The tail shouldn't wag the dog: Why modeling dog–human interaction is not ideal for socially assistive robotics

Article *in* Interaction Studies · January 2014

DOI: 10.1075/is.15.2.06fei

CITATIONS
2

READS
24

1 author:

David Feil-Seifer
University of Nevada, Reno
54 PUBLICATIONS **1,253** CITATIONS

SEE PROFILE

Running head: TAIL WAGGING THE DOG

Tail Wagging the Dog: Why Modeling Dog-Human Interaction is Not Ideal For Socially Assistive Robotics

David Feil-Seifer

Lab

Department of Computer Science, University of Nevada, Reno

Reno, NV, USA 88888

dfseifer@unr.edu

Tail Wagging the Dog: Why Modeling Dog-Human Interaction is Not Ideal For Socially Assistive Robotics

Introduction

In their article, Farago, et al. present a study designed to investigate dogs' behavior toward their human owners in home settings (Farago, Miklosi, Korcsok, Szaraz, & Gacsi, 2013). Their examination concerned how a dog's behavior would be different when their owner was paying them attention to when their owner was ignoring them. The stated intention of this study was to use dogs' behavior as a model for robot-human interactive behavior in home settings.

This critique advances the argument that there are applications for which the use of dog behavior as a guide is appropriate. However, there are also several instances where the type of behavior that dogs exhibit and the types are reactions that dogs engender are not appropriate for use in the home.

In particular, when examining Socially Assistive Robotics (D. Feil-Seifer & Matarić, 2005), robots that provide assistance through social interaction, dog-type interaction becomes a real concern and possibly a detriment to the robot's intended use. In this critique, we will present scenarios where basing a robots' interactive behavior on a dog's may become problematic.

Original Argument

Farago, et al., argue that social interaction with robots in the home suffers from a novelty problem. They cite studies which demonstrate that users of iRobot Roombas in the home initially spoke of the robots as if they were living creatures. However, over time, they started to merely think of the robots as home appliances. The authors argue that this is a result which needs to be addressed.

To do so, they propose to use human-dog socialization as a model for human-robot interaction (HRI). This is a good model, they argue, because dogs' social interaction behavior has allowed them to operate in human society. In particular, they discuss how dogs can be used for cooperating with humans, communicating in different modalities, and can show attachment with a person similar to mother-infant attachment.

Counter Argument

This paper presents a counter-argument to the authors' conclusions. There exist many domains for which dog-like interactions with a user are appropriate. However, there also exist numerous domains where such interactive behavior would be inappropriate, even detrimental to the goals of the robot. This section will examine three counter-arguments to the authors' assertions. This counter-argument is not intended to address the validity of the presented study, only the range to which they propose to apply its results.

Should robots be appliances or social partners?

The target article cited the work of Sung, et al., who studied long-term adoption of the Roomba vacuum cleaner robot. The decreased novelty of the robot was reflected in a change of terminology relating to the robot, gradually referring to it less as a social entity and more as a tool (Sung, Grinter, & Christensen, 2010). Farago argues that the social role is beneficial for long-term relationships. The implicit argument is that a lack of social attitudes are reflective of a lowered interest in the robot and that lowered interest will interfere with the robot's goals.

However, as Sung, et al. discussed in their paper, even as the Roomba owners began to think of the robot more as a tool, they still showed behavior consistent with adoption of the robot into their lives. Most significantly, even as they were less interested in the robot as a novelty item, the families started showing accommodation behavior to the robot's eccentricities while cleaning. In particular, the researchers observed that while traditionally

vacuuming had been a "mom-cleaning" job, that after the introduction of the Roomba, vacuuming and the pre-cleaning behaviors associated with vacuuming became tasks done by the whole family. This would suggest that a lack of social identification with the robot did not negatively impact its adoption as a tool by the families.

