Why do some ideas suddenly become popular, and then die out just as quickly?

Following the Herd

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WHY DO CERTAIN IDEAS AND philosophies suddenly become en vogue in society, and then just as quickly fall out of favor? Consider, for example, all of the different management fads that have come and gone in the past few decades: management by objectives, the pursuit of excellence, employee empowerment, business process engineering, core competencies, and six sigma, not to mention the Japanese model, business ethics, and now "corporate governance." Countless management gurus and cohorts of business executives enthusiastically embraced each of those trends, proclaiming it necessary for economic survival, and later dropped the trend in favor of the next emerging idea.

This following of the herd is especially curious when the trend is contrary to established evidence. Consider, for instance, the current attitude toward tobacco use. Health experts generally accept that smoking increases the risk of ailments like lung cancer, but survey research indicates that smokers and nonsmokers overestimate those risks. Harvard University professor Kip Viscusi has calculated that, if the public better appreciated the risk of lung cancer from tobacco use, smoking rates would actually increase between 6.5 and 7.5 percent. (See "The New Cigarette Paternalism," Winter 2002-2003.) Additionally, some 89 percent of adults and 97 percent of 10th grade students surveyed in California believe that breathing secondhand smoke is a heath hazard — a very doubtful proposition.

Or consider environmental scares. Revelations about the burial of toxic waste on ground that later became the site of a school and subdivision known as Love Canal in New York State led to billions of dollars in public expenditures to isolate and monitor the site. But according to many analysts, including Timur Kuran of the University of Southern California and Cass Sunstein of the University of Chicago, the fears for the residents' health were not justified by any hard scientific evidence. The Alar pesticide scare in the late 1980s also apparently lacked any scientific foundations, but public fears caused significant economic loss for Washington State apple growers who used the chemical to preserve their produce.

How can so many people suddenly sign on to a questionable idea? And then, why do they often change their opinion just as quickly? Over the last two decades, economists have tried to answer those questions using cascade theories, which attempt to explain the emergence and evolution of transient and reversible phenomena of people falling in line with the crowd.

INFORMATIONAL CASCADES

Informational cascades are the most basic sort of cascades. In them, people form their beliefs using information obtained by observing the behavior or opinions of others. UCLA economists Sushil Bikhchandani, David Hirshleifer, and Ivo Welch define an informational cascade as a situation in which "it is optimal for an individual, having observed the actions of others ahead of him, to follow the behavior of the preceding individual without regard to his own information." Although "actions speak louder than words" and economists rely more on actions to reveal individual preferences, cascade theory also applies to opinion conformity.

This behavior is rational for the simple reason that obtaining information is costly, even if only in terms of time, whether it relates to consumption of food or drugs, to moral acts, or to any other type of behavior. Individuals will buy information – or get "private signals" in cascade jargon – only up to the point where the information yields no more net benefits than just following signals emitted by others. Cascade theory tries to reconcile herd behavior with the rational-choice approach in the social sciences — it is often rational for an individual to rely on information conveyed by others. Table 1 lists several examples of such cascades.

One set of phenomena that is conspicuously absent from Table 1 is so-called "financial bubbles." There is little evidence that financial bubbles, if they exist, are explained by informational cascades, because prices of financial instruments move to render herd behavior less and less attractive. If everybody buys, there must come a point when people will think that it

