Influence of the prosodic structure on phonological productions in French children with autism

Unlike the stress organization of English, the prosodic structure of French is mainly based on discrete accentuation supporting the phonological structure. A primary accent is placed on the final syllable of lexical words and of phrases, taking the form of syllabic lengthening (fig.1). This primary accent persists on each lexical word inside phrases, but in a less prominent form than the accent found on the very final syllable. In addition to this final accent, a secondary, initial accent is found on lexical words. This secondary accent is expressed by a rise in F0 and a lengthening of the vowel. It signals a clear syllabic demarcation at the beginning of a lexical word and is perceived very well by French speakers (Astésano, 2001; Aguilera et al., 2014). These accent alternations (strong-weak/lengthening-F0) constitute the rhythm of French and support the phonological structure (fig. 2). In autism, although prosodic alterations are often noted in individuals' production (Peppé et al., 2007), the literature on prosody in autism does not lead to any consensus on the prosodic capacities of autistic people. This can be explained by the diversity of the variables being measured, the tools being used, and the subjects being tested. As heterogeneity is central to the definition of autism, it seems difficult to reach a consensus without considering more specifically the characteristics of the autistic population, and especially their phonological abilities.

The present study aims to analyze the prosodic patterns of children with and without autism, whether they have phonological difficulties or not. The main objective is to better understand the dependency between phonological and prosodic structures in these children.

Mean F0 and duration of the vowels /a, i, u/ produced during a non-word repetition task containing 31 items of 1 to 3 syllables varying in phonological complexity were measured in four groups of children aged 6 to 12: two groups of autistic children with phonological difficulties (ASD-LI, n=8) or not (ASD-LN, n=7), and two groups of nonautistic children with Developmental Language Disorder (DLD, N=14) or not (TD, n=15).

Performance of nonword repetition was significantly lower in children with phonological disorders (DLD and ASD-LI) than in those without such disorders (TD and ASD-LN), regardless of whether the children had autism or not. Overall, the mean F0 was significantly higher in children with ASD-LI than in the other groups of children (ASD-LN, TD and DLD), particularly for the first vowel of trisyllabic items. As for duration, autistic children (with either phonological difficulties or normal language) generally presented longer vowels than nonautistic children. For trisyllabic nonwords, we observed a significant lengthening of the second vowel for ASD-LI children, but of the third vowel for the ASD-LN group, whereas nonautistic children (DLD and TD) displayed an identical pattern, in line with the expected prosodic pattern for French.

The results show that in autistic children without phonological deficits, strong-weak syllabic alternation is indeed present, but the increased duration of the last vowel, which is greater than that observed in children without autism, indicates a unique prosodic pattern. In autistic children with phonological deficits, not only is the increase of the F0 of the first vowel larger compared to nonautistic children, vowel lengthening also affects the wrong syllable (the second one), generating an atypical prosodic pattern, not centered on the last vowel. The prosodic rhythm is thus completely erased. The case of children without autism but with DLD is also noteworthy: they always behaved like TD children. Therefore, phonological disorders do not seem to be the source of an altered prosodic structure. The observed differences suggest that prosodic difficulties in autism vary, and they are not due to the presence of a phonological disorder. We can thus hypothesize that in these children prosodic deficits could be a possible cause for the alteration of the phonological structures. These results are encouraging and will be reinforced with the results of more autistic children.

	(2)			(1)			(2)		(1)
									+
				+					+
-	+	-	-	+	-	-	+	-	+
la	**de**	**gʁa**	**da**	**sjɔ̃**	**də**	**sə**	pʁo	**se**	**de**
la	*dégradation*				*de*	*ce*	*procédé*		
'the	*degradation*				*of*	*this*	*process'*		

Figure 1: Primary (1) and secondary (2) accentuation pattern in French (Delais-Roussarie & Di Cristo, 2021)

(2)		(1)
		d
		d
F0	-	**d**
V1	V2	V3

Figure 2: Typical prosodic pattern of a trisyllabic word in French ('d' = duration ; 'F0' = fundamental frequency)

References

Aguilera, M. ; El Yagoubi, R. ; Espesser, R. ; Astésano, C. (2014). Event Related Potential investigation of Initial Accent processing in French. Speech Prosody 2014, 383-387.

Astésano, C. (2001), Rythme et accentuation en Français : invariance et variabilité stylistique, Paris : L'Harmattan.

Delais-Roussarie, E. & Di Cristo, A. (2021). Chapitre XIX - L'accentuation. In Godard, D. ; A. Abeillé & A. Delaveau (eds) : *Grande Grammaire du Français*. Actes Sud.

Peppé, S., McCann, J., Gibbon, F., O'Hare, A., & Rutherford, M. (2007). Receptive and Expressive Prosodic Ability in Children With High-Functioning Autism. *Journal of Speech, Language, and Hearing Research*, *50*(4), 1015–1028

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