Chapter 13
Remediation and Assistive Technologies for Communication Deficits in Autistic Spectrum Disorders

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ABSTRACT

This chapter surveys and critiques the existing and emerging remediation technologies and assistive technologies targeted at verbal communication deficits in individuals with autism spectrum disorders. Focusing on deficits in grammar/syntax and pragmatics (language use), the chapter examines remediation technologies that teach sentence-level comprehension, sentence-level production, and productive pragmatics. It then examines assistive technologies for sentence-level production and productive pragmatics. Throughout, it explores pedagogical strategies, questions of efficacy, and what to look out for in selecting technologies. It concludes with a discussion of the importance of ensuring that the goals of assistive technologies complement rather than undermine the goals of remediation technologies.

INTRODUCTION

One of the core deficits of autism spectrum disorders is in communication. This deficit affects both verbal communication (communication involving language) and nonverbal communication (communication involving gestures and facial expressions). In this chapter, we focus on verbal communication, and, in particular, on remediation technologies and assistive technologies aimed at verbal communication in individuals with autism spectrum disorders.

BACKGROUND

Successful verbal communication requires oral articulation skills, or pronunciation; word-level skills, or vocabulary; sentence-level skills, or grammar/syntax; and skills in the social use of language, or pragmatics. Among individuals with autism who have at least some basic language skills, pronunciation and vocabulary are often relative strengths compared with grammar/syntax and pragmatics (Tager-Flusberg et al, 2013). Grammar and syntax, on the other hand, are often areas of deficit even when vocabulary levels are age appropriate (Kjelgaard & Tager-Flusberg, 2001; Roberts et al, 2004; Kelley, Paul, Fein & Naigles, 2006). Generally, autistic children are more likely to make syntactic errors (e.g., "want cookie" rather than "I want a cookie"; "He walk" rather than "He walks"), and tend to speak in shorter, less complex utterances than control subjects matched on vocabulary acquisition and non-verbal mental age (Tager-Flusberg et al., 1997; Eigsti, Bennetto & Dadlani, 2007; Eigsti, Marchena, Schuh & Kelley, 2011).

A substantial subpopulation of individuals with autism, however, shows no difficulties with grammar/syntax. People in this subpopulation are diagnosed with disorders at the higher functioning end of the autism spectrum: typically, Asperger's Syndrome (no longer an official diagnosis), Semantic-Pragmatic Disorder, or Social Pragmatic Communication Disorder. Here the diagnostic criteria restrict communication deficits to difficulties with the social aspects of language use—what we are calling pragmatics. But since pragmatics deficits derive from social deficits, and since social deficits characterize the mildest to the most severe cases, we find deficits in pragmatics in individuals across the entire autism spectrum.

Pragmatics deficits, moreover, also affect large swathes of what these individuals experience in terms of verbal communication. This is because much verbal communication requires pragmatic reasoning for full comprehension. While "It's cold in here" is literally about the temperature, its full meaning in a given context might include such implied meanings as "Please close the window." While a simple "yes" might be the literally correct response to "Did you enjoy your summer vacation?", it is typically too curt to be conversationally appropriate. Deficits in pragmatics, therefore, even unaccompanied by other linguistic deficits, are associated with serious deficits in both language comprehension and language production.

For decades now, the communication problems in autism have been addressed through in-person therapy--whether traditional speech/language therapy or autism-specific therapies like Applied Behavioral Analysis. But in-person therapies are costly in terms of man-hours, and, unless they are covered by insurance, costly financially as well. This raises the question of whether certain aspects of language remediation might be automated by computerized technologies. Indeed, such remediation technologies have been proliferating in therapeutic and educational settings, and some of them are aimed specifically at language deficits in autism. Another area of technological growth is in assistive communication, and this, too, potentially offers services to autistic individuals. Furthermore, there is evidence that those with autism often prefer interactions with computers, and computer mediated interactions, to direct face-to-face interactions with people (Chen & Bernard-Opitz, 1993; Heimann, Nelson, Tjus & Gillberg, 1995; Moore & Calvert, 2000).

MAIN FOCUS OF THE CHAPTER

In this chapter, we will focus on technologies that address the two most common verbal communication deficits in autism: grammar/syntax and pragmatics. We will begin with technologies that aim to remediate these deficits, and then move on to technologies that aim to help people communicate in spite of these deficits. We begin with remediation technologies for grammar/syntax.

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