



Contents lists available at ScienceDirect

Research in Developmental Disabilities



Review article

On the nature of the speech perception deficits in children with autism spectrum disorders

R.S. You^{a,b,*}, W. Serniclaes^{b,c,d}, D. Rider^b, N. Chabane^e

^a Dipartimento di Neuroscienze, Università di Parma, Italy

^b Laboratoire de Psychologie de la Perception, Université Paris Descartes, France

^c Centre National de la Recherche Scientifique (CNRS), France

^d UNESCOG, Université Libre de Bruxelles, Belgium

^e Centre Cantonal de l'Autisme, Université de Lausanne, Switzerland

ARTICLE INFO

Article history:

Received 28 December 2015

Received in revised form 16 July 2016

Accepted 19 December 2016

Available online xxx

Keywords:

Categorical perception

Allophonic perception

Phonological features

Vowels

Consonants

Autism spectrum disorders

ABSTRACT

Previous studies have claimed to show deficits in the perception of speech sounds in autism spectrum disorders (ASD). The aim of the current study was to clarify the nature of such deficits. Children with ASD might only exhibit a lesser amount of precision in the perception of phoneme categories (CPR deficit). However, these children might further present an allophonic mode of speech perception, similar to the one evidenced in dyslexia, characterised by enhanced discrimination of acoustic differences within phoneme categories. Allophonic perception usually gives rise to a categorical perception (CP) deficit, characterised by a weaker coherence between discrimination and identification of speech sounds. The perceptual performance of ASD children was compared to that of control children of the same chronological age. Identification and discrimination data were collected for continua of natural vowels, synthetic vowels, and synthetic consonants. Results confirmed that children with ASD exhibit a CPR deficit for the three stimulus continua. These children further exhibited a trend toward allophonic perception that was, however, not accompanied by the usual CP deficit. These findings confirm that the commonly found CPR deficit is also present in ASD. Whether children with ASD also present allophonic perception requires further investigations.

© 2016 Elsevier Ltd. All rights reserved.

Contents

1. Introduction	00
1.1. The nature of speech perception deficits in children with ASD	00
1.2. The present study	00
2. Method	00
2.1. Participants	00
2.2. Stimuli	00
2.3. Procedure	00
2.3.1. Data processing	00
3. Results	00
3.1. Identification data (categorical precision)	00

* Corresponding author at: Dipartimento di Neuroscienze, Università di Parma, Via Volturno, 39, Parma-Italy.
E-mail address: ridasolracyou@gmail.com (R.S. You).

<http://dx.doi.org/10.1016/j.ridd.2016.12.009>

0891-4222/© 2016 Elsevier Ltd. All rights reserved.

Please cite this article in press as: You, R. S., et al. On the nature of the speech perception deficits in children with autism spectrum disorders. *Research in Developmental Disabilities* (2016), <http://dx.doi.org/10.1016/j.ridd.2016.12.009>

3.2.	Discrimination vs. identification data (categorical perception).....	00
3.3.	Discrimination peaks	00
3.4.	Relationships between the perceptual deficits and individual characteristics of the ASD children.....	00
3.4.1.	Individual differences	00
3.4.2.	Subgroups	00
4.	General discussion.....	00
4.1.	Categorical precision deficit	00
4.2.	Is the CPR deficit in ASD related to language delay?	00
4.3.	Allomorphic perception and categorical perception deficit	00
	Acknowledgments	00
	References.....	00

1. Introduction

Autism spectrum disorders (ASD) are severe and complex developmental conditions characterised by persistent deficits in social communication and social interaction and restricted repetitive patterns of behaviour, interests, or activities (APA, 2013). ASD affects people in different ways and can range from mild to severe. For example, people with ASD have highly variable cognitive and language skills, from a complete lack of verbal language to only minor disorders (Kjelgaard & Tager-Flusberg, 2001; Lord & Paul, 1997). The majority of children with ASD begin to speak late, and about half remain nonverbal throughout their lives (Rick & Wing, 1975). Although language problems are central to ASD, and are the most important feature for establishing a prognosis with these developmental disorders (Rutter, 1978; see also: Kuhl, Coffey-Corina, Paden, Munson, Estes, & Dawson, 2013), the mechanisms underlying language impairment in autism remain poorly understood.

