

# Understanding People and Animals: The Use of a Positioning System in Ordinary Human-Canine Interaction

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## ABSTRACT

Animals are increasingly integrated in interactive contexts depending on digital technologies. The current and future use of such technologies is a relevant topic for HCI research. However, the field is struggling with the inherent problem of ‘interaction’ in understanding interaction with animals. We argue for a way forward based on an ethnomethodological perspective on anthropomorphism, with a focus on manifest interaction. Drawing upon a field study of hunters’ use of a GPS dog tracking-device, we discuss how interaction between dogs and humans is affected when new technology is introduced. The GPS data is situated and interpreted by the dog handler, and supports the hunter’s work of dealing with the dogs’ intentions. This opens up for new forms of interactions with the dog. When studying and designing for interaction between humans and animals we should move beyond merely looking at dyadic relationships, and also consider the social organization of the interaction.

## Author Keywords

Dogs, human-canine interaction, GPS, mobile technology, social organization, ethnomethodology, anthropomorphism.

## ACM Classification Keywords

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

## INTRODUCTION

Digital technology is increasingly applied to support human-animal interaction, which is not so surprising given people’s strong relation to pets and nature. There is a growing market for various types of digital technologies to support human-animal interaction. The commercial

relevance of human-canine interaction can be seen in the many technologies marketed to dog owners. These consist of devices for *training* dogs (e.g. electric shocks to teach the dog to stay away from the sofa), *care-taking* of the dogs (e.g. remotely controlling feeding device from your laptop) as well as *surveillance* of dogs (e.g. GPS tracking of the pet’s whereabouts). The social relevance is seen in such phenomenon as Dogbook, a popular Facebook application where dog owners can create profiles for their dogs.

However, the research in this area is limited, making it difficult to understand the experience of such new technologies and what to design next. Human-animal interaction is at best an emerging theme within HCI, with relatively few published studies [6;12;13;14;20]. The marginalization of this work, we suggest, might be because of a strong positioning of animals’ similarities to humans, with limited theoretical articulation. We argue that the area should transcend the issue of assessing the ‘appropriate’ level of anthropomorphism, by applying an ethnomethodological perspective on human-animal interaction [4]. It implies that accounts of animals’ mental states are seen as occurring in particular social situations for particular practical concerns. We should therefore analyze how such ordinary activities are conducted. Such investigations provide both a way of understanding how this type of activity, which includes animals, is pursued, and analytic resources informing the design of technology to support it.

In this paper we apply this approach to the case of hunting and the use of a mobile positioning technology for dogs. Technologies supporting human-animal interaction might seem like peripheral and odd, but in hunting they are already in everyday use. Dogs have long had a crucial role in the organization of many forms of hunting, and increasingly, technology has played an important role. By presenting material from a field study of how hunters use a GPS device aimed at monitoring the dogs, we show how the relationship between dogs and humans change when new technology is introduced. In order to do this, we rely upon another study of hunting, where this type of device was not used [8]. We show how the GPS allows the hunters

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to get a richer understanding of what the dog is doing and supports the interpretation of the dog's actions. The technology has the dual role of supporting the interaction between the dog and the hunter, and in adding to the role the dog has in the organization and experience of the hunt.

## BACKGROUND

Our research is located in between the research community interested in human-animal interaction in general and a growing field of study focused on technological support for such interaction. Previous research on human-animal interaction of relevance for our study contains technical research on species-appropriate computer-mediated interaction, as well as studies on everyday interaction between humans and dogs. This research will be reviewed in the next section. After that, we outline the benefits of using an ethnomethodological perspective to understand and design for the interaction between humans and animals.

### Studies of human-animal interaction

The relationship between human and non-human animals is a longstanding concern within anthropology and related disciplines [18]. Recently, Kirksey and Helmreich [9] have outlined the emergence of a multispecies ethnography, dealing with the study of “the host of organisms whose lives and deaths are linked to human social worlds” [ibid., p. 545]. Central to such approaches are to challenge distinctions between culture and nature, humans and non-humans. Haraway criticizes the common conception of human exceptionalism [5].

Within the HCI field, there are several technically oriented projects that investigate how to digitally enable interaction between humans and animals. Most of the early projects focus on establishing remote interaction over a distance, such as from a dog owner at an office to her pet at home. Mankoff et al. [13] present a paper on “supporting interspecies social awareness”. They put forward a system where a remote dog owner gets notified when the animal is lying still in its bed. The owner can then remotely release tennis balls to play with the dog. The system is designed to support the dog's orientation to the humans and animals, as well as to stimulate and engage it. Similarly, Lee et al. [12] suggest a system through which a poultry owner can caress a bird remotely. The owner strokes a hen-like object equipped with touch sensors. The bird wears a jacket, which outputs the owner's strokes. Conversely, the jacket senses the movement of the bird's legs, transformed into low-level electrical currents in the user's shoes. The authors argue that this system could be useful also for interacting with dogs e.g. guiding them in rescue operations.

