# Utilities of Gossip across Organizational Levels

## Multilevel Selection, Free-Riders, and Teams

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Gossip is a subject that has been studied by researchers from an array of disciplines with various foci and methods. We measured the content of language use by members of a competitive sports team across 18 months, integrating qualitative ethnographic methods with quantitative sampling and analysis. We hypothesized that the use of gossip will vary significantly depending on whether it is used for self-serving or group-serving purposes. Our results support a model of gossip derived from multilevel selection theory that expects gossip to serve group-beneficial rules when rewards are partitioned at the group level on a scale that permits mutual monitoring. We integrate our case study with earlier studies of gossip conducted by anthropologists, psychologists, and management researchers.

KEY WORDS: Gossip; Multilevel selection theory; Organizational behavior; Organizational levels; Social control

Both the social and individual utilities of gossip have been the subject of study by researchers from a range of disciplines. For example, anthropologists have historically considered gossip as a tool to maintain group interests (e.g., Gluckman 1963; Haviland 1977) whereas psychologists have tended to consider the use of gossip to advance individual interests (e.g., Dunbar 1996; McAndrew and Milenkovic 2002; Nicholson 2001). Management researchers concerned with contemporary business groups are pressured to balance these levels of interest, and they continue

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to question whether gossip enhances or damages an organization's performance (e.g., Evans 2000; Glover 2001; Morris 2001; Prietula 2001).

The wide variation in opinion and action concerning gossip reflects more than traditional, discipline-specific biases of methodological collectivism, which is common to anthropology, and methodological individualism, which is common to psychology. First, the word "gossip" is often used to communicate many alternative meanings. Second, there are few empirical studies of gossip in contemporary organizations (e.g., Noon and Delbridge 1993).

Since empirical studies require operationalized subjects, we define gossip to include positive and negative talk about commonly associated people. We also do not distinguish whether such talk is done covertly or overtly with regards to the gossip's target. Given these conditions, we accept a modified version of Kurland and Pelled's (2000:429) definition of gossip as "informal and evaluative talk in an organization, usually among no more than a few individuals, about another member of that organization" who is or is not present.

In this paper, we will review earlier studies of gossip across organizational levels that have been conducted in a wide array of settings before presenting results of a case study of language use by members of a competitive sports team. Our study benefits from qualitative and quantitative, context-sensitive data. Our results suggest that the degree of common fate shared by a group's members influences the degree to which gossip is used as an instrument of social control.

The model of gossip that we test through our case study is pluralist, multilevel, and evolutionary. Rather than assuming that gossip is a function of either individual—or group-level interests, we recognize that gossip can be "group-serving," "self-serving," or some combination thereof, depending on the context (e.g., Wilson et al. 2000). We agree with Noon and Delbridge's conclusion that "the multiple motivations and functions of gossip take place at both the individual and group level, so analysis should not ignore this" (1993:29).

Given the recognition that gossip can impact multiple levels of organization, and given that the intensity and direction of gossip can change across space and time, we consider it useful to employ the evolutionary framework of multilevel selection theory (Sober and Wilson 1998; Wilson 2002). Evolutionary biologists increasingly apply multilevel selection theory when considering interaction across organizational levels in a range of non-human species (e.g., Goodnight and Stevens 1997; Muir 1996; Swenson, Arendt, and Wilson 2000; Wilson and Kniffin 2003). For human organizations, multilevel selection theory has been successfully employed through a variety of archival analyses (e.g., Boehm 1993, 1996, 1997, 1999; Richerson and Boyd 1999; Wilson 2002), simulation models (e.g., Boyd et al. 2003; Bowles and Gintis 2004; Wilson and Kniffin 1999), and experiments (e.g., Fehr et al. 2002).

Multilevel selection theory recognizes that interests can overlap across levels. For example, group-serving behavior does not need to come at the expense of individual interests. The framework provided by multilevel selection theory avoids the

focus on individual interests common to arguments that "costly signaling" (e.g., Smith 2004) explains cooperation within groups. Multilevel selection theory's pluralism promotes flexibility that recognizes that traits such as selfishness can occur in different contexts at levels including those of genes, individuals, and groups.

