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CONVERSATION, INFORMATION, AND HERD BEHAVIOR

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ABSTRACT

Experimental evidence shows that an important reason why people tend to imitate others, to exhibit "herd behavior," is that they assume that the others have information that justifies their actions. The informational cascade models of Banerjee [1992] and Bikhchandani *et al.* [1992] are significant developments in showing some general equilibrium and welfare effects of such rational imitative behavior. But these models as specified may be of limited applicability since they assert that differences across groups in herd behavior can be attributed to the random decisions of first movers. Differences across groups in herd behavior might be explained more often in terms of different modes of interpersonal information transmission. Patterns of human conversation imply great selectivity to the kinds of information transmitted within groups.

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People who interact with each other regularly tend to think and behave similarly. Sometimes this "herd behavior" is so striking as to suggest a puzzle. Why, for example, should political beliefs or opinions on policy issues such as gun control tend to show such geographical and social patterns? The facts that should inform beliefs are the same everywhere. For another example, why should at certain times consumer and investor confidence be high and at other times low? Often, economists cannot discern any logic to changes in public confidence.

The tendency for people in groups to think and behave similarly seems to suggest some kind of irrationality, such as a loyalty-induced psychological motivation to be in accord with group members; see Jost [1995]. But more seems to be at work than just such a motivation. One is struck, in talking to people, that they act purposefully, bring up facts to support their views, and often seem unaware of opposing arguments.

For understanding herd behavior, it is helpful also to consider theories of information, theories that represent each group as reacting to an information set common to that group. The kinds of opinions where herd behavior is prominent are not matters of plain fact (which way is north) but subtle matters, where many pieces of information are relevant, and where limitations of time

and natural intelligence prevent each individual from individually discovering all relevant information.

I will discuss here a couple of approaches to understanding why groups at different places or times have access to different information sets. One approach is represented by models where people acquire information by observing actions of others in their group, the "informational cascade" models of Sushil Bikhchandani, David Hirshleifer and Ivo Welch and of Abhijit Banerjee. Another approach is to study the mechanisms of transmittal of information within groups, we have the "conversation analysis" of anthropologists (see Charles Goodwin and John Heritage) and the studies of "social cognition" of social psychologists (see John Levine and Lauren Resnick).

I. Informational Cascades and the Herd Externality

The models of Bikhchandani *et al.* and Banerjee both show people acquiring information in sequence by observing the actions of those in their group before them in the sequence. Banerjee introduces his model in terms of an example of people's efforts to discover which of two restaurants is better, and where each person has an imperfect signal about the quality of the restaurants. The first individual follows his or her own signal. The subsequent people may rationally ignore their own signals, deciding that the information of those before them, information revealed by their decision to go to one of the restaurants, dominated their own signal. Everyone could wind up going to the wrong restaurant, if the first signal

was bad. The bad equilibrium arises from a "herd externality," of imitating others and thereby concealing one's own information.

That people do indeed try seriously to infer information by observing the actions of others has been documented. Solomon Asch in 1952 reported a (now famous) experiment that has been widely interpreted as demonstrating the power of social pressure, but that might better be regarded instead as an experiment demonstrating that people rationally take into account the information revealed by others' actions. In each of these experiments, Asch placed a subject in a group of people, the others of which were confederates. The group was asked to answer a sequence of twelve questions about the lengths of line segments; the answers to all questions were obvious and were nearly always correctly answered when presented to individual respondents outside of a group. In each experiment the confederates were told to give an incorrect answer on seven of the twelve questions. The subjects, reacting to the conflict between their own senses and the unanimous consensus of the rest of the group, showed evidence of anxiety and distress, and a third of their responses then made the same error as the majority.

There is an alternative to the social pressure interpretation of Asch's results, an information-based interpretation. A rational subject might well reason that, under the assumption that the answer to the question is as obvious as it seems, the probability that someone would make an error may be very small, one in a hundred, let us say. The probability that the other eight group

members would make the same error would be, if all are independent, one in a hundred to the eighth power, an extremely small number. The subject might then reason that conclusive evidence has been presented that he or she is incompetent to answer the questions. Curiously, Asch seemed not fully aware of this informational interpretation, even though he quoted subjects as practically explaining this to him after the experiment. One subject told him that "To me it seems I'm right, but my reason tells me I'm wrong, because I doubt that so many people could be wrong and I alone right." (p. 464) The subjects told Asch of a number of theories they tried to construct to explain the conflict between their own perceptions and those of the group, such as that the actions are not independent, "the other members of the majority are conformists, following the first subject who for some reason is inaccurate," (p. 462), or that the other subjects were vulnerable to an "optical illusion" that the experimenter had devised. This theorizing on the part of the subject is evidence of an apparently rational effort to interpret the conflicting evidence.

