ABSTRACT
This paper draws on two main premises – that children with autism are more susceptible to being bullied, and that they gravitate toward technologies to facilitate learning. We therefore propose that utilizing this propensity for digital participation, in this marginalized population, may provide a solution for children with Autism Spectrum Disorder (ASD) to recognize and respond to social bullying. We are developing modules for a chat-bot that include bullying and recognizing sarcasm that allow bullied autistic children to develop the social prowess to withstand their aggressors.

1 BACKGROUND
Bullying is a societal problem that is prevalent in all forms of communities. Being a victim of bullying often leads to low-self-esteem, mental illness, self-harm and suicide ideology which may persist well after the bullying has ceased [1]. Research has shown there are risk factors that increase the probability of being bullied. These include ethnicity, poor social interaction, and low academic success [2]. Conversely, social networks have been found to offer a significant protective factor in minimizing the extent of bullying [1].

Global research has found special needs children particularly those with autism spectrum disorder (ASD) have been found to more likely to be bullied [1,3], potentially because of the inherent difficulties they face in forming positive relationships in social networks. And sadly, it was identified by Anderson [3], autistic children who have a desire to interact with other children are bullied more frequently than children who prefer to play alone. ASD children can find social interaction challenging and frustrating, which can lead to social disengagement and result in social isolation. Improving their social interaction skills is essential. To do this, parents, speech pathologists and occupational therapists are heavily relied on to identify strategies that will support the child’s progression. Parents can also gain assistance through service providers and charities. However, aside from the time parents can spend with their child, there is little assistance children can receive to improve their social interaction skills outside of the clinical setting. Chat bots present a potential solution to
this problem. They can be used to engage with a child outside and within the home, becoming a comfortable personal assistant that can nurture the social interaction skills of a child.

2 AUTISM SPECTRUM DISORDER

ASD is lifelong developmental disorder that affects, among other abilities, communication, social interactions and sensory processing. As a spectrum condition, autism varies greatly from person to person; ranging from severe to near-typical functioning. In Australia, there is no reliable of data on the prevalence, however a conservative estimate is at least 1 out of 100 children, which equates to approximately 230,000 people [4]. As of 2016, autistic people comprise 29% of participants on the National Disability Scheme (NDIS) – the 2nd largest group [4].

Identifying bullying in children with ASD is hampered by the fact that children with ASD have limited speech and struggle with communicating their experiences. In these cases, being bullied can compound social interaction difficulties and impede communication development. Moreover, some struggle with understanding social interactions and may not know themselves whether they are being bullied. This is particularly common with indirect bullying such as social exclusion [1].

Once a child has been identified as either likely to be, or being, bullied, it is important that they are taught strategies and skills on how to recognize and respond to the social situation. Guidelines for developing anti-bully plans are becoming common place in most schools; however, innovative methods are required for teaching autistic children as they may have difficulty perceiving the concept of bullying and social betrayal.

Methods of teaching involving technology are becoming more appealing to learners on the autism spectrum as it has been widely known for some time that such individuals have a tendency to gravitate towards technology. It is believed that the visual focus and having the locus of control are some of the appealing reasons [5].

The form of technology best able to help an autistic individual understand and respond to bullying behaviour is an open question. Here we propose the concept of using a conversational agent or chat-bot to provide a pseudo conversation partner for practicing various scenarios and other interactions.

4 HARLIE: AUTISM TAILORED CHAT-BOT

HARLIE (Human and Robot Language Interaction Experiment) is a chat-bot we are developing that is akin to Apple’s Siri [6]. Various modules are in active development that allow conversations on variety of topics such as interests and hobbies, weather, bullying, identifying sarcasm and many more.

HARLIE is very extensive and leverages state-of-the-art technology in speech detection and
natural language processing. None-the-less, expertise in computer science is not needed to develop content for HARLIE’s so-called brain. In fact, a majority of the existing content was developed by speech and occupational therapists.

HARLIE allows for multi-modal interaction in the form of voice, text and images. For non-verbal children, an interface using the picture exchange communication system [7] is also being developed.

Figure 1 gives a screenshot with an example interaction that shows the beginning of a conversation involving identifying whether the user is being bullied. Images, as shown in Figure 1, are embedded into the responses to help guide the meaning of the conversation.

Various scenarios could be presented that allow the user to work through different responses and reactions. These would need to be developed in cohort with clinicians and parents.

For individuals with developing speech, HARLIE can analyse the user’s voice and communication. This includes measuring speech and syllable rate; how vowels were articulated; vocabulary range and duration of mid-sentence pauses. It is believed these metrics could be helpful for autistic learners and also for clinicians and researchers who are trying to understand the challenges and improvements of the individual. Longitudinal use would determine the impact of social interaction on communication.

4 CONCLUSION

Digital participation may provide the answer for social marginalisation experienced by children with ASD, especially when it comes to bullying. A chat-bot designed to help autistic children recognise and react appropriately to aggressive behaviour in their peers may assist in developing the social prowess required to develop resilience against bullies.

REFERENCES