Discussion within the HRI community has identified situations where a robot is a *tool* rather than a *team-mate*. In these situations, a robot is something that is used without regard for its social identity. Robots such as the DaVinci surgical robot (Chapman Iii, Albrecht, Kim, Young, & Chitwood Jr, 2002), hospital delivery robots (Mutlu & Forlizzi, 2008), etc. are used mostly for manipulation or fetch-and-carry tasks. Their lack of social identity has not negatively impacted their use in workplace settings. Similarly, the Roomba study above shows that if seen as an appliance, social identity is not necessary for adoption, even in the home.

Does the robot's form match its function?

There are a number of pet-like robots that are being used, from dog-like robots such as the AIBO (Stanton, Kahn, Severson, Ruckert, & Gill, 2008), to cat like robots such as NeCoRo (Libin & Cohen-Mansfield, 2004), and seal-like robots such as Paro (Wada, Shibata, Saito, & Tanie, 2002). The forms of these robots all are rather pet-like, and so it would make sense for the robot to behavior in a pet-like manner. However, in cases where the robot does not look like a pet, especially if it looks like a person, it would not make sense for it to behavior in a dog-like fashion.

I recall a time when my lab was developing a humanoid robot intended for children (see Figure 1). We thought that it would be more soothing for the robot to have a woman's voice; we used no gender-specific terms with the robot. We then ran a demo session with about 15 children. Without fail every child approached us after the session was over and asked, "why is the boy robot talking in a girl's voice?" One of the lessons we took from this session was that the behavior of the robot has to match preconceived notions that people

may have for the robot. In this case, the robot was taller than them with no hair and was therefore a boy.

Similarly, it would negatively impact a user's impression of a robot if it exhibited dog-like interactive behavior without looking like a dog. There are many robot morphologies that would be dog-like. In fact, many of the early two-wheeled robots are small in height and roughly dog-sized. These robots elicited a dog-like response. However, if you look at humanoid robots, a pet-like interaction would detract from a user's experience with the robot.

When are dogs not the best model for home-based interaction?

The second major point made in the target article is that human-dog interaction behavior can be used as a model for sustained human-robot interaction. The authors cite examples from companionship, to fetch and carry tasks, to other forms of helper robots. While many of these examples are valid, there are just as many examples where dog-like behavior might be inappropriate, even detrimental to the goals of the robot.

As the authors pointed out, the seal-like robot Paro can be used in elder-care settings where pets are not allowed. Paro has been shown to reduce stress reactions and provoke both human-robot *and* human-human interaction (Wada et al., 2002). In these situations, a pet-like robot can be used in a similar way to a non-robotic pet. The authors' assertion that dog-like interaction can be an effective model for robot behavior is true in the case. Similarly, if a robot is being designed merely for companionship then dog-like interaction may be appropriate.

However, there are several cases where such behavior would not be ideal. Studies have shown that the behavior of a robot has an impact on a user's perception of that robot (D. J. Feil-Seifer & Matarić, 2011; Tapus & Matarić, 2006; Mutlu, Shiwa, Kanda, Ishiguro, & Hagita, 2009). If the role of the robot and the projected behavior of the robot do not match, then people might have difficulties interacting with it. Similarly, Kiesler and Goetz

published a study which showed that a more stern robot engendered higher compliance rates than a robot which was friendlier (Kiesler & Goetz, 2002).

Dog-like interaction may pose a similar problem for a robot designed to encourage compliance with a therapeutic regimen. Take, for example, an in-home robot designed to give medical advice or feedback. In those cases, the robot is meant to have some type of authority in an assistive domain. If the robot is behaving like a dog such as constantly exhibiting behavior consistent with enhanced neuroticism like constant proximity or tail-wagging, that behavior would deter from the image of an agent which is capable of giving competent medical device. After all, would you take medication just because your dog told you to?

Conclusions

In the target article, Farago, et al., present an interesting study which examines dog-human interactive behavior. They propose to use these data as a model for human-robot interaction in the home. This paper presents a counter-argument to that assertion. Instead, I propose that dog-like behavior is appropriate as a model for a robot similar in form to a dog that only has companionship as its primary goal.