There are also other projects, which aims to support co-present human-animal interaction such as the serious gaming approach called “Canine amusement and training” [20]. MacGrath [14] provides an overview of technical research on these kinds of systems, which “enables a non-human to interact with a computer in a (species-specific) meaningful way.” He identifies three critical research issues: designing the appropriate interaction mechanism,

deciding on tasks, and the provision of translation mechanisms for inter-species communication. He concludes that the research shows that it is technically possible to design for human-animal interaction, but that the significance of the research lies in raising the questions and aims to “excite the imagination.”

Here, we suggest that the issue of deciding on the appropriate approach to human-animal interaction is of specific importance. Human-animal interaction can be described as, at best, an emerging theme within HCI; related work in this area includes only a few academic publications. At worst, it can be described as a limited topic, which few researchers are taking serious. As it stands, the researchers in this field either diminishes the relevance of the area themselves [13;20] or motivate their research from an animals' right's position and pre-conceive their work as bound to be misunderstood and ridiculed [12].

We argue that both the political and the humorous approach suffer from under-articulated standpoints on the issue of anthropomorphism, that is, to what extent human characteristics should be ascribed to animal behavior. For example, the political concern in the research on “poultry internet” [12] is motivated by a critique of the mistreatment of chicken as objects of consumption. Lee et al. argue that “[p]oultry should have the same status as other pets such as cats and dogs because of their similar level of cognition and feelings”. On the other hand, the humorous attempts are constructed by suggesting extended human abilities, such as authorship of research papers to animals [13]. Thus, the pun occurs through *maximizing* anthropomorphism. We argue that the area needs to articulate those anthropomorphic positions, and make them available for broader discussions within HCI.

### Anthropomorphic perspectives

When engaged in the study of human dog interaction we are facing an area where the most fundamental part of the unit of analysis, i.e. the *interaction*, is questionable. In what sense should we think about the activities we are studying as a form of interaction between the human dog handler and the dog? Already when conceptualizing something such as human-animal “interaction,” we infer a form of anthropomorphism, where for example pets are thought of as being able to share our form of life. In order to interact with us, they and we must in some sense have some shared abilities and orientations.

Ethnomethodologist David Goode provides a thorough discussion on the topic in his book, “Playing with my dog Katie” [4], based on an autoethnographic account. He identifies two influential theoretical positions in this area. First, behaviorism has been a strong tradition within animal research. It sees interaction as a set of stimuli and responses, and discards any more ambitious ways of relating to animals. Goode argues that it is a theoretically guided research approach, making it difficult to account for the ubiquitous ways in which humans engage with animals.

Second, symbolic interactionism argues that successful interaction depends on shared rules or mental states in order to be successful. What is at stake is the necessity of shared mental states to achieve mutual understanding, and whether that is present in human-animal interaction.

The latter idea, i.e. that dogs have mental states or psychological attributes, is referred to as "subjective anthropomorphism". The availability of such attributes is much discussed within animal science, according to Goode. In these discussions, two different errors are recurrently made. First, there is the categorical error that there are such mental states in general. Such understanding seems to be overly anthropomorphic. Second, there is the situational error of implying an incorrect attribute in a specific circumstance. To avoid the pitfalls described above, Goode adopts a perspective on anthropomorphism where "conventional interpretation of animal behavior that sensibly emerges within concrete situations of actions." In this approach, anthropomorphic accounts are seen as human representations of relevance in specific contexts. It is not necessary to know whether these attributes are correct or not in a theoretical sense. Instead, the topic is to account for interaction, as it is empirically available in concrete situations, and analyze how they are achieved as ongoing practical accomplishments including humans and animals. The ethnomethodological perspective on anthropomorphism avoids the perceived problem of whether sharing mental states with animals is actually possible. Thus, following Goode, we suggest that design oriented research on human-animal interaction should by-pass current politicization and irony by informing the research with (i) "A concern for the enacted nature of social settings": Goode argues that we should investigate members' accounts of e.g. human-dog interaction in specific situations, rather than taking such accounts as universal statements. (ii) "A respect for the indigenous": we should not preclude a priori any ontological statements on the human-canine interaction as being irrational or immoral.

In pursuing such a methodological approach, we need to recognize that there are several types of intersubjectivity that occurs between animals and humans. Goode argues that language interaction, where both the dog and the human, draw upon some form of codified or non-codified language, only account for part of the interaction. Instead the interaction depends on interpretation of non-gestural body postures. He also adds matters assumed but not communicated, or "concrete facticity", and communicated but not spoken, such as bodily gestures or exchanges.

The dependency on non-language interaction in human-animal interaction makes it important to choose methods, that give access to such communication as well as to the shared concrete facticity. Goode himself utilizes autoethnographic accounts, where he video records and analyzes his own interaction with his dog. Höök's study [6] of human-horse interaction is a recent example, within HCI, of an attempt to unpack the design-related benefits of

incorporating analyses of embodied interaction into human-computer interaction. On the other hand, Laurier et al. [11] have shown how the interaction between a dog owner and a dog is publicly available for an outside observer. They suggest that we should study animals' "practical skills in the wildness of where ever it is that they inhabit", something that we have taken up on in this study.

