-Computer Interaction (HCI) and industry has recognized the visually impaired as a user group for decades [2,4, 6,7,11]. Accessible technology developments such as tools, applications and gadgets have been improving the lives of people challenged with visual impairment, enabling them to be more independent. Different mobility aids have been developed to enhance their travel abilities. The most popular travel aid is the long cane. Nevertheless, research has shown that guide dogs are the most beneficial and appropriate travel aid because they provide safe guidance, increased mobility and independence, while offering the additional benefit of companionship [8,15]. Recently, the study of sighted dog owners and their pets has gained interest in HCI [3,5,12,14,17,18]. This research investigates guide dog teams from an HCI perspective with the aim of providing an understanding of their interactions and how those may be improved upon with design and technology. Our data has led us to focus on the challenges guide dog teams face in off-work activities. In the following sections we give an overview on guide dogs and outline related work in and beyond HCI. Subsequently, we describe our study, which includes an in-depth interview with a guide dog expert and interviews and observations examining guide dog teams. Our findings promote design interventions that address issues of awareness, pride, trust, reliability, confidence, and predictability that are present in guide dog teams at work but absent in off-work and play settings. Finally, we conclude with initial scenarios for guide dog teams discussing technological aids for improving their interactions.

2. GUIDE DOGS

Guide Dogs are highly trained animals that provide better mobility and more independent travel abilities to their visually impaired users than the cane [8,15]. They respond to verbal commands such as "Forward", "Left", "Right", "Straight on", "Find the stairs", and "Find the door", and disregard commands that could lead to a dangerous situation (e.g. a car backing up out of a driveway). When traveling together, the human is responsible for orientation and safety issues monitoring traffic and traffic lights. The dog is the guide to staying on track, avoiding obstacles, finding destinations (doors, stairs, chairs), and watching out for dangerous situations. A guide dog owner, like any other dog owner has to provide for the physical and emotional needs of a dog. Dogs need food, several opportunities each day to relieve themselves, grooming, veterinarian visits, playtime and affection from their handler. Guide dogs, retiring usually after 8 years, are mostly Labrador retrievers, which are known for their willingness to please and serve, and eagerness for play.

3. RELATED WORK

When looking at interactions of guide dog teams, works from different research fields can be considered. This encompasses research within and beyond HCI highlighting an interesting void with a multidisciplinary overlap.

Designing technology for the visually impaired has been addressed by HCI-research for decades. For example, computers were made accessible through screen-reader programs such as JAWS [6] and VoiceOver [2]. Efforts have been made to make the web accessible [10], and many assistive technologies have been developed [4,7] including haptic technologies [7]. Recently, publications looking at technology-assisted human-pet interactions have appeared at HCI-focused conferences. Britt et al. [3] built a tracking and communication system that consistently tracks the position, motion behavior, and orientation of a dog. With this research they are focusing on Canine Augmentation Technology (CAT) for search and rescue (SAR) dogs, and attempt to provide useful procedures for the analysis of dog trials and missions. Focusing on human-canine interactions between people and their pet dogs, Paasovaara et al. [12] developed the 'paw tracker concept', which combines sensor-based dog created content with social media to connect a dog that stays home with a human who is at work, enabling the human to check on the pet on an automatically updated blog. Similarly, Hu et al. [5], and Yonezawa et al. [18] introduce prototypes for remote pet control. Moreover, Wingrave et al. [17] introduced game-prototypes for strengthening the human-animal bond of dog owners and their dogs and Weilenmann and Juhlin [14] conducted a study observing hunters using GPS devices to monitor their dogs, aiming to find out how technology assists the interactions of human-canine teams. Additionally, Animal-Computer Interaction (ACI) has recently been discussed as a new field in HCI [9].

Studies from other research fields beyond HCI have looked at what we refer to as guide dog teams: visually impaired guide dog users and their dogs. The research concerns itself primarily with the impact on identities of guide dog owners [13], the benefits of guide dogs [8,15], and the experience of their usage [11,16]. However, within HCI we have yet to see a focus on technology design enhancing guide dog team interactions.

4. OUR STUDY

To gain an understanding of guide dogs and interactions of guide dog teams, a two-part study was conducted. First, we recruited an expert who is a co-founder of a guide dog association and has been working in guide dog training since 1977. In a two-hour interview, the participant gave insightful descriptions about guide dogs. For the second part of the study, we recruited five participants (P01-05) through word-of-mouth, social media and the Canadian National Institute for the Blind (CNIB). The participants, four female and one male guide dog user, lived in a major metropolitan city in Canada, were aged 21 to 41. Four participants were early blinds, meaning they had been blind since birth and one participant was a late blind; she lost her sight at the age of 27. Two of the five participants had their first guide dog, two had their second and one had her third one. The length of guide dog ownership ranged between four and over 20 years. The dogs came from three different guide dog schools. We conducted in-depth interviews and observations at the participant's homes and work places, each lasting between 2.5-4.5 hours. Questions explored routines, tasks, activities, and challenges of the guide dog teams and the handler's use of and relationship to technology.

