Prominence deafness in Tashlhiyt Berber and Moroccan Arabic

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This paper uses a perception study to shed light on the word prosodic systems of Tashlhiyt Berber (TB) and Moroccan Arabic (MA), languages characterised by long-term contact. While it is generally accepted that TB lacks lexical stress [1,5], there is no such consensus for MA [6,7,8,9]. The present study investigates whether native speakers of both languages exhibit perceptual insensitivity to prosodic prominence asymmetries at the lexical level, which would make them 'stress-deaf', and would suggest the absence of lexical stress in the native lexical phonology [10,11.]

The present study tests TB and MA native speakers' ability to discern word-level prominence contrasts caused by lexical stress (as in Dutch) or post-lexical accent (as in Persian), replicating the methodology used in the stress deafness study performed by [11]. The experiment consisted of two Sequence Recall Tasks (SRTs), one testing a segmental contrast [ˈmuku]~[ˈmunu] and the other a prosodic contrast [ˈnumi]~[nuˈmi]. The test phase of the SRT required participants to accurately retain, in (short-term) memory, sequences of words: 3, 4 or 5 words, followed by the word "OK" to prevent participants from using acoustic memory. Participants represented the sequences by keying in the numbers they had learned to associate with the individual words (e.g. 122 for [ˈnumi] [nuˈmi] [nuˈmi]). There were 30 test sequences per SRT, with half the sequences made up of 2 Dutch speakers' renderings of the relevant words, and the other half made up of 2 Persian speakers' phonetic variants.

The full dataset for the present experiment consists of 1860 individual responses (31 participants x 2 native languages x 5 sequences x 3 sequence lengths x 2 stimulus languages), logged as correct or incorrect. The present dataset was directly compared with the raw scores from [11].

The comparison of the TB/MA scores with the scores from [11] reveals that on the prosodic contrast, both TB and MA groups have lower scores than Dutch and Japanese ('non stress deaf') groups, while they are no different from 'stress deaf' French/Indonesian/Persian groups. Figure 1 shows the predicted scores and 95% confidence intervals based on the model.[1] An additional finding is the differential behaviour (of the TB and MA groups only, no information in [11]) depending on the acoustic nature of the stimuli: Participants scored lower on the Dutch female speaker's stimuli (Figure 2). These particular stimuli exhibit a prominence contrast which lacks durational differentiation (which is present in the other stimuli), and exhibit final rising F0 (as opposed to rising-falling F0) in stimuli with final prominence.

The general results, with TB and MA scoring low on the SRT with the prosodic contrast, can be interpreted in terms of native speakers of MA and TB exhibiting stress deafness, which lends credibility to claims that lexical prominence asymmetries are absent in both languages. This, in turn, suggests that convergence between the languages extends to prosodic-phonological aspects of structure.

The effect of the acoustic details of stimuli TB and MA participants moreover show differential sensitivity to prominence asymmetries as a function of the acoustic properties involved in the relevant contrast, which suggests that a possible, new explanation for earlier observed degrees of 'stress deafness' (cf. [12]) might relate to the details of acoustic prominence.

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[1] glmer(SCORE ~ GROUP + CONTRAST + SEQUENCELENGH + STIMLANG + GROUP:CONTRAST + STIMLANG:CONTRAST + STIMLANG:GROUP + (0+CONTRAST|PARTICIPANT) + (0+STIMLANG|PARTICIPANT))

Figure 1 Predicted response accuracy on the prosodic SRT for present data and [11] combined

