Dynastic dynamics: Modelling powerful naming choices with stochastic prestige

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How do powerful rulers choose their names? Regnal names are not neutral labels: they encode institutional memory, legitimacy, and continuity across generations. We analyse naming sequences from ten historical ruling systems, including popes, Egyptian pharaohs, Roman emperors, Russian tsars, Ottoman sultans, and several European monarchies. These records reveal pronounced inequalities in name frequencies, long periods dominated by a small set of names, and abrupt changes that cannot always be explained by random reuse or standard rich-get-richer dynamics.

To account for these patterns, we introduce the Reinforcement and Innovation through Prestige (RIP) model [1]. At each succession, a ruler either introduces a new name or reuses an existing one according to the prestige accumulated by previous rulers bearing that name. Crucially, prestige increments are heterogeneous and heavy-tailed, allowing rare but highly influential reigns to reorganize established name hierarchies.

In this talk, I will show how this minimal stochastic model based on prestige reproduces the bursty popularity, persistence, and inequality observed across dynastic naming traditions. By comparing it with random-choice and frequency-based reinforcement models, we identify the historical systems in which prestige is essential, including popes, pharaohs, Roman emperors, and English monarchs. More broadly, our results illustrate how long-lived cultural institutions can combine gradual reinforcement with rare, high-impact events that reshape symbolic conventions across generations.

[1] Rosillo-Rodes, P.*, Lamata-Otín, S.* et al. arXiv preprint arXiv:2607.08689 (2026).

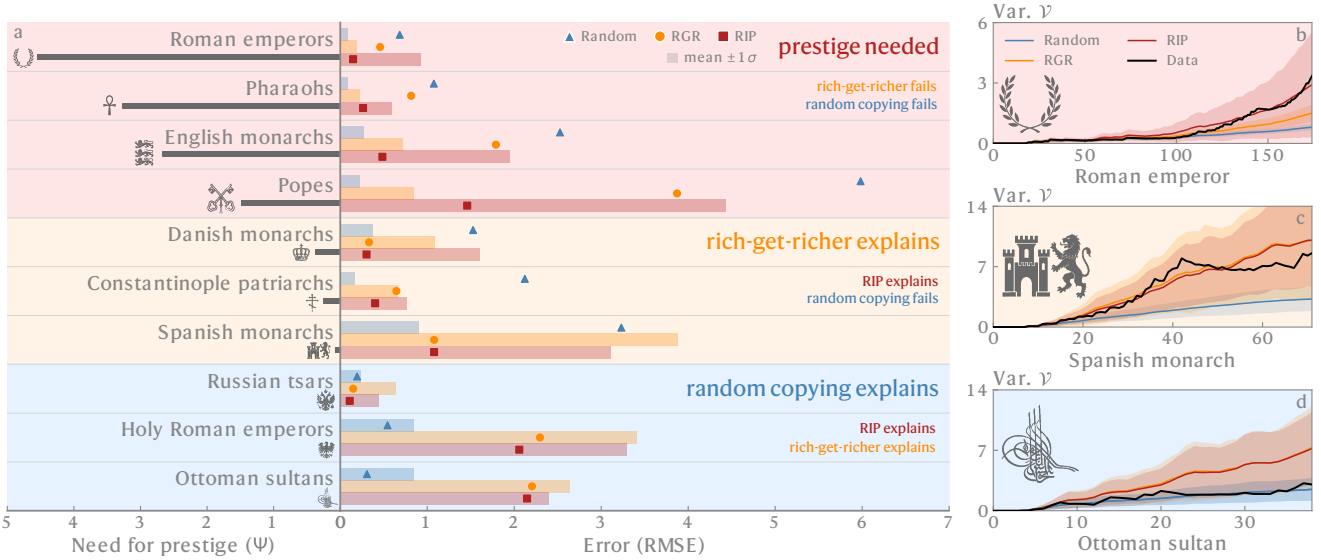


Figure 1: **Prestige explains what random copying and rich-get-richer dynamics miss about onomastics. a** Root mean square error (RMSE) of the variance of the name distribution for the random, rich-get-richer, and RIP models. Shaded bars represent the RMSE that a trajectory at distance $\pm 1\sigma$ of the mean of the trajectory would produce. If a point is inside its corresponding bar, the empirical trajectory is compatible with a random realization of the model at 1σ confidence. Prestige bars below labels indicate the prestige indicator Ψ. **b-d** Examples of datasets where prestige is or is not required for explaining onomastics. Background colors group the traditions based on the simplest mechanism that accounts for their variance trajectory. Specifically, blue denotes cases explained by the random model (as well as rich-get-richer and RIP), orange refers to dynamics accounted for by rich-get-richer (and RIP), and red highlights instances where prestige (RIP) is explicitly required to explain the trajectory.