4.1. Two Distinct Scenarios: at Work & off Work

At work, guide dogs wear a harness and guide their owner. In this mode, the dog is an instrument in the role of a working assistance dog. When working, the interactions of guide dog teams are limited. The owner knows where to go, gives the dog commands, and monitors traffic and lights. The dog guides the owner safely wherever s/he needs to go, around obstacles and towards steps or doors. The guide dog is supposed to stay focused, and not get distracted. An owner notices when the dog gets distracted and can remind him to pay attention with a command. The abilities of working guide dogs were highly appreciated by participants, who all used a cane before acquiring the dog. During the interviews, they mentioned that traveling with a guide dog instead of a cane is less exhausting. Receiving less tactile feedback from their environment, the associated level of concentration and effort is greatly reduced with the dog as a mobility aid:

The dog has impacted my travel tremendously. [...] When I think about my route into work. If I had to use the cane, I would need a nap when I got to work. It would be mentally exhausting. [P04]

When off work, the harness is taken off and guide dog teams rest, walk, play, and communicate together. The owner takes care of the dog, which includes: feeding, walking the dog to go to the bathroom, grooming, playing, and giving the dog affection. In this mode, guide dogs are just pets with individual behaviors. Similar to the routines of non-visually impaired human-canine teams, the interactions of non-working guide dog teams can vary a lot. Some dogs are more playful and enjoy off-work time to have fun, while others like to rest more. Nevertheless, there are differences between human-pet interactions of guide dog teams and sighted owners and their dogs, which are highlighted in the next section.

4.2 Contrasting Interactions

4.2.1 Lack of Visual Perception

Due to their visual impairment, guide dog owners perceive certain things differently than sighted pet owners. In a unique way, when working they are aware of their surroundings and confident about their dog's skills. By holding on to the harness, guide dog handlers get information about their dogs by feeling movements. We observed that even minor changes in movement were felt by the owner: While observing, one of our participants (100% blind) noticed a dog far away on the other side of the street just by slight changes in his dog's movement. The observer was surprised since she had not noticed either the other dog or the guide dog movement. In those cases, owners are able to predict moments of inattention of their dogs and react by correcting the dog with a command.

When guide dogs are off work this is completely different. Guide dog handlers are often unaware of the behavior of their dogs, both inside and outside of the home. In off-work observations participants often asked what their dog was doing:

I don't know what's going on [with the dog] usually he's excited when people are over. [P02] [He was sleeping in that moment.]

All guide dog handlers used auditory cues, such as a bell on the dogs collar to tell where the dog was. All participants were unaware of the locations of their dog toys. Some kept a few toys in a closet, but all had dog toys lying around on the floor. Outside of their homes, guide dog handlers, compared to sighted dog owners have no view of a park their dog runs around in. They cannot see when their dogs pick up a toy, look at something, interact with other dogs, cannot reach a toy, suddenly go to the bathroom, or get in a dangerous situation. We revisit these issues with additional data when we describe challenges guide dog teams face.

5.2.2 Strong Bond

Most dog owners experience a strong relationship with their dogs often referring to them as a companion or best friend. Participants felt that the human-animal bond of guide dog teams is stronger than the bond that evolves between sighted owners and their dogs. Three reasons were mentioned for their strong bond. First, guide dog teams spend a great deal of time together:

They are with you all the time. You develop a very very strong bond. [...] I spend more time with that dog than people with their children and husbands combined. [P04]

I consider him my friend [...] I have an emotional attachment. I spend a lot of time with him, almost all day long. That in addition that he helps me get around makes it a strong bond. [P02]

Second, guide dog handlers conceive reliability and trust through their dogs working abilities; this was found to enhance their bond:

I feel I can rely on him! I really feel I can trust him. [P03]

Third, participants named gratefulness and pride for their guide dogs work abilities and the positive impact on their lives as strengthening the bond. One participant shared a situation that made him feel both grateful and amazed. At a theatre play his dog somehow managed to make eye contact with people they had met before, pulling him to them and thereby helping him to develop a bond with other people. Another participant shared a story about when she got lost in a mall and her dog found an escalator getting them out of the situation. That was a difficult task, since malls differ a lot from streets making it difficult for the dog to stay oriented. She states:

Stuff like that makes me so proud of him, I feel really lucky and taken care of. It makes me so happy that he can be so helpful. [P03]

Although we can see how the bonds of guide dog teams can be stronger than other human-dog bonds, interestingly this strength comes almost entirely through the working relationship. When off work, guide dog handlers are in fact lacking reliability, trust and pride; their confidence is not present in the off-work mode.

