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An information-theoretic model for communication

Nicholas R. Moloney. London Mathematical Laboratory, London, UK

We examine the cost-minimisation problem posed by Ferrer i Cancho and Solé in their information-theory based communication model (R. Ferrer i Cancho and R. V. Solé, PNAS 100, 788 (2003)), proposed in efforts to explain Zipf's Law (power law frequency-rank relation for words in written texts). We obtain the exact minimum-cost solutions as obtained previously via other methods. The model exhibits three qualitatively different behaviours according to the relative importance of speaker and listener costs. At the phase transition, the minimum-cost solutions do not correspond to a power law except for a vanishingly small subset.