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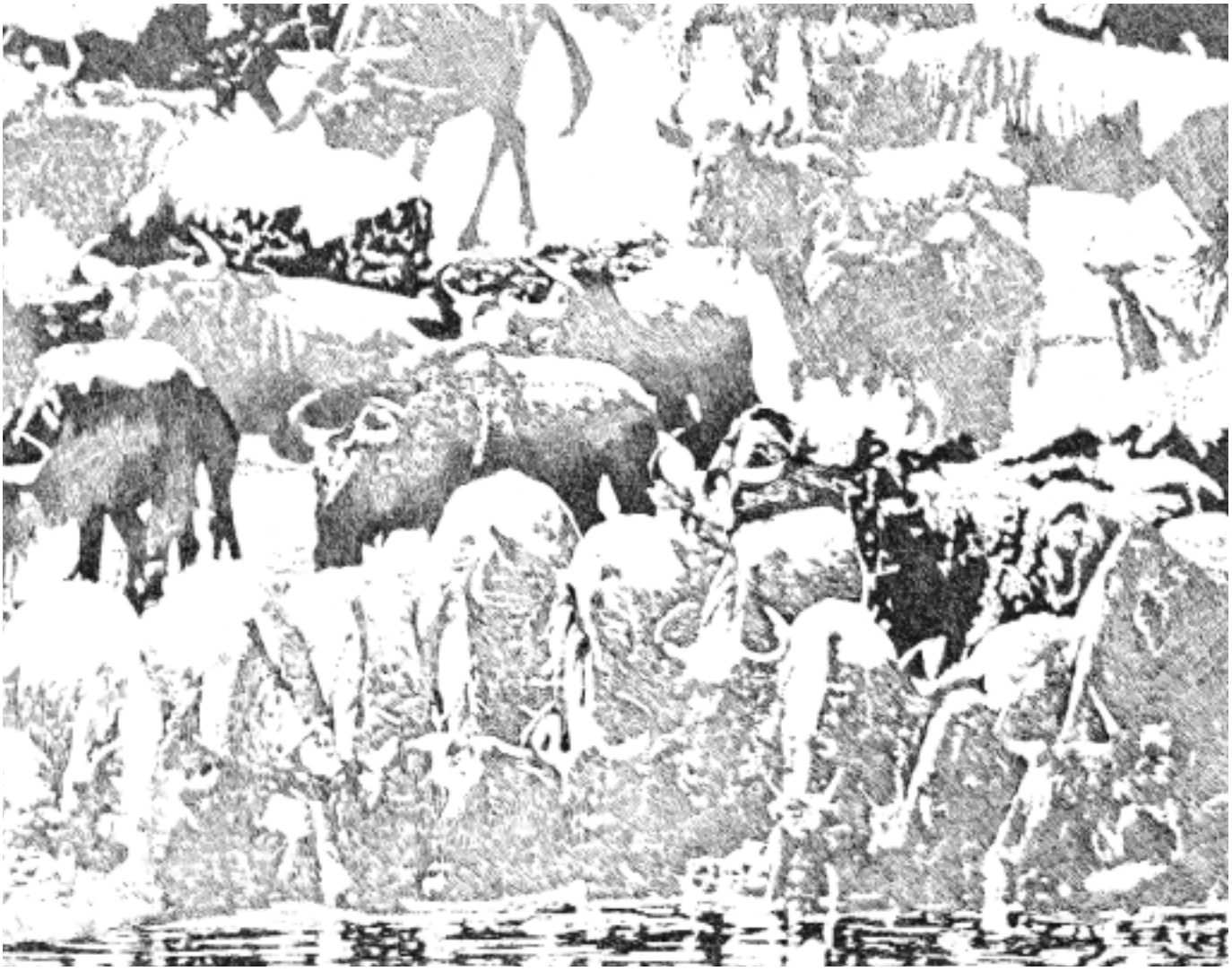


MORGAN BALLARD

is too expensive to buy. When individuals have an incentive not to follow the crowd, they do not. In cascades, on the contrary, individual incentives remain biased towards herd behavior.

The formal model Like all economic models, the formal model is a simplified representation of reality. The model is sequential (individuals decide one after the other), and everybody observes the decisions of all those before him in the queue. In the simplest case, there are two mutually exclusive alternatives: adopt or reject a certain behavior — say, implementing a given management strategy or expressing a certain opinion. Assume that, objectively, adopting is better (in the sense that it has higher net benefits than the other alternative) than rejecting. A private signal can be any private information: seeing an advertisement, reading an article, talking to an acquaintance, etc. Finally, assume for the moment that every individual gives equal weight to his private signal and to any other individual's signal.

