Smelling, Pulling, and Looking: Unpacking Similarities and Differences in Dog and Human City Life

Fredrik Aspling
Mobile Life @ Stockholm University
P.O. Box 1197 SE-164 26
Kista, Sweden
aspling@dsv.su.se

Oskar Juhlin
Mobile Life @ Stockholm University
P.O. Box 1197 SE-164 26
Kista, Sweden
oskarj@dsv.su.se

Elisa Chiodo
Politecnico di Milano
Dipartimento di Design
Via Durando 38/a, 20158
Milano, Italy
elisa.chiodo@polimi.it

ABSTRACT
The problem of understanding animals, e.g., what they want and what they are doing, are recurrent matters for the emerging field of animal-computer interaction (ACI). We focus on animals in the city by bridging the field with urban studies and open up for new design opportunities in terms of the possibilities of new digital technology to re-configure animal city life. We present an ethnomethodological video analysis of the negotiations and interactional work between two leashed pugs and a handler walking down a street. We unpack similarities and differences between the two species in terms of their interests and intentions in an urban environment through detailed examination of the moments in the walk when the leash is pulled taut. We show how a strained leash can result from a conflict between the dog's attentiveness towards other dogs by smelling and looking, and the human's urge to move along. We propose design directions supporting the dogs' wants and needs by accessing the handler with information on the dogs' curiosities in other dogs by visualizing the invisible scent-universe of the dogs and encourage dog-dog interaction.

Author Keywords
Dogs; dog walking; urban design; ethnomethodology; animal-computer interaction; human-dog interaction; dog-dog interaction; smelling.

ACM Classification Keywords
H.5.m. Information interfaces and presentation.

INTRODUCTION
Nonhuman animals have inhabited cities for ages. Since the mid-1990s there has been growing consideration of human-animal relations and animal lives within urban studies (e.g., [14, 27, 32, 33, 34]). Apart from these theoretical contributions dealing with urban animals, there has even more recently been increased interest in animals in urban design (e.g., [5, 6, 10, 11]) and planning (e.g., [1, 31]). The inclusion of nonhuman animals in design comes with a wide array of problems based on how humans and nonhuman species differ from each other physically, cognitively and subjectively. Hence, the problem of finding appropriate methods and approaches to account for animals and human-animal configurations is something that urban animal studies and design shares with the emerging field of animal-computer interaction (ACI) (e.g., [16, 18, 20, 21]). ACI emerged in order to treat animals and their involvement in computer-mediated interactions seriously and to develop user-centered technologies for animals. Just as animals have populated cities for a long time without being considered in urban design and theory, they have been involved in machine interactions for decades, but the design of such technologies has been anthropocentric, meeting humans' needs rather than those of animals [21]. With the emergence of ACI, animals have been placed at the center of attention in design. This has changed the way of thinking about animals and their involvement with technology. Animals are being treated as equal users of such systems and their perspectives must therefore be taken into consideration in the design of such systems.

The entrance of nonhuman animal species and their diverse abilities, bodies, languages, and cognition has challenged conventional HCI theory and design. It implies a need to account for the variety, potentials and limitations of nonhuman animal users [20]. However, there is also a need to understand their doings, wants, and needs. In order to truly design for animals, and reduce the problem of the "human proxy", where the animal's wants and needs are solely imagined by the human, it is necessary to find useful methods for gaining a better understanding of animals, e.g. of what they want and what they are doing. Hence, one of the key challenges facing ACI, and the main focus of this paper, is to find appropriate methods and approaches to account for animals and human-animal interaction from the animals'

 ACE '15, November 16-19, 2015, Iskandar, Malaysia ISBN 978-1-4503-3852-3/15/11. DOI: http://dx.doi.org/10.1145/2832932.2837013

perspectives, in order to base the design on their doings and interests.

Ethnomethodology (EM) has been proposed as an alternate approach to behaviorism and symbolic interactionism in dealing with problems relating to human-animal interaction [9]. From an EM perspective the inner lifeworlds of actors (e.g., their experiences, intentions) are not just available inside their heads, but are also revealed in ongoing concrete situations and understood not only by the involved actors themselves, but also by outside observers such as researchers. Previous EM studies include Goode's [9] account on human-dog play, Laurier et al.'s [17] work on how dogs and humans walk together, and Juhlin and Weilenmann's [16] work on hunters' use of GPS devices to monitor their hunting dogs. In line with these studies we want to emphasize the usefulness of EM in accounting for human-animal interaction by unpacking differences and similarities between humans and dogs in terms of their wants and needs in an urban environment.

