

The Scaling Landscape: Measured Allometric and Urban Exponents Across Six Domains of the Audited Reference Base

reference lines: Kleiber 3/4, geometric 2/3, linear 1; negative exponents are rate/density laws

METABOLIC

mammal basal metabolic rate	0.686 ± 0.014 [~5 dec]
mammal basal metabolic rate (unbinned)	0.712 (95% CI 0.699-0.724) [~5.5 dec]
mammal BMR, binned by size class	0.737 (95% CI 0.711-0.762) [~5.5 dec]
mammal field metabolic rate	0.749 (95% CI 0.695-0.802)
mammal BMR log-log curvature	0.540 ± 0.0053 [~6 dec]
homeotherm metabolism (classic)	0.74 (range argued 2/3-3/4) [~2.6 dec]
prokaryote active metabolism	1.96 ± 0.18
protist active metabolism	1.06 ± 0.07
metazoan active metabolism	0.79 ± 0.04
eukaryote metabolism within groups	0.75
eukaryote metabolism across all eukaryotes	1.0
eukaryote max growth rate	-0.25
teleost fish resting metabolism	0.793 ± 0.020 (c)
fish standard metabolism (intraspecific)	0.89
insect metabolism (interspecific)	0.830 ± 0.036 (c)
passerine bird BMR	0.711 ± 0.109 (c)
unicellular organisms metabolism	0.66 ± 0.092 (c)
plant biomass production (algae to trees)	0.75 (c)
mammal heart rate	-0.251
biological times (twitch to lifespan)	0.250 ± 0.011
mammal maximum lifespan	0.2

ECOLOGY

mammal population density vs mass	-0.75 (SE 0.026) [~7 dec]
plant max density vs mass (self-thinning)	-0.757
eukaryote abundance vs mass	-0.75 (~-1 across groups)
population variance vs mean (Taylor's law)	1.5 (range 1-2) (u?)
fluctuation scaling across complex systems	0.75 (range 0.5-1)
species-area relationship	0.27 (mean of 794 SARs) (u?)
mammal home range vs mass	1.0
predator vs prey community biomass	0.74

NEURO

white vs gray matter volume, mammal cortex	1.23 ± 0.01 [~5-6 dec]
cortical folding, mammals	1.305 (u?)
cortical folding across human individuals	1.25
human tumor metabolic activity vs volume	1.27 (range 1.25-1.3)
mammal brain mass vs body mass	0.75 (CI 0.742-0.758)

