Typological Analysis in Optimality Theory
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In Optimality Theory, formal factorial typologies predict sets of abstract languages which can be compared to the typologies found in the world's languages. The issue of matching is however only one of many interesting questions theoretical investigations can address. Of equal interest is the analysis of formal typologies themselves. With the adequate analytical and computational tools (in this talk: OT-Workplace, Prince, Tesar & Merchant 2007-2017) it is now possible to investigate the structure of complete, formal typological systems.

A higher level of understanding of typological systems is reached once the *Typological Properties* of formal typologies are extracted and analysed (Alber & Prince, in prep., see also Alber, DelBusso & Prince 2016). We define Typological Properties (TypProps) as the ranking conditions necessary and sufficient to generate every language of a typological system.. Under our hypothesis, TypProps come with two values, one the logical opposite of the other. They are facts of the system as it has been defined, in terms of its constraints and candidate set. They can be uncovered upon examination of the system (we find them), but they are not something we impose on the system. Thus they are part of the predictions, not part of the assumptions of our theory.

Take as an example the formal typology of nGo, representing one possible typology of stress patterns (Alber & Prince, in prep.). The five constraints of this typology are Trochee, favoring trochaic feet, Iamb, favoring iambic feet, Parse-s, requiring syllables to be parsed into feet, and the alignment constraints AFL and AFR, requiring feet to be left or right aligned. The set of possible outputs of the system contains strings which do not parse any foot at all as well as strings where at least one foot is parsed. These assumptions about the constraint set and the candidate set define the typology completely and as a complete system its structure and defining features can now be studied in detail.

Analysis of nGo yields six defining Typological Properties. Among these we find obvious ones, such as FtType: Trochee < > Iamb, where the ranking Trochee > Iamb can be found in the grammar of all trochaic languages in the system, while the logically opposite Property value Iamb > Trochee is part of the grammar of the iambic languages in the typology. In the same typology, we find the less immediately obvious TypProp of Have-a-Foot: Trochee & Iamb < > Parse-s. Have-a-foot distinguishes between languages which do not parse any feet at all and languages parsing at least one foot. In the foot-free languages, both Trochee and Iamb dominate Parse-s (Trochee *and* Iamb > Parse-s), asserting that not parsing any foot is better than having even a single foot, since any foot, whether trochaic or iambic, will necessarily violate one of the two foot-type constraints. In the grammars of foot-full languages, the logically opposite value of the Property holds: Parse-s dominates one of the two foot-type constraints to guarantee that at least one foot can be parsed (Parse-s > Trochee *or* Iamb).

(1) Examples of Typological Properties in the stress typology nGo

Property	Definition	Values	Trait
FtType	Trochee < > Iamb	trochaic: Trochee > Iamb iambic: Iamb > Trochee	distinguishes trochaic from iambic lgs.
Have-a-foot	Tr & Ia < > Parse-s	no feet: Tr and Ia > Parse-s at least one foot : Parse-s > Tr or Ia	distinguishes lgs. with no feet from lgs. with at least one foot

Typological Properties reveal a classification of a typological system which *explains* how its natural classes come about (e.g.: languages without feet are the victims of the ranking Trochee and Iamb > Parse-s, which is part of their grammar), allowing thus for a non-arbitrary classification of the typology, far from the classification that can be obtained by observing output forms alone. Once we

have uncovered the Properties of a typological system we can therefore claim to have truly *understood* the typology.

In this talk, the explanatory power of typological analysis in terms of Typological Properties will be illustrated by discussing some stress pattern typologies (joint work with Alan Prince, Alber & Prince, in prep.) and a typology of word truncation (joint work with Sabine Arndt-Lappe, based on Alber & Arndt-Lappe 2012). Both types of typologies have been studied in detail by linguists and the distribution of their patterns among natural languages are generally well understood. Their respective formal typologies furthermore display many relevant features and intricacies which are of interest to Property Analysis.

References
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ROA = Rutgers Optimality Archive: roa.rutgers.edu