Very soon after the publication of Asch's experiment, critics realized the importance of the informational interpretation of Asch's results. Morton Deutsch and Harold Gerard in 1955 reported experiments modifying the Asch experiment by separating the group members, so that there was no interpersonal interaction. Each subject was seated in a partitioned area so that other group members could not be seen, and was told to enter the answer by pushing a button, which lit a bulb visible to the subject and,

presumably, bulbs visible to the other group members. The supposed answers of the other group members were made known to the subject by the lighting of other bulbs supposedly operated by these members. In fact, the bulbs were secretly controlled by the experimenter to imply that other group members were giving wrong answers. Thus, the informational aspects of the situation are essentially the same as in Asch's; only the face-to-face interaction is eliminated. The subjects here made almost as many errors (84% as many) as in the face-to-face experiment, indicating that the informational effects, not the social effects, were the predominant cause of Asch's results, and allowing us to reinterpret the famous Asch experiment as revealing information-based behavior.

The Bikhchandani *et al.* and Banerjee papers add to our understanding of this informational herd behavior by illustrating through their models the general equilibrium effects, social welfare and policy implications of such behavior in rational imitation of others. There is some doubt, however, whether these authors have properly identified the usual source of difference in behavior across groups. The reason that one group behaves differently from another in their model is that the first movers in the sequence in each group received different (partly random) signals. While such sequential decision making does occur (consider the example of John Leahy on the location of new stores on Sixth Avenue), in most cases many people independently choose their actions based on their own signal, without observing the actions of

others. By the law of averages, we would expect that the group behavior is determined by the information, not the random signals.

It would seem that few of the examples of informational cascades proposed by these authors satisfy the assumptions of the sequential models. Banerjee gives the examples of choice of stores, schools, investments, political candidates, technologies, how many children to have, and research topics (for academics). Bikhchandani *et al.* offer, as additional examples of herd behavior, drug, alcohol and cigarette use, war fever, cohabitation, communism, religions, choice of papers by editors, choice of initial public offerings, medical practice (tonsillectomies or hysterectomies), and health fads. For most of these, it is hard to see how there could be a first mover who set the behavior of others. Returning to Banerjee's introductory example, of restaurant choice; it seems unlikely that restaurants succeed or fail for reasons represented in his model. There are too many "first movers" who try the restaurant not having observed others, or not trusting that others' decisions are relevant to their own.

II. Interpersonal Communications: Conversation

Human speech developed through millions of years of evolution. The development of speech required the expansion of certain areas of the brain that make it possible: Broca's area in the brain developed to allow the fine control of muscles of the mouth and larynx, Wernicke's area developed to process the incoming speech of

others, other areas developed to allow the storage of words and to connect the memory of words to logical thought processes.

Along with the patterns of speech itself, there has evolved a complex set of brain structures supporting emotional and interpersonal behaviors that facilitate communication, so that communication is not only possible but also so that communication is effective and frequent. Human society has had an evolutionary advantage in its ability to act as a unit, to respond collectively to information; groups must therefore exchange information within themselves before a crisis happens, they must promote a collective memory of important facts, common assumptions and conventions. The human communications patterns work very well, and must account for part of the success of the human species in competition with other animals. Still, one would not expect to see that evolution has completed the job yet, and so sometimes collective behavior is likely to be inappropriate or counterproductive.

Human behavior common to all human societies involves a tendency for an idle free-flowing exchange of ideas and thoughts; we call this conversation. This flow of conversation serves to exchange a wide variety of information, and also to reinforce memories of pieces of information to be held in common by the group. Modern civilization has brought with it some more structured environments for exchange of information (academic seminars or meetings held under Roberts Rules of Order, for example) but such structured environments are still dominated by ordinary conversation that follows ancient patterns. The communications

media of modern society are of course not governed by all the same rules as is ordinary interpersonal conversation. Still, there is a sense of conversation in the media, and still many of the same patterns continue in these media. Moreover, the media appear to be somewhat less effective in transmitting information and opinions than is ordinary interpersonal conversation, see for example William McGuire. Perhaps the media do not provide stimuli to all of the brain processes that evolved to make use of face-to-face conversation.

Associated with conversation are a number of emotional responses to what is said, and an awareness of the emotional responses of others, responses that presumably promote the exchange of information. In the course of a conversation, normal people at frequent intervals become aware of feelings of emotional support from the other party, or feelings of being put down, of loss of face, and they attempt to deal politely with these feelings.

Anthropologists have documented, with their "Conversation analysis," patterns of conversation that appear to transcend all cultures and are apparently part of the basic behavior patterns of the human animal. Penelope Boran and Stephen C. Levinson have reported extensive cross-cultural similarities in behavior regarding politeness in conversation. For a specific example of such a behavior, note that in many languages there are words that serve to soften an imperative. In the English sentence "My house would be OK then?" the word "then" serves such a function, helping the other party save face, if he or she wishes to object to the

suggestion, by creating a supposition that the idea in the sentence had been suggested by something that person had said earlier in the conversation. Boran and Levinson report that the word "appuram" in the Tamil language of India and the word "ç'in" in the Tzeltal language of Mexico are used for precisely the same purpose (p. 115).

