Hello, It's Me, I Was Wondering if You'd Like to Speak: Creating an Embodied Conversational Agent for Neurodivergent Students' Social Skills Training

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Abstract

Current social skills training (SST) often lacks inclusivity, limiting participation among neurodivergent individuals. In this late-breaking report, we present an in-progress design and study protocol for a neurodiversity-affirming social skills training approach using the Furhat social robot with neurodivergent post-secondary students who find it difficult to initiate conversations with peers. We are developing a Wizard-of-Oz methodology in which a human operator flexibly guides Furhat's responses as participants practice self-identified challenging scenarios (e.g., asking a classmate about a group project). We describe our session structure, measures (comfort, self-efficacy, preferences, behavioural indicators), and planned mixed-methods analysis, and outline our current implementation steps. This work-in-progress contribution invites feedback from the HRI community on how embodied conversational agents can offer neurodiversity-affirming social skills training.

CCS Concepts

• **Human-centered computing** → **HCI design and evaluation methods**; **Interaction devices**; **Accessibility**; *Usability testing*; • **Applied computing** → *Psychology*; *Interactive learning environments.*

Keywords

Human-Robot Interaction, Social Skills Training, Conversational Agents, Furhat, Inclusive Design, Neurodiversity

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1 Introduction

Initiating a conversation can be difficult for many individuals. Factors such as anxiety, low confidence, or limited social skills can make developing or maintaining interactions overwhelming [29]. Poor social skills have also been shown to have an indirect effect on mental and physical health through both stress and loneliness [24].

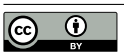
These challenges are especially salient for neurodivergent students (e.g., autistic, ADHD, and students with learning differences) in post-secondary education. Neurodivergent people are increasingly involved in higher education, yet they continue to face serious barriers and are less likely to complete their degrees than non-neurodivergent peers. Campus social life—forming study groups, talking to classmates, and feeling a sense of belonging—plays a critical role in their academic success but can be particularly demanding to navigate. For example, a student might rehearse an opening line to ask a classmate about a group project all the way to class, only to feel overwhelmed in the moment and say nothing. Our work focuses on this kind of everyday conversation initiation as a key site where better support is needed.

Although social skills are learned, not everyone finds social skills training (SST) accessible or effective. Social skills training programs teach interpersonal social skills, such as starting and sustaining a conversation [7]. However, obstacles such as time, availability, or lack of inclusivity — specifically for neurodivergent individuals [19], and those with mental disabilities [15] — can limit participation.

Prior research has explored the use of conversational agents to help grow social skills and social-emotional learning, particularly among children and autistic individuals [10, 26]. Building on these works, we focus on neurodivergent post-secondary students and explore whether an embodied conversational agent can act as a low-pressure practice partner for initiating conversations with peers. Such a robot can enable people to learn at their own pace in a judgment-free environment, adapt to individual social abilities, and provide a personalized experience for social growth.

Current social skills training uses role-playing, feedback, homework and other methods to help improve social skills. Yet the approaches that social skills training employs try to force neurotypical standards on non-neurotypical individuals [8]. Furthermore, individuals may have difficulty generalizing the skills they learn in a traditional social skills training session; they may perform a skill perfectly during a practice session, but fail to perform the skill in real life [20].

Using a robot-based approach can address these limitations. An embodied humanoid robot can provide the same realism that a human provider can, while allowing individuals to learn anytime and anywhere, making it more accessible and available compared to traditional social skills training sessions that are scheduled at certain times and dates. This provides individuals with more opportunities to practice their skills and explore different scenarios



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to help generalize skills they learned. Moreover, while some social skills training sessions may teach non-verbal communication, some individuals may struggle to interpret expressions or tone. A robot-based approach can teach these cues in a personalized and adaptive manner that matches the individual's ability. Finally, the physical presence can enhance motivation for users to learn and practice their social skills. Unlike traditional social skills training, where individuals may forget what they have learned in the previous lesson, having a constant presence may encourage individuals to be consistent with their skills.

However, creating such a robot raises challenges in relation to empathy, inclusivity, and ethics. The robot must use language that is inclusive to all while ensuring privacy when creating adaptive and personalized content. The goal of this work is to determine how an embodied conversational agent can be created to provide adaptive, personalized, and inclusive social skills training for neurodivergent adults in post-secondary contexts, with a particular focus on initiating conversations with peers.

