An Interactive Tangram Game for Children with Autism

Conference Paper · September 2016

DOI: 10.1007/978-3-319-47665-0_63

5 authors, including:

Patrícia Alves-Oliveira
ISCTE | INESC-ID | Cornell University
35 PUBLICATIONS **49** CITATIONS
SEE PROFILE

Francisco S. Melo
Inesc-ID
68 PUBLICATIONS **544** CITATIONS
SEE PROFILE

Ana Paiva
Instituto Superior Técnico, Inesc-ID
411 PUBLICATIONS **4,904** CITATIONS
SEE PROFILE

An Interactive Tangram Game For Children With Autism

Beatriz Bernardo[1], Patrícia Alves-Oliveira[2], Maria Graça Santos[3], Francisco S. Melo[1], and Ana Paiva[1]

[1] INESC-ID and Instituto Superior Técnico, Universidade de Lisboa
[2] INESC-ID and Instituto Universitário de Lisboa (ISCTE-IUL), CIS-IUL, Lisboa
[3] Centro de Desenvolvimento da Criança, Hospital Garcia de Orta, Almada, Portugal

Goals

This work explores the use of a social robot as an assistive agent during therapy sessions, in order to assist children with Autism Spectrum Disorder (ASD), through a Tangram puzzle game. Previous works showed that children with ASD express enthusiasm when interacting with robots and other technologies. Also, these tools have been used during therapy to help them overcome their social difficulties. Our aim was to develop a tablet game so children with autism can play with a humanoid robot - NAO. Normally, children with ASD have difficulties in taking turns, so part of our work focuses on improving this ability.

Methods

This experiment has two conditions: the Tutor Mode and the Peer Mode. In the first condition, the robot gives graded cueing feedback whenever the child experiences difficulties during the game. It is directed for children who have difficulty playing this type of games, and it allows us to analyze the evolution and the concentration of the child in a certain task. In the second condition, the robot plays with the child in turn-taking: one player places one piece and then the other places another, and so forth until the game finishes. This condition enables the study of the child's capacity for taking turns and robot's efficiency to establish turns.

Eight children with ASD participated in this study. Our purpose was to analyze the evolution of their turn-taking skills, performance, and attention on the game, and also the effects of the robot during therapy sessions. These participants presented various degrees of autism, so we conducted a single-subject study.

Results

The results indicated that in the Tutor Mode the robot was capable of maintaining children's attention on the game and to help most of the times it was necessary. In the Peer Mode, the robot also stimulated children's concentration on the game and was able to establish turns for the majority of the participants. External interventions decreased over time but did not disappear completely.

Conclusion

This concludes that our approach was able to succeed for the majority of participants. However, for some children of the spectrum it was not as effective. In general, this study shows that the targeted children can benefit from robot based therapies and that the presence of a therapist is crucial in order to have an optimal interaction.