We do this by presenting a detailed EM study of a video showing a human handler and her two leashed pugs walking down an urban street. When humans and dogs are connected through a leash, the interaction is direct, graspable, and tight. Apart from increasing the handler's control of a dog, the leash also functions as a mediator between them. The movements of the dog affect the movement of the human and vice versa. What each of them is doing or wants matters to the other in a very physical sense. If they have opposing intentions or interests it will be perceptible as a tension in the leash connecting them. That tension is not just felt in the hands or neck of the participants, but is visible also to outside observers such as an analyst. It follows that the perspective of the analyst, as presented in this article, is of possible relevance for individual dogs and dog handlers.

By observing the negotiations and interactional work between the handler and the dogs, particularly the moments where the leash goes taut, the intentions and interests of both humans and dogs can be grasped. We show how a taut leash can be an effect of the conflicting interest of the dogs' attentiveness towards other dogs by smelling and looking and the human's urge to move along. By following the leash and unpacking similarities and differences in how humans and dogs experience the city, we take a step towards producing more detailed accounts of human-animal configurations and conflicts, instead of the abstract and structural accounts of urban theory. In this sense it is similar to the ethnomethodological critique of traditional sociological theory, emphasizing the importance of studying how actors create order in actual concrete situations instead of constructing abstract theories of social orders. In this example, the actors are both animal and human.

Moreover, we link together animal-centered urban studies and ACI and open up for new design opportunities in terms of the possibilities of new digital technology to re-configure animals' city life. The design implication of this study is also to spark and inspire design by opening up new design spaces and opportunities for the ACI community. In this case, by opening up for the development of a more technological leash and to involve the dogs' wants and needs in future ACI design, rather than solely focusing on solving specific tasks or designing interspecies games.

THEORIZING AND DESIGNING FOR URBAN ANIMALS

In recent decades there has been growing interest within urban studies in animals and their city life. In particular, human and cultural geographers have explored how animals have been socially defined and positioned in human societies, many times focusing on human-animal relations in urban spaces (e.g., [27, 32, 33, 34]). This field, sometimes labeled animal geography, has made an effort to take animals seriously and to allow various forms of nonhuman urban inhabitants to "step out from the shadows" [2] and become subjects in urban theory.

Urban geography focusing on human-animal relations generally involves power-relations and conflicts over space such as "who is allowed here, and under what conditions?" [13]. Depending on how different species are categorized in terms of their usefulness and degree of domestication or wildness, they are assigned to specific spaces. In general, the city is often envisioned as exclusively human, but also as a space for pets and companion animals. Livestock animals are assigned to the countryside, and wild animals to the wilderness [27]. Thus, the nature/culture divide is a basic starting point in these kinds of discussions, with animals conventionally falling under the former category, and humans and cities under the latter. Situations where animals are "out of place" or at the boundaries of their prescribed places generally involve conflicts with human categorizations and objectives. Even dogs, which are widely accepted in cities and form part of the urban identity, have a history of conflict. Historically, the household pet dog was shaped in the 19th century, primarily for the rich, but was considered useless and lacking in any practical or economic function [9]. Before the modern practice of dog walking, dogs' access to public places was initially restricted, with requirements for muzzles and leashes [15]. Even today there are urban spaces where dogs are excluded, or must be leashed. Nevertheless, dogs are perhaps among the most accepted animal species in urban settings, with specially designed spaces such as dog parks.

Emphasizing the spatiality of human-animal orderings; how animals are categorized (as useful, pets or pests) and relegated by humans to particular places, leads us to new ways of thinking about human-animal relations. In the end it can also inspire us to find better ways to live

together [27]. One way of doing this could be through urban design and planning. It has already been suggested to take urban animal populations and how they are affected by the increased urbanism and infilling into account when doing urban planning (e.g., [1, 31]) and design (e.g., [6, 10, 11]). However, as a designed environment the city is primarily adapted for humans and their needs, and does not supply the needs of the non-human urban inhabitants [31]. Most design-work including urban dogs, such as dog parks and leashes, serves to control dogs and restrict them to prescribed places. However, there has recently been an ontological expansion and a move towards a posthuman understanding and sensibility in urban design and architecture (e.g., [5, 6, 10, 11]), embracing the dynamic between the architecture and the environment and introducing questions such as "for how many species do you design" [10, p. 3] even if there are still few examples of designing for and with urban animals (e.g., [6, 10, 11]).

These fields encompass new ways of looking at animals and attributing them with agency, intentionality, and subjectivity. However, they primarily build on abstract and theoretical contributions about human-animal orderings and relations in urban environments. Consequently they mainly draw on "cultural representations and anthropomorphized interpretations" with humans as the reference point [4]. The degree of such "human proxy" can at least be reduced by grounding the work in empirical studies aiming at understanding animals from their own point of view, something from which both urban studies and design could benefit. Instead of abstract and general explanations of urban animals and human-animal relations, we propose detailed empirical accounts of actual and concrete human-animal interactions and suggest using ethnomethodology as a way to deal with the problem of how to understand animals' wants and need in the urban environment.