Figure 1 shows the sequence of decisions. Individual A makes a choice based solely upon a private signal because there is no public information for A to use, as nobody has made a choice on the matter prior to him. If A gets signal 'H' ("high," the signal consistent with the correct decision to adopt), he will adopt; if he gets signal 'L' ("low," the signal contrary to the correct decision), he will reject.

For the sake of illustration, assume that there is a 60 percent probability that any individual gets a private signal H, and a 40 percent probability that he gets L. The signal is said to have some "precision" because it conveys the right information with a probability greater than 50 percent.

The second individual in the queue, B, will get a private signal, but he will also benefit from public information because he can observe what A has done. Suppose that B gets a private H signal. Because he knows, by observing A's behavior, that the latter also got an H, he has only reasons to adopt. The third individual, C, will then adopt because, even if he gets an L signal privately, he will see A and B exhibiting public H signals. A cascade will thus begin. All subsequent individuals will have the same incentives as C because they observe the information-conveying choices of A and B. C's choice (as the choice of all following individuals) conveys no new information, because it is made entirely on the basis of public information conveyed by A and B's choices. This cascade, where everybody adopts when adopting is the correct choice, is called an "up cascade."

Now, consider what happens if B gets an L private signal after A got an H signal. B would thus have reason to both adopt and reject. Let us assume that, to resolve his dilemma, he simply flips a coin. (In fact, laboratory experiments suggest that individuals follow their private signal when it conflicts with an

equal amount of public information, but the coin-flipping assumption is sufficient for our discussion.) If the coin flip provokes B to adopt, then C — seeing the signals from A and B — would adopt as well and start an up cascade.

But suppose the coin flip prompts B to reject. We thus have one adoption and one rejection. When C weighs his choices, he will have evenly-split public information and a 60 percent chance (per our example) of receiving a private H signal. Thus, in essence, there is a 60 percent chance that C would adopt. If C does in fact adopt, person D would then start an up cascade, regardless of his private signal, because of the overwhelming public information supporting adoption. On the other hand, if C gets an L private signal and rejects, then D would have two public signals to reject (B and C) but only one to adopt (A).

But what would happen if A were to reject (by receiving an L signal, which has a 40 percent possibility of occurring in our example). In that case, a down cascade — in which everyone makes the wrong choice — would start with person C either if person B gets an L signal too, or if B receives an H private signal but his coin flip prompts him to reject. However, if B's coin flip prompts him to adopt, then either C would adopt and generate an up cascade or C (as a result of some mixture of public and private signals plus coin flips) rejects and leaves subsequent decision-makers with mixed signals. Those mixed signals would continue until some mixture of coin flips and public and private information would produce either an up or down cascade.

The model can be reinterpreted in more sophisticated probabilistic terms. An individual in the sequence observes the choices made by individuals behind him, which is public information, and deduces what their private information was. More precisely, from the choices made before him, the individual computes the probability that the best decision is to adopt or reject. His signal will, if he is not already in a cascade, serve to correct the "prior" probability with his own private "objective" signal, and obtain a "posterior" probability. Readers familiar with statistical theory will realize that our players are involved in a Bayesian decision scheme.

Likely to be wrong In this model, informational cascades are very likely to occur. It can be calculated that, even if information signals are not very precise, the probability that a cascade will form after 10 individuals is greater than 99 percent. The probability that a cascade will eventually start approaches one as the precision of the signal and the number of individuals increase.

Incorrect cascades have a relatively high probability. In our chart, a down cascade is less likely than an up cascade because the private signal has some precision – i.e., it conveys the true information (H) in 60 percent of the cases. The more precise the signal, the higher the probability that the cascade will be correct. Yet, the probability of an incorrect cascade remains significant even if the signal is relatively precise — it can be calculated that the false cascade will occur about a third of the time when the signal accuracy is 60 percent, and a fifth of the time when it is 70 percent.