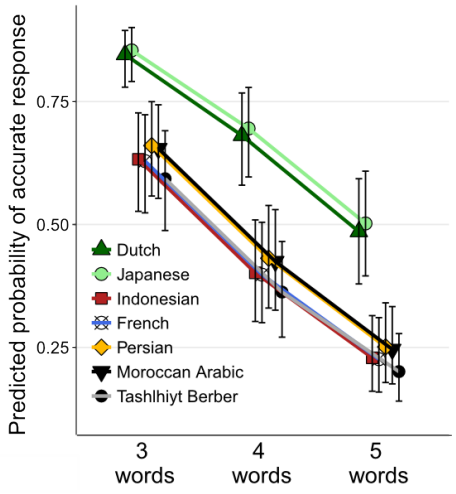
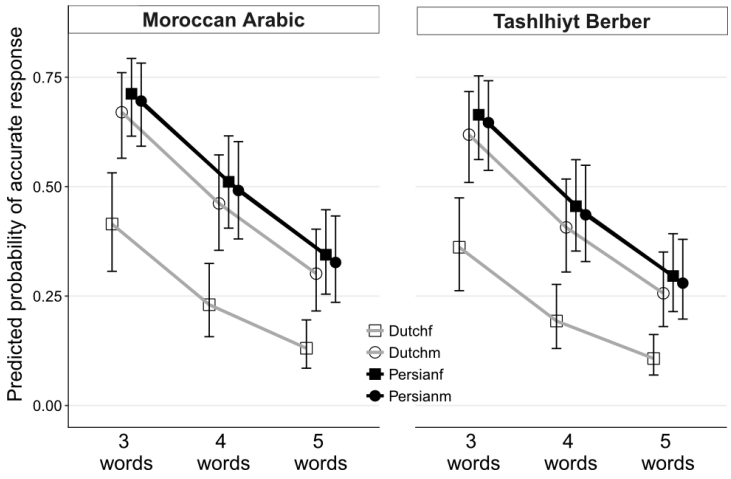


Figure 2 Predicted response accuracy on the prosodic SRT per stimulus speaker for present MA/TB data



References

[1] Dell, F. and Elmedlaoui, M. (2002). Syllables in Tashlhiyt Berber and Moroccan Arabic. Dordrecht: Kluwer.

[2] Grice, M., Ridouane, R. and Roettger, T. (2015). Tonal association in Tashlhiyt Berber: Evidence from polar questions and contrastive statements. *Phonology 32 (2),* 241-266.

[3] Hellmuth, S., N. Louriz, B. Chlaihani, and Almbark, R. (2015). F0 peak alignment in Moroccan Arabic polar questions. In: *Proceedings of ICPhS XVIII.*

[4] Maas, U. and Procházka, S. (2012). Moroccan Arabic in its wider linguistic and social contexts. *STUF – Language Typology and Universals 65 (4),* 329-357.

[5] Roettger, T., Bruggeman, A and Grice, M. (2015). Word stress in Tashlhiyt : Postlexical prominence in disguise ? In: *Proceedings of ICPhS XVIII.*

[6] Benkirane, T. (1998). Western Arabic (Morocco). In: Hirst, D. and A. Di Cristo (eds.) *Intonation systems: A survey of twenty languages*. CUP.

[7] Boudlal, A. (2001). *Constraint interaction in the phonology and morphology of Casablanca Moroccan Arabic.* Unpublished doctoral thesis, Université Mohammed V.

[8] Bruggeman, A. & Hellmuth, S. (2017). Correlates of lexical "stress" in Moroccan Arabic. Oral presentation, Phonetik und Phonologie 13, 28-29 September 2017, Berlin.

[9] Maas, U. (2013). Die marokkanische Akzentuierung. In: Kuty, R., U. Seeger and S. Talay. *Nicht nur mit Engelszungen*. Harrasowitz Verlag.

[10] Dupoux, E., Sebastián-Gallés, N., Navarrete, E. and Peperkamp, S. (2008). Persistent stress 'deafness': The case of French learners of Spanish. *Cognition 106 (2),* 682-706.

[11] Rahmani, H., Rietveld, T. and Gussenhoven, C. (2015). Stress 'Deafness' reveals lexical marking of stress and tone in the adult grammar. *PLoS One 10 (12).*

[12] Peperkamp, S., Vendelin, I. and Dupoux, E. (2010). Perception of predictable stress: A cross-linguisic investigation. *Journal of Phonetics 38,* 422-430.