



International Conference on Knowledge Based and Intelligent Information and Engineering Systems, KES2017, 6-8 September 2017, Marseille, France

Effects of the Perspectives that Influenced on the Human Mental Stance in the Multiple-to-Multiple Human-Agent Interaction

Yoshimasa Ohmoto^{a,*}, Toshinari Morimoto^a, Toyoaki Nishida^a

^a*Kyoto University, Yoshidahonmachi, Sakyo-ku, Kyoto 6068501, Japan*

Abstract

Virtual agents are useful for simulations of real-world events or processes designed for solving a problem, such as serious games and gamifications. In several types of the virtual world simulations, multiple-to-multiple interaction is needed because our social interaction is multiple-to-multiple in many cases. In this study, we extended the agent behavior model that induces intentional stance in one-to-one human-agent interaction, which was proposed in our previous works, to the multiple-to-multiple human-agent interaction. By using the agent group, we investigated effects of the perspectives that influenced the human mental stance in the multiple-to-multiple human-agent interaction. To investigate the effects of the perspectives, we changed the viewpoints (subjective or objective) in different perspectives (physical or mental) when people interacted with a team of agents in the virtual futsal game. As a result, we can find that there is a different effect between the physical perspective and the mental perspective. The subjective viewpoint of the physical perspective enhanced the feeling of the agent team's intelligence, but the objective viewpoint of the mental perspective enhanced the feeling of the agent team's intelligence.

© 2017 The Authors. Published by Elsevier B.V.
Peer-review under responsibility of KES International

Keywords: Human-agent interaction; Multiple agent interaction; Player perspective.

1. Introduction

Many types of the collaborative agents have been developed over the years. Virtual agents are useful for simulations of real-world events or processes designed for solving a problem, such as serious games and gamifications¹. In virtual world simulation, we can conduct rehearsals or practice skills in specialized situations, extraordinary environments, and circumstances where no mistakes are allowed. In addition, an individual's motivation to practice more can be improved because, although serious, the game includes an entertainment aspect. In fact, the use of serious games using a virtual world is spreading widely in education, medical services, welfare, and fitness (e.g.^{2,3}).

In previous studies^{4,5,6,7}, we focused on the mental stances that people infer when considering an agent, which can be defined as physical stance, design stance, and intentional stance⁸. When humans interact with each other, they usually assume the intentional stance, and they and their communication partner respect each other. When humans interact with a machine, they usually assume the design stance. In this case, they usually interact with

* Corresponding author. Tel.: +81-75-753-5371.
E-mail address: ohmoto@i.kyoto-u.ac.jp

the machine from a self-centered perspective because they do not consider that the machine has its own intentions. To establish social relationships between a human and an artificial agent, the agent should induce and maintain the intentional stance in its human partner. On the other hand, we just focused on the mental stances in one-to-one human-agent interaction. In several types of the virtual world simulations, multiple-to-multiple interaction is needed because our social interaction is multiple-to-multiple in many cases. Therefore, we should consider how to establish the social relationships in multiple-to-multiple human-agent interaction. Moreover, we believe that similar issue was encountered in the one-to-one human-agent interaction also, that is, how to induce the intentional stance for agents, which form a group.

In this study, we extended the agent behavior model that induces intentional stance in one-to-one human-agent interaction, which was proposed in our previous works^{5,7}, to the multiple-to-multiple human-agent interaction. However, the intentionality of the agent group is complex. As the first step to the goal, we aimed that the agent group, on whom the proposed behavior model was to be implemented, was regarded as an "intelligent" group. In this study, a group which is regarded as intelligent means an observer regards that the group members are acting according to a kind of consensus in the group. Since objective viewpoints were useful⁹ in understanding the meaning of the group behavior, we confirmed the effects of the perspectives (subjective or objective; physical or mental) on the evaluation of the "intelligence" of the agent group. When the perspectives, which are independent from the agent's abilities, influence the evaluation of the intelligence of the agent group, we should also consider human factors like the mental stances to establish the social relationships between a human group and an agent group.

The present paper is organized as follows: In Section 2, we briefly introduce some related work. Section 3 outlines the agent's behavior model and the hypothesis about the effect of the perspectives. Section 4 contains a description of our experiment that investigates the hypothesis and presents our results. In Section 5, we discuss the achievements of this research and future work. Section 6 describes the conclusions of our study.

2. Related works

Nishihara and Ikuta⁹ investigated situational cognition by recruiting a university football club coach and had him observe a football game while imagining that he was the coach. As a result, it became clear that the space visually perceived as a horizontal surface from pitch-level was understood in terms of representations based on a bird's-eye view of the pitch from above. This result means that the objective viewpoint (bird's-eye view) is effective to understand the behavior of the team. In their study, the coach stood in the pitch. In other words, the coach did not actually observe from the bird's-eye view so the effect of the changes of the physical perspective was not clear.

There are some researches on the effect of the changes of the physical perspective. Denisova and Cairns¹⁰ reported that first-person view is more immersive than its third-person counterpart when playing an RPG game. Black¹¹ said that the player's visual relationship with the world of the game is determined by the ideal viewpoint of the virtual camera. The ideal viewpoint is not the first-person view. Our capacity makes a close identification between game player and game body in third-person games seem more natural and attainable than it might otherwise appear. These researches show different results. We think that the effects of the physical perspective are influenced other factors, such as mental stances.

Shirouzu et al.¹² investigated how collaboration leads to abstract and flexible problem solving. As a result, two factors, individuals' activeness in choosing and confirming the initial strategies and the frequent role exchange between task-doing and monitoring in collaborative situations, interact in collaboration to generate various solutions differing in the degree of abstraction, which are then reflected upon by the participants to lead them to abstraction. This shows that the mental factors influence the evaluation of an observation target.

These researches show that the physical viewpoints and mental factors influence the human mental stance in their evaluation and interaction. Therefore, we should consider the physical viewpoints and mental factors in the human-agent interaction. We mainly focused on the intentional stance in the one-to-one human-agent interaction. In this study, we extend the model to the multiple-to-multiple human-agent interaction and investigate the effect of the physical viewpoints and mental factors.

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات