Cascade experiments

For *The New Palgrave Dictionary of Economics*, 2nd Edition
Edited by Steven Durlauf and Lawrence Blume

Cascade experiments test the theory that conformity can result from individuals receiving private imperfect information and making public decisions in a sequence (see INFORMATION CASCADES AND OBSERVATIONAL LEARNING entry).

Cascade theories provide a rational explanation for imitation even when people receive different private information. If a person gathers additional information by observing others' decisions, then a sequence of matching decisions might be strong enough to outweigh that person's contrary private information. When the initial decisions in a sequence are correct, cascades can lead to better overall decision making than private information alone. However, information cascades are problematic when the initial decision makers in a queue receive incorrect information and convey it to other through their public (incorrect) decisions.

Anderson and Holt (1997) designed the first laboratory cascade experiment to test the theory described in Bikhchandani, Hirshleifer and Welch (1992). Participants were shown two cups labeled A and B. Cup A contained two light marbles and one dark marble. Cup B contained two dark marbles and one light marble. A six-sided die was used to determine whether Cup A or Cup B was selected at the start of each decision making round. The cups were equally likely to be selected by the die throw. Once a cup was selected, each person saw one private draw from the cup, with the marble being returned to the cup after each draw. Each participant made a public prediction about which cup (A or B) was being used for the draws in a randomly determined sequence that changed from round to round. Sessions included six decision makers who were paid $2 for a correct prediction and nothing otherwise for each of 15 rounds.

In any given round, if the first two public predictions matched (AA or BB) it was rational (based on Bayes'rule) for all subsequent decision makers to follow, regardless of which marble they saw drawn from the cup (see BAYES' RULE entry). Starting with prior probabilities of ½ for each cup, if the first decision maker predicted cup A, others could rationally infer that he saw a light marble, since there were more light marbles than dark marbles in Cup A. With this new information, the probability of Cup A should have been updated to 2/3. If the second decision maker predicted Cup A, others could infer that he also saw a light marble, and the probability of Cup A being used for the draws should have been updated to 4/5. Even if the third person observed a dark marble, it was still more likely that Cup A was being used for the draws and a cascade should start with the third decision maker. Alternatively, if the first two decision makers canceled each other out (AB or BA) and the next two matched, then a cascade could start with the fifth person in the sequence.

Cascades were possible, based on the private draws and the decision making sequence, in about half of the Anderson and Holt (1997) experiments and actually formed in about 70 percent of these cases. Almost all of the people who did not join rational cascades were following private information that conflicted with the cascade. This type of deviation is explained by cascade models with small amounts of noisy behavior, as described in Anderson and Holt (1997) and Goeree et al. (2003) who showed that incorrect cascades are not likely to persist in experiments with long sequences of decisions.

From a policy perspective cascades are a concern because they hide information, since the private information of cascade followers is not revealed by their decisions. Kübluer and Weizsäcker (2004) studied whether or not people recognized the lack of information in conforming decisions by making participants pay a fee to see a private signal. In one version of their experiment, it was only rational for the first person in the sequence to purchase information, but they found that many people made irrational purchases. Some of this behavior can be explained by a model with error, since it is rational to buy information if you cannot completely trust the quality of public decisions.

In addition to the studies discussed above, laboratory experiments have been used to test other variations of the seminal cascade theory including applications to voting (Hung and Plott, 2001), investment (Alsopp and Hey, 2000), markets (Drehmann, Oechssler and Roider, 2005 and Cipriani and Guarino, 2005) and advice giving (Çelen, Kariv and Schotter, 2005).

Bibliography

Alsopp, L., and J. D. Hey 2000. "Two experiments to test a model of herd behavior," Experimental Economics 3, 121-136.

Anderson, L.R. and C.A. Holt 1997. “Information cascades in the laboratory.” American Economic Review 87 (5), 847-862.

Bikhandani, S., D. Hirshleifer and I. Welch 1992. “A theory of fads, fashion, custom and cultural change as information cascades.” Journal of Political Economy 100 (5), 992-1026.

Çelen, B., S. Kariv and A. Schotter 2005 “Words Speak Louder than Actions and Improve Welfare: An Experimental Test of Advice and Social Learning.” Working paper, Center for Experimental Social Science, New York University.

Cipriani, M., and A. Guarino 2005. “Herd behavior in a laboratory financial market,” American Economic Review 95 (5), 1227-1443.

Drehmann, M., J. Oechssler, and A. Roider 2005. "Herding and contrarian behavior in financial markets: an internet experiment," American Economic Review 95(5), 1203-1426.

Goeree, J. K., T. R. Palfrey, B. W. Rogers, and R. D. McKelvey 2003. "Self-correcting information cascades," Discussion Paper, Caltech.

Kübler, D., and G. Weizsäcker 2004. "Limited depth of reasoning and failure of cascade formation in the laboratory,' Discussion Paper, Humboldt University, Berlin.

Lisa R. Anderson, Department of Economics, College of William and Mary
Charles A. Holt, Department of Economics, The University of Virginia