Task Dynamics is an explicit computational model of the speech production system, which applies the dynamical systems approach to speech. It models the planning and execution stages—from gestures and their overlap to articulatory motions and acoustics. Using the model, it is possible to implement hypotheses about cross-linguistic differences in contrasts, amount of gestural overlap, or gestural parameters, and to run simulations using TADA (Task Dynamic Application). These simulations generate articulatory and acoustic trajectories that can be compared to data. This use of the model allows for deeper interpretation of experiments that look at the relation between phonology and phonetics. Also, TADA, together with its articulatory synthesizer CASY (Configurable Articulatory Synthesis), can be used to simultaneously model three major sources of variability in speech production and acoustics: prosody, coarticulation, and speaker differences. System-level manipulation of the high-level parameters and of speaker-based parameters (e.g. ratio of oral to pharyngeal cavity length) therefore allows for the study of the effect of these sources of variation on signal-level parameters (both articulatory and acoustic) that could then be checked against data. This use of the model promises to be important for applications in speech recognition and synthesis systems, where it is useful to have explicit models of signal-variability due to these factors.

Lecture 1. Articulators and Gestures: Theories of Speech Production


Lecture 2. What is Dynamics?

Iskarous Intuitive Notes on Kinematics and Dynamics

**Lecture 3. Vocal Tract Dependencies: Task-Articulator Jacobian**


**Lecture 4. Using TADA to study phonological patterns I (Lab Session)**

TADA (Task Dynamics Application) Manual

Iskarous, K., McDonough, J. and D. H. Whalen, (manuscript). A gestural account of velar contrast in a coronal heavy inventory: the back fricatives in Navajo.

**Lecture 5. Using TADA to study phonological patterns II & New Developments**
