About human activity, long-term memory, and Gibrat’s law

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A. MAKSE — A central research question in the social sciences for several centuries
has been whether any law like patterns in the unintended outcomes of human action
exist. Here we investigate the existence of scaling laws in the human activity of
communication, considering the number of messages sent by individuals as a growth
process in time. We analyze millions of messages sent in two social online commu-
nities and uncover power-law relations between fluctuations in the growth rate and
the activity of the members. We attribute this scaling law to a long-term persistence
of human activity beyond daily or weekly cycles holding up to more than a year.
Based on such an underlying long-term correlated dynamics, we elaborate a con-
sistent framework for the empirical evidences, establishing a missing link between
the scaling behavior in the growth and long-term persistence. Our results indicate
that large fluctuations in communication activity can be expected as an unintended
consequence of human interaction. This finding is of importance for both designing
communication systems and for understanding the dynamics of social systems.

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