Creating Meaningful Interactions with Dogs and Screens

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ABSTRACT
This short paper presents current work done within the Animal Computer Interaction (ACI) field on Dog Computer Interaction (DCI) in aim of a doctorate in Computer Science. Work here aims at enabling a dog to use computer machinery in an ordinary way to have meaningfully interactions enhancing their current lives. A short elucidation of studies and theories developed is given up to this point followed by their findings and conclusions. This is followed by research topics that this work aims to cover with questions arising from these.

Author Keywords
ACI; DCI; Dog Computing; Doctoral Paper.

ACM Classification Keywords
H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION
With the growing occurrence of pets sharing our homes and technology becoming further ubiquitous is only progressive to presume that the technology revolution humans’ face will be soon facing our pet companions’ as-well. Although technology has been used by dogs in laboratories and working environments (either military or as human-aids) this research has been primarily focused on the human requirement aspect, seeking goal oriented tasks, rather than an animal-centric approach. This creates a gap of missing animals’ requirements in Animal Computer Interaction (ACI), the subfield of Dog Computer Interaction (DCI) and Human Computer Interaction (HCI). Our research aims to explore this research gap through the well explored HCI lens to create a user-centric approach to dogs’ interaction with screens to elicit root requirements and needs to build theories and methods for DCI.

RESEARCH QUESTIONS
Research here aims to progress DCI to empower dogs through technology shaped around their requirements, optimizing screen interaction interfaces for DCI purposes. These questions below, therefor, are sought in purpose of this overarching goal.

- Can dogs learn to use automatic screen devices?
- Can methods be created to model dogs’ interaction with singular and multiple screens?
- How can, we as humans, evaluate and support screen interaction within DCI?
- Can screen interaction in DCI be automated, as evident in HCI?
- What is a dogs’ role within DCI systems?
- What meaning does a dog gather from screen interaction?

These questions, whilst often a definitive answer remains often illusive, has been partially explored through studies and theories created over the last two years of this investigation.

STUDIES UNDERTAKEN
DCI studies undertaken, have been taken on two perspectives: to support the human role or support the dogs’ role within DCI systems. Whilst the studies investigating a dogs’ choice over content and screens with a head tracker focus on supporting the dogs’ role within DCI through aiming to draw meaning and automation, Dog Information Sheet (DISH) aims towards enhancing the human feedback upon the DCI interface.

Dog Content Digression
The initial exploration into DCI with screens was taken through a study to explore if the preference that dogs have over images [9] are further pertained with media. Work here formed an initial method for quantifying dogs’ interactions with screens and supported the pictorial findings of content digression for dogs preferring their own species based media [7].
Dog Head Tracker
The above analysis however required human analysis of the data, and as such a method was explored of automation through a dog head tracker, unlike the previous contact methods [9, 10]. This head tracker was programed in Matlab using image classification of head movements left, right and center could identify the dogs head direction with an accuracy of >82% [6]. This resulted in an initial method of classifying head direction contact free without training.

Dog Screen Choice
Following on from this investigation into automation and content choice, screen choice was analysed to further develop a method of quantifying screen choice. These preliminary results indicated that dogs cannot choose between multiple screens, often preferring to watch nothing not aligning with previously seen media context digression [1]. This study overall, helped to bring further scaffolding into the DCI screen interaction space through a method to quantify interaction.

Dog Information Sheet (DISH)
This aim for enhanced evaluation was then taken into a human context as an informed evaluator to see if supplementary information on dog behaviour, a Dog Information Sheet (DISH), resulted in more contextual emulations. Contextual evaluations are observations on not only the behaviour exhibited by the dog, but the more in-depth reason behind the behaviour. This contextual reason helps DCI system designers by providing meaning behind the interaction behaviour. This study found that by using DISH dog owners gave 33% more contextual behaviours, but unless the dog owner evaluated themselves as experts they could not assess their dogs’ reactions to persuasive media [2].

THEORIES FORMED
Surrounding these studies forming methods within DCI with screens, theories have also been created to support DCI.

Dog Centric Design (DCD)
Early into the exploration of DCI, informed by the way that the researcher feels about dogs, a dog centric approach was taken to DCI coined Dog Centric Design (DCD) [5]. This has formed the backbone of the study methodology within this exploration that the technology created for dogs should be formed around their needs and requirements centering them within the design process of DCI. With history littered with DCI technology for the human vantage, this work follows the progressive dog sentient rights, to empower dogs to take an active role within computer systems.

This was initially approached through classifying DCI into three categorizations through the outcomes they sought; humanization, domestication and playful. This theory is based upon the acknowledgement that the outcomes sought through technology impact the roles that the users hold within systems and as such, the outcomes derived. This theory, whilst drawing from HCI takes on an agential realism and Science, Technology and Society (STS) stance that the values we hold and the state of social, political and cultural values affect the research conclusions researched and social norms in DCI and in turn, future investigations iteratively. The undertone of all the work encompassed by this research argues for centering practices.

Doggy Ladder of Participation (DLOP)
To support these practices, taking from Harts Ladder of Participation empowering children, a Doggy Ladder of Participation (DLOP) was modeled [4]. DLOP encourages a dogs’ participation within DCI through enabling a dogs’ interactions to have a direct result upon the systems created. This ladder, whilst acknowledges dogs will never make their own computer systems, does encourage a shared decision as a top form of participation. These leaves the model open to debate around which level, from decoration to full participation, holds the most meaning for dogs with ultimately inclusion, on some level, creating more informed DCI technology systems.

Ethics of creating DCI systems
When designing technology for dogs, ethics need to be considered [8]. The technological approach with dogs has changed with a progressive viewpoint of where a dog is situated within a computer system and how the researcher reacts and treats the dog. Informed by previous studies, a list of ethical protocols within DCI was comprises to ensure the best animal welfare and the usage of appropriate data collection methods [3]. Within this ethics, as mentioned within DCD, the ideology is presented that the extent to which the researcher views the animals will directly affect the results and methods created. It is through the researchers stating how they conceptualize dogs, and being aware where the dog-human relationship place can be situated that more depth is given to the findings.

TOPICS FOR DISCUSSION
Within this research, DCI and ACI, there are topics of exploration that would benefit from discussion.

What can a dog do interactively and their role in ACI?
Whilst systems are being created for dogs to interact with, there is a lack of discussion behind what a dog is within a computer system context, and what can a dog do interactively within a system from a cognitive standpoint. Whilst a definitive answer is not sought, and certainly not possible, as a researcher this discussion could help define both interactivity within DCI, arguably the largest area of ACI, helping to frame a dogs’ role and possible interaction methodologies.

CONCLUSION
The work carried out throughout this doctoral research is the first initial look into dogs’ interactions with screen technology in a Dog Computer Interaction (DCI) centric
standpoint. Through this work, methods and theories have been created to help scope out both the role that the dog takes through DCI systems and a dogs’ choices and interaction methods possible. This is supported through theories of inclusion, participation, ethical guidelines with an overarching theme of Dog Centric Design (DCD). This paper presents research questions sought through this, and future, work and presents useful topics of discussion within DCI and ACI.

REFERENCES