

The transparency and density of phonological rule interactions

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This paper introduces two new mathematical formulas designed to describe, compare, and contrast languages in terms of the overall markedness and complexity of their phonological rule components. The Transparency Index evaluates the four classical types of ordering relationships which obtain between individual pairs of rules, building on Kiparsky's (1968, 1971) classification of these as either feeding, bleeding, counterfeeding, or counterbleeding. Among these, feeding and bleeding orders are transparent in that they result in surface-true generalizations and are therefore natural and preferred, whereas counterbleeding and counterfeeding relationships lead to opaque (non-transparent) phonetic outcomes since the final surface representation appears to be a counterexample to one of the rules. For each language that we wish to analyze, the Transparency Index calculates the attested frequency of both types of transparent interactions grouped together (feeding and bleeding), and divides this sum by the total number of tokens of all four rule ordering types combined. The Density Index, on the other hand, computes the total number of crucial rule orderings (regardless of which kind) among each exhaustive, language-specific inventory of processes. These two statistical proposals are applied to a sample of seven genetically and areally diverse languages to illustrate their usefulness and rank each language along a continuum of relative typological markedness and simplicity. This study constitutes the first rigorous attempt to quantify the occurrence of different types of phonological rule relationships — including their degree of interaction and inherent rate of opacity — both within and across languages. It thus represents a welcome step forward in extending an old line of inquiry into a topic which has recently spawned a renewed wave of interest, partly due to the problems it raises for standard Optimality Theory.