The approach adopted in this paper, following Goode, is informed by ethnomethodology [3]. Ethnomethodology is particularly suitable for studying the relationship between animals and humans. This is because of its focus on manifest, observable actions, rather than inner, mental states. Further, ethnomethodology focuses on the analytic work of the members, making it useful when understanding how the hunters analyze, interpret and situate the GPS data. Goode argues that this approach is particularly suitable "for analyzing interaction between individuals with very different bodies and bodily potentialities" [4:12].

The aforementioned studies [4;6;11] investigate the interaction between a human-animal dyad. We expand that concern by looking at another type of activity consisting of many animals and many people. This case is described in the next section.

#### **METHOD AND SETTING**

In this paper, we focus on a particular form of human-canine interaction, i.e. that taking place during a hunt. In doing so, we are taking up the cue from previous ethnomethodological studies of how humans interact with dogs [4;11]. We have followed the dogs and their leaders during a hunt in the wild. In a previous study [8], we captured the hunting experienced through a field-study of all the different roles in the hunt. The current fieldwork focuses on the dog and its role in the hunt, as well as the interaction between the dog and the dog handler. Particularly, we investigate the ways in the dogs' role in the hunt transform with the advent of new technology.

In total, we have participated during five full days of hunting; including about eleven so-called drives. Previously we have studied all roles of the hunt, including the dog handlers, the rifles on stand and the leaders of the hunt [8]. In the current study, we focused primarily on the dog handlers' role. In both studies we have used ethnographic methods to capture the hunt, including video recordings and photography. Also, in this as in previous study, audio recordings of the radio communication have been made. We then matched the recordings with the video. This made it possible to get close to the participants' perspective, as the hunters had simultaneous access to both the local environment (as captured on video) and the remote sound environment (the radio talk as captured on audio recordings). The video clips chosen for analysis have been shown to the dog handler, enabling the discussion of analytic issues as well as clarifying misunderstandings.

In order to reveal more about the use of the GPS, the ethnographer would sometimes ask the dog handler to clarify his use of the GPS. There is particularly at one moment in our data, an instance where these instructional moments serve to reveal new information that the hunters might not have discovered otherwise. It could be argued that this disturbs the natural use of the GPS. However, we argue that of relevance here is how the positioning information, no matter on whose initiative it is accessed, is taken up and used as a resource in the interaction between the hunters and the dogs.

The video and audio material collected in this study, was analyzed using an interaction analytic approach [7]. The data has been transcribed according to conventions in conversation analysis [17], see the appendix for details. The translations to English were made by the authors. Body movements, dogs barking, whistling and other non-verbal and verbal behavior difficult to render in writing are described within double parenthesis, and relevant events are illustrated with pictures from the video. Broadcasted radio talk is italicized.

### Technology – the GPS

The device used by the dog handler we are following is a Garmin Astro. Every five seconds the dog's unit sends its position to the handheld unit (figure 1). The hunter can then see the dog's current position and a trace showing how it has moved is drawn on the map page of the GPS. The dog is represented by a small dog symbol. Shifting to another screen, there is a compass that shows the direction in which the dog is located, as well as the distance to it.

The hunter we followed, here called Ansgar, functions as a dog handler in this hunt. He has hunted together with his dog, here called Sam, for about ten years, and used a GPS for the last two years. It is important to mention that only Ansgar and one other dog handler used a GPS; all other participants in the hunt did not use this technology.

### ANALYSIS

The dog is crucial to the organization of the hunt, since the dog can give the hunter information about where the prey is. Therefore, figuring out what the dog is up to is one of the most important tasks of the hunter. When looking at the material, we have been trying to pull out the resources the hunters have to make sense of what the dog is doing. In short, these resources are based on sounds and vision. The hunter relies upon what he<sup>1</sup> can see and hear in the close



**Figure 1: The GPS used by the dog handler studied in this paper.**

vicinity (e.g. a branch of a tree cracking behind him, a quick serendipitous movement captured in the corner of the eye), as well as sounds heard in the distance (e.g. shots or dogs barking). Besides this, there is also sound transported via radio, where other hunters share what they hear and see. So there is a complex web of sounds and visual impressions that the hunters map together to get a sense of the ongoing hunt. In fact, as was shown in our previous study, doing the work of puzzling these pieces together is a big part of the enjoyment of the hunting experience [8].

Now, with the advent of the GPS, appears a new form of information, a form of *remote vision*. It could be objected that this will take away the pleasure of the hunt, leaving no room for interpretation or need for skill on the part of the hunter. However, as we will show below, this new visual information needs to be interpreted and situated and combined with the previously existing resources. The GPS adds a new dimension but does not take away the challenge of the hunt. In the following, we will present examples of how the new GPS information provides an added resource in the hunt, and how it is interwoven with other resources.