5.3 Challenges of Guide Dog Teams

People who are challenged with vision loss are often independent in their activities of daily living. Guide dog owners extend this independence through the working relationship with their dog. In our study, all participants showed remarkable independence in and outside of their homes not often relying on the help of others. The guide dog expert even described blindness more as "an inconvenience than a disability". When guide dog teams are traveling (at work) they do not like interruptions in their humandog interaction, especially through computer-mediated technology. For instance, participants did not answer their cellphone when walking with their dog because they needed to concentrate on traffic, orientation and safety. All participants strongly disapproved any changes in their working interactions. They all found their dogs very reliable travel aids, more reliable than technology. In contrast, when guide dog teams are off-work and the dog is 'just a pet' we uncovered severe challenges.

5.3.1 Human-Pet Interactions of Guide Dog Teams

The practical side of prideful and independent off-work relationships in guide dog teams involves the challenge of providing the dogs with certain privileges that add up to a typical 'dog's life', not only consisting of things such as feedings, opportunities to go to the bathroom, attention and interaction (e.g. talking to the dog); additionally, playing and free runs are important.



Figure 1. Participants challenged with toys: a,b) search for toys and c) shows a toy with sharp edges that led to injuries

5.3.1.1 Playing

Guide dogs are generally very playful, due to their breed's (Labrador retriever) character. There are no special dog toys for blind dog owners. Guide dog handlers end up using dog toys designed for sighted dog owners such as ropes, tug toys, balls, plush toys, squeaky toys, and bones. All participants mentioned several challenges with dog toys. First, it is hard to find the toys when the dog is not interested in finding them or if the toy is out of reach for the dog (e.g. when it is underneath a couch or stuck in a bush). Figure 1a,b shows two participants searching for dog toys that are right in front of them. We observed several searches like this. Second, dog owners did not notice when their dogs became tired or were no longer interested in playing (e.g. they became busy with other things such as sniffing). This caused confusion for owners due to the lack of response by their dogs. Third, we found that all participants had stepped on dog toys before and two had gotten serious injuries. In figure 1b, a participant shows her dog's favorite toy; a bone, which she hurt herself on many times by stepping on its sharp edges. All participants try to keep most of the toys in closets but let their dog have frequent access to a few. In reality though, dog toys were often 'laying around' on the floor as a potential hazard.

5.3.1.2 Free Runs

Guide dogs work hard when they are on-duty. The work needs their full attention and concentration. Free runs are stress-

reduction for dogs and guide dogs certainly should be able to get free runs. As the guide dog expert explains:

It's stressful being a guide dog. They need stress-reduction. They need free runs. They have to have a life. [X01]

In fact, most guide dog schools tell their students that guide dogs need free running, however, this is one of the most challenging tasks for guide dog teams. Guide dog handlers lack reception of necessary information when their dogs are off leash. This includes things such as where the dog is, what mood he is in, and whether he is walking, running, or sniffing. Handlers might not be able to prevent the dog from running away in case he would and this can be dangerous for both the handler and the dog. The handler depends on the dog to get around and the dog could get hurt. All but one participant (the youngest, aged 21) stated free running as challenging. This one participant takes her dog off-leash by herself in a school parking lot every day and is confident the dog will not get into trouble because she believes he is afraid of cars. Yet after watching the scenario during our observations, we estimated the situation to be dangerous. The dog could have easily run across a street nearby and been hit by a car. All other participants described off-leash situations as dangerous and stated that they cannot do free runs independently:

He would be unpredictable. [P02]

I don't know what he is up to [off-leash]. It's too insecure. [P05]

Free runs need to be done in areas that are safe such as dog parks or big fields without traffic around. For visually-impaired owners, it can be challenging to find such places as there are few dog parks in the location of study (and likely elsewhere as well). None of our participants lived close to one. One participant lived close to a soccer field, and with a sighted person accompanying her, she goes there frequently to give her dog free running. The participant was found to be proud about her dog retrieving well. Because this play is a routine for her, she gained trust in it.

