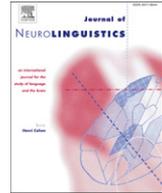




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Understanding and production of prosody in children with Williams syndrome: A developmental trajectory approach

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ABSTRACT

This study investigated the development of three aspects of linguistic prosody in a group of children with Williams syndrome compared to typically developing children. The prosodic abilities investigated were: (1) the ability to understand and use prosody to make specific words or syllables stand out in an utterance (focus); (2) the ability to understand and use prosody to disambiguate complex noun phrases (chunking); (3) the ability to understand and use prosody to regulate conversational behaviour (turn-end). The data were analysed using a cross-sectional developmental trajectory approach. The results showed that, relative to chronological age, there was a delayed onset in the development of the ability of children with WS to use prosody to signal the most important word in an utterance (the focus function). Delayed rate of development was found for all the other aspects of expressive and receptive prosody under investigation. However, when non-verbal mental age was taken into consideration, there were no differences between the children with WS and the controls neither with the onset nor with the rate of development for any of the prosodic skills under investigation apart from the ability to use prosody in order to regulate conversational behaviour. We conclude that prosody is not a 'preserved' cognitive skill in WS. The genetic factors, development in other cognitive domains and environmental influences affect developmental pathways and as a result, development proceeds along an atypical trajectory.

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1. Introduction

The purpose of this study is to investigate three aspects of linguistic prosody in a group of children with Williams syndrome (WS) compared to typically developing (TD) children by taking a developmental trajectory approach. WS is a relatively rare genetic disorder with a prevalence of about 1 in 25,000 live births (Korenberg et al., 2000), although recent estimates have been higher (1 in 7500; Stromme, Bjornstad, & Ramstad, 2002). It occurs due to a microdeletion on chromosome 7, which results in a number of physical abnormalities, such as elevated blood calcium levels, sensitive hearing and high blood pressure, failure to thrive in infancy, abnormal sensitivity to certain classes of sounds (hyperacusis), etc.

It is generally accepted that individuals with WS show an uneven neuro-cognitive profile, characterised by relative strengths in the verbal domain, auditory memory and face recognition skills, and weaknesses in the visuo-spatial domain (Mervis & Bertrand, 1997). The study of the WS neuro-cognitive profile has been of particular theoretical interest since the 1980s because this uneven neuro-cognitive profile has led some researchers to view WS as providing evidence for a developmental modularisation of higher cognitive functions, such as language, and the implications that this may have for understanding of typical development (see Thomas & Karmiloff-Smith, 2005 for a review). In particular, investigations of the WS cognitive profile have been used as evidence to advance two theoretical views about the way in which the brain becomes specialised for different cognitive functions. The nativist view argues that the developmental trajectory of language, and specifically morpho-syntactic abilities, is relatively independent of other cognitive skills. It predicts that the brain has dedicated neural mechanisms for different cognitive functions from the outset and that language and other cognitive skills in populations with genetic disorders, such as WS, follow constrained but typical developmental trajectories (Pinker, 1999; Zukowski, 2004). In support of this view, cross-sectional investigations of children and teenagers with WS reported relatively spared language abilities, despite general cognitive and visuo-spatial deficits. A substantial number of studies argue for the existence of 'spared' versus 'impaired' cognitive abilities in WS, such as: spared syntax (Bellugi, Marks, Bihrlé, & Sabo, 1988); spared computational system of language responsible for regular grammatical morphology (Clahsen & Almazan, 1998); spared phonology (Barisnikov, Van der Linden, & Poncet, 1996) and preserved prosody, albeit over rich in affect intonation (Trevarthen, Aitkin, Papoudi, & Roberts, 1998). However, none of these studies have actually taken a developmental trajectory approach and their conclusions are based on between group comparisons or error analyses and, therefore, the question of whether the developmental trajectory is typical or atypical cannot directly be answered.

The neuro-constructivist view, on the other hand (Karmiloff-Smith, 1998) holds that a genetic abnormality affects the developmental pathways and as a result, development may proceed along an atypical trajectory. It assumes that neural mechanisms become specialised for particular functions (such as language) over time and the developmental trajectory is a product of interactions between genetic factors, development in other cognitive domains and environmental influence (Grant et al., 1997; Karmiloff-Smith, Brown, Grice, & Peterson, 2003). In support of this view, studies have shown that, although language may be a relative strength in WS, the verbal domain is characterised by an atypical pattern of strengths and weaknesses (Grant, Valian, & Karmiloff-Smith, 2002; Thomas et al., 2001). The developmental trajectory approach emerged from the neuro-constructivist view.

While there is a large body of literature on various aspects of language in individuals with WS (see Brock, 2007 for a review), the status of prosody in the WS neuro-cognitive profile has rarely been studied. Yet, the ability to produce and interpret prosody is fundamental to effective and successful communication. In order for communication to proceed successfully, it is not only important *what* is being said, but also *how* it is said. Some of the functions attributed to prosody are (Roach, 2000): (1) the accentual function, also known as *focus*, in which prosody is used to make specific words or syllables stand out in a stream of speech (for example: *I wanted chocolate cake not chocolate biscuits*); (2) the grammatical function, in which prosody is used to discriminate grammatical units, such as for example: *chocolate cake* and *honey*, as opposed to *chocolate, cake* and *honey*, also referred to as *chunking*; (3) the discourse function or *interaction*, in which prosody is used to regulate conversational behaviour, for example, asking a question as opposed to producing a statement. These functions of prosody are referred to as *linguistic prosody* (Plante, Holland, & Schmithorst, 2006). Linguistic prosody

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