Lingual egressive airstream harmony in beatboxing

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Overview

Beatboxing is a form of vocal music in which artists imitate percussion instruments and a wide variety of sound effects. It has been suggested that beatboxing uses elements of linguistic representation and exhibits grammatical phenomena like those observed in phonology [1, 2]. This paper elaborates on those claims, analyzing a case of unbounded bidirectional lingual egressive airstream harmony in beatboxing using feature representations and Optimality Theory [3, 4]. Implications of this work include expanding the domain of phonological grammars to include paralinguistic phenomena.

Data

The beatboxing data described here were elicited from an expert beatboxer and recorded using real-time MRI [1, 2, and references therein]. The beatboxer was asked in advance to prepare a list of the beatboxing sounds she could produce. Subsequent transcription of the real-time MRI videos was performed by visual and audio inspection [1].

Beatboxing sound inventory

The four sounds in the table below are the beatboxing sounds relevant to this example of lingual airstream harmony. Shorthand representations are provided in Standard Beatbox Notation (SBN), indicated by curly brackets [5].

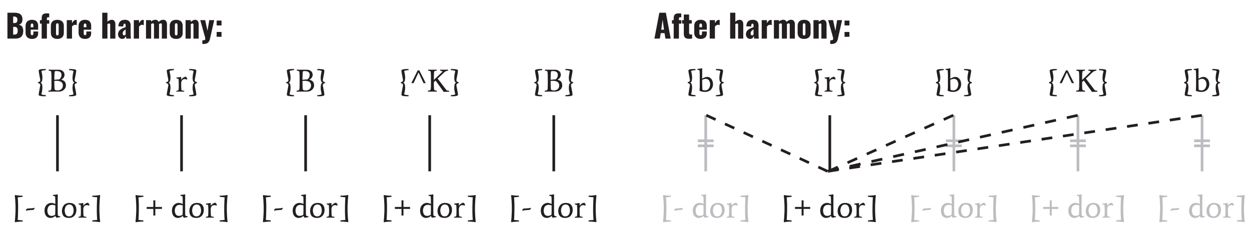
Note that {b} and {r} both have a lingual egressive airstream, the key component of this airstream harmony. In a lingual egressive airstream, the tongue body and a more anterior articulator make simultaneous constrictions; then, the tongue body moves forward to squeeze out the air captured between the two constrictions [1]. The main difference in the airstreams of ejective {B} and lingual egressive {b, r} is the absence or presence of a tongue body closure; therefore, the difference between ejective and lingual egressive airstreams is the contrast between [- dorsal] and [+ dorsal]. Airstream harmony can be analyzed using this contrast.

Sound name	SBN	Description	Relevant features
Kick Drum	{B}	Voiceless glottalic egressive labial stop	[+ lab], [- dor], [- pulm]
Kick drum, unforced variant	{b}	Voiceless lingual egressive labial stop	[+ lab], [+ dor], [- pulm]
Inward K	{^K}	Voiceless pulmonic ingressive lateral velar affricate	[+ dor], [+ pulm]
Clickroll	{r}	Voiceless lingual egressive alveolar trill	[+ cor], [+ dor], [- pulm]

Description of lingual egressive airstream harmony

In airstream harmony, the airstream mechanism of one sound spreads to other sounds in the utterance. Consider the example in the figure on the next page: the lingual egressive airstream of {r}, represented as [+ dor], spreads leftward and rightward. This causes ejective {B}s to assimilate to lingual egressive {b}s.

In the data collected so far, [+ dor] can spread at least four segments away. Lingual egressive airstream harmony thus appears to be a case of unbounded bidirectional harmony, similar to linguistic patterns like the whole-word bidirectional [ATR] harmony found in Nandi [6].



Analysis

In an Optimality Theory analysis, the Spread(F) constraint can capture the bidirectional spreading observed in beatboxing [3, 4]. The tableau below shows how this analysis applies to the example of harmony shown above.

Canidate (a) is the "after harmony" example from the figure above. In candidate (a), {r} has spread its [+ dorsal] quality to every segment, satisfying Spread([+ dorsal]). A violation of Ident(dorsal) is incurred whenever [- dorsal] {B} becomes [- dorsal] {b}. No violation of Ident(dorsal) is assigned for {^K} because it was already [+ dorsal] to begin with. Candidate (b) is the fully faithful candidate; it is also the loser, because the [+dorsal] feature of {r} fails to spread to any {B}.

{ B r B ^K B }	Spread([+ dorsal])	Ident(dorsal)
a. ☞ { b r b ^K b }		***
b. { B r B ^K B }	*!**	

Implications

Beatboxing appears to share sound representations and grammar with phonology. Having found one pattern in beatboxing that is similar to patterns in phonology, we expect to find many more cross-domain correspondences. This would suggest that phonology may govern more than the sounds of language, as a cognitive umbrella encompassing the organization of both linguistic and paralinguistic sound.

References

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