In sum, animals are increasingly visible in urban theory and we can also see the beginnings of animal-centered urban design. Hence, there is a need to understand animals and what they require in the city. This kind of problems, and the methods, approaches and knowledge it involves, unite animal-centered urban studies and design with animal-computer interaction (ACI). Besides linking the fields and their concerns together, we would also like to point towards the design openings there is for the ACI community to design and reconfigure human-animal interaction and animal city life, and in that sense open up for new design spaces and possibilities.

METHOD AND SETTING

In order to unpack differences between dogs' and humans' city life, we have engaged in a detailed examination of an ethnographic video of two leashed dogs being walked in an urban setting. An ethnomethodological (EM) approach [7, 8], focusing on observable, concrete, and actual practices, is adopted when analyzing and interpreting the data. Ethnographic video provides a rich material for detailed in-depth examination of interactions in actual and concrete situations [12]. Hence, videography is commonly used in EM studies covering ordinary activities such as walking down a street [29]. It has also been influential in HCI since the 1980s when Suchman's [30] classic work gave a detailed account of practices of technology use. Audiovisual data are also commonly used in ethology to study animal behavior [19] and by ethnomethodologists studying human-animal interactions in the form of dog walking [17] and play [9]. Goode's [9] contribution is perhaps the most extensive EM work on human-animal interactions, and human-canine play in particular, and has influenced other EM studies focusing on human-dog interaction [e.g., 17, 16]. In this paper, which follows previous EM studies on human-animal interaction [9, 16, 17], we focus on leashed dog walking and the differences, similarities, negotiations, and interactional work between humans and dogs as a way to deal with the problem of grasping the wants and needs of animals from their own point of view. Analyzing one single case makes it difficult to make generalizations about the dynamics of leashed human-dog interaction, but it can reveal a detailed account of this form of interaction.

From an EM perspective inner lifeworlds (e.g., interests, motives, intentions) do not exclusively occur inside the head of the human actor, but are also visible in concrete and observable social situations [28]. An EM approach can also be valid for understanding animals and human-animal interaction, enabling us to grasp the mental states of animals in concrete and ordinary social situations. It is especially useful when dealing with direct interactions that are embodied and not language-based, such as those occurring between different species that do not share the same language. In accordance with Goode [9], we argue that detailed ethnomethodological investigations offer fruitful techniques for exploring various practices of human-animal interaction and emphasizing the interests of domesticated dogs. Understanding the human side of human-animal interaction is one thing [25] but accessing the animals' perspectives is more challenging. We do not claim that EM is the ultimate solution or the sole correct approach, but at least it is an alternative approach for understanding animals and their wants and needs in different ongoing and concrete situations. It is perhaps especially useful in situations such as leashed dog walking where artifacts, such as the leash, are involved and the interaction is direct and encompasses some kind of conflict or negotiation.

The data consists of a 15-minute video recording of a female handler in her thirties walking her two leashed pugs to and from a public dog park in central Milan. One of the pugs, henceforth referred to as the "big dog," is a five-year-old male. The other pug, the "small dog," is a

six-month-old female. The video was recorded with a mobile phone camera by author three in 2012. Most of the video captures the time spent off leash in the dog park (10 min), but here we analyze the leashed walk to and from the dog park (5 min). The time spent at the park is left out, as we are interested in the negotiations and conflicting interests manifested in the stretching of the leash. The dog park is a designed urban space where dogs can run around unleashed without disturbing people. When walking to the dog park the video shows the handler from behind and the dogs from various angles. Filming the handler from behind preserves her anonymity as well as giving a good view of the dogs and the tension in the leashes. The handler is aware of being filmed and has agreed to participate in the study.

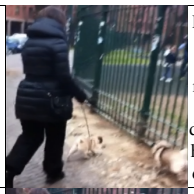
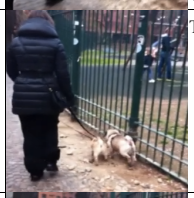
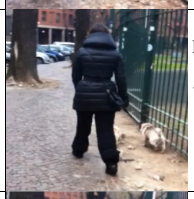
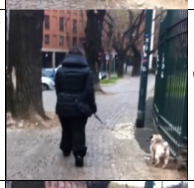
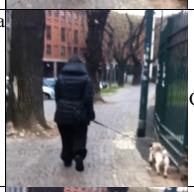
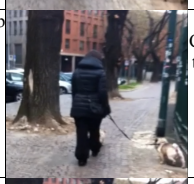
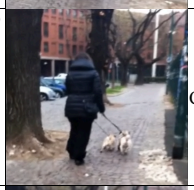
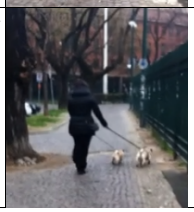
The video was transcribed, coded, and analyzed in joint sessions by the group. The transcript was organized in five columns, describing what's going on moment-by-moment. The first two columns provide time-stamps and image screenshots, followed by a column for each actor involved (human, small dog, big dog) with descriptions of what they are doing and indicating whether the leash is taut. This process progressed through several close viewing of the clip. Playing the video frame-by-frame in slow motion was useful for studying the tension in the leash and the dogs' rapid bodily movements. We have selected three excerpts that were especially relevant for the analysis and which are presented in the next section. The status of the leash is summarized in each dogs column with L:— for taut leash and L:~ for slack leash.

