How Robots Persuasion based on Personality Traits May Affect Human Decisions

Raul Paradeda* Maria José Ferreira* João Dias*

Ana Paiva*

* INESC-ID and Instituto Superior Técnico, University of Lisbon - Portugal
{raul.paradeda, maria.jose.ferreira}@tecnico.ulisboa.pt, {joao.dias, ana.paiva}@gaips.inesc-id.pt

ABSTRACT

The use of autonomous agents, such as robots, to perform tasks such as cleaning the floor or washing the car are more frequent in our daily life. Moreover, with the advance of technology the society is in front of a new trend, your devices are connected to each other, for example, the robot that cleans the floor is connected to the cellphone. This trend was named as Smart Interaction. Those connections may be used to persuade the person to do some task in his/her own benefits, e.g., the refrigerator could recommend healthy foods if the bathroom scale informs that the person is overweight. However, the communications and the persuasions made by these autonomous agents should not be performed in an invasive way. In this sense, our motivation is to create a model were the autonomous agents may perform persuasion based on the person's personality traits.

Keywords

Human Robot Interaction; Persuasion; Personality Traits; Social Robotics; Smart Interactions.

1. INTRODUCTION

Smart cities concept has been growing in the past years with the evolution of technology. Research with this concept in areas such as: Smart Grids, Smart Transportation, Smart Homes [3] and others, made it possible for us to have our devices connected with each other in a way of Smart Connections (SCon). In other words, inside this concept it is possible that our devices exchange messages with each other to reach a goal, e.g., make us more comfortable in our home. In fact, the SCon allow that researchers use many of other concepts to improve our well-being. For example, imagine the situation, you are at your home and decide to take a beverage from the refrigerator. Before opening the refrigerator door, in the screen located in the door, a message appear, this message advises that you should drink more orange juice. Furthermore, if this message explains the benefits of drinking more orange juice it would lead to a stronger persuasion effect [5, 6].

In this sense, it is notorious that people are surrounded by these techniques of persuasion; there are persuasions on: television, radio, magazines, newspapers, commercials, in health campaigns, politics, etc. However, some techniques are subtle, using just verbal or nice pictures, and others are not so subtle, using corporal approach or offensive pictures. Because of this, it is very important to use the best way to try to influence a person to do something that is proposed.

Moreover, in a scenario of SCon, could be a great advantage whether the devices were able to identify patterns of behavior, thought, and emotion. In other words, identify people's Personality Traits (PT) [4]. For example, when you get in the car, the radio could play some music according to your PT, or play a commercial trying to persuade you to buy some music of a new singer that you probably will like.

In fact, the best strategies for persuasion has been studied in areas as: psychology, marketing, human resources, etc. However, as the focus of this project is the persuasion through autonomous agents, we address our work in a very recent concept, that is in Social Assistive Robotics. This concept has as aim the use of social robots to aid, in somehow, the life of human beings. For example, healthcare robots as companions for elders, or health life coach robots. In these cases, the trust on the robot and the persuasion made by it are very important, mainly whether in the case of the robot's task is persuade the person to take some medicine or follow some specific instruction. Although, each person has different PT and sometimes the persuasion techniques used in some group of people with specific PT may not be so effective as on other group with different PT [2]. Having the aforementioned in mind, the identification of PT to do a focused and personalized persuasion becomes a valid and promising strategy.

Along these lines, in this work we will describe a model that we believe may be used through an autonomous agent, in our case a robot, to persuade a person based on their PT to develop a specific task in a context of SCon.

2. METHODOLOGY

In order to investigate the techniques of persuasion based on PT through a social robot in a context of SCon, we proposed an architecture that we believe be capable to adapt in that context. In sum, the social robot architecture has a module responsible to observe the human tasks and human decisions, and according to a learning module, the robot

HRI '17 Companion March 06-09, 2017, Vienna, Austria

ACM ISBN 978-1-4503-4885-0/17/03.

DOI: http://dx.doi.org/10.1145/3029798.3038348

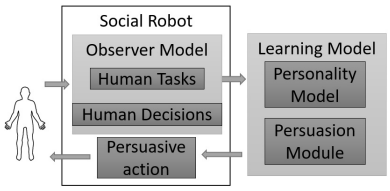

Figure 1: **Social Robot Architecture**

may perform a persuasive action based on participant's PT model. Hereafter, we will describe the personality model and the architecture that we propose.

2.1 MBTI Personality Test

In the initial stage, we will focus on the development of the Persuasion module and how it can be influenced by the PT to make more adapted persuasive actions. As such, we will use a personality questionnaire to create the personality model used by our system.

