

Designing Robot Behavior Based on Fictional Sidekick Characters

Michal Luria
Carnegie Mellon University
mluria@cs.cmu.edu

ABSTRACT

Although most social robots introduced in the consumer market devoid of personality, research in HRI shows that designing personality-like behavior for robots could greatly benefit future interactions [2]. This work suggests the relationship between sidekick characters and protagonists, frequently found in media narratives, as a metaphor for designing robot behavior and personality. Findings from a content analysis study that examined fifteen characters from popular books and movies suggest three guidelines for designing personal robots: Reciprocity, Affirmation and Independence.

ACM Reference Format:

Michal Luria. 2018. Designing Robot Behavior Based on Fictional Sidekick Characters. In *HRI '18 Companion: 2018 ACM/IEEE International Conference on Human-Robot Interaction Companion, March 5-8, 2018, Chicago, IL, USA*. ACM, New York, NY, USA, Article 4, 2 pages. <https://doi.org/10.1145/3173386.3176912>

1 INTRODUCTION

Today, social robots in the consumer market mostly follow metaphors of personal assistants, supporting utilitarian value at work and in the home [3, 10]. However, social robots are also capable of emotionally influencing users by pushing their “Darwinian Buttons” [21], and creating new forms of interaction beyond efficiency-focused ones. While researchers have suggested social robots as therapeutic companions for specific populations [7], few have looked at the emotional value robots can offer the general public.

In order to change the current metaphor of robots as personal assistants, it is necessary to replace it with another, as people tend to engage with concepts they understand [12]. This work suggests *sidekick characters* that accompany protagonists in popular media as an alternative metaphor for personal robots. According to Zimmerly [23], some of the roles of sidekick characters include challenging the protagonist, exposing hidden personality traits, providing a comic relief and advancing the story. Thus, such characters could potentially serve as inspiration for social robots.

Preliminary results of a qualitative content analysis of relationships between protagonists and sidekicks point out a novel design space for personal robots. We identify three themes in our findings and suggest future exploration and potential applications.

Permission to make digital or hard copies of part or all of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for third-party components of this work must be honored. For all other uses, contact the owner/author(s).

HRI '18 Companion, March 5-8, 2018, Chicago, IL, USA

© 2018 Copyright held by the owner/author(s).

ACM ISBN 978-1-4503-5615-2/18/03.

<https://doi.org/10.1145/3173386.3176912>

2 RELATED WORK

Social robots designed for the consumer market are mostly efficiency and task-oriented [3, 10]. Social robots have also been designed for education [16], as a form of entertainment [1], or as assistive robots [7]. However, robots are capable of generating emotional interactions with a broader range of users. Turkle [21] defines such robots as “Relational Objects”, and argues there is a “crisis in authenticity” when robots express artificial emotions that threaten to replace human relationships. Nevertheless, perhaps there is a design space for Relational Objects that give emotional support but avoid modeling after human-human relationships.

We suggest the companionship of protagonists with non-human sidekick characters commonly present in popular media as a metaphor that could lead to a better understanding of this design space. Zimmerly [23] defines four roles of sidekicks in fictional narratives: (1) Sidekicks are capable of challenging the protagonist and improving their decision-making; (2) They provides a comic relief, at times when it would be unacceptable for the protagonist to do so; (3) Sidekicks can contrast the protagonist and present a hidden aspect of their personality; (4) Sidekicks have a role in advancing the narrative. According to Nikolajeva [18], a non-human companion is often used because it has no social obligations and can be completely loyal in accompanying the protagonist, on the verge of a transitional object. In that sense, social robots are like sidekicks.

Previous research in HRI has been successful in drawing inspiration from artistic fields, such as theater [11] and animation [9]. In my previous work, I had combined the expertise of puppet designers and actors in the design of nonverbal behavior for robots [14]. Thus, learning from sidekick characters could also be of value for designing HRI. To note Vazquez and colleagues [22] who designed a sidekick robot as a secondary interaction companion to a ‘main’ robot and evaluated how users reacted to two robots. We do not know of a robot designed based on fictional sidekick characters.