FINDINGS

We present three excerpts of a female dog handler walking down a street with two leashed pugs. By studying the tension in the leash in relation to what the actors are doing we visualize and reveal the interactional work and negotiations between them, and hence also similarities and differences in their interest in the urban environment. These excerpts show how human and dogs have different focuses of attention, and that dogs are often more interested in other dogs than in humans. Their curiosity in other dogs can be revealed in the tautness of the leash based on the dogs' practices of smelling (Excerpt 1) and looking (Excerpt 2), and due to the internal conflicts between the two dogs (Excerpt 3).

Pulling and Smelling

We show how the leash becomes taut when the human and the dogs choose different paths because of the dogs' interest in smelling various things.

Time	Image	Human	Big dog	Small dog
0:00		Walks forward in the middle of paved path. Both leashes in right hand.	Pulling right towards sand and fence area beside paved path (not visible, outside of the image). L:—	Pulling forward right. L:—
0:01		Follows dogs with taut leashes by going forward right. Slows down and takes the big dog's leash in right hand and the small dog's leash in left.	Moves forward on sand path close to the fence. L:—	Moves further to the right, head down, smelling. L:—
0:02		Turns head slightly left and goes onwards on right-side border of paved path, just before the path turns to sand, alongside dogs.	Continues forward. Passes fence pole, steady pace and head up, looking ahead. L:~	Bumps into big dog and walks side by side for a few steps. L:~
0:03		Follows small dog out to the left towards middle of paved path, alongside the big dog.	Continues forward by the fence, head down sniffing, slows down slightly and smells at fence posts when passing by. L:~	Speeds up out to the left on paved path, in front of human, pulling forward. L:—
0:06		Continues straight ahead, alongside the big dog.	Abruptly stops as sand path changes to asphalt, lifts head up, looking ahead. L:~	Pulling forward in front of human. L: possibly—
0:07a		Continues forward.	Standing still. L:—	Hidden behind handler, but seems to be pulling forward. L: possibly—
0:07b		Continues forward, turns head slightly to the right, probably looking at the big dog as leash gets taut.	Responding to taut leash by speeding up left forward towards the others. L:~	Hidden behind handler, but seems to be pulling forward. L: possibly—
0:09		Continues forward.	Joins small dog, pulls forward, walks side by side with small dog and in front of human. L:—	Pulling forward slightly to the right, in front of human. L:—
0:14		Moves forward right, responding to the dogs and taut leashes.	Pulling hard towards the fence to the right just after asphalt area has turned to sand. L:—	Follows big dog, starts pulling right towards sand/fence area. L:—

Excerpt 1: Human path and dog path

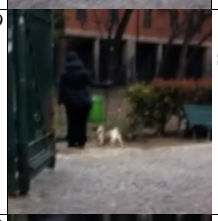
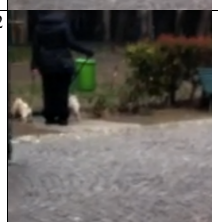
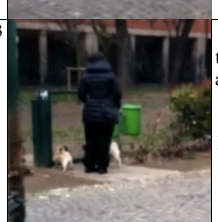
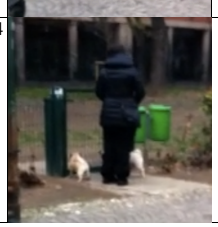
In Excerpt 1, the human is walking in the middle of a paved path and both dogs are pulling to the right toward an unpaved and sanded track close to a large fence (0:00-0:01). The handler follows and walks alongside the dogs on the right-hand border of the paved lane (0:02). The small dog runs out to the paved track and pulls forward; the human follows the pace of the small dog while the big dog continues sniffing along the fence (0:03–0:06). As the

sanded area turns to asphalt the big dog stops (0:06) and strains at the leash (0:07a). The big dog responds by speeding up and joining the others (0:07b). Just as the asphalt area, which stretches for about ten meters, ends the big dog pulls towards the sandy area again, joined by the small dog (0:14).

