# Social Information Foraging and Sensemaking

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**ABSTRACT**
The time is ripe for a new paradigm of research on social information foraging and sensemaking to be coupled with the development of theoretically motivated systems. In contrast to the bulk of CSCW (Computer Supported Cooperative Work) there is an opportunity now to develop predictive, quantitative, formal models of social information foraging and sensemaking.

**Author Keywords**
Information foraging; sensemaking.

**ACM Classification Keywords**
H5.m. Information interfaces and presentation

**INTRODUCTION**
Cooperative information sharing and information analysis is often proposed as a means to avoid catastrophic failures such as 9/11 or the NASA Columbia explosion. In other words, social information foraging and sensemaking is expected to improve situation awareness, problem solving, and decision making. There appears to be a number of intuitions about why cooperation might improve information foraging and sensemaking. (1) Like over-the-horizon radar, an individual information forager may receive information otherwise unseen because of the information flowing to him or her from a social network of collaborators. (2) Collectively, by arranging the spotlights of attention of individual senamkers to insure maximum, exhaustive coverage of the information, one can diminish the chances of failing to bring to light some crucial data that might otherwise be missed. (3) Coordinated teams of experts may be assembled in order to exploit years of specialized skill and relevant knowledge about background and precedents, in order to better recognize and interpret information and intentions. (4) Diversity of viewpoints can be brought to bear to provide mutually corrective forces to overcome the cognitive heuristics and biases that often create blindness to unconsidered possibilities that are nevertheless consistent with incoming information.

However, there is also a considerable body of evidence from social psychology and decision support systems that indicates that collaborative work often results in worse outcomes than working alone. Further, it is common knowledge that cooperation involves overhead costs that, for the individual, act as disincentives for collaborative activities. Despite the potentially negative features of collaboration**,** many tools for social information foraging have emerged as disrupting Web 2.0 technologies.

In previous research, we developed cognitive task analyses of individual expert sensemaking [15] and computational cognitive models of individual information foraging [12-14]. We have started to expand this to studies of collaborative intelligence analysis [2] and a theory of social information foraging and sensmaking [11]. The theory draws upon models from optimal foraging theory [5], computational ecologies [6, 9, 10], library science [17], and anthropological studies of scholars [16]. Figure 1 summarizes key predictions of the theory. Figure 1a shows how collaboration with a diverse group improves the rate of return to the individual information frorager. Being embedded in a cooperative social network of sensemakers provides the individual with the ability to explore more of the space of information more rapidly than could be done alone—like an over-the-horizon radar [4]. Figure 1b shows how the theory predicts how cooperation among a set of sensemakers improves the probability of making important (or difficult) discoveries. This means that unseen patterns, connections, inferences that are latent in the raw data may come to light as one increases diverse but cooperative sensemakers [17]. Figure 1c illustrates that the effective size of cooperating groups is a combination of benefits and interference costs to the individual that determine the effective size of a group.[1] People typically join a group only

[1] Figure 1c illustrates a kind of Nash Equilibrium in which individuals join the group so long as adding one more to the group still returns more to the individual joiner than if