This counter-argument asserts that in the first place, it is acceptable for humans to regard robots as appliances in certain conditions as long as it is still being used for its intended purpose. Second, that a robot's form should match its functionality. If a robot behaves like a dog, then it should look like a dog. Third, that dog-like interaction might be inappropriate for tasks related to socially assistive robotics, even for task occurring in the home.

The results of the study presented in the target article are interesting and could be applicable to a limited range of human-robot interaction. However, the scope of their answers are too broad.

References

Chapman Iii, W. H., Albrecht, R. J., Kim, V. B., Young, J. A., & Chitwood Jr, W. R. (2002). Computer-assisted laparoscopic splenectomy with the da vinci surgical robot. *Journal of Laparoendoscopic & Advanced Surgical Techniques*, *12*(3), 155–159.

Farago, T., Miklosi, A., Korcsok, B., Szaraz, J., & Gacsi, M. (2013). Social behaviours in dog-owner interactions can serve as a model for designing social robots. *Interaction Studies*.

Feil-Seifer, D., & Matarić, M. (2005, Jul). Defining socially assistive robotics. In *Proceedings of the international conference on rehabilitation robotics* (p. 465-468). Chicago, Il.

Feil-Seifer, D. J., & Matarić, M. J. (2011, Aug). People-aware navigation for goal-oriented behavior involving a human partner. In *Proceedings of the international conference on development and learning.* Frankfurt am Main, Germany.

Kiesler, S., & Goetz, J. (2002, April). Mental models and cooperation with robotic assistants. In *Proceedings of conference on human factors in computing systems* (p. 576-577). Minneapolis, Minnesota, USA: ACM Press.

Libin, A., & Cohen-Mansfield, J. (2004). Therapeutic robocat for nursing home residents with dementia: preliminary inquiry. *American journal of Alzheimer's disease and other dementias*, *19*(2), 111–116.

Mutlu, B., & Forlizzi, J. (2008, March). Robots in organizations: the role of workflow, social, and environmental factors in human-robot interaction. In *Proceedings of the international conference on human robot interaction (hri)* (pp. 287–294). Amsterdam, The Netherlands: ACM New York, NY, USA.

Mutlu, B., Shiwa, T., Kanda, T., Ishiguro, H., & Hagita, N. (2009, March). Footing in human-robot conversations: How robots might shape participant roles using gaze cues. In *Proceedings of human-robot interaction.* San Diego, CA.

Stanton, C., Kahn, P., Severson, R., Ruckert, J., & Gill, B. (2008, March). Robotic animals

might aid in the social development of children with autism. In *Proceedings of the international conference on human robot interaction* (p. 271-278). Amsterdam, The Netherlands.

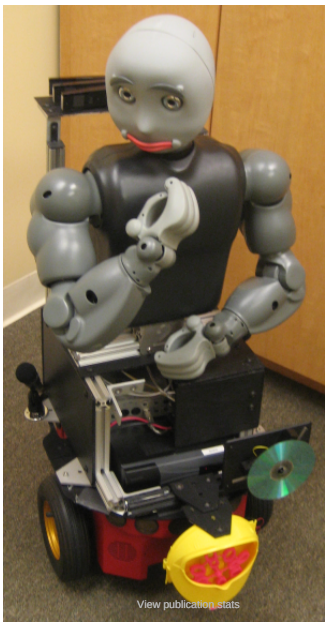
Sung, J., Grinter, R. E., & Christensen, H. I. (2010). Domestic robot ecology. *International Journal of Social Robotics*, *2*(4), 417–429.

Tapus, A., & Matarić, M. J. (2006, Jul). User personality matching with hands-off robot for post-stroke rehabilitation therapy. In *Proceedings, international symposium on experimental robotics.* Rio de Janeiro, Brazil.

Wada, K., Shibata, T., Saito, T., & Tanie, K. (2002, October). Analysis of factors that bring mental effects to elderly people in robot assisted activity. In *Proceedings of the international conference on intelligent robots and systems* (Vol. 2, p. 1152-1157). Lausanne, Switzerland.

Figure Captions

Figure 1. The Bandit Humanoid Robot


View publication stats