Another interesting characteristic of cascades is that they are path-dependent: their direction (up or down) depends on small variations in the initial conditions. In terms of the simple model, whether A gets an H or an L signal is crucially important for the likelihood of an up or down cascade, and the signal received by B will determine if the cascade starts immediately.

Informational cascades are fragile. Once a cascade has started, it remains brittle, contrary to other forms of social conformity. The reason is that cascades are triggered by a small amount of information and, therefore, can also be stopped or reversed by little new information (including by errors). Anybody in a cascade knows that the behavior of most individuals carries no information because it is purely imitative (the definition of a cascade). The cascade can be broken and reversed by an individual with a more precise signal, especially if the ones who follow know that and are ready to ignore their own signals.

The real world Indeed, one way to make the model closer to the real world is to assume that some individuals have more precise signals than others, and that those higher-precision individuals are known. Think about fashion leaders or community leaders. If the highest-precision individual chooses first (which might very well be the case because all the others ration-

TABLE 1

The Herd Mentality

Examples of cascades.

- The Love Canal scare
- The Alar pesticide scare
- Opinions on the 1996 TWA Flight 800 crash
- Medical fashions (the practice of bleeding patients until the 19th century, elective hysterectomies in the 1970s)
- Bank runs
- Behavior of employers toward job applicants who have been rejected by other employers
- Adoptions of new technologies and innovations
- Organizational inertia, i.e., managers continuing the failed policies of their predecessors
- Adoption of hybrid corn by farmers
- Adoption of new scientific theories by the general public
- Use of, and opinion on, recreational drugs
- Practice of, and opinion on, freer sexual mores
- The rise and decline of McCarthyism
- The struggle for black civil rights
- The student rebellions of the 1960s
- The rise and (partial) fall of affirmative action
- The rise of feminism
- The anti-tax movement
- The rise of the religious right in the United States
- The spread of ethnic and religious separatism around the world
- The rise and fall of wooden-plank roads in the 19th century
- The spread of successful crimes
- The secondhand-smoke scare
- Regulation and prohibition of smoking in "public" places
- Management fads

ally let him go to the head of the queue), he is going to be imitated by all others because the second individual will defer to his predecessor's judgment and ignore his private signal, thus starting a cascade.

Letting higher-precision individuals choose first can be either a blessing or a curse, depending on how much more precise they are compared to other individuals. On the one hand, because a higher-precision individual has a better chance of making the right choice, there is a greater probability that he will start an up cascade. Ultimately, if his signal is 100 percent precise, an up cascade will start with probability one. On the other hand, if the highest-precision individual is only slightly more precise than others, and if he happens to get an L signal, an incorrect cascade will start without any other information being aggregated, because all followers imitate the highest-precision decider. In this latter case, lower-precision individuals should decide first, for then their actions will not be merely imitative but will convey to others the information on which they are based. People will then be able to weight the information conveyed by the different individuals whose precision differ, and more information will be taken into account.