As in several other sequences during the walk, the tautness of the dogs' leashes reveals the intention of the involved actors to follow different paths. In this case, the dogs' choice of track, and hence the environment to walk on, seems to be dependent on the availability of interesting smells. The dog was leaning down and smelling along the fence. This sensorial aspect is not present in the humans' choice of route. The handler wanted to stay on the paved path (the human path) and the dogs prefer rougher and unpaved environments (the dog path), though alongside the human path.

Pulling and Looking

We show how the dogs' acts of looking make their interest in other dogs observable.

Time	Image	Human	Big dog	Small dog
0:48		Follows small dog to the left on a paved path curving to the right towards dog-park fence.	Starts pulling right (or forward on paved path after the curve). L: —	Pulling towards dog park fence. L: —
0:49		Stops in front of fence, lifts arm/leash up as the big dog comes up alongside.	Responds to taut leash by slowly moving left. Gets closer to the fence on the right side of the handler. L: ~	Stops by the dog park fence. L: ~
0:52		Standing still, right arm upwards.	Stops by dog park fence, on the right side of the handler. L: ~	Standing still by dog park fence, looking towards other dogs on the far right of the park. L: ~
0:53		Standing still, takes down right arm, seems to be rolling up the leash on her hand, to make it taut, gets them ready to move along.	Casts an eye towards small dog. L: ~	Still standing by the fence, quickly looking at big dog. L: ~
0:54		Standing still.	Hidden behind handler (seems to be standing with head towards small dog). L: ~	Looks into the dog park again. L: ~
0:56		Starts walking right. Both underarms upwards, making the leash shorter.	Follows human, looks to the right, walks in front of handler. L: ~	Follows human on left side of handler. L: slightly —

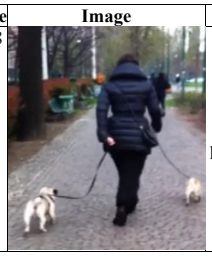
Excerpt 2: A gaze into the dog park

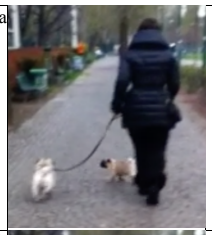
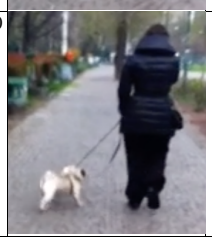
In Excerpt 2, the handler and the two pugs move forward on a paved path curving to the right. The small dog constantly pulls left towards the dog-park, whereas the big dog pulls right and forward on the path after the curve. The handler follows the small dog and both leashes are taut (0:48). The handler stops in front of the dog-park fence with the small dog in front of her, and the big dog responds to the taut leash by coming closer to the others (0:49), and later by joining them on the right side of the handler (0:52). The two pugs are now standing slightly in front of the handler, the small dog to the left and the big dog to the right (0:52). The small dog, who is gazing into the dog park and at the other dogs (which are in the corner of the park and not visible in the images from the excerpt), casts an eye towards big dog (0:53), which seems to be looking at the small dog rather than into the dog park. The small dog looks into the park again and the big dog seems to be looking at the small dog (0:54) until the handler lifts her arms to tauten the leashes somewhat and takes the initiative to moving on (0:56).

The tension in the leash due to the small dog pulling towards the dog park (0:48), is followed by the small dog intensely looking through the dog park fence (0:52, 0:53, 0:54). It thus seems to have revealed an interest in looking into the dog park, presumably at the other dogs on the far right side of the park. The handler agrees to stay there for a while, but the next time the leash gets stretched (0:56) it is the human who desires to continue walking along the path. The small dog adapts to the handler and her wish, hence letting go of its interest in the other dogs. The dogs want to check things out, especially other dogs, while the handler prefers to move along.

Pulled Between two Dogs

There can be other reasons for the leashes to go tout. It can be caused by internal conflicts between the dogs, rather than between the handler and the dogs, as in the previous two excerpts. In that sense, the human becomes intertwined in dog-dog interaction through the leash.

Time	Image	Human	Big dog	Small dog
1:18		Moving forward in the middle of paved path. Big dog's leash in left hand and small dog's leash in right.	Moves forward on left side of handler, slightly behind. L: ~	Moves forward on right side of handler, slightly in front of handler. L: slightly ~

1:19a		Continues forward.	Continues forward on left side of handler, pulling to the left. L: ~	Moves to the left, towards the big dog in front of the human, looks at the big dog. L: ~
1:19b		Continues forward.	Continues forward pulling left. L: starts to —	Moves further to the left, towards the big dog. L: starts to —
1:19c		Continues forward.	Continues ahead, pulling forward, slightly behind the small dog on its right side. L: —	Starts moving forward, slightly in front of the big dog. L: —
1:20		Continues forward.	Moves to the right, behind the small dog. L: ~	Continues forward. L: —

Excerpt 3: Straining at the leash to get away from the small dog

In Excerpt 3, the human is walking in the middle of paved path with the small dog to her right and the big dog to her left (1:18). The small dog changes side by crossing the human path (1:19a–1:19b) and comes up next to (in front of) the big dog who starts going to the right (1:20).