6. DISCUSSION

In our study, we first segmented two major scenarios: guide dog teams at work and off work. Although we recognize opportunities for addressing working guide dog teams through design, we choose to focus on off-work scenarios, where we found more challenges. Addressing the play of guide dog teams would greatly improve the relationship between guide dogs and their owners. Interestingly, guide dog teams develop a strong bond evolving through awareness, pride, trust, reliability, confidence and predictability in their working relationship. However, off work, those attributes are missing. In the following, we propose ways for bringing such attributes back into the human-pet interactions of guide dog teams. In two fictional scenarios, we manifest the defined attributes as starting points for design interventions such as animal-human technologies for play-interactions of guide dog teams. Subsequently, we discuss how these technologies might be realized in the near future and how that can contribute to research.

Scenario 1: Becky is in her neighborhood in a fenced dog park with her guide dog Max. She takes Max to this park by herself every other day. Becky throws a ball augmented with location-tracking technology. She gets an audio notification from her tactile phone app telling her the ball is 28 meters away from her. She constantly knows where the ball is in relationship to the dog and herself. Max, off-leash running after the ball, regularly emits a noise with a bell on his collar, letting Becky know where he is. After a while, her app tells Becky that Max is starting to get tired so they stop playing and she puts his harness on to go home.

Scenario 2: Candace wants to play with her guide dog Bella in her apartment. She tries to get Bella to find her favorite toy which does not work. She uses an app on her mobile phone to locate the rope-toy, which quietly starts emitting a soft noise. Finally, Candace finds it under the couch and they play tug-o-war before they go to bed.

Looking at those two scenarios, different ways of implementing the aforementioned attributes in the play of guide dog teams emerge as design challenges. Awareness would be gained by guide dog owners through knowing about surroundings, location of the dog and toys, distances between them and how far they are from the owner herself. Dogs can get bored, tired or just excited about something, which is hard to tell for guide dog owners. Having access to information about the dog would help the owner to more easily *predict* some of his actions (sniffing, looking at something, going 'to the bathroom') and eventually lead to more trust and reliability towards the dog. Pride, trust and reliability would certainly evolve when smooth off-leash play is routinely practiced; handlers will possibly enjoy play more and gain confidence in off-leash play. These propositions now raise the question: How can guide dog owners be provided with all that information?

The observed lack of information when having a guide dog offleash or even just off-harness can be an opportunity for technology designs. New inventions utilizing sensor-technologies and mobile apps could give the visually impaired access to information. So far, there are no artifacts, such as toys, apps, tools or gadgets specifically for guide dog teams. Accessible dog toys utilizing sensor-technologies could communicate described situational information such as locations and distances to the dog owner and thereby improve the play-interactions of guide dog teams. Additional sensors on dogs could track them and communicate their location and distances to owners and toys. Biometric sensor technology could inform handlers about the moods and needs of their dogs. When using technologies on the dog, any attachments would need to be kept small so that the dog does not think it is a harness. This is important as the harness differentiates work time from non-work time for the dog. For example, the design of Wingrave et al.'s [17] tracking prototype for dogs would not be suitable for a guide dog since its shape is very similar to a harness. Technologies implemented into toys will need to be safely protected from the dog. In the case of indoorplay, technologies will have to be suitable for indoor usage.

Research would have to further investigate exact parameters and find out how to capture locations of dogs and toys, how to translate locations into (ambient) feedback for visually impaired dog-handlers, and what kind of feedback would be suitable. In order to provide accurate information about the moods and needs of dogs, we need to find out how to capture those? It is imaginable that information about canine heartbeat, temperature, and body language (calm, aggressive, excited or happy postures) could give insights about the dog. Although such technologies would have a great impact on the play of guide dog teams and further affect future research, ethical issues always need to be considered. Technology should not be invasive and the technological augmentation of animals should clearly be ethically deliberated. In addition, we suggest considering mobile apps to enhance the play-interaction of guide dog teams. Smart phones such as the iPhone are now reasonably accessible for blind users [1] and accessible apps are being designed. A smart phone app could possibly receive information from the described sensors and allocate it to the handler.

7. CONCLUSION

We discovered how important it is to address the needs and requirements of guide dog teams and discussed improvements in their play-interaction. This forms a point of departure for further research. We see three research fields that would benefit from further work in the proposed areas. Attempts at implementing emotional attributes (pride, trust etc.) into guide dog play will lead to critical considerations for designers who aim to address these challenges through interaction design. Studying feedback technologies to inform guide dog handlers can inform research on ambient auditory feedback technologies. Exploring the use of biometric sensor technologies to tell guide dog owners about the moods and needs of their dogs can inform research in ACI as well as general studies on biometric sensors in human behavior studies.

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