Autistic traits in duration of utterance-final particles in Japanese

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https://doi.org/10.36505/ExLing-2021/12/0038/000511

Abstract

This study investigated the effects of individual autistic traits on productive prosody of Japanese utterance-final particles (UFPs) as social markers expressing the speaker's moods, based on previous studies reporting atypical patterns in speech prosody by people with autism spectrum disorders (ASDs). Analysis of the prosodic features of UFPs obtained from a role-play task by typically developed native Japanese speakers revealed that individual speakers' autistic traits significantly affected the duration of the UFPs, but intensity and pitch did not show any significant effects. Speakers with higher autistic traits tended to utter UFPs in shorter times, in comparison with those with lower autistic traits. This study provides evidence that the atypical prosody associated with autistic traits may be reflected in the duration of mood morphemes.

Keywords: Japanese, right periphery, utterance-final particle, prosody, autistic traits

Introduction

Prosody plays a key role in communicating a speaker's emotional state as well as linguistic meanings. It has long been claimed that individuals with autism spectrum disorder (ASD), which is characterized by difficulties with social communication and restricted and repetitive behavior, display atypical prosodic features in their use of pitch, duration and intensity (Asperger, 1944). However, some recent studies have rejected this long-held claim, suggesting instead that individuals with ASD have no specific difficulties in productive prosody (McCann & Peppé, 2003). This lack of consensus could stem from the heterogeneity that exists within the ASD population, but it could also reflect shortcomings in the way earlier experiments were conducted, where results were often based on various factors (e.g. grammatical, semantic, emotional) which were not specified (Dahlgren et al., 2018).

We explore one possible solution to control these confounding effects by focusing on utterance-final particles (UFPs) in East- and South-East Asian languages, because UFPs are bound morphemes with no substantial meanings, and speakers can freely attach UFPs to an utterance to indicate their attitude or mood (Yap et al., 2014). To elucidate the effects of individual autistic traits on prosody, this study measured the prosodic features of the high-frequency Japanese UFPs *-ne* (other-oriented UFP) and *-yo* (self-oriented UFP), with

reference to the Autism-Spectrum Quotient (AQ) for typically developed (TD) young adult native Japanese speakers. It was hypothesized that individual AQ has a stronger association with the prosody of other-oriented *-ne* than with self-oriented *-yo*, since autistic traits are concerned with the other's mental states.

Methods

We obtained data (Table 1) on the prosodic features of Japanese UFPs from 27 native Japanese speakers (average age 21.1± 2.7 years, 13 males) by utilizing a role-play task where each participant uttered 80 sentences with either the UFP *-ne* or *-yo* in hypothetical dialogs in a soundproof chamber. Linear mixed effects (LME) models were constructed for the features of duration, intensity, and pitch. Specifically, the index of pitch was examined in terms of mean, standard deviation (SD), and difference between maximum and minimum, to track the intonation patterns. In sum, dependent variables of the modelling were mean duration, intensity, and pitch, and pitch SD, and difference. For each of the five dependent variables, the LME modeling included fixed effects of UFP type (*-ne*/*-yo*) as a categorical variable and AQ (out of 50) as a continuous variable, and random effects of participant and item.

Results and discussion

We found a significant correlation between the participants' AQ (i.e., a higher score indicates a higher autistic tendency) and the duration of UFPs, whereas correlations of AQ with other indices of intensity and pitch were not significant (Figure 1). The LME modeling (Table 2) revealed that TD young adults with a higher autistic tendency uttered the UFPs with a shorter duration, in comparison with those with a lower autistic tendency. This effect was stronger for other-oriented *-ne* than for self-oriented *-yo* (Figure 2).

The result is consistent with a previous electrophysiological study of Japanese UFP comprehension (Kiyama et al., 2018), which reported that young TD adults with higher autistic traits exhibited a particular hypersensitivity to theUFP *-ne* as a marker of social distance with others. By focusing on the prosody of UFPs, this study provides evidence that AQ-associated atypical prosody may be reflected in the duration of mood morphemes.

Table 1. Means (SDs) of prosodic features of Japanese UFPs *-ne* and *-yo*.

UFP	Duration (ms)		Intensity (db)		Pitch (Hz)	
Type	Men	Women	Men	Women	Men	Women
-ne	286.8 (78.4)	331.2 (67.9)	70.6 (4.3)	71.0 (5.8)	135.0 (29.7)	196.2 (30.7)
-yo	227.9 (63.9)	237.3 (41.9)	66.5 (5.3)	69.6 (5.4)	134.5 (27.4)	189.6 (28.3)

Notes: UFP = utterance-final particle, Men (n = 13), Women (n = 14).