In the analysis, we will present and discuss excerpts from one particular episode from the hunt. This sequence spans over about thirteen minutes. The reason why this particular case is chosen is that it highlights the multiplicity of ways in which the hunters are interpreting and articulating the information that the GPS provides them. This case will allow us to examine how the hunter construes of the dog's *intentions* based on the use of the GPS, and how that is used in the interaction with the dog, as well as interaction with other hunters, thereby affecting the hunt in general. Further, this case points out the *situatedness* of the GPS data; how the geographical information is used "in the wild". In order to get an understanding of what is going on in the hunt in this point in time, we begin with a short background and brief summary of the main points in this case. Then we will present the details with our analysis.

In this episode from the hunt the dog handler that we are focusing on, Ansgar, is dealing with mainly three different issues. First, he needs to figure out whether the animal that was just shot at (by another hunters) was the animal that his dog, Sam, was following. Second, he is trying to make sense of whether his dog is following a new lead, the traces of another animal, or whether the dog is backtracking, i.e. going in the same tracks as previously. Third and finally, he wants to get the dog back again, and leash it, in order to prepare for what might be a search for the presumably wounded deer that was shot in the beginning. In all these three activities he relies upon the GPS to provide him with information in various ways. This will be explored in more detail below.

### Part 1: What animal has been shot?

We begin when a shot has just been heard. It is initially unclear whether the animal has been killed or just wounded.

<sup>1</sup> The hunting teams we have studied consisted of men only.

Ansgar is trying to figure out if it was the animal that his dog, Sam, was following that was shot, or another animal.

**Excerpt 1: Was it Sam's animal?**

A=Ansgar, our dog handler, R= Researcher

001 R: Now there was a shot  
002 A: Yes::: hhhhh  
004 A: Yeah you see? ((shows GPS to R))  
005 R: Yes  
006 A: You see.  
008 R: What is it I'm looking at  
009 A: Yes: I don't know I check like if it was  
010 (.) if it was shots e Sam's e: drive  
011 animal that was shot  
010 R: How do you see that then=  
011 A: =Eh I should see that then he like  
012 stops/stays there  
013 R: =Yes  
014 A: By the animal (.) but he's usually a  
015 bit behind so ((laughs))  
016 R: Right it takes some time  
017 A: So it takes some time  
...  
018 A: It was maybe there right by the side path  
019 that that it did sound like a bit far away  
020 R: Yes  
...  
040 A: But it sounded as if it was like that so  
041 (.) we'll see  
042 ((Starts walking))  
043 R: You mean the distance or  
044 A: Yes: exactly

A shot echoes through the terrain, as commented by the researcher, and the hunter is looking at his GPS. The researcher asks for a clarification (line 8) "What is it I'm looking at". Ansgar explains that he checks if it was his dog's so called drive animal, i.e. the animal that his dog was following, that was shot. The researcher asks how he can see that on the GPS. The hunter explains that the dog stops/stays by the animal (line 11), but that the dog is usually a bit behind so it will take some time.

That means that there is a delay between the shot and the stopping of the dog. The hunter then is looking for the cessation of movement in the dog symbol representing his dog. If the symbol would stop moving, he could assume that it was his dog's animal that was shot. In this way, the GPS is used to try to answer the question that the hunter is currently struggling with (what animal has been shot?) by interpreting the dog's movement pattern as a *document* describing its motivation (following an animal) and a particular event (halting since the animal also stopped).

Summing up, here we have seen how the information that the GPS provides is used as a piece in the puzzle, trying to figure out what animal has been shot, and where that animal is located in relation to the dog. This information, that the new technology provides, is combined with other sound

information (hearing the distance and the direction of the shot) as well as local knowledge of the terrain, and where the rifles at stand are located within this terrain. In order to know which animal has been shot, the hunter combines these different sources of information. In this way, the GPS adds to, rather than replaces, the interpretative material that the hunter has to work with in order to make sense of what's going on in the hunt and what the dog is doing.

While the issue dealt with in the first excerpt is still not completely resolved, a new concern arises; whether the dog has got a new trace. The dog, Sam, has returned to the hunter and then taken off again. Ansgar calls out to the rifles at stand close to where he can see that Sam is located:

**Excerpt 2: That's not what Sam was hunting**

A= Ansgar, our dog handler, F=Freddy rifle at stand, M=Micke, rifle at stand, X=unidentified speaker, G=Gitte, dog, S=Sam, our hunter's dog, R= Researcher.

001 A: to the the rifles by the side path and h  
002 the tongue then e (0.2) e .hh are the dogs  
003 hunting still or is that animal down hh  
004 (.) over h  
005 (4.0)  
006 F: the animal that Gitte hunted is shot but if  
007 Sam is hunting go:d knows (.) cause he  
008 came over and turned by me and there  
009 hasn't been any animals here over  
010 A: yea:h yeah there is something anyway hh  
011 hhh  
012 R: how do you see that then  
013 A: yes because he doesn't run this far without  
014 having anything in front of him ((with  
015 index finger, doing a quick lengthwise  
016 movement from the bottom towards the top  
017 of the screen))  
018 (1.1)  
019 M: yeah Micke here (xxx)(.) I stand up by the  
020 road (xxx) and shot a deer here but it  
021 went in here (xxx) it's very dense here  
022 (xxx)  
023 (6.1)  
024 A: yea::h that was good (.) but that's not  
025 what Sam was hunting over  
026 (1.2)  
027 M: yea:::h (xxx)  
028 (0.9)  
029 A: okay that sorry  
030 R: but doesn't it seem to be moving now=  
031 M: =that animal came from the south  
032 X: from Johan I think  
033 (3.1)  
034 A: °okay°  
035 (7.3) ((Dogs barking in the background))  
036 A: yeah both dogs are running around on that  
037 old clear-felled area anyway wonder what  
038 the hell it is (.) they are yelping after  
039 .hhh I take stand here so we'll see  
040 what happens



**Figure 2:** “Both dogs are running around on that old clear-felled area anyway wonder what the hell it is (.) they are yelping after”.

