Metrical pressures can lead to segmental alternations, and conversely, segmental alternations can provide evidence for metrical structure. I show that obstruent stops /p, t, k/ in Finnish exhibit a range of phonological patterns, including lenition, fortition, and phonotactic gaps, that are predictable from metrical structure. Three main results emerge. First, the segmental evidence shows that Finnish foot structure is sonority-sensitive (Kenstowicz 1996, de Lacy 2002, cf. Hayes 1995), which eliminates the need for underlying lexical accents (Kiparsky 2003). Second, the analysis accounts for speaker-internal variability and makes quantitative predictions that hold independently of constraint rankings. Third, the same metrical problem is resolved differently in different morphological constructions. I conclude with some speculative remarks on why that might be.