3 QUALITATIVE STUDY

In order to learn from sidekick characters, five novels and five animated films for kids and young adults were qualitatively analyzed. They were randomly selected from a list of narratives that include non-human sidekicks. Data on these sidekicks (n=15) was collected using a coding sheet with categories prepared in advance (e.g. “What does the character look like”, “What does it do/say”, “What do others say about them”, see coding sheet in [13]). The categories were filled by extracting quotes or by describing the visual content in a sample of each narrative. The samples used were consistent: the first 30 pages in books, and the first 30 minutes in movies. The data was sorted using an affinity diagram [8], and each group was titled according to the type of behaviors it contained

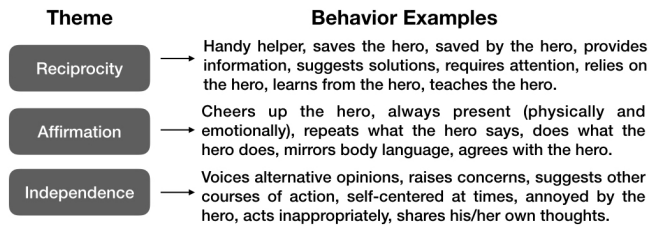


Figure 1: Qualitative analysis of fifteen fictional sidekick characters suggests three themes based on their behavior patterns: Reciprocity, Affirmation and Independence.

(Fig. 1, right). Then, similar behaviors were clustered into three themes: Reciprocity, Affirmation and Independence (Fig 1, left).

Reciprocity—The sidekick is a handy helper always available to give assistance. For example, the dragon from *The Neverending Story* [6] takes the protagonist across the world on his wings, while pushing back on his own desire to discontinue the journey. However, this type of behavior is typical for both sides of the relationship. For instance, *The Little Mermaid* returns to save her sidekick fish from a shark attack, even though she had already escaped [17]. Narratives exhibit constant reciprocity between protagonists and sidekicks.

Perhaps reciprocity could create an alternative, engaging relationship with users. Although some artificial pets are designed to be reliant on the user [5], they too do not offer reciprocity. Reciprocity can be created by designing the robot to not only assist the user, but to also seek assistance. For example, the robot could verbally ask the user for help getting to another floor, or simply move in distress when approaching the stairs.

Affirmation—Sidekicks often mirror or enhance the hero's behaviors and emotions. In *Aladdin* [15], *Abu* the monkey shared his food with hungry kids, after *Aladdin* did so. In *The Little Mermaid* [17], *Sebastian*, the king's sidekick, confirms that the punishment the king gave his daughter was "more than appropriate".

In addition to designing robots to assist users and behave in a friendly manner, robots should also be designed to affirm users' behaviors. By repeating what the user says or does, a robot could support the user's morale and boost their self-confidence. For instance, the robot can take a break when the user does, or verbally repeat a part of a user's argument.

Independence—The sidekick frequently suggests an alternative voice, opinion or emotion. *Pantalaimon*, *Lyra's* moth sidekick in *The Golden Compass* [20] is unhappy with her behavior and the danger she is putting them in. He voices critique and encourages an alternative solution. According to the literature, this can also be a method to express hidden personality traits of protagonists [18].

This notion could also serve as a model for designing HRI—robots could provide users with views different from their own by having an independent mood, personality or opinion. For example, the robot could comment on a user's unthoughtful behavior, or ignore the user until they realize their mistake.

4 FUTURE EVALUATION

In order to ground the presented findings, structured and unstructured field studies are required to understand how such interactions will unfold with actual users. We will design an initial sidekick robot prototype, and make use of "user enactments", a design exploration

and evaluation method that acts out interactions with prototypes in a real-world setting [19]. Emerging users using this method allows rapid evaluation of multiple interactions when users are new to the technology. Verbal and nonverbal behaviors based on sidekicks will be designed for each category and tested in isolation and in combination with behaviors from the other two categories. We will use a Wizard-of-Oz method to control the prototype, and the interactions will be evaluated using contextual inquiry, qualitative interviews and questionnaires that measure engagement and enjoyment.