Ansgar asks the rifles, over radio, if the dogs are still hunting (lines 2-3) or if the animal is down. Freddy, a rifle at stand in the area, reports that the animal is shot (not necessarily meaning that it is dead) but he does not know if the dog is hunting. He reports having seen the dog, without having seen any traces of an animal. In this way, Freddy shares his own local visual information with the dog handler over radio. We can also see that the GPS is used by the dog handler to know whom to address with questions, based on geographical proximity to the dog.

The hunter then adds to the discussion about whether the dog is hunting or not that “there is something anyway” (line 9). When asked by the researcher to clarify, he explains that the dog would not run that far without having something in front of him. In this way, the dog’s movement and the distance it has run are taken to be signs that it is hunting.

Another hunter, a rifle on stand, reports in (lines 19-22), saying where he is located and that he has shot a deer. The deer has taken off, as they often do when shot. Ansgar is acknowledging this but adds that the animal that was shot was not what is dog was hunting.

Ansgar is standing still, listening to distant dog barking and watching his GPS. He notices that “both dogs are running around on that clear-felled area”, “yelping”, and decides to take stand. This means that Ansgar is shifting from being a dog handler to being a rifle at stand. The technology is providing him with added information about the dog’s behavior, supporting this decision. He also explained, when being interviewed about this situation, that he knew that this area was well populated with deer, thus making it even more relevant to be prepared.

## Part 2: Is the dog backtracking?

### Excerpt 3: Sam you have already run there

A= Ansgar, our dog handler, R= Researcher.

```
001 ((Dog barking heard continuously in the
002 background))
003 A: °yeah here comes Sam°
004 R: ° what°
005 A: °Sam is right down here° ((points in front
006 of them, into the forest))
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007 A: °I think he has stopped°
008 A: >SAM SAM< ((whistles)) GOOD BOY >SAM SAM
009 SAM SAM< HERE I AM (.) >SAM SAM SAM SAM<
010 ((whistles)) COME ON BOY GOOD BOY (.) HERE
011 I AM ((whistles))
012 R: when you checked last time did you see
013 that he was on his way back then or
014 A: yes
015 R: yeah
016 A: exactly but I don't know if he ((whistles))
017 has got something new now
018 ((A is watching the GPS. Dog barking heard
019 in the background))
020 A: ((sighs)) yes: (.) no he goes in backtrack
021 A: SAM-SAM (.) YOU HAVE ALREADY RUN THERE
022 ((laughs)) ((dog barking)) ((whistles))
023 R: what do you mean backtrack where he has
024 run before=
025 A: =yeah:: you see you see now he's running
026 exactly in the track back where he already
027 has been ((shows screen - see figure 3))
028 R: yes okay
029 A: eh (.) ((dog barking)) so that yes (.)
030 ((puts down GPS)) YES: eh hh ((dog
031 barking, A brings GPS up again, watching
032 it)) eh h this is difficult (.) he
033 will notice that he's doing if after a
034 while but (.) (xxx)
```

In the beginning of this excerpt, Ansgar explains that he thinks that the dog has stopped hunting (line 7). This is based on the use of his GPS, as clarified in Ansgar’s reply to the researcher’s question (line 12.) He had seen on the GPS that the dog was on his way back, and that supported him in his decision to call on the dog. What follows then, is Ansgar trying to call his dog back. On lines 8-11 he calls out loud, and whistles, orienting to the dog. The GPS has informed Ansgar about the dog’s action in a way that makes him communicate with the dog. Thus, the GPS affects the communication between dog and hunter.

The GPS is consulted again, and the hunter now makes the interpretation that the dog is “backtracking” – i.e. going in the same tracks as he has run before (line 20, see figure 3 below). This interpretation makes him call out to the dog (lines 21-22), telling the dog that he has already run there. When the researcher asks what backtracking means, Ansgar shows the screen of the GPS. The two tracks, the current track Sam is now running in, and the previous track, are now on top of each other (see figure 3). Ansgar explains that the dog is now “running exactly in the track back where he already has been” (lines 25-27).

In the next excerpt, new uncertainty is introduced. When showing the zoom feature to the researcher, the hunter notices that the dog is actually *not* going in his old tracks (see figure 4).



**Figure 3: The hunter believes that the dog is backtracking – running in the same tracks as previously.**

**Figure 4: A bit later, he zooms in on the dog's tracks, and questions his previous assumption – maybe the dog is not backtracking, but instead following a new lead?**

*Excerpt 4: Zooming in*

A= Ansgar, our dog handler, R= Researcher.