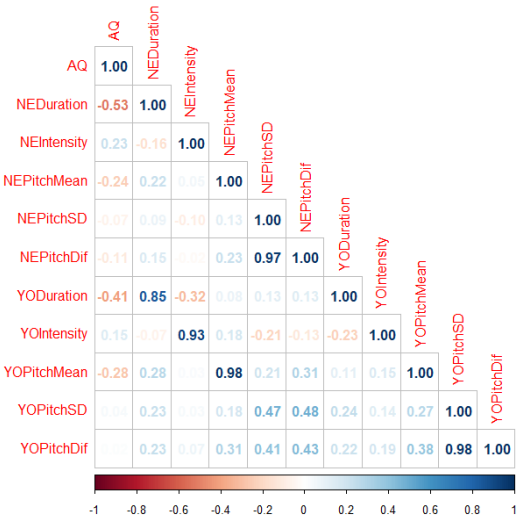

Figure 1. Correlation matrix among prosodic features of Japanese UFPs *-ne* and *-yo*, in addition to individual speaker's AQ (N = 27).
Notes: UFP = utterance-final particle, AQ = Autism-Spectrum Quotient.

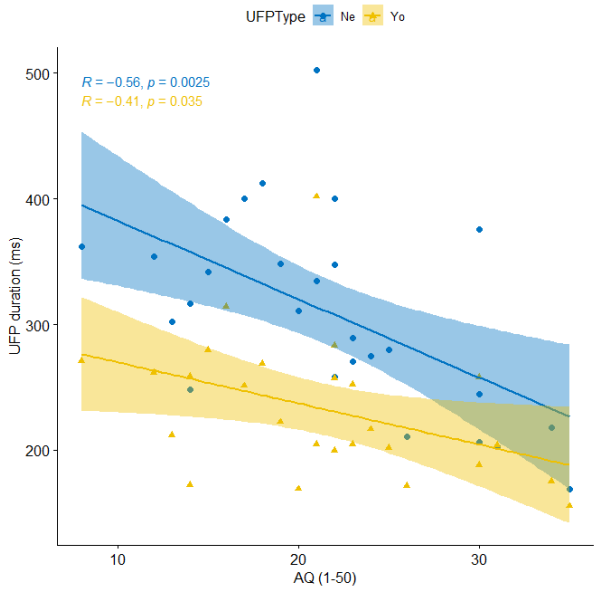

Figure 2. Plot of individual native speakers (N = 27) in terms of AQ (x-axis) and duration (y-axis) of Japanese UFPs *-ne* (blue) and *-yo* (yellow).
Notes: UFP = utterance-final particle, AQ = Autism-Spectrum Quotient. Shades represent 95% confidence intervals.

Table 2. Fixed effects of UFP type (*-ne* and *-yo*) and AQ on UFP prosody.

Contrast	β	95% CI [LL, UP]	t	df	p
Duration					
(Intercept)	0.419	[0.167, 0.671]	3.261	28.5	0.003
UFP type	-0.786	[-0.935, -0.638]	-10.360	34.0	< 0.001
AQ	-0.432	[-0.671, -0.193]	-3.547	23.9	0.002
UFP type x AQ	0.173	[0.036, 0.309]	2.480	26.7	0.020
Intensity					
(Intercept)	0.187	[-0.118, 0.493]	1.201	64.7	0.234
UFP type	-0.318	[-0.548, -0.088]	-2.709	80.3	0.008
AQ	0.131	[-0.103, 0.364]	1.096	6.4	0.312
UFP type x AQ	-0.024	[-0.121, 0.074]	-0.473	26.4	0.640
Pitch Mean					
(Intercept)	-0.040	[-0.373, 0.293]	-0.236	15.8	0.816
UFP type	-0.021	[-0.138, 0.095]	-0.361	62.2	0.719
AQ	0.048	[-0.200, 0.296]	0.382	7.6	0.713
UFP type x AQ	0.013	[-0.067, 0.093]	0.323	27.2	0.749
Pitch SD					
(Intercept)	-0.274	[-0.355, -0.194]	-6.686	62.4	< 0.001
UFP type	0.464	[0.277, 0.652]	4.847	29.4	< 0.001
AQ	-0.071	[-0.207, 0.065]	-1.020	10.7	0.330
UFP type x AQ	0.067	[-0.114, 0.248]	0.728	26.7	0.473
Pitch Difference					
(Intercept)	-0.237	[-0.320, -0.153]	-5.541	61.2	< 0.001
UFP type	0.402	[0.190, 0.614]	3.715	26.8	0.001
AQ	-0.096	[-0.234, 0.042]	-1.368	9.4	0.203
UFP type x AQ	0.061	[-0.138, 0.260]	0.599	25.3	0.555

Notes: UFP = utterance-final particle, AQ = Autism-Spectrum Quotient, β = standardized partial regression coefficients, CI = confidence interval, LL = lower limit, UL = upper limit, *N* = 27.

Acknowledgements

This study was supported by JSPS KAKENHI Grant Number 19H00532.

References

Asperger, H. 1944. Die Autistisehen Psychopathen im Kindesalter. Archiv fr Psychiatrie und Nervenkrankheiten, 117, 76–136.

McCann, J. Peppé, S. 2003. Prosody in autism spectrum disorders: A critical review. International. Journal of Language and Communication Disorders, 38, 325-350.

Kiyama, S., Verdonschot, R., Xiong, K., Tamaoka, K. 2018. Individual mentalizing ability boosts flexibility toward a linguistic marker of social distance: An ERP investigation. Journal of Neurolinguistics, 47, 1-15.