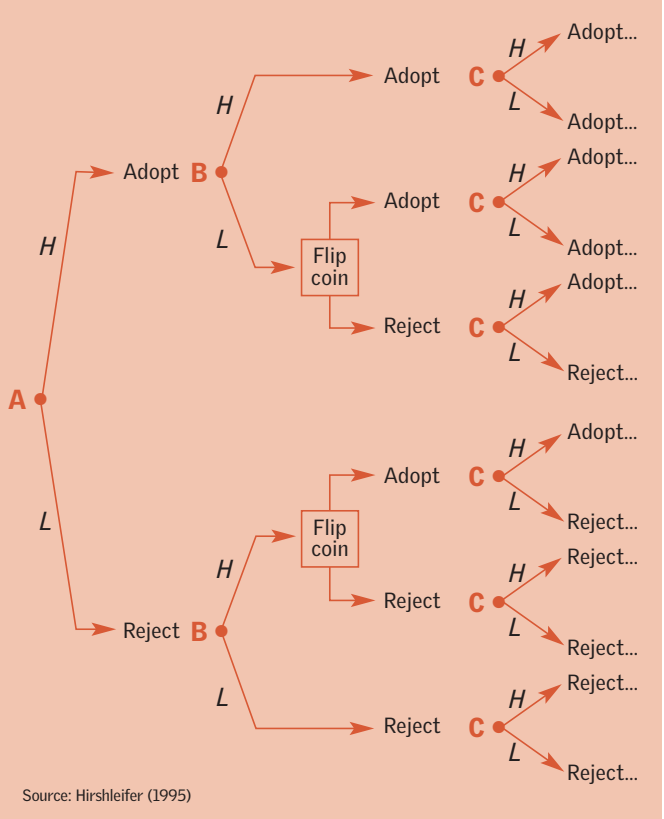
Informational cascades may be useful to economize on information and promote social coordination, but they also obliterate all the information contained in the private signals of the individuals who fall in a cascade. If it is not known who the higher precision individuals are, or if they are likely to be only slightly more precise than others, then the more people take their own signals into account, the better. A practical implication is that, if we are not sure that government decision-makers know more than ordinary individuals, individuals should be left to conduct themselves in accordance with their own judgments and signals. Rules and fashions should be left to develop spontaneously instead of being imposed by individuals who can make mistakes that will be imposed on everybody. This confirms Hayek's theory that free markets and decentralized decisions maximize the use of knowledge in society.

The reason why cascades hide information is that we often observe only people's actions, not the private information on which they are based. We may try to deduce bits of private information from individual actions, but when such actions are imitative, they convey no information at all. For example, if we observe that all individuals vote for interventionist policies, we cannot conclude that they all have private information that supports statism. It is conceivable that most of them actually have just the opposite private signals, but they discount those and follow the crowd. Because everyone knows this, the cascade remains fragile; public opinion changes quickly. The point here is that if people observe others' private signals instead of only their actions, public information continues to accumulate even if some decide to ignore their private signals. In that case, cascades will take more time to form, be more likely to be correct, and be easier to break if they are not. In other words, the more those private signals are publicly observed, the less path-dependent cascades are, and the lower the probability of errors in social imitation.

FIGURE 1

Following the Herd

Different possible decision outcomes in a cascade.



Source: Hirshleifer (1995)

MORE RESILIENT CASCADES

As we model cascades with more features from the real world, they begin to appear more resilient. This is good news when the cascade is correct, but bad news when it is not.

Revolutions Cascades are related to tipping points in public opinion and, ultimately, to social and political revolutions. Timur Kuran has developed a model to explain changes in public opinion that lead to sudden and unexpected political revolutions. Major examples include the French revolution in 1789, the Russian revolution in 1917, and the Iranian revolution of 1977–1978. Why did public opinion seem to change so rapidly that contemporaries (and even some revolutionary leaders) were taken by surprise?

The crux of Kuran's theory lies in the assumption that individuals have two types of political preferences, private and public, that do not necessarily coincide. Public preferences are fully expressed and contribute to public opinion, but they may not be the real preferences of the people who express them. Some private preferences may be kept secret. People engage in this sort of "preference falsification" in order to get "reputational utility" through favors, or at least non-repression, from the regime. But an individual will only falsify his preferences up to a certain point, because he also gets utility from "integrity" — that is, from the coincidence of his public and private preferences. An individual decides which preferences to express so as to maximize his utility by balancing reputa-

tional and integrity contributions. A sudden revolution happens when people stop hiding their private preferences, and the movement snowballs.

Preference falsification does not occur only when the cost of non-conformity is political repression. People also falsify their preferences when social sanctions are meted out under the form of social disapproval or boycott. For example, individuals may use "politically correct" language in order to be accepted, even if they do not share the implied opinions. Once a certain critical mass is reached in support of a certain politically correct opinion, voicing an alternative view can turn the speaker into a social outcast.

