1086-VD-2297 **Haley A Yaple*** (haleyyaple@u.northwestern.edu). *Modeling the dynamics of competitive systems, with applications to religious shift and ferromagnetism.* Preliminary report.

When a society is partitioned into two groups, the dynamics of affiliation can be studied using mathematical models. We construct a model that captures mean-field behavior with a simple nonlinear differential equation. We then generalize to include the possibility of non-trivial interaction networks and allow for a discrete or continuous system. The resulting integro-differential equation is amenable to perturbative analysis and numerical simulation.

When applied to the case of religious shift in a society, our mean-field model is a good fit for historical census data. Perhaps surprisingly, our model is also a good fit for ferromagnetism, using an analogy between individuals in a society who may switch group affiliation and particles in a material that may switch magnetic polarity. Based on the energy arguments of the Ising model, we are able to reproduce results from statistical mechanics and make predictions about dynamics that are difficult or impossible to determine from stochastic systems. (Received September 25, 2012)