Representation and logical characterizations of phonological well-formedness

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This talk is an introduction to the use of logical languages to characterize different types of well-formedness constraints for phonology. This allows for explicit descriptions of patterns and representations, and it makes clear the relationship between the power of the grammar, the kind of representation, and expressivity. I begin by defining basic logic for strings and give examples, primarily drawn from accent patterns in the Japanese dialects, of phonological patterns that can be described in this logic and patterns that cannot. For the patterns it cannot describe, we can change either the logic or the representation. I show how changing to a more complex logic overgenerates, whereas keeping a simple logic but changing the representation to include tier-based locality increases the expressivity enough to capture more of the typology without this overgeneration. This illustrates the importance of representation in a restrictive theory of well-formedness. However, there are still some tone patterns which cannot be described even with these tier-based structures, motivating the need for other kinds of representation, at least for tone. I briefly discuss how the logical approach here can be extended to other kinds of representation, studying the nature of faithfulness constraints, and learning.