Sushil Bikhchandani, David Hirshleifer, and Ivo Welch. "Learning from the Behavior of Others: Conformity, Fads, and Informational Cascades" The Journal of Economic Perspectives Vol. 12, No. 3, Summer 1998

1 The Basic Problem

People must choose an action from a set of alternatives but possess imperfect information about the payoffs to the various actions. If others are known to face the same problem, people can hope to aggregate their limited bits of information. People engage in *observational learning* or *social learning* when they try to glean more information by observing either the private information or the actions of others.

2 A Model

There is an infinite population of agents that are ordered in a sequence $1, 2, 3, ...i, i+1, ...$. Each agent must decide to either adopt (a), or reject (r), a specific course of action. Agents are risk neutral and care only about the expected payoffs of the two options. If r is chosen, the agent gets a payoff of 0. If a is chosen, the agent gets a payoff of V. V can either take two values, 1, the "HIGH" payoff, and -1, the "LOW" payoff. V is determined once and for all by a 50-50 coin flip, but agents are uncertain as to which value it has taken.

Private Information:

The i^{th} agent receives a private signal X_i that either indicates a "HIGH" payoff or a "LOW" payoff. Each X_i is independently and identically distributed as (essentially) a Bernoulli variable:

$$X_i = \text{HIGH with probability p}$$
$$X_i = \text{LOW with probability (1-p)}$$

If V=HIGH, then p can be interpreted as the probability that the signal is correct. It is assumed that $p > .5$

2.1 Observable-Signals Model

In this version of the model, each agent observes its own private signal in addition to the signals of all previous agents. Let $\overrightarrow{X_i}$ denote the sequence of signals, including its own, that agent i observes in this manner. Using Bayes Rule, the agents calculate the probability of V=1, conditional on their observations, $P(V=1|\overrightarrow{X_i})$, and adopt if the expected utility of adoption exceeds the utility of rejection (0):

$$P(V=1|\overrightarrow{X_i}) - [1 - P(V=1|\overrightarrow{X_i})] > 0 \Rightarrow$$
$$P(V=1|\overrightarrow{X_i}) > .5$$

By a Law of Large numbers argument, as the number of observed signals gets very large, there will come a point after which every subsequent agent will make the ”correct decision.” Information keeps accumulating, and all pieces of information are used by subsequent decision makers.

2.2 Observable-Actions Model

In this version of the model, each agent observes its own signal, but now only observes the actions of the previous agents as opposed to their private signals. This creates a more complex decision environment. This environment allows for the possibility of an *informational cascade*, in which the optimal decisions of agents do not rely on their private information. If d is the difference between the number of previous adopters and

the number of rejectors, then the optimal decision rule is as follows:

If d¿1, then adopt regardless of one’s own signal

If d=1, then adopt if one’s own signal is HIGH and flip a coin if one’s signal is low.

If d=0, act according to one’s signal

If d=-1, reject if one’s own signal is LOW and flip a coin otherwise.

If d¡-1, reject regardless of one’s own signal

3 Extensions

Number of Goods: Cascades and the number of goods: Lee (1993) demonstrates that with a continuum of goods, cascades do not form. However, even in a continuum situation, people may ”discretize” the process, producing cascades.

Experts: The presence of Experts that may have better information than other agents can create cascades if everyone defers to their expertise. If an expert is called upon to chose in the middle of a sub-optimal cascade, it can break the cascade.

Information Costs: If private signals are costly to obtain, agents may prefer to rely on the information of previous adopters.