In this late-breaking work, we report on the in-progress design of a Furhat-based, neurodiversity-affirming social skills trainer for neurodivergent post-secondary students who find it difficult to initiate conversations with peers. Our contributions are: (1) a design rationale that combines the Strength-Based Model of Neurodiversity (SBMN) with an embodied conversational agent; (2) a Wizard-of-Oz protocol and scenario structure for practicing conversation initiation in realistic academic contexts; and (3) a mixed-methods evaluation plan centred on comfort, self-efficacy, and perceived inclusivity. This work is guided by the following research questions:

- RQ1: How do neurodivergent post-secondary students experience interacting with a Furhat-based social skills trainer in terms of comfort, self-efficacy, and perceived inclusivity?
- RQ2: How do participants perceive the strengths and limitations of a strengths-based, neurodiversity-affirming feedback style when it is delivered by an embodied conversational agent?

2 Related Work

2.1 Social Skills Training

Social skills are not explicitly taught; they are often learned through life experiences. However, anxiety, negative experiences, or other factors can cause poor social skills [1, 3, 18, 23, 30]. Strong social skills are associated with improved personal well-being by building strong relationships and improving the quality of life [2]. On the contrary, poor social skills can lead to isolation and contribute to mental and physical health issues through stress and loneliness [24].

Social skills training is a well-known method for improving social and communication skills. For instance, one study showed that even brief social skills training helped a participant with social anxiety disorder improve both her confidence and perception of social skills, enabling her to perform behavioural experiments and homework in feared social situations [32]. However, traditional human-led social skills training is often targeted towards neurotypical norms and may lack inclusivity towards neurodiverse individuals [19]. Moreover, limited access to professional trainers can limit availability and accessibility [27].

To address these limitations, researchers explored automated social skills training through conversational agents [27] , robots [14], and virtual reality (VR) [31]. These studies show that such technologies can improve and develop social skills among individuals. Regardless, most prior work focuses on children or autistic individuals, with limited work explicitly centring on neurodivergent adults who must navigate frequent peer interactions in post-secondary settings. This project aims to address that gap by designing an embodied conversational agent for neurodivergent post-secondary students to practice initiating conversations with peers in a neurodiversity-affirming way.

2.2 Conversational Agents

Conversational agents are primarily used as assistants that help users complete tasks such as setting timers, checking the weather, or playing music through conversation. Popular examples include Amazon Alexa, Google Home, and Google Nest [9]. Beyond task completion, researchers have explored how conversational agents can be utilized in various contexts, including workplaces [16] and healthcare [28].

Previous studies have also examined how conversational agents can support social-emotional learning, particularly for children and autistic users [10, 12]. However, many of these technologies were originally developed for adults or older children and later appropriated by younger users, and relatively few explicitly attend to neurodiversity-affirming principles. Building on these works, this project proposes a conversational agent that supports neurodivergent adults in post-secondary education, focusing primarily on the development of social skills for conversation initiation.

Recent works have proposed the concept of a proactive conversational agent [17] and agents that can process textual inputs and visual stimuli to create more natural conversation [4]. Studies show that people attribute personality traits to a human-like computer interface compared to a text-display interface [25]. As a result, using a talking-face interface that can be expressive, such as Furhat [4], may promote a more natural and engaging experience for social skills development.

These findings motivate the design and development of a conversational agent with a human-like face and the ability to initiate and maintain conversations to support people in practicing and developing their social skills in an inclusive, adaptive, and interactive manner. In contrast to prior work that often treats social skills as deficits to be remediated, our design is grounded in the Strength-Based Model of Neurodiversity and focuses on amplifying conversational strengths while offering affirming strategies for navigating challenging social situations.

3 Design

Our current design employs a Wizard-of-Oz methodology to support neurodivergent individuals in learning how to initiate conversations. While the dialogue manager in [4] could be adopted to guide users to create a conversation using contextual prompts, a Wizard-of-Oz approach can provide a more flexible conversation. A human operator (the "wizard") controls Furhat in real time, allowing intervention or guidance if there is a conversational gap or to maintain a smooth dialogue. This methodology also mitigates potential

technical issues or malfunctions that can occur in an autonomous system. Moreover, the Wizard-of-Oz setup allows researchers to observe individuals in situ and provide personalized, contextually related feedback tailored to the individual. We are implementing initial Furhat scripts for the two-session protocol and a simple control interface for the wizard to select prompts and feedback.

