Cross-level correspondence in Q-theory

Introduction. This paper examines cross-level interactions in basic systems modeling segmental harmony in a version of Q theory (Shih & Inkelas 2019 etc.; S&I). Q-theory decomposes segments (*Q*s) into strings of subsegments (*q*s). Correspondence and identity relations are enforced at either or both structural levels, allowing Agreement-by-Correspondence (ABC; Rose & Walker 2004, etc.) constraints to cause assimilation of individual features (harmony at the *q* level), or contours of features (harmony at the *Q* level). The proposal relates to other recent studies considering representational choices in theories of (dis)agreement phenomena (e.g., Hansson 2014, Lionnet 2017). Using this ABC+Q theory, S&I analyze a range of tonal phenomena.

Not considered in S&I's analyses are interactions *between* the two representational levels of Q theory: what consequences do *Q*-*Q* interactions entail for their component *q*s? Such interactions emerge as a consequence of the definitions of *Q*-level and *q*-level correspondence and the constraints on correspondence. Through typological analysis, this paper shows when correspondence or its lack at one level affects that at the other.

Implementing Q-theory. This paper formally implements a version of Q-theory derived from S&I's formulation. It defines a basic system, QqCor. GEN produces forms consisting of two *Q*s, each comprising two *q*s. Each *q* is defined by a feature value for tone, either high (h) or low (l), i.e. [hh] or [hl]. A Q has a level tone when both qs are the same value, and a contour tone when different. CON contains three central ABC constraint types: 1) Corr, violated by non-correspondence between either *Q*s or *q*s; 2) CC.Id, violated for lack of feature identity between correspondent *q*s or *Q*s; 3) IO faithfulness. For *q*, identity is assessed for every corresponding pair; for *Q*s, it is based on string-to-string correspondence (S&I, Zuraw 2002). Possible optima and violations for a representative input are in (1).

1) Optima and violations for [hl][hh]

Input	Output	Corr.Q	Corr.q	CC.IdQ	CC.Idq	f.Q	f.q	
[hl][hh]	$[h_1h_1]_x[h_1h_1]_x$					1	1	*Q* and *q* har and cor.
	$[h_1l_1]_x[h_1h_1]_x$			1	3			*Q* and *q* cor, no har.
	$[h_1l_2]_x[h_1h_1]_x$		3	1				*Q* cor; *q* cor iff *q*s agree (hh)
	$[h_1l_1]_x[h_1h_1]_y$	1			3			*q* cor, *Q* no cor
	$[h_1l_2]_x[h_1h_1]_y$	1	3					*Q* no cor; *q* cor iff *q*s agree (hh)

Notations: Q = [qq], q ∈ {h,l}; x, y = Q correspondence indices; 1,2 = q-correspondence indices. Correspondence is assumed to be transitive, rather than adjacent-pairwise.

Results. The full typology was calculated and analyzed in OTWorkplace through Property Theory (Alber & Prince in prep., Alber, DelBusso & Prince 2016, DelBusso 2018). A Property Analysis identifies the central rankings and constraint interactions that define the grammars of the typologies and, in turn, their alignment with particular extensional traits of optima, showing the specific constraint interactions that give rise to the predicted languages.

In QqCor, the same constraint interactions characteristic of ABC(D) systems generally (Bennett & DelBusso 2018) occur at both the *Q* and *q* levels. There are 9 grammars, with

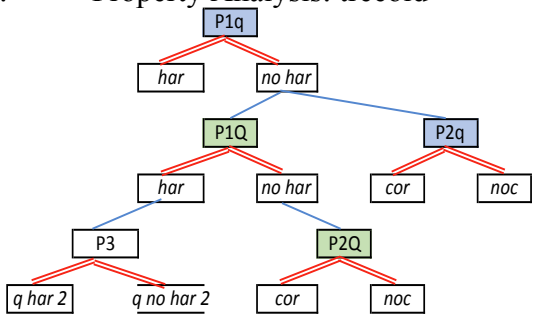
languages differing in whether they have tone harmony (har), correspondence (cor), or non-correspondence (noc), at both *Q* and *q* levels (2a). These cjhoices are, however, not entirely independent. *Q*-har is entailed by *q*-har: if *q*s are all identical, then *Q*s containing them are identical too (and correspondence is entailed). The reverse does not hold: the string-to-string correspondence between *Q*s allows for satisfaction of CC.IdQ without all *q*s being the same (e.g. in contour harmony, $[hl]_x[hl]_x$). The Property Analysis structure (2) shows this relationship in the embedded structure of the properties: choices about whether harmony obtains at the Q level (P1Q, P2Q) matter only if harmony does *not* uniformly hold at the *q* level ('no har' P1q value).

2) QqCor.

a. Typology

	[hh][hl]	[hl][hl]	[hl][lh]
L1	Q/q har	Q/q har	Q/q har
L2	Q/q har	Q har/q cor	Q/q har
L3	Q/q har	Q har/q cor	Q har/q cor
L4	Q/q har	Q har/q noc	Q/q har
L5	Q/q har	Q har/q noc	Q har/ q noc
L6	Q/q cor	Q har/q cor	Q/q cor
L7	Q cor/q noc	Q har/q noc	Q cor/q noc
L8	Q noc/q cor	Q har/q cor	Q noc/q cor
L9	Q/q noc	Q har/q noc	Q/q noc

b. Property Analysis: treeoid



A second system analyzed extends on QqCor by adding the constraint CCq.QEd, violated by correspondence between *q*s belonging to distinct *Q*s. The effect of this constraint is to duplicate the structure of the typology in two halves, one with *q*-*q* correspondence and one without. The properties of QqCor carry over, with one additional property. This system also generates another type of language, where *q* har does *not* entail *q* cor, though such entailment continues to hold at the *Q* level.

Conclusion. Previous work in Q theory focuses mainly on interactions occurring at either the *Q* or *q* level. Through analysis of typologies including the full constraint set with both levels, this paper shows interactions that arise across the levels, highlighting the importance of examining typologies in their completeness, rather than isolating specific extensional phenomena.

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