001 ((A is standing still, watching the GPS))  
 002 A: oh stupid dog  
 003 R: shit it's slippery ((nearly falling over  
 004 with video camera))  
 005 A: yes now it seems as if he got it- no okay  
 006 ((sighs))  
 007 (2.0)  
 008 A: ((deep sigh)) well e: there's not much to  
 009 do about this hhh  
 010 (9.6)  
 011 A: one can go and ((takes off glove with  
 012 mouth)) follow the dog also if one wants  
 013 (.) h ((changes to another screen on the  
 014 GPS)) no (.) no it's possible to zoom in  
 015 on the dog then even if he's far away he's  
 016 not directly in backtrack actually but  
 017 it's (.) very very similar (.) he h  
 018 ((turns screen to R) isn't [it h  
 019 R: [yeah (.) if you zoom in you see that [it's  
 020 not  
 021 A: [yes (.) yes but now it seems as if he's  
 022 turning again (.) hope so (.) no maybe  
 023 he's hunting something actually (.) what  
 024 the hell could that be

In the beginning of this excerpt, the hunter is watching the GPS and says “stupid dog” (line 2). He believes that the dog is backtracking, thus not “understanding” that he is running in old tracks. Right after, the hunter displays a shift in this interpretation, based on the movement of the dog seen on the GPS (“yes now it seems as if he got it”, line 5). But immediately, this is changed, again based on the dog's movements (“no okay”, and a sigh, lines 5-6). The hunter expresses some frustration about the situation, sighing and saying that “there's not much to do about this” (lines 8-9).

He then explains to the observer that there is another view of the information, and zooms in on the traces from the dog.

Interestingly enough, this explicative sequence results in his re-evaluation of what the dog is doing. He notices (on lines 15-17) that the dog is “not directly on backtrack” but something similar. In the previous view, zoomed out, the difference between the two tracks was not discernable. In the zoomed out view, the two traces representing the dog's movements (the previous and the current) seemed to be on top of each other. Zooming in, he notices that the traces are actually separated with a couple of meters. It then becomes an issue of how close to the previous tracks that the dog can be in order for it to be interpreted as “doing a backtrack”.

Summing up, the practical concern here is whether the dog is backtracking or not. In excerpts 3 and 4, the dog handler shifts between these two interpretations of the information on the GPS. The challenge is that the GPS supports both interpretations. Further, this example shows how the dog handler is constantly revising his interpretation of the dog's actions and movements, and how the GPS supports that. It highlights the situated and accomplished character of GPS use. We have also seen how the dog's movements are interpreted by the hunter, and how those interpretations are played out in the interaction between the dog and the dog handler. In this way, the use of the GPS adds to the communicative environment made available to the dog.

Next, the leader of the hunt, Wolfgang, appears. He says that his radio is out of order, and he can only hear what the others are saying, but not talk himself. They discuss whether the dog is backtracking; note how they draw upon different locational resources to talk about the dog's movement (see also figure 5 below).

*Excerpt 5: Sam was here before and turned*

A= Ansgar, our dog handler, W= Wolfgang, the leader of the hunt, J=Johan, a rifle at stand.

001 W: eh:: there went a bastard snuck by there  
 002 ((gestures into the forest))  
 003 A: yeah there was wasn't it that's probably  
 004 what they are (going on about) ((points  
 005 towards the dogs with the GPS))  
 006 W: yeah but eh is he going in backtracks (the  
 007 dog) or ((points out in the forest))  
 008 A: he did that first I thought but now now  
 009 there is something  
 010 W: otherwise it has turned ((makes a sweeping  
 011 gestures with his arm into the forest, see  
 012 figure 5 below)) but that seems a bit  
 013 A: ((looks at the GPS)) yeah yes but exactly  
 014 because it's actually it's not precisely  
 015 ((Ansgar points on the screen)) I just  
 016 zoomed in and checked and it's not  
 017 precisely backtrack he's sort of eh  
 018 W: but could it be the one that was shot ((points  
 019 out in the forest))  
 020 A: well:: I'm hoping it's not (.) but on the  
 021 other hand it's becoming ((points on the  
 022 screen)) ((interrupted by radio traffic))  
 023 J: Johan to Ansgar  
 024 A: Ansgar here over  
 025 J: now Sam is going in his old tracks

026 A: noe: not not totally correct actually (.)  
 027 so that's what I wonder what it's all  
 028 about

029 J: he was like here before and turned down  
 030 towards Svarttorp when I called for Rickard

031 A: yes it was but I know i see but whatever  
 032 but that (.) he is clearly in the vicinity  
 033 i hope that he I will try to leash him  
 034 then if there will be any search here  
 035 later also



**Figure 5: When discussing the dog's movement, the dog handler (left) is orienting to his GPS, while the leader of the hunt (right) gestures into the forest behind him.**

The leader of the hunt asks whether Sam has been backtracking, and the dog handler says that Sam might be following a new lead. Ansgar explains what just happened, and also accounts for how he came to the conclusion that the dog is probably not backtracking. He refers to the GPS “I just zoomed in and checked and it's not precisely backtrack” (lines 14-17). In explaining this, he also points to the screen. Wolfgang, on the other hand, orients to the forest and the environment around them, when pointing out the movements of the deer he has just noticed and the dogs.