One of the rules of polite conversation is respect for a common consensus on the topic of conversation. Somehow, a set of topics commonly sanctioned as appropriate for conversation becomes established in groups. Topics that might exclude members of the group, or reveal their inadequacies, are less likely to be broached. Not only are there socially sanctioned rules for appropriate topics of conversation, but also, in the course of a conversation, it is impolite to make an abrupt change of topic even to another socially sanctioned topic. To make a change of topic one must usually create some link to the previous topic, or one must drift to another topic in a stepwise fashion. The protocol creates a fluid, apparently random drift of topic of conversation, but does not allow for the expansion of complicated ideas. The protocol of conversation usually dictates that no single person dominates the conversation, and so knowledgeable persons usually do not have opportunities to give lectures, even if such lectures would greatly inform the others.

The consequence of these conversation behaviors is to keep people well informed about simple facts about the local environment, where to get things and where there are hazards, how

simple tasks are performed, about family and friendship ties, about local gossip, about who is deviant and not to be trusted. Abstract topics are not usually pursued in depth.

Much of the failures of human judgment that fall under the rubric of "herd behavior" might be traced to the limitations imposed on human thought and memory by these patterns of communications. For an economic example, consider that savings rates differ strikingly across countries (e. g., US versus Japan) and through time. It appears that the question "are we saving enough?" is a suitable conversation topic beyond spousal pairs in almost no circumstances. Problems of face seem to be important; there is a potential for embarrassment if matters of wealth are brought up, and moreover, the topic is rather abstract and difficult, discussions of it would exclude or diminish many people. Instead, appropriate behavior towards saving is learned from hints and rules of thumb inferred within each group from conversations centered on other matters.

The "monetary veil," "money illusion" and the failure of "Ricardian equivalence" are also inappropriate topics. The topic whether the national debt should be regarded as wealth is just not suitable for discussions outside of economics department coffee hours, as is the topic how much we should diversify our portfolios and hedge risks. Opinions on these matters thus ought also to vary through time and across groups.

III. Information and the Volatility of Mass Behavior

What is the source of the volatility of mass behavior, the source of apparent randomness in actions and behavior across groups and through time? I have argued that, while informational cascades appear to be very important, the first-mover aspect of the stories of Bikhchandani *et al.* and Banerjee seems not to be widely applicable.

The differences in mass behavior across groups may be due more to differences across groups in the nature of information transmission. Different groups (or groups at different times) have different tendencies, different in terms of conversation patterns as well as circumstances promoting informational cascades, to transmit certain kinds of information and thereby place it in their collective memories. The outcome for collective memory may differ across groups even if the information is repeatedly observed by some members of all groups.

A large part of the difference across groups in information transmission on any single topic must be due to differences in initial conditions in terms of information and opinions of that group. Knowing the beliefs and attitudes of the people in their group, people freely bring up information only if it is a suitable conversation topic for that group and not diminishing or excluding anyone. Moreover, stimuli to conversation are different across groups, each group has its own reminders of conversation topics. For example, given the basic human tendency to converse about

people known in common, the association of a visible group member with certain ideas may speed their transmission.

Groups may differ in complicated ways in terms of what may be called informational cascade facilitators. For example, some groups may tend to observe the behavior of others in relation to certain kinds of information more often than other groups, or have different theories than other groups about the relevance of other group members' decisions to their own decision problem. Conversation patterns may also vary across groups in terms of habits of revealing sources of information. A seemingly inessential group tendency to reveal or not reveal where one heard an improbable story may make an important difference in the kind of informational cascades that develop in conversation. If one knows that one more reliable person believed the story enough to tell it, then that would logically have more tendency to believe it and spread it. Much research could be done documenting differences across groups in such dimensions.

References

- Asch, Solomon. Social Psychology. Englewood Cliffs NJ: Prentice Hall, 1952.
- Banerjee, Abhijit V. "A Simple Model of Herd Behavior." Quarterly Journal of Economics, August 1992, 107(3), pp. 797-817.
- Bikhchandani, Sushil; Hirshleifer, David, and Welch, Ivo. "A Theory of Fashion, Custom, and Cultural Change." Journal of Political Economy, October 1992, 100(5), pp. 992-1026.
- Brown, Penelope, and Levinson, Stephen C. Politeness. Cambridge: Cambridge University Press, 1987.
- Deutsch, Morton and Gerard, Harold B. "A Study of Normative and Informational Social Influences upon Individual Judgment." Journal of Abnormal and Social Psychology, November 1955, 51, pp. 629-36.
- Goodwin, Charles and Heritage, John. "Conversation Analysis." Annual Review of Anthropology, 1990, 19, pp. 283-307.
- Jost, John T., "Negative Illusions: Conceptual Clarification and Psychological Evidence Concerning False Consciousness," Political Psychology, 1995.
- Leahy, John, "Miracle on Sixth Avenue," reproduced, Harvard University, 1994.
- Levine, John M. and Resnick, Lauren B. "Social Foundations of Cognition." Annual Review of Psychology, 1993, 44, pp. 585-612.
- McGuire, William J. "Attitudes and Attitude Change" in Gardner Lindzey, and Elliott Aronson, eds., Handbook of Social Psychology, Volume 2. pp. 233-346, Reading MA: Addison Wesley, 1985.
- Turner, John C. Social Influence. Buckingham England: Open University Press, 1991.