This crisscrossing, where the dogs continuously change sides making their leashes go taut is present during the whole walk. The small dog seems to want to interact by bumping into and getting in the way of the big dog. The big dog seems to try to avoid the interaction by going away from the small dog. It is in these situations that the big dog's leash goes taut. This excerpt highlights the different characteristics of the two dogs, and how the human is entangled in their interactions. The interaction between the human and the dogs is here an indirect effect of the direct interaction between the animals.

DISCUSSION AND DESIGN REQUIREMENTS

This study was undertaken to reveal differences between dogs' and humans' experiences of city life by closely examining the negotiations and interactional work manifested in the ordinary activity of leashed dog walking**.** We have already emphasized to usefulness of video analysis and ethnomethodology (EM) as tools for understanding animals and their interests. In this section we first focus on what the dogs want in an urban environment. As a methodological implication, this is of relevance for both urban studies and urban design focusing on animals. Second, the detailed findings and thick descriptions of the negotiations and interactional work between the dogs and the handler, and the dogs wants and need in terms of attentiveness towards other dogs, can be of relevance to future design directions for ACI.

City Life for Dogs and Humans

As the excerpts showed, humans and dogs want different things in the urban environment. Understanding dogs' or other nonhuman animals' wants and needs in the urban environment is crucial for designing with their point of view in mind. To avoid ending up in what we call "human proxy", where the human is the reference point for the animals' point of view, we suggest grounding animal-centered design in empirical studies with appropriate methodological approaches. We have already proposed using ethnomethodology (EM) and video analysis as ways to expose the differing interests of dogs and humans and thereby to reveal their wants and needs by "following the leash" in concrete situations. Here we focus on dogs in the city and their requests.

Firstly, as the first excerpt shows, they chose different paths. The human path and the dog paths run parallel to each other. The dog path contains more natural features such as grass, sand, and objects marked with urine from themselves or other dogs, and the pace is adapted to what the environment has to offer. In Excerpt 1 the big dog walks on a sandy dog path until it suddenly changes into asphalt. The dog hurries back to the human path, stays there until the asphalt ends, and finally returns to the more interesting dog path. On the other hand, the human prefers walking forward on the paved path at a normal pace without longer halts. The dogs seem to want to investigate more smells, and most likely the traces of other dogs, than they have a chance to. This is visible in the tautness of their leashes in situations of smelling, where the human continues walking forward fulfilling her interest in proceeding towards a goal. Hence, all these scenarios where the dogs' leashes go taut while they sniff around for other dogs indicate a need and wish to interact with other dogs. This is also visible in the second excerpt, though this time the dogs look at other dogs rather than sniffing after their traces. Acts of both smelling and looking and situations with taut leashes all reveal the dogs' wish to interact with other dogs.

In the video we have also seen that there are differences between the two pugs. This is perhaps most evident in Excerpt 3. The small dog constantly seems to be interested in other dogs passing by or visible at a distance, or that have left traces on fence posts and other objects along the way. The big dog seems to avoid the other dogs, including the small dog, but is still interested in smelling

things, presumably for traces of other dogs. Rather than viewing all dogs as the same, we must be aware of differences between them, in terms of different breeds, and different ages and sexes within the same breed. However, in comparison to humans they all behave and experience their environment in a very similar manner, and relate to other dogs through looking and smelling.

Urban studies concerning animals tend to lean towards abstract and structural accounts of human-animal orderings, often in relation to issues of conflict, power and control. Such general approaches have little to say about the intentions and interests of animals themselves. In this paper we take a step toward understanding the more practical and detailed aspects of human-animal conflicts by studying the interactional work and negotiations performed through the leash. Leashed dog walking facilitates such as an analysis, as the tension in the leash reveals and visualizes differences and conflicting interests between humans and dogs. The animals' wants and needs in urban environments are better understood by studying actual practices and human-animal interactions in concrete ongoing situations. This move is similar to the ethnomethodological critique of traditional sociological theory, emphasizing the need to study people methods for creating order in actual concrete situations instead constructing and applying abstract theories of social orders.

