

Extra Slides

The Dynamical Graph Grammar Formalism (Extended)

What are DGGs anyway?

- The DGG formalism is a declarative modeling language L :
 1. A compositional map $\Psi : L \longrightarrow S$ that maps all syntactically valid models $M \in L$ into some space S of dynamical systems.
 2. Conditionally valid or conditionally approximate valid families of Abstract Syntax Tree Transformations.
- Rules map to operators where $\Psi(M) = W(M)$
- The master equation, $\frac{d}{dt}P(t) = W \cdot P(t)$, represents the time evolution of a continuous-time Markov process with formal solution is $P(t) = e^{tW} \cdot P(0)$.
 - Hard to solve analytically! So, we need help!
- Let $\hat{W}_r \equiv \hat{W}_{LHS_r \rightarrow RHS_r}$ be an operator that specifies the nonnegative flow of probability between states under each rule r then:
 1. $W = \sum_r W_r$ (rule operators sum up)
 2. $W_r \equiv \hat{W}_r - D_r$ (rules conserve probability)
 3. $D_r = \text{diag}(1 \cdot \hat{W}_r)$ (total probability outflow per state)