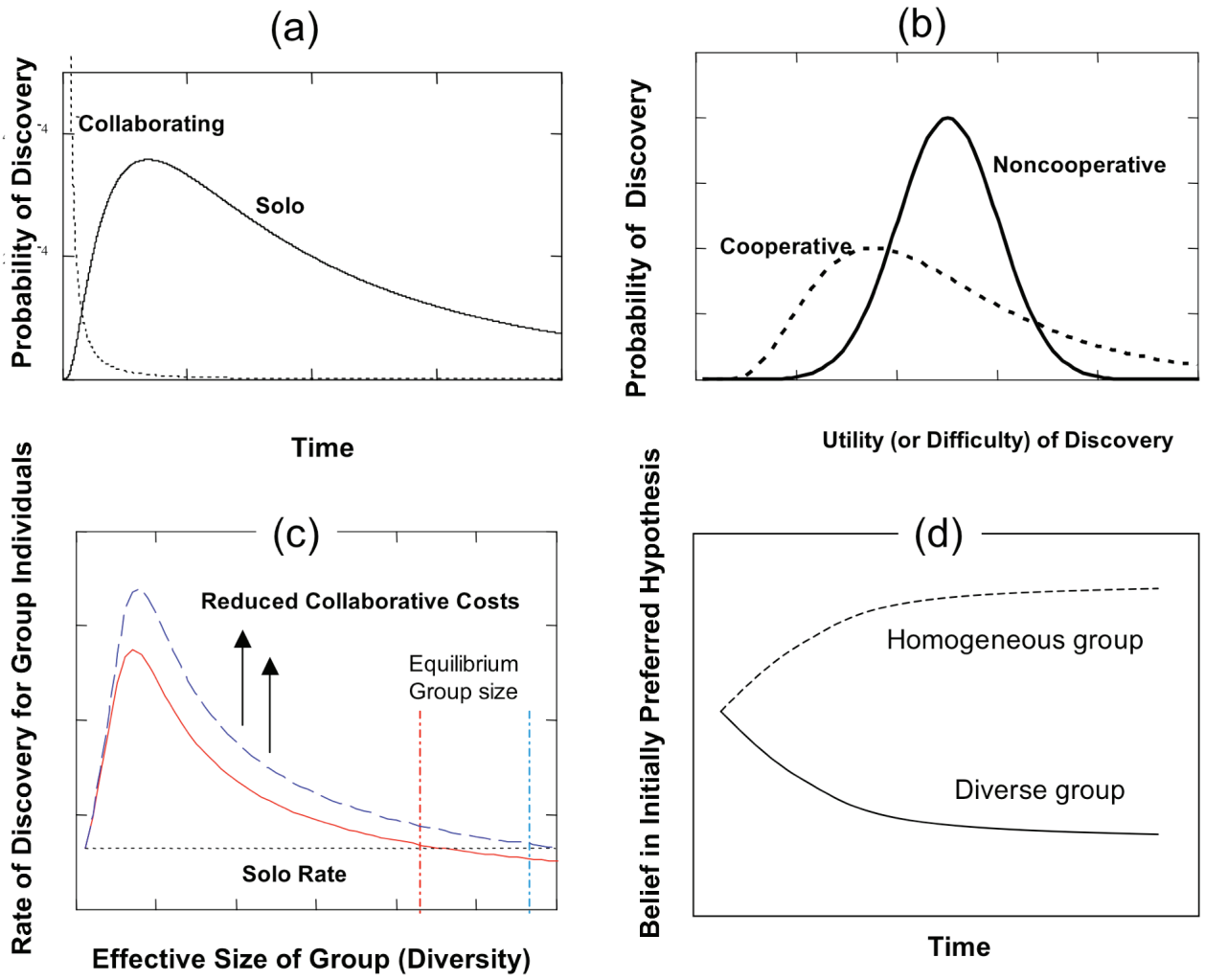


Figure 1. Key predictions of a Basic Social Information Foraging theory.

if the benefits (to the individual) outweigh the costs of cooperation [5]. Figure 1c also illustrates how a reduction in the costs of cooperation is predicted to increase the effective size of the cooperating group. Lowering the costs of participation leads naturally to larger groups of cooperating sensemakers. Figure 1d illustrates the effects of diverse heuristics and biases in a cooperative group on the mitigation of confirmation bias [8, 18]. Diversified groups show greater mitigation of confirmation biases than homogenous groups [2].

**SUMMARY**

In communities of practice that depend on foraging in overly rich information environments, there appears to be pressure to self-organize into a balance of some division of labor, plus some degree of cooperation. This is evident, for instance, in the study of social information foraging among scholars [16]. The division of labor is necessary because of the limits of human attention, but some investment in cooperation can lead to increased returns and less risk of missing something important. The power of cooperation is related to the amount of diversity of the information foragers. Greater diversity leads to greater returns for the group and the individual. This is related to the notion that brokerage (diverse social contacts) provides social capital [3], and there is evidence that brokers in the flow of information are more likely to be sources of innovative discoveries. Although there are benefits to cooperation, those benefits trade against interference effects that ultimately seem to limit the size of groups. In addition, because of the diversity of individuals, and because of the

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that individual worked alone (dotted horizontal line in the figures).

way people associate with like-minded people, information is typically likely to flow to small finite sized groups [19].

A variety of technologies have emerged to exploit or enhance, in some measure, social information foraging. To some extent, the Web, blogs, email, internet groups, collaborative tagging, and other mundane technologies are all aimed at supporting cooperative information sharing and their success implies their effectiveness. Recommender systems exploit social information to make recommendations (documents, movies, music) to individuals. These include collaborative filtering systems [e.g., 7] in which people typically indicate their preference for items in some way (e.g., by rating things such as books), and they receive recommendations based on the preferences of others with similar tastes. Social data mining systems [e.g., 1] examine logs of activities of groups of users and automatically create profiles of group or individual preferences that may be the source of novel recommendations. Both kinds of systems have shown success in enhancing the foraging capabilities of the individual. Given the increased ease with which it is possible to study social networks and information flow in the electronic world, it is likely that there will be more studies of the effects of technologies on social structure and social capital.

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