

Abstract Submitted
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The Cancho i Ferrer - Solé model does not explain Zipf's Law¹ RONALD DICKMAN, Universidade Federal de Minas Gerais, NICHOLAS MOLONEY, London Mathematical Laboratory — We examine the cost-minimization problem posed by Ferrer i Cancho and Solé in their information-theory based communication model [1], proposed in efforts to explain Zipf's Law (that is a power-law frequency-rank relation for words in written texts). Using a simple inequality, we obtain the exact minimum-cost solution as a function of the parameter λ , as obtained previously via other methods [2-4]. (λ defines the relative weights of speaker's and listener's costs.) We show that at the phase transition, the minimum-cost solutions do not correspond to a power law except for a vanishingly small subset, even if we impose the additional condition of equal costs to speaker and listener. Finally we consider the model at finite temperature using mean-field theory and entropic Monte Carlo simulation, and find a line of *discontinuous* phase transitions in the λ - T plane. The simulations yield no evidence of a power-law frequency-rank distribution. 1. R. Ferrer i Cancho and R. V. Solé, PNAS **100**, 788 (2003). 2. R. Ferrer i Cancho and A. Díaz-Guilera, J. Stat. Mech.: Theory Exp. (2007) P06009. 3. A. Trosso, Master's thesis, 2008, University of Turin, Italy. 4. M. Prokopenko et al., J. Stat. Mech. (2010) P11025.

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