

MIMS現象数理カフェセミナー

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When it pays to teach: an optimal population structure for dedicated teaching

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Abstract : Teaching is a prominent feature of human societies, yet it remains unclear why some individuals are allocated to teach full-time rather than directly contribute to productive work. Using a simple mathematical model, we identify the tradeoff between the size of a population and its collective level of expertise; and we analyze the optimal proportion of a population that should serve exclusively as teachers across a wide range of scenarios. We show that teaching becomes advantageous only after a population exceeds a critical size, and even in large societies only a limited fraction of individuals should be dedicated to teaching. Subsequently, the peak demand for education is achieved at an intermediate population size, and it never surpasses one half of the population. For more complicated tasks, the optimal allocation of teachers develops a layered structure that depends on population size. These findings offer insight into the conditions that favor the evolution of teaching and help explain its prevalence in both human and some non-human species.

Reference: H. Goto & J.B. Plotkin, “When it pays to teach: a population threshold for dedicated teaching,” arXiv:2507.02327



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