Another hunter, Johan, calls for Ansgar on the radio and says that Sam is going in his old tracks (line 25). Ansgar does not agree: “Not totally correct actually”. The hunter insists, and also provides an account of how he came to the conclusion that the dog is backtracking - he mentions that he has seen the dog. Ansgar seems a bit hesitating “yes it was but I know I see but whatever but that he is clearly in the vicinity” (lines 31-32). For some reason, he does not provide an account of the analysis of the dog's movement; he does not refer to the GPS. Ansgar then says that he will leash the dog in case there will be a search. If anyone sees the dog, they shall leash it. Finally, and before moving on to the discussion, it should be noted that there is a happy ending to this: Ansgar finally finds Sam, and leashes him. The wounded animal is found and taken care of.

## DISCUSSION

The detailed study of the use of positioning technologies to support collaborative hunting has implications for how new mobile technologies affect this type of leisure practices, as well as our understanding of human-animal relations in general. These issues will be discussed in the following.

## Positioning technologies and the restructuring of uncertainties in hunting

We argue that the positioning system influences both the hunters practice as well as that of the dogs. First, with the advent of GPS technology, the hunters can obtain a new document of dog behaviour, i.e. the *position* of the dog as well as the history of the dog's movements, but not the *intention* of the dog. The GPS provides information about where the dog is and where it has been. It is in a sense a new window into the dog's actions, providing the hunter with a remote vision of the dog's action. We have seen how this information is used in the dog handler's analytic work trying to make sense of the dog's actions. Importantly, the intentions of the dog are still concealed for the hunter. The hunter gets more documents related to the whereabouts of the dog, but not what it is doing there or why. However, Goode [4] argues that most of the communication between canines and humans are non-language based where spatial attributes play a considerable role.

Second, the system also influences the ways in which dogs relate to the hunt. The dog's actions, visible on the GPS as well as made available through other resources, are oriented to by the dog handler as a turn in the interaction between him and the dog. Based on what the hunters see and hear they can adjust the communication with the dog. For example, the hunter calls out to the dog his interpretation, that the dog is back tracking – “you have already run there”.

In all, the positioning technology does not provide such exhaustive information on the prey, or even the dogs, that it settles the discussions on what the animals are doing and where they are. Thus, the positioning technology is merely *restructuring the uncertainty* in the hunt, rather than dissolving it. This is probably a positive characteristics of the tracking system. Hunting [8] and other leisure activities [2] depend on balancing enjoyment and efficiency. Thus, the task of figuring out what the dog is doing is not a problem that should be removed from hunting. Finding out how to interpret the dogs' actions is part of the pleasure of the hunt. Getting more documents on the dogs actions seem not to ruin the hunting practice, rather the opposite.

## Anthropomorphism, intentionality and human agency

We argue that it would be inappropriate to conduct research by theoretically, or politically, deciding on suitable levels of animal abilities a priori to empirical studies or design. For example Wingrave et al. [20] suggest that human-animal technologies should be designed to support the interaction between the participants symmetrically, providing interfaces to act on, both for humans and animals. However, in order to decide whether there is or is not a symmetrical relation, we need to figure out the attributes of both sides of the interfaces. Thus, we need to provide a position on the appropriate level of anthropomorphism for specific species. However, that is conceptually problematic. Therefore, we recommend avoiding design approaches that requires premature conceptions, but instead turn to approaches that open the area for investigation.

First, following Wingrave's interpretation [20], the system we studied was asymmetrically designed since it only provided an interface to the hunter and not to the dog. However, from a situated perspective during the hunt, the system's influences is much less asymmetrical. We have tried to show how the information is brought into the interaction between the dog handler and the dog. In various ways, the system influenced the dog handler's communication with the dog. Thus, from the perspective of the dog, it changes the way its tracking actions were supported and acted upon by the hunting organization.

Second, designing for symmetrical interaction depend on understanding the mental capabilities of animals and humans. Goode [4] argued that we could see two types of errors, i.e. *categorical* errors where we would completely misinterpret the possible mental attributes, as well as *situational* errors where the problem only had to do with what was working in a particular setting at a particular time. Again, we suggests that such preconceptualisations are premature when we have not yet understood dog handlers' ethnmethods of inquiring into this topic.

Further, we have seen how the hunters' ethnmethods of human-canine interaction draws on a multitude of contextual resources. It is not just a dyadic interaction between a dog and a human. The interaction is also informed by sound as well as interaction with other hunters. Thus, even though the GPS became much more of a topic in between the hunters, than between the dog handler and the dog, it still contributes to the overall experience of the hunt. And the dog becomes an even more central concern in their organizational endeavor. Thus, *we suggest that the design of HCI systems supporting interaction between human beings and animals, should account for complex interactions, which goes beyond dyadic relations between a person and an animal.* This is similar to the ways in which we have learnt to design for interaction that goes beyond a single person and a desktop computer, to considering computer support for various types of collaborative tasks.