Suggested Design Orientation: Visualizing Smell

We would like to point out that the dog's taut leash in Excerpt 1, due to its desire to smell, is visible in the video and to the dog handler. But neither the analyst nor the dog handler has access to the experience of the smell when looking at the video. We do not see the dog handler make any effort to share the smelling experience, such as leaning down toward the fence posts, etc. Modern biology also teaches us [23] that the sense of smell differs between canines and humans, so we cannot assume that the human would experience the same thing as the dog even if she carefully sniffed the objects smelled by the dog. Thus, both in terms of the actual practice and biology, we are looking at humans and dogs having different experiences of the city. What is visible to the analyst is obviously also visible to the dog handler, for instance the dogs bumping into each other and trying to get away in Excerpt 3, or the dog looking at other dogs in Excerpt 2. These excerpts show not only that the human and the canines want to do different things, but also that the dogs take an interest in other dogs.

Acknowledging our uncertainty about what the dog is experiencing when smelling, we allow ourselves to make a more risky interpretation. Since we see the dogs urinating on objects in other situations during the walk, and seeing that these particular dogs do take an interest in other dogs, we assume that they are smelling other dogs' urine, possibly to identify who has been there. We argue that this divergence in interests, which is visible to the dog handler and the analyst, based on an invisible orientation to an unshareable experience, could be taken into account in design. There are already studies within ACI that recognize the importance of smell. In ACI, researchers have acknowledged canines' extended sense of smell by designing a diabetic alarm system that a dog grabs with its mouth when it smells that a patient has fallen into coma [26], and designing a communication system that allows dogs to communicate with humans with increased richness [23]. In HCI, Obrist et al. [24] recognize the emergence of smell interfaces and Brewster et al. [3] investigate how humans' perceptions of such sensorial experiences connect to memories, and develop a categorical scheme that generalizes from individual experiences.

We propose the designing of a canine-social media through which the locations of dogs' urination is tagged with the position and the dog's name, and this information is then shared. When other dogs smell the object at that location, their owners could use the app to get more information about what has happened there. In our case, the dog handler would gain an increased understanding of the invisible dog-dog communication observed in Excerpt 1, which might affect the negotiations of their common city life through the leash.

CONCLUSIONS

This paper primarily has methodological implications for the field of animal-computer interaction (ACI) through its suggestion that ethnomethodology (EM) can be used as an alternative approach for understanding the doings, wants and need of dogs, as well as of their interactions with humans. This is done here by focusing on differences and similarities between the two species, in terms of their interests and intentions in the urban environment, by analyzing their interactional work and negotiations manifested in the moments of the walk where the leash go taut. Hence, it also relates to urban studies and design focusing on animals, which shares the same fundamental problem of finding ways to account for animals and human-animal configurations in designing for urban animals in a way that more closely reflects their own interests.

Besides linking the fields together suggesting approaches of dealing with their shared concerns, we would also like to point towards the design openings there is for the ACI community to design and possibly reconfigure animals' experience of their city life. Drawing on the empirical findings we emphasize that a taut leash results from the conflict between dogs' interest in other dogs, expressed through smelling and looking, and the humans' urge to keep walking. We propose design directions supporting the dogs' want and needs in the urban environment by accessing the handler with information on the dogs' curiosities in other dogs by visualizing the invisible scent-

universe and communication system of the dogs. Consequently, involving the dogs' interest in design, rather than focusing on solving specific tasks or designing interspecies games. At a more general level, the design implication for this paper is also to spark and inspire design by introducing new design spaces such as the outdoor and urban scenarios for ACI.

ACKNOWLEDGMENTS

We would like to thank our participants and the Mobile Life VINN Excellence Center for making this research possible.