Availability cascades The idea of following the crowd in order to maintain one's social reputation and acceptability is a major element of Timur Kuran and Cass Sunstein's theory of availability cascades. In a recent *Stanford Law Review* article, the two analysts extended informational cascade theory by borrowing reputational factors from the theory of revolutions and incorporating cognitive limitations in individual rationality. This theory was designed to explain why the regulation of risky products or environmental risks is so often driven by public opinion movements that run counter to scientific evidence.

Availability heuristics

Kuran and Sunstein assume that individuals use different heuristics, or rules of thumbs, to evaluate their environment. One is the "availability heuristic," "which involves estimating the probability of an event on the basis of how easily instances of it can be brought to mind." In what they call "availability cascades," individuals imitate others not only because they trust that the latter have reliable information that would be costly to reproduce, but also because they take the simple availability of information as an indication of its reliability. The availability of information influences individual perceptions, which in turn adds more of the same to available information.

Reputational factors

Kuran and Sunstein's availability cascades combine the concept of informational cascades with what are known as reputational cascades. A reputational cascade works like an information cascade but, instead of being driven by economizing on information costs, it is motivated by the individuals distorting their public preferences in order to maintain their reputation. Individuals engage in preference falsification in order to appear to conform to the opinions of others and gain social approval. Adding reputational factors to informational motivations implies that individuals will ignore their private signals even more often, and that the information made available by everyone's choices will be even more biased toward following the crowd. Once an availability cascade has started, few will dare to question the underlying self-righteous and apparently obvious conventional wisdom. Availability cascades are therefore more resilient than simple informational ones. New information is much less forthcoming because nobody wants to risk his reputation by going against the trend.

Availability entrepreneurs

Because availability cascades are very efficient and more resilient than simple informational cascades, it is in the interest of activists to generate them. "Availability entrepreneurs" are the type of activists who launch "availability campaigns," often on behalf of special interest groups. Availability campaigns can be useful to solve collective action problems by fostering cooperation practices and moral rules, but they may also generate incorrect cascades, as Kuran and Sunstein have observed in many cases of risk regulation.

> At best, the state meddles with individual choices on the basis of correct cascades; at worst, it will turn incorrect cascades into bad policy.

Tipping social systems

Other extensions have been made to cascade theory and social tipping models. Susanne Lohmann, another UCLA economist, has built a non-sequential model with many rounds in which participants can change their minds. Individuals take others' behavior (or expressions of opinion) as information about the best course of action (or the true opinion), and change their minds at the next round if required by new information. This generates endogenous dynamics that, once a certain threshold has been reached, can tip the system into fundamental change.

FALSE CASCADES AND THE STATE

To the extent that public policy follows majority public opinion, cascades will play a role in state intervention. At best, the state will meddle with individual choices on the basis of correct cascades — correct, at least, for most individuals. At worst, the state will turn cascades with no objective or scientific basis into bad public policies.

Majoritarianism But does the state follow majority opinion? The major conclusion of public choice economics is that, at least in the short run, public policy often does not reflect majority opinion in any meaningful sense. The results of elections,

bureaucratic processes, politicians' actions, and special interests' lobbying often run counter to the majority's preferences. But even in this case, opinion cascades can have a bad influence on public policy through the action of special interest groups.

Special interest groups are generally small groups with large concentrated interests to defend — like farmers or steel manufacturers, for example. Such groups organize and lobby while taxpayers and consumers do not organize to fight every small government intervention. The theory predicts that only certain interests will become efficiently organized and able to exploit other individuals and groups. For example, there is evidence that soft-drink manufacturers financially supported the drive for Prohibition, just as there now is some evidence that nicotine patch manufacturers are involved in the anti-smoking cascade.

The effect of special interest groups is increased by their ability to award reputational advantages to their supporters and to boycott or threaten their opponents. Trade unions are the classic example. Promoting preference falsification is a vehicle used by pressure groups to control public choices. As run by pressure groups, writes Kuran, "politics consists of controlling society's choice" through manipulation of public opinion.

