# Phonological learning: auditory, visual, computational and animal perspectives

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In this talk I will offer a formal, algebraic approach to the analysis of different phonological systems and "phonology adjacent" systems, building on Raimy 2000 and Papillon 2018. For spoken (human) languages, phonologies consist of <E,F,P> structures comprised of phonological events (points in time), monadic properties of events (features) and at least one dyadic relation over events (precedence). Precedence is coded here with open bigrams (Grainger & Whitney 2004), conferring advantages similar to those in D-theory (Marcus, Hindle & Fleck 1983). In contrast, for sign languages, phonologies add additional (dyadic?) spatial relations (such as symmetries) forming the super-structure <E,F,P,S>, with events there being points in spacetime. This formal analysis offers insight into the similarities and differences between the two modalities for phonology. It also offers insight into the observed differences between bird species in the perceptual discrimination of syllable order (Lawson et al 2018) and for the developmental trajectory regarding syllable and segment perception (Walley, Smith and Jusczyk 1986) and for the typological differences in the choice of the proximal unit of speech production (O'Séaghdha 2015).

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