REFERENCES

1. Beatley, T. & Bekoff, M. (2013). City Planning and Animals: Expanding Our Urban Compassion Footprint. In: *Ethics, Design and Planning of the Built Environment,* Vol. 12, 185-195.
2. Braun, B., (2005). Evironmental Issues: Writing a More-Than-Human Urban Geography. In: *Progress In Human Geography*, 29(5), 635-650.
3. Brewster, S., McGookin, D., and Miller, C. (2006). Olfoto: Designing a Smell-Based Interaction. In: *Proc. of CHI '06 (ACM)*, 653-662.
4. Buller, H., 2014. Animal Geographies I. In *Progress in Human Geography*. Vol. 32(2), 308-318.
5. Dodington, E., 2013. *How to Design with the Animal. Lessons in Cross-Species Architecture and Design*. Independently published, privately funded.
6. Extended Environment (formerly Animal Architecture), expandedenvironment.org, Retrieved May 25, 2015.
7. Garfinkel, H. (1964). Studies of the Routine Grounds of Everyday Activities. In *Social Problems*, 11(3), 225-250.
8. Garfinkel, H. (1967). *Studies in Ethnomethodology*. Cambridge: Polity Press.
9. Goode, D. (2006). *Playing with my dog Katie: An Ethnomethodological Study of Dog-Human Interaction*. Purdue University Press.
10. Harrison, A. L. (Ed.) (2013). *Architectural Theories of the Environment: Posthuman Territory*. Routledge.
11. Harrison, A.L. (2013). Animal Interfaces for a Post-Human Territory. In *ACSA Annual Meeting Proceedings, New Constellations, New Ecologies.*
12. Heath, C., Hindmarch, J. and Luff, P. (2010). *Video in Qualitative Research. Analysing Social Interaction in Everyday Life.* London: SAGE.
13. Holmberg, T. (2013). Trans-Species Urban Politics: Stories from a Beach. In *Space and Culture*. 16(1), 28-42.
14. Holmberg, T. (2015). *Urban Animals: Crowding the Zoocities.* Routledge.
15. Howell, P. (2012). Between the Muzzle and the Leash: Dog Walking, Discipline, and the Modern City. In: Atkins, P. (Ed). *Animal Cities: Beastly Urban Histories*. Ashgate.
16. Juhlin, O. & Weilenmann, A. (2011). Understanding People and Animals: The Use of a Positioning System in Ordinary Human-Canine Interaction. In *Proc. of CHI '11 (ACM),* 2631-2640.
17. Laurier, E., Maze, R. & Lundin, J. (2006). Putting the Dog Back in the Park: Animal and Human Mind in Action. In *Mind, Culture, and Activity*, 13(1), 2-24.
18. Lee, S. P. Cheok A. D., James T. K. S. 2006. A Mobile Pet Wearable Computer and Mixed Reality System for Human-Poultry Interaction through the Internet. In *Personal and Ubiquitous Computing,* 10, 301-317.
19. Lorimer, J. (2010). Moving Image Methodologies for More-than-Human Geographies. In *Cultural Geographies*. 17(2), 237-258.
20. McGrath, R. (2009). Species-Appropriate Computer-Mediated Interaction. In *CHI '09 (ACM)*, 2529-2534.
21. Mancini, C. (2011). Animal-Computer Interaction: A Manifesto. In: *Interactions*. 18(4), 69-73. ACM.
22. Mancini, C., van der Linden, J., Bryan, J., & Stuart, A. (2012). Exploring Interspecies Sensemaking: Dog Tracking Semiotics and Multispecies Ethnography. In *Proc. of UbiComp'12*, 143-152.
23. Mancini, C., Harris, R., Aengenheister, B., & Guest, C. (2015). Re-Centering Multispecies Practices: A Canine Interface for Cancer Detection Dogs. In *Proc. of CHI '15 (ACM)*, 2673-2682.
24. Obrist, M., Tuch, A.N., and Hornbaek, H. (2014). Opportunities for Odor: Experiences with Smell and Implications for Technology. *In Proc CHI '14 (ACM)*, 2843-2852.
25. Paldanius, M., Karkkainen, T., Vaananen-Vainio-Mattila, K., Juhlin, O., and Hakkila, J. (2011). Communication Technology for Human-Dog Interaction: Exploration of Dog Owners' Experiences and Expectations. *In Proc. CHI '11 (ACM),* 2641-2650.
26. Robinson, C., Mancini, C., van der Linden, J., Guest, C., Harris, R. (2014). Canine-Centered Interface Design: Supporting the Work of Diabetes Alert Dogs. *In Proc. CHI '14 (ACM)*, 3757-3766.
27. Philo, C. & Wilbert, C. (Eds.) (2000). *Animal Spaces, Beastly Places: New Geographies of Human-Animal Relations*. London: Routledge.
28. Randall, D., Harper, R., & Rouncefield, M. (2007). *Fieldwork for Design: Theory and Practice.* Springer.

29. Ryave, A. L., & Schenkein, J. N. (1974). Notes on the Art of Walking. In R. Turner (Ed.), *Ethnomethodology.* Harmondsworth: Penguin.

30. Suchman, L. (1987). *Plans and Situated Actions: The Problem of Human-Machine Communication.* Cambridge: Cambridge University Press.

31. Tarsitano, E. (2006). Interaction Between the Environment and Animals in Urban Settings: Integrated and Participatory Planning. In *Journal of Environmental Management*. 38, 799-809.

32. Wolch, J. & Emel, J. (Eds.) (1998). *Animal Geographies: Place, Politics and Identity in the Nature-Culture Borderlands*. New York: Verso.

33. Wolch, J. (1996). Zoöpolis. In *Capitalism Nature Socialism*, 7(2), 21-47.

34. Wolch, J. (2002). Anima Urbis. In *Progress of Human Geography*, 26(6), 721-742.