

Factorial Typology in Stratal OT

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1. Motivation and Approach. Modern grammatical theories typically involve abstract, dispersed assumptions rather than concrete, easily interpreted statements. OT, for example, defines the constraints and structures that participate in an (I,O) map. *Predictions* at all levels of generality emerge from the definition of optimality as it plays out freely over these elements and need not be obvious.

Since choice compares *all* competitors over *all* constraints, OT cannot be validly carried out without full specification of these entities. The arena of investigation must therefore be a circumscribed, well-defined *system* S given explicitly as $\langle S.GEN, S.CON \rangle$. Progress toward the ultimate goal—obtaining GEN and CON for all human language—must be achieved by moving from system to well-defined system, rather than by a frontal assault on an imagined whole, much of which awaits clarification.

2. Stratal OT. OT specifies how (I,O) maps work, but not how to arrange them in a grammar. Under stratal organization, the output from one stage is used to define the input to the next, with a variety of interesting effects (see McCarthy & Prince 1993, Kiparsky 2014, Bermúdez-Otero 2019 and many others). Contrary mono-stratal proposals expand the constraint repertory, e.g. into “Output-Output constraints, Paradigm Uniformity constraints,” etc. Kiparsky cites and rejects these because, among another deficits, “they vastly expanded *the factorial typology* [italics ours].” We concretize this concern. What does stratality itself do to typologies?

To obtain typologies in Stratal OT, we make these baseline assumptions:

- **S.CON.** Exactly the same for all strata.
- **S.GEN.** Each **stratum** Σ_n specifies its own morphology, but builds *inputs* for its grammars from the optima (*outputs*) of Σ_{n-1} . (Directly descended from Lexical Phonology.)
- **Branching.** Each grammar G from a non-final stratum Σ_k leads to a mini-typology, a ‘branch’ of which G is the parent, in which all inputs at stratum Σ_{k+1} are constructed from the outputs of G .
- **Condensed Language.** There’s a derivational path of possibly many stratal steps from I_1 to a final output O_n of the last stratum Σ_n . This characterizes a language as a set of n -tuples. We recognize the reduced pairs (I_1, O_n) , involving the ultimate IO relation, as forming a **condensed language**, a key discriminant of grammatical equivalence. The input combines the morphology of all strata.

We study a basic two-stratum typology and find that:

- [1] **MBMC. Many Branches, Much Condensation.** There are often many paths joining up to produce the condensed languages.
- [2] **FIDE. Faithfulness in Derived Environments.** A basic new product of stratality is increased faithfulness in morphological derived environments. (Cf. Harris 1990, Bermúdez-Otero 2019, Mackenzie 2024: Derived Contrast).

3. Basic Phonology. The system Basic Phonology (BP) gives rise to faithfulness and neutralization patterns ubiquitous in phonology (Prince 1998, Alber & Prince in prep.).

- **BP.GEN:** Inputs and outputs contain elements u and m , either in a specific environment E or in its “elsewhere” complement E' (neither E nor E' contains u or m).

- BP.CON: Three constraints.
 - $f.um$: penalizing $u \rightarrow m$ and $m \rightarrow u$.
 - $m.m$: penalizing output occurrences of m .
 - $m.u/E$: penalizing output occurrences of u in E .

Mappings thus toggle or preserve u and m , but do not change E or E' .

Concrete examples abound. A&P illustrate with fricative voicing, sensitive to intervocalic and elsewhere (non-intervocalic) environments. In BP terms, $u = s$, $m = z$, and $E = V-V$. Inputs lack C clusters. Atomic non-faithful I:O maps are like $az:as$ (devoicing) and $asa:aza$ (intervocalic voicing). The typology contains four languages. (We write x as a variable over $\{s, z\}$.)

F:	$x:x$	(‘Faithful’)
U:	$x:s$	(‘Unmarked’)
CD:	$x:z$ in $V-V$; $x:s$ elsewhere.	(‘Complementary Distribution’)
NiE:	$x:z$ in $V-V$; $x:x$ elsewhere.	(‘Neutralization in E' ’)

Stratalizing BP (Strat.BP)

- The 1st stratum Σ_1 is just BP.
- The 2nd stratum Σ_2 uses Σ_1 grammars to engender new branches, with the important twist that Σ_2 has its own morphology that allows suffixation with one affix $/+a/$. This allows the constraint hierarchies a second shot at the intervocalic environment, with inputs restricted by the action of Σ_1 grammars.

4. Results. We show that while there are 13 distinct derivational paths from Σ_1 inputs to Σ_2 outputs, there are only 6 distinct condensed (I,O) languages in Strat.BP.

- The 4 languages of BP, morphologically extended but taking no account of morphology.
- 2 novel patterns, one from CD, the other from NiE, both involving derived contrast (Harris 1990), in which *faithfulness* has a stronger hold in derived environments.
 - CD+DF. Here u and m are in complementary distribution (e.g. $/az/:[as]$, $/asa/:[aza]$) except in $+E$, where they *contrast* ($/as+a/:[as+a]$, $/az+a/:[az+a]$).
 - NiE+DF. In the other, u and m neutralize in underived E ($/asa/:[aza]$), but contrast in E' ($[as]$ vs. $[az]$) and $+E$ ($[as+a]$ vs. $[az+a]$).

Although derived faithfulness (DF) may sound peculiar from the Lexical Phonology perspective, CD+DF, is instantiated by Bermúdez-Otero’s (2019) stratal analysis of $/əʊ/-$ allophony in London vernacular English, as well as in Mackenzie’s (2024) stratal analysis of German dorsal fricative assimilation. NiE+DF has not, to our current knowledge, been identified in the literature. In the full talk, we display and discuss the branching tree that details how this unfolds.

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