5 FUTURE APPLICATIONS

By learning from fictional sidekick characters, robots could provide novel emotional interactions. Testing the designs in field study simulations will allow to better understand what a sidekick robot "must do, should do, and could do" [4]. This general knowledge could shed light on various functions and behaviors that are suitable for particular users and contexts, and could then be applied to specific domains. One possible domain is for sidekick robots to help boost self confidence in intimidating situations, such as helping girls gain confidence in STEM disciplines. Another could be for sidekick robots to promote diversity of opinion by contradicting the user and proposing alternative courses of action. Thus, these and other specific applications will be explored once a broad set of behaviors and their implications will be determined (see Section 4).

REFERENCES

- [1] Anki. 2017. Meet Cozmo. <https://www.anki.com/en-ca/cozmo>. (2017).
- [2] Cynthia L Breazeal. 2004. *Designing sociable robots*. MIT press.
- [3] Buddy. 2017. The first companion robot. <http://www.bluefrogrobotics.com/en/buddy/>. (2017). Accessed: 2017-10-31.
- [4] Dai Clegg and Richard Barker. 1994. *Case method fast-track: a RAD approach*. Addison-Wesley Longman Publishing Co., Inc.
- [5] Judith Donath. 2004. Artificial pets: Simple behaviors elicit complex attachments. *Encyclopedia of animal behavior* (2004).
- [6] M. Ende and G. Doyle. 1983. *The Neverending Story*. Doubleday Garden City.
- [7] Jodi Forlizzi et al. 2004. Assistive robotics and an ecology of elders living independently in their homes. *Human-Computer Interaction* 19, 1 (2004), 25–59.
- [8] Rex Hartson and Pardha S Pyla. 2012. *The UX Book: Process and guidelines for ensuring a quality user experience*. Elsevier.
- [9] Guy Hoffman and Wendy Ju. 2014. Designing robots with movement in mind. *Journal of Human-Robot Interaction* 3, 1 (2014), 89–122.
- [10] Jibo. 2017. Jibo. <https://www.jibo.com/>. (2017).
- [11] Heather Knight. 2011. Eight lessons learned about non-verbal interactions through robot theater. In *Int'l Conf. on Social Robotics*. Springer, 42–51.
- [12] M. Lakoff, G. & Johnson. 2008. *Metaphors we live by*. University of Chicago press.
- [13] M. Luria. 2017. Media Sidekicks Coding Sheet. <http://www.michalluria.com/wp-content/uploads/2017/12/coding-sheet.pdf>. (2017).
- [14] Michal Luria et al. 2016. Designing Vyo, a Robotic Smart Home Assistant: Bridging the gap between device and social agent. In *RO-MAN*. IEEE, 1019–1025.
- [15] Ashman H. Rice T. Menken, A. 1992. *Aladdin*. (1992).
- [16] Francesco Mondada et al. 2009. The e-puck, a robot designed for education in engineering. In *Proc. of the 9th conf. on autonomous robot systems and competitions*, Vol. 1. IPCB: Instituto Politécnico de Castelo Branco, 59–65.
- [17] John Musker. 1989. *The Little Mermaid*. (1989).
- [18] Maria Nikolajeva. 2002. *The rhetoric of character in children's literature*. Scarecrow Press.
- [19] William Odom et al. 2012. A fieldwork of the future with user enactments. In *Proceedings of the Designing Interactive Systems Conference*. ACM, 338–347.
- [20] Philip Pullman. 2001. *The Golden Compass: His Dark Materials*. Vol. 1. Knopf Books for Young Readers.
- [21] Sherry Turkle. 2007. Authenticity in the age of digital companions. *Interaction studies* 8, 3 (2007), 501–517.
- [22] Marynel Vázquez, Aaron Steinfeld, Scott E Hudson, and Jodi Forlizzi. 2014. Spatial and other social engagement cues in a child-robot interaction: Effects of a sidekick. In *Proceedings of the 2014 ACM/IEEE int'l conference on HRI*. ACM, 391–398.
- [23] Stephen M Zimmerly. 2016. *The sidekick comes of age: Tracing the growth of secondary characters in young adult literature*. Ph.D. Dissertation. IUP.