As this approach is designed for neurodiverse individuals, the feedback provided will follow the Strength-Based Model of Neurodiversity (SBMN) [11]. Rather than encouraging masking or adopting neurotypical behaviours, feedback is designed to foreground the individual's conversational strengths (e.g., clear topic transitions, active listening) and offer constructive, neurodiversity-affirming suggestions for skill development. This is similar to [27], who adopted the positive reinforcement method. However, unlike how their work provided feedback through digital signage, we provide it verbally through Furhat, making it feel more personalized. To ensure the study is inclusive and accessible, the study follows recommendations from [13] and [21], including practices that encourage comfort, positive feedback, and customization for participants.

Drawing on SBMN [11] and design recommendations for neurodivergent users [13, 21], we articulate three preliminary design principles for neurodiversity-affirming social skills training agents: (1) Affirm, do not normalize—feedback should highlight existing conversational strengths and offer optional strategies rather than prescribing "correct" neurotypical behaviour; (2) Offer scaffolds, not scripts—the agent should provide prompts and suggestions that can be adapted by the user instead of fixed, one-size-fits-all scripts; and (3) Make social demands negotiable—the system should allow users to set boundaries (e.g., conversation length, topics, breaks) and acknowledge that opting out or taking pauses are valid choices. These principles inform how Furhat presents scenarios, structures practice, and frames feedback in our design.

3.1 Participants

Participants will be neurodivergent individuals over 18. Ideally, participants are enrolled in a post-secondary institution, as these situations expose individuals to a greater number of potential peer interactions and provide numerous opportunities for conversation. Therefore, this demographic is ideal for the goal of this research. We will recruit individuals who self-identify as neurodivergent (e.g., autism, ADHD, learning differences) and report difficulty initiating conversations with peers in academic contexts.

3.2 Sessions and Scenarios

The initial meeting is designed to be divided into two sessions. Before beginning, participants will complete a questionnaire regarding demographic information and a situation in which they find initiating a conversation challenging. The collected responses will be used to recreate the scenario the participant provided. Example scenarios will range from approaching a classmate for a project to initiating a conversation with a peer to discuss coursework. These self-identified scenarios allow Furhat to practice with situations that are both realistic and personally meaningful to participants.

In the first session, Furhat will describe the scenario and initiate the conversation as if it were a peer. It will introduce itself and prompt the participant to do the same. The conversation will then unfold, where Furhat will use contextual clues of its environment to continue the dialogue. The conversation will follow a turn-taking structure, where both parties will have an equal opportunity to speak. At the end of the session, Furhat will guide strategies the participant can use to initiate similar future conversations.

In the second session, Furhat will once again describe the scenario; however, it will prompt the participant to initiate the conversation this time. If there are conversational gaps, Furhat will offer hints on how to continue the conversation. Similar to the first scenario, the conversation will follow a turn-taking structure to provide equal opportunities to speak and ensure the conversation flows naturally. At the end of the session, Furhat will offer personalized feedback on the participant's performance and recommendations for improvement.

Before concluding the study, participants will complete a brief survey and a 10-12 minute semi-structured interview regarding their experience and provide any additional feedback to refine the study.

3.3 Data Collection

To evaluate the usability and inclusivity of the proposed social skills training conversational agent, the following measures would be collected: perceived comfort, self-efficacy, user preferences, and behavioural indicators. These measures were selected based on the study goals, and the methods for data collection are informed by [13], which outlines approaches used in studies involving assistive technologies for neurodivergent individuals. We have drafted survey items and a semi-structured interview guide based on these recommendations.

3.3.1 Perceived Comfort. Perceived comfort is subjective and therefore must be assessed using quantitative or qualitative methods [22]. In this study, perceived comfort will be measured using a Likert scale question asking participants to rank their comfort level when interacting with Furhat.

3.3.2 Self-Efficacy. Self-efficacy refers to "the belief in one's capabilities to organize and execute the courses of action required to manage prospective situations'' [5]. Participants will complete a Likert scale question to rank their self-efficacy in initiating a conversation in a real-world context after using the Furhat.

