1035-60-927 **Eli Ben-Naim*** (ebn@lanl.gov), Complex Systems Group, Theoretical Division, Los Alamos National Laboratory, Los Alamos, NM 87545. *Random Averaging.*

Averaging processes underlie collisions in granular media as well interactions in social and opinion dynamics. In the averaging process there are are infinitely many interacting "particles", each characterized by a single variable. Repeatedly, two particles are chosen at random and both are set to their average. We study averaging processes using kinetic theory and find a number of interesting phenomena including: 1) Multiscaling. The moments of the distribution exhibit multiscaling and knowledge of the average behavior is not sufficient to characterize the probability distribution function. 2) Patterns and bifurcations. When the averaging process excludes particles that exceed a threshold, the system organizes into clusters. These clusters are patterned and the number of clusters undergoes a series of bifurcations as a function of the initial conditions. 3) Synchronization. When the averaged quantity represents a phase and in the presence of noise, there is phase transition from an ordered state where the particles are aligned into a disordered state where the particles are not correlated. The behavior is related to a special partition of the integers. (Received September 17, 2007)