After some research, we intend to use the theory applied in Myers-Briggs Type Indicator (MBTI) [7]. The MBTI can provide 16 types of PT and each is identified by four types of descriptions, as: ISTJ means Introversion + Sensing + Thinking + Judging, or ENFP means Extroversion + iNtuition + Feeling + Perceiving [7]. In this sense, to be able to classify the person's PT, we will apply the MBTI questionnaire and measure the decisions made in a task, relating these decision with questionnaire' questions.

2.2 Architecture

Figure 1 presents the proposed architecture. The social robot has an observer module, responsible to capture human tasks and human decisions. These informations are send to a learning module, that has the following modules:

a) Personality Model contains the model for the user's PT.

b) Persuasion Module using the personality model that identifies the person, select the most recommended persuasion technique and the message to be performed, then, send it to the persuasive action module.

The **Persuasive action module** is responsible to perform the utterances, movements, actions and animations of the robot to try to persuade the person. With this, the agent, through the observer module, notes if the person executed the task as planned or not.

In this sense, we found many techniques using autonomous agents. Some works concluded that is more effective combining persuasion strategies as gaze and gesture (as pointing). Besides, persuasive gesture is more strong when the robot is gazing at the listener [1]. For this reason, in this first stage, we intend to use techniques of persuasion using a social robot performing gaze and pointing.

2.3 Hypothesis

To reach the goal of our project, we intent to create a scenario where a robot, using the personality model, will be able to try to persuade the participant to take decisions according to his/her personality. Based on this scenario, we idealized a research question and its hypothesis:

Q - Can decisions-based tasks be more performed when persuasion is based on PT? The person's personality can be an important factor to make a specific task be more or less performed by a person.

In this sense, as the task is performed we hypothesise that a person with persuasion based on his/her PT will perform the tasks more, in comparison with the users without persuasion. The presented hypothesis is kind of bipolar variable. To be more specific, could be expressing either performed or not performed the task but analysing the persuasion effect.

2.4 Study

A between subject method will be use in the study with four conditions, three conditions with robot and one without robot. Our ambition is to have at least 10 individuals per condition. The robot would have the following conditions: *no based on PT* (N-PT), *persuasion with user's PT* (P-PT) and *persuasion with opposite PT from the user* (P-OPT).

In sum, the participants in the conditions with PT, are going to fill in the MBTI test to identify in which category of personality the participant is related. Then, the robot will be configured to persuade the participant according with the scenario (P-PT or P-OPT) in a specific task. After, the participants will fill in a questionnaire related to the interaction with the robot, the task performed and the persuasion applied.

3. DISCUSSION AND FUTURE WORK

Our study presented a model that enables autonomous agents, in this case robots, to persuade a person based on his/her PT. In fact, our model was thought and designed to be used in many autonomous agents, since they can have the capability to process and identify the person's PT based on person's actions.

4. ACKNOWLEDGMENTS

We would like to acknowledge the National Council for Scientific and Technological Development (CNPq) program Science without Border number 201833/2014-0 - Brazil and Agência Regional para o Desenvolvimento e Tecnologia (ARDITI) - Project M1420-09-5369-000001, for PhD grants to first and second authors respectively. This work was also supported by Fundação para a Ciência e a Tecnologia (FCT - UID/CEC/50021/2013) and through project AMIGOS (PTDC/EEISII/7174/2014).

References

[1] J. Ham, R. H. Cuijpers, and J.-J. Cabibihan. Combining robotic persuasive strategies: The persuasive power of a storytelling robot that uses gazing and gestures. *International Journal of Social Robotics*, 7(4):479–487, 2015.

[2] J. B. Hirsh, S. K. Kang, and G. V. Bodenhausen. Personalized persuasion: tailoring persuasive appeals to recipients' personality traits. *Psychological science*, 23(6):578–5781, jun 2012.

[3] IEEE. IEEE Standards Activities for Smart Cities. Technical report, IEEE, 2016.

[4] S. Kassin. *Psychology*. Pearson/Prentice Hall, 2004.

[5] R. E. Petty and J. T. Cacioppo. The effects of involvement on responses to argument quantity and quality: Central and peripheral routes to persuasion. *Journal of personality and social psychology*, 46(1):69, 1984.

[6] D. D. Rucker and R. E. Petty. Increasing the effectiveness of communications to consumers: Recommendations based on elaboration likelihood and attitude certainty perspectives. *Journal of Public Policy & Marketing*, 25(1):39–52, 2006.

[7] The Myers & Briggs Foundation. The Myers & Briggs Foundation - MBTI® Basics, 2014.