False trends Kuran and Sunstein propose different institutional means against the danger that incorrect cascades will govern public policies. The general idea is to prevent the state from responding too hurriedly, without enough scientific evidence and debate, to "populist firestorms." But it is difficult to prevent democratic states from responding to democratic pressures. Instead, we should examine the general social circumstances under which the right cascades are more likely to be started and false cascades more likely to be reversed.

One implication of cascade theory is that the first individuals to decide have disproportionate weight on public opinion and social behavior. People or organizations that react first to public issues may start cascades. Moreover, when the issue is very controversial (in the sense that we do not know who has the more precise private signal, in terms of our discussion above), it is better that there be as many informative individual actions as possible, so that everybody is not misled by authorities. We stumble here on old ideas that retain all their currency: free speech and popular debate are socially efficient; it is also efficient to let individuals experiment with different lifestyles. As Hayek argued, diversified individual actions will create more information than centralized decision.

Reversing incorrect cascades requires credible individuals who get the right private signals and act on them. When reputational factors are involved, individuals capable of breaking a cascade will need to be not only credible, but also free-spirited and relatively independent of social pressures and government payouts. Again, cascade theory vindicates an old classical liberal idea: the importance of independent social elites capable of resisting public opinion and the state.

Assuming that the availability heuristics have some influence in public debates, it is also important that a large volume of evidence and ideas contrary to conventional wisdom be available. Because we cannot know who will have an opportunity to break the cascade, and because we are never sure which information is actually true, redundancy of correct information is necessary for efficient social cooperation.

CONCLUSION

Cascade theory explains, within a rational-choice framework, why large numbers of people think and behave in the same way. To the extent that the state follows what people do or think — public opinion in a broad sense — public policy is partly explained by informational, reputational, and availability cascades. Cascade theory explains why a lot of people can be wrong. When incorrect cascades develop, bad public policy will follow.

False cascades do not necessarily last forever. They often are fragile. However, reputational concerns make them more resilient, and may tip a social system into inertia or into revolution. Special interests also make cascades more resilient to the extent that they can manipulate them. One way interest groups manipulate public opinion is by rewarding certain types of opinion or behavior, generating reputational cascades. Cascades can thus amplify the collective-action biases stressed by public choice theory.

Cascades are only one of the factors that influence what people think and how they behave, and which public policies follow. Long-term ideology and political and bureaucratic processes interact with cascades. Many people can be wrong for a long time, but there are good reasons to believe that false cascades, even supported by special interests, can be reversed by free speech, individual liberty, and the dispersion of power in society. R

READINGS

- "Availability Cascades and Risk Regulation," by Timur Kuran and Cass Sunstein. *Stanford Law Review*, Vol. 51, No. 4 (April 1999).
- "The Blind Leading the Blind: Social Influence, Fads, and Informational Cascades," by David Hirshleifer. In *The New Economics of Human Behavior*, by Mariano Tommasi and Kathryn Ierulli. Cambridge, UK: Cambridge University Press, 1995.
- "Cascades: An Informational Rationale for the Power in Numbers," by Susanne Lohmann. *Journal of Economic Surveys*, Vol. 14, No. 5 (December 2000).
- "Information Cascades," by Lisa R. Anderson and Charles A. Holt. *Journal of Economic Perspectives*, Vol. 10, No. 4 (Fall 1996).
- "Learning from the Behavior of Others: Conformity, Fads, and Informational Cascades," by Sushil Bikhchandani, David Hirshleifer, and Ivo Welch. *Journal of Economic Perspectives*, Vol. 12, No. 3 (Summer 1998).
- "Sparks and Prairie Fires: A Theory of Unanticipated Political Revolution," by Timur Kuran. *Public Choice*, Vol. 61 (1989).
- "A Theory of Fads, Fashion, Custom, and Cultural Change in Informational Cascades," by Sushil Bikhchandani, David Hirshleifer, and Ivo Welch. *Journal of Political Economy*, Vol. 100, No. 5 (October 1992).