Editorial for special issue on intelligent virtual agents

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Published online: 21 April 2013
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Intelligent virtual agents are interactive characters that exhibit human-like qualities and communicate with humans or with each other using natural human modalities such as speech and gesture. They are capable of realtime perception, cognition and action that allows them to participate in dynamic social environments. This field has been steadily growing as applications in areas like education, simulation and gaming become more common-place, and new applications such as in health-intervention and elderly care emerge. Since 2006, the International Conference on Intelligent Virtual Agents (IVA), has served as the central annual venue for the field, but since 2008, the International Conference on Autonomous Agents and Multiagent Systems (AAMAS), has also dedicated a special track to virtual agents, acknowledging the significant ties between the communities. This special issue of JAAMAS on intelligent virtual agents is meant to further contribute to the interaction between virtual agent researchers and autonomous agent researchers in general.

The papers in this volume are extended versions of full papers presented at IVA 2011 in Reykjavík, Iceland. That year, the conference received 69 full paper submissions and admitted 18 based on a stringent reviewing process. After the conference, admitted full paper authors were invited to submit extended versions to this special issue, where again they were subject to thorough reviewing and feedback. Finally six papers have been selected that we believe represent some of the best virtual agent work today, representing the richness of the field by bringing together a multitude of disciplines and application areas.

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The first paper by Tsai et al. [Empirical Evaluation of Computational Fear Contagion Models in Crowd Dispersions](#) underlines the importance of modeling non-physical contact in any society of agents and humans. The authors explore mechanisms of how people's emotions, such as fear and anxiety, are affected by the emotions of those around them. The predictive power of different contagion models implemented in virtual agents are evaluated using real world footage from two emotional crowd scenes.

The second paper by Wang et al. [Multi-party, Multi-role Comprehensive Listening Behavior](#) focuses on the behavior of agents that are listening to someone else speaking. Getting this behavior right can improve believability of a simulation, but may also provide crucial feedback for a human speaker. The authors present a model that generates listening behavior based on the speaker's behavior, including an unfolding comprehension of the content of the speaker's utterance. Leveraging the work of sociologist Erving Goffman, the approach also makes the listening behavior conditional on the listener's participation roles and goals.

The third paper by Poppe et al. [Perceptual Evaluation of Backchannel Strategies for Artificial Listeners](#) also addresses the design of listening agents. The work presents two empirical studies that explore the factors that influence the perception of agent listening behavior. The studies systematically evaluate the impact of listening strategies using a methodology where human subjects are shown videos of a speaker and a listening agent that employs a range of rule based listening strategies.

The fourth paper by Bickmore et al. [Tinker—A Relational Agent Museum Guide](#) places a virtual museum guide named Tinker into the Museum of Science in Boston where over 175,000 visitors have interacted with her face-to-face. Apart from being a great example of a real-world virtual agent, Tinker is also a valuable laboratory where the effects of turning certain behaviors on or off can be observed on a great number of visitors. This paper shows how so called relational behaviors improve visitor engagement.

The fifth paper by Endrass et al. [Investigating Culture-related Aspects of Behavior for Virtual Characters](#) provides an in-depth review and model of communicative verbal and non-verbal behaviors specific to either German or Japanese culture. By showing subjects, either Japanese or German, virtual agents performing these culture-specific behaviors, the authors demonstrate clearly how choice of behavior impacts subjects' impression of the agents. In particular, people seem to respond positively to behavior specific to their own culture, which has clear implications for virtual agents crossing cultural boundaries.

The sixth paper by van Welbergen et al. [Multimodal Plan Representation for Adaptable BML Scheduling](#) brings attention to the computational challenge of producing and coordinating in real-time a range of communicative behaviors such as gaze, gesture, posture and facial expression. The authors build on the efforts of an international working group that at IVA 2011 published version 1.0 of the Behavior Markup Language (BML)¹, a virtual agent language for specifying nonverbal behavior at an observational level rather than at the animation engine level. The paper describes an approach to schedule synchronized multimodal behaviors using an intermediate motor plan representation that makes it easier to adapt behavior plans to an evolving situation.

It should be clear from this selection of papers that intelligent virtual agents challenge us to understand our own behavior, but that they also give us an incredible tool to do so.

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¹ <http://bml-initiative.org>

The work in the field, from observational studies or behavioral models to successful applications, has substantially matured over the past decade. With every new application, we are now getting closer to not only constructing a more intelligent machine but also to knowing what it means to be human.