URBAN

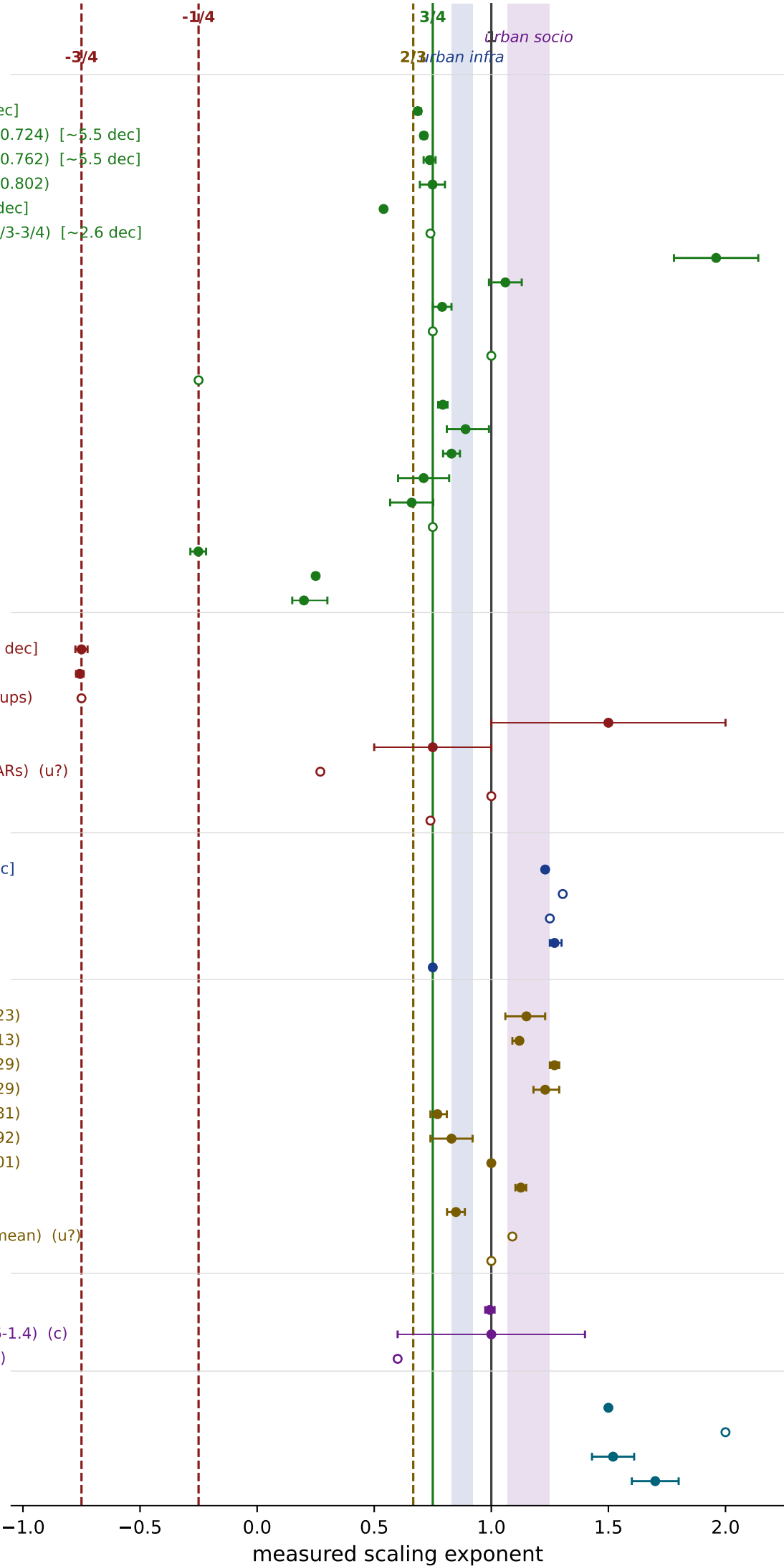
city GDP vs population (China)	1.15 (95% CI 1.06-1.23)
city total wages vs population (USA)	1.12 (95% CI 1.09-1.13)
new patents vs city population (USA)	1.27 (95% CI 1.25-1.29)
new AIDS cases vs city population (USA)	1.23 (95% CI 1.18-1.29)
gasoline stations vs city population (USA)	0.77 (95% CI 0.74-0.81)
road surface vs city population (Germany)	0.83 (95% CI 0.74-0.92)
total housing vs city population (USA)	1.00 (95% CI 0.99-1.01)
gross metropolitan product (USA 2006)	1.126 ± 0.023
road lane miles (USA 2006)	0.849 ± 0.038
city size distribution (Zipf)	1.09 (meta-analytic mean) (u?)
word frequency (Zipf's law)	1.0

GEO

earthquake frequency-magnitude, S. California	0.994 ± 0.02
earthquake frequency-magnitude (classic; S. California)	1.0 (typical range 0.6-1.4) (c)
river basin: length vs area (Hack's law)	0.6 (0.6 (0.7 Arizona))

AVALANCHE

neuronal avalanche size (cultures/slices)	1.50 ± 0.008
neuronal avalanche lifetime (cultures/slices)	2.0 (initial slope)
spike avalanche size, rat V1 in vivo	1.52 ± 0.09
spike avalanche duration, rat V1 in vivo	1.7 ± 0.1



(c) = compiled (u?) = unverified ◇ = exact