Impaired central auditory processing might contribute to the language deficits in autism. Evidence suggests that structural and functional abnormalities exist in cortical regions involved in language and auditory processing in autism (for a recent review, see Kujala, Lepistö, & Näätänen, 2013). Previous studies revealed significant differences in specific regions recruited to process speech. For example, a comparison between children with ASD and typically developing control children showed reduced activity within an extended number of brain regions of the left hemisphere (LH) in response to speech (e.g., Redcay & Courchesne, 2008), a larger activation of right hemisphere compared with controls (e.g., Flagg et al., 2005; Redcay & Courchesne, 2008), and a reduced activation in specific speech-temporal regions (e.g., superior temporal gyrus) of the LH (e.g., Boddaert et al., 2004; Zilbovicius et al., 2000), and with a significant diffuse activation bilateral outside the temporal lobe (Boddaert et al., 2004). In addition, more specifically, several electrophysiological studies have revealed that children with ASD have difficulties in phonological feature discrimination. The mismatch negativity (MMN), an event-related potential (ERP) component elicited automatically by phonological contrasts, has been found to be weaker in children with ASD than in control children (vowel contrasts: Čeponiene et al., 2003; Kujala et al., 2010; Lepistö et al., 2005, 2006, 2008; consonant contrasts: Jansson-Verkasalo et al., 2003; Kuhl, Coffey-Corina, Padden, & Dawson, 2005; Kujala et al., 2010). In sum, as underlined by Flagg et al. (2005), language impairment in the subjects with autism associated with abnormal functional specialisation of the LH for linguistic processing would be related with impaired stimulus feature properties encoding during early sensory processing of the speech signal (e.g., formant transitions, voice-onset time).

These findings suggest that the individuals with ASD have various problems to extract phonological features relevant for understanding speech. Studies on the development of speech perception show that typically developing infants change from a language-general pattern of speech perception, based on auditory features, to a language-specific one, based on phonological features (for review see, Kuhl, 2000). They have the initial abilities to discriminate all of the phonemic contrasts, including those used in foreign languages (Werker & Tees, 1984) and then lose this ability and only discriminate the categories present in the native language. In addition, infants' early speech perception skills have been shown to be reliable predictors of future language abilities (Tsao, Liu, & Kuhl, 2004) and a further study specifically showed that infants' early perception of native and foreign contrasts (at 7.5 months) predict later language ability, but, in opposite directions, language advancement (over the next 2 years) was faster with better perception of native contrasts and slower with better perception of foreign contrasts (Kuhl et al., 2008).

Other studies have investigated differences in speech perception between subgroups of ASD children with differing reading status. White et al. (2006) divided children (aged 8–12 years) with ASD into two groups: 'poor readers' and 'good readers'. Neither showed evidence of a deficit in identification and discrimination on the basis of voicing or place of articulation (identification: 'coat'/'goat' and ba/da continua; discrimination: ba/da continuum). In line with the findings of White et al., Constantino et al. (2007) found no difference between verbal high-functioning English-speaking children with ASD and typically developing controls in the perception of English vowels and consonants and similar-sounding non-native vocalic contrasts. Seery, Vogel-Farley, Tager-Flusberg, and Nelson (2013) used ERP to investigate whether infants at risk for ASD 'HRA' (infants who had an older sibling with ASD who were designated high risk) differ from low-risk controls 'LRC' (infants who had one typically developing older sibling were designated low risk) in the processing of native and non-native phonemes. They found no evidence of delayed perceptual narrowing with non-native phonetic contrasts in the HRA group. However, another recent study (De Pape, Hall, Tillmann, & Trainor, 2012), using a large behavioural battery of speech perception tests, including discrimination tasks on both Zulu consonantal contrasts and native English contrasts, found that monolingual English-speaking adolescents with ASD showed a smaller difference between the native and foreign contrasts

Download English Version:

<https://daneshyari.com/en/article/4941173>

Download Persian Version:

<https://daneshyari.com/article/4941173>

[Daneshyari.com](https://daneshyari.com)