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The scaling laws of human travel - A message from George

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In the light of increasing international trade, intensified human mobility and an imminent influenza A epidemic the knowledge of dynamical and statistical properties of human travel is of fundamental importance. Despite its crucial role, a quantitative assessment of these properties on geographical scales remains elusive and the assumption that humans disperse diffusively still prevails in models. I will report on a solid and quantitative assessment of human travelling statistics by analysing the circulation of bank notes in the United States. Based on a comprehensive dataset of over a million individual displacements we find that dispersal is anomalous in two ways. First, the distribution of travelling distances decays as a power law, indicating that trajectories of bank notes are reminiscent of scale free random walks known as Lévy flights. Secondly, the probability of remaining in a small, spatially confined region for a time T is dominated by algebraic tails which attenuate the superdiffusive spread. We show that human travel can be described mathematically on many spatiotemporal scales by a two parameter continuous time random walk model to a surprising accuracy and conclude that human travel on geographical scales is an ambivalent effectively superdiffusive process.