We have seen how our dog handler, Ansgar, has treated the dog as a competent actor in the hunt, acting rationally upon different situations. Ansgar has claimed that the dog "will notice after some time" that he is running in his own tracks. Likewise, his statement "stupid dog", when he believed the dog to be backtracking, suggests that the dog is treated like a competent actor, who can make a mistake and do something stupid. The dog is treated as having the resources to discern the difference between backtracking and not backtracking (although failing to do so here, i.e. being stupid). However, we would not argue that the owner is taking a general stance on his dog's mental characteristics. Rather these statements are *contextually* dependent, visible in the ways that such statements are reinterpreted given new contextual cues and documents of actions. Thus, an ethnomethodological perspective on anthropomorphism reveals how 'situational errors' in understanding human dog interaction is a member's concern. In this case, the dog

handler does not hold a fixed position as to what are the dog's abilities and intentions. Instead, we should see his anthropomorphic accounts as situated interpretations of relevance in the practical accomplishment of pursuing a hunt. The hunt, and the use of the GPS, is accomplished without taking stance on levels of anthropomorphism, and instead conducting an ongoing investigation of the relations to the animal along with other uncertainties. Similarly, *we argue that the research would benefit from focusing on instances of interaction, and practical accomplishments, rather than pushing particular anthropomorphical agendas.*

Our study has implications for morally or politically influenced research, as well as for the prevalent humorous and ironical style of writing. First, hunting per se is a practice which often evoke moral discussions. Here we do not take a stance on the moral appropriateness of hunting among humans or animals. It is not that we say that such moral positions are illegitimate. It is just that we argue that the research area, at this time, need to bracket such concerns, and instead attempt to formulate appropriate research agendas. Second, we have also shown how an ethnomethodological approach provides methodological tools to unpack the human-animal relation. Such a focus aligns it with other more accepted areas, such as the study of and design for work and leisure.

Figuring out the relation between humans and animals, and the way technology supports interaction between them, is as we have discussed a growing domain with its own relevance. However, understanding people and animals also have implications for broader areas of research within HCI. Here, the role of humans' anthropomorphism of personal computers per se has been a longstanding concern [16;19], and also in the attempt to design humanoid robots. The relevance to study technically mediated interaction with animals is made salient in Taylor's reformulation of how "machine intelligence" should be seen [18]. His starting point is people's ordinary ways of treating non-human things as intelligent in specific situations. He argues, along with much research in the area, that such relations occur when objects show some autonomy. Taylor further notes that the relations are engineered, and that the "intelligence" emerges in the relationships. He urges us to reflect on how assemblies of people and objects interact.

We argue that understanding technologically mediated human-animal interaction has a role to play here. This is not to say that animals and machines are the same thing, but that we can learn from the way people approach non-human "intelligence" in one area, by studying another domain. The 'assemblies' in hunting draw upon existing and historically established practices. Still, assessing the animals' abilities in the interaction is a constant concern, as well as the need to engineer the assemblies to make the interaction fit into social practices. Further, studying human-animal interaction makes it possible to understand how machine intelligence fits into wider social practices, beyond dyadic relationships between a person and e.g. a robot.

## CONCLUSION

Animals are increasingly integrated in interactive contexts dependent on digital technologies. How such systems are used at present, and could be used in the future, is a relevant concern for design-oriented areas like HCI. But if we do not decide on how to handle the inherent problems in the interaction with animals, the area will struggle to expand. In this paper we have argued for a way forward based on an ethnomethodological perspective on anthropomorphism [4]. We suggest focusing on instances of interaction, rather than pushing particular anthropomorphical agendas.

By presenting material from an ethnographic study of how hunters use a new GPS device aimed at monitoring the dogs, we have shown how the relationship between dogs and humans change when new technology is introduced. The GPS allows the hunters to get a richer understanding of what the dog is doing and supports the interpretation of the dogs' actions. The technology has the dual role of supporting the interaction between the dog and hunter, and in adding to the role the dog has in the organization and experience of the hunt. When we design for interaction between humans and animals, we should consider the social organization of the activities, rather than looking primarily at dyadic relationships between one person and one animal.

## APPENDIX: TRANSCRIPTION NOTATIONS

Based on Jefferson's transcript notation, as related in [1].

—	emphasis is indicated by underlining
e:h h h:	colon, indicates prolonged segment
(0.3)	a pause, timed in tenths of a second
(.)	pause shorter than one tenth of a second
Overlap []	simultaneous (overlapping) speech
-	interrupted speech
hhh	outbreath
.hh	inbreath
>what<	spoken faster
°yes°	'degree' signs enclose quieter speech
SAM	capitals are spoken louder than surrounding talk
<i>Over</i>	talk broadcasted on radio is italicized

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<sup>1</sup> In reverse alphabetical order. The research was carried out while the first author was a VINNMER fellow at Mobile Life Centre.