Developing ‘social intelligence’ for assistive robots to seamlessly interact with humans remains an open research challenge. However, socially assistive robots typically engage in types of interactions that already exist between humans, which makes models of human-human interactions useful to inform the design of robot social behaviors. In particular, in applications such as healthcare, therapy or education, interactions usually take the form of tasks led by a ‘provider’ - e.g., therapist, teacher - over a ‘receiver’ - e.g., patient, student - with specific goals.

The central claim of this thesis is that robots involved in such provider/receiver types of interactions can benefit from existing standardized procedures widely used by human providers. In particular, leveraging the structure of such tools can:

1. Unlock new dimensions of social intelligence for robots acting as providers
2. Enable the use of robots in the inverse role, i.e. the receiver, which can have a number of benefits, including enhanced training of providers in controlled environments

Our work towards demonstrating the claim above is focused on the rich domain of autism. Robots have been shown to hold promise in enhancing existing autism therapy tasks, thanks to their controllability, repeatability, and simplicity of social behavior. The existing standardized procedure utilized in this thesis is the Autism Diagnostic Observation Schedule (ADOS), a state-of-the-art ASD diagnostic tool. We show how the structure of this procedure can be leveraged in order to:

1. Enhance the robot-assisted interventions, by allowing personalization according to an assessed level of child response, following the ADOS procedures
2. Simulate the inverse interaction, where the robot plays the role of the child, which may have a number of benefits including therapist training

In our treatment of (1), we created an architecture for personalizing the social behavior of a NAO robot with children with ASD in attention-related tasks, and test it in a naturalistic context with 11 children with ASD. In our treatment of (2), we demonstrated how reversing the chain of the ADOS procedure can enable the simulation of an interaction between a therapist and ASD children of a diverse set of children profiles. We built ADOS-Sim, a simulator that stochastically generates behavioral responses to the standard ADOS tasks, informed by a worldwide database of ADOS scores. Additionally, we introduced interactive robots that exhibit ‘autism-like’ behaviors with controllable degrees of severities along several features. We evaluated the validity and promise of our approach in complementing therapist training, both in video-based and ‘in situ’ studies.

For the remainder of this thesis, we plan to devise an optimization framework for generating optimal provider action sequences, and to establish clearer guidelines for the generalizability of the different components of our approach.