3.3.3 User Preferences. User preferences will be collected through semi-structured interviews. Participants will be asked about aspects of the robot and procedure they found helpful, challenging, or enjoyable, along with any additional feedback to refine the study and conversational agent.

3.3.4 Behavioural Indicators. Behavioural indicators such as body language and vocal cues will be collected through video recordings captured by Furhat. Using this approach lessens the intrusiveness of observational research by reducing the presence of an additional observer, therefore promoting participant comfort.

3.4 Analysis

Data collected from the surveys, interviews, and recordings will be analyzed using a mixed-methods approach, combining statistical

data with qualitative thematic analysis to evaluate the usability and inclusivity of the proposed study design and Furhat.

Quantitative measures, such as perceived comfort and self-efficacy, will be analyzed using means to evaluate the overall perspective of participants' comfort and confidence when interacting with Furhat. In addition to overall trends, we will explore whether reported comfort and self-efficacy align with observed behavioural indicators (e.g., body posture, latency before speaking), and how participants describe the fit between Furhat's feedback style and their own communication preferences.

Qualitative data from interviews and recordings will be analyzed using thematic analysis following Braun and Clark's methodology [6]. Transcripts of responses and behaviours will be coded to create an initial codebook. To ensure accuracy, two researchers will perform iterative coding to assess inter-rater reliability (IRR) and refine the codebook. Once IRR is satisfactory, the lead researcher will code the remaining data and generate themes from the data that accurately portray the participants' experiences.

3.5 A User Example

To illustrate the study design, we present a session between Furhat and a participant who finds initiating a conversation with a classmate to be challenging. After completing the introductory questionnaire and receiving an overview of the study from a researcher, the participant will be introduced to Furhat and the study procedure before independently beginning the session.

In the first session, Furhat will present the scenario the participant described and initiate the conversation, role-playing as a classmate. For example, Furhat might begin the conversation with, "Hi, I'm Furhat. I noticed we're in the same class together. What are you working on?''. The participant will then introduce themselves and provide an answer, such as "I'm working on the assignment due this week''. The conversation will continue in a turn-taking manner, with Furhat leading the dialogue. At the end of the session, Furhat will provide guidance on strategies for initiating similar conversations. A five-minute break will follow. In the second session, Furhat will again describe the scenario that the participant provided, but state that the participant will lead this session. The participant will begin the conversation, and Furhat will provide subtle cues if conversational gaps occur. At the end of the session, Furhat will provide tailored feedback, highlighting the participant's conversational strengths and providing recommendations for areas of improvement related to a real-world context. Finally, the researcher will return to conduct the survey and interview to capture the participant's experience and feedback, focusing on perceived comfort, self-efficacy, and the extent to which the interaction felt inclusive and affirming.

4 Current Status and Next Steps

At the time of writing, we have defined the session structure, drafted Furhat scripts for both sessions, and prepared initial survey and interview materials. We are currently setting up the Wizard-of-Oz control workflow and seeking feedback from neurodivergent students and practitioners on the language and pacing of the interactions. Our next steps are to conduct a small pilot with 3–5 participants to evaluate feasibility and comfort, refine the scenarios and feedback based on their input, and then run a larger study using the measures described above to assess usability and inclusivity. We define success as a high perceived comfort level and overall good user experience during the study and interview. In parallel, we will explore transitioning from a fully Wizard-of-Oz setup to a semi-autonomous dialogue manager, informed by the patterns we observe in the wizard's behaviour.

Our design also raises several tensions that we plan to explore in future iterations: whether practicing with a robot genuinely supports generalization to human interactions or risks becoming a comfortable "bubble"; how to balance affirming diverse communication preferences with institutional expectations in academic settings; and how much initiative the agent should take in steering conversations versus allowing pauses and missteps as part of authentic practice.

5 Conclusion

In this paper, we presented the in-progress design of an inclusive, neurodiversity-affirming social skills training approach for neurodivergent post-secondary students using the Furhat social robot. We described our Wizard-of-Oz session structure, measures for comfort, self-efficacy, user preferences, and behavioural indicators, and our planned mixed-methods analysis, and illustrated the procedure through a concrete user example. As a late-breaking work, our contribution is to share this design and study protocol while we are still implementing and piloting it, and to invite feedback from the HRI community on how embodied conversational agents can best support neurodivergent users' social skills in affirming ways.

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