## LITERATURE REVIEW

Gossip has traditionally not been the subject of a multilevel evolutionary analysis that hypothesizes different utilities of gossip for individuals and groups. Wilson and colleagues (2000), however, designed and administered hypothetical paper-and-pencil tests of reactions to self-serving and group-serving gossip. In samples of undergraduates in the northeastern United States, they presented subjects with a series of hypothetical vignettes that varied the interests of the fictional gossiper. Wilson et al. (2000) found a consistent pattern of approval for group-serving gossip and disapproval for self-serving gossip. In one set of varied scenarios, respondents found no fault with gossip exposing cheaters on a test, while gossip that derogated fellow classmates (i.e., competitors) drew harsh reactions.

More commonly, gossip has been descriptively reported in ethnographic accounts (e.g., Acheson 1988), explained by evolutionists primarily for its individual benefits (e.g., McAndrew and Milenkovic 2002), or recognized as a topic that is resistant to systematic inquiry (e.g., Noon 2001). Among anthropologists, Gluckman's (1963) view of gossip as a tool of social control has been adopted widely though not uniformly (e.g., Paine 1967). In more contemporary and compartmentalized environments, gossip has been acknowledged for playing a role in the social management of ranching lands (Ellickson 1991), lobster fisheries (Acheson 1988), a garment factory (Hamilton et al. 2003), and airline performance (Knez and Simester 2001). In each of these cases, gossip has been recognized as an important line of defense against violations of group-beneficial norms.

Among ranchers in California, Ellickson (1991) found that members of the rural, relatively small-scale communities populated by cattle managers were mutually governed by informal rules for which negative gossip was a feared penalty. If a rancher allowed his or her cattle to escape onto another rancher's lands, negative gossip about the negligent rancher was an important line of deterrence and defense against such infractions. In the case of the lobster gangs studied by Acheson (1988), negative gossip about outsiders seeking to enter the lobster fishery as competitors helped to regulate against unsustainable exploitation of the natural resource. In both of these cases, negative gossip served as an indicator that cooperation with the gossip's target (e.g., to identify good fishing locations) would be withdrawn or never extended.

In larger industrial settings that are less traditionally studied by anthropologists, Knez and Simester (2001) and Hamilton et al. (2003) found that firms can benefit from the creation of structures that encourage "mutual monitoring," a state where members of a given unit take greater responsibility for the actions of others in their

unit and a prerequisite condition for gossiping (Campbell 1994). In their study of the effects of an incentive scheme that rewarded airport-specific units of ground staff as independent groups, Knez and Simester (2001) found that the introduction of team-based incentives to preexisting units increased performance as measured by the timeliness of airline flights. In a different context, Hamilton and colleagues (2003) found that the creation of work teams and the institution of team-based incentive structures led to an increase in the factory's overall garment production.

In each of the cases described above, studies were conducted within communities of familiars with common goals or rewards in mind. Though group sizes were not consistently reported, it is reasonable to assume that the groups sharing common incentives were small enough to allow for meaningful interpersonal relationships (e.g., Dunbar 1993; Hill and Dunbar 2003). By taking advantage of the "mutual monitoring" that is available to members of relatively small groups, organizations appear to have benefited from "recreating the kinds of social environments in which we work best" (Dunbar 1996:207) across generations of social evolution or more novel, managerial plans.

The field studies described above are also consistent with the results of mathematical models (Enquist and Leimar 1993) and laboratory experiments (e.g., Ostrom et al. 1994). In their model, Enquist and Leimar presuppose that mobility confers opportunities to engage in serial cheating among competitors while finding that "gossiping counteracts free riding by allowing information (that a particular individual is unreliable and should not be interacted with) to spread through a group" (1993:751). As reviewed by Dunbar (1999), Ostrom and colleagues (1994) report laboratory experiments showing that face-to-face communication—particularly when such communication is allowed to include the punishment of defectors—typically increases the probability that strangers will cooperate in public goods dilemmas.

In a relatively rare quantitative study of real-world gossip, Dunbar, Duncan, and Marriott (1997) report the results of systematic eavesdropping on strangers in trains, cafeterias, and bars. Dunbar and colleagues found that "only about 3–4% of conversation time centers around 'malicious' (or negative) gossip in the colloquial sense" (1997:242). Although Dunbar, Duncan, and Marriott employ useful quantitative sampling methods to reach their conclusions, it is important to observe that their samples do not account for the nature of any relationships that might have existed among the conversants. Their samples also do not account for conversations held away from open, public spaces that are ripe for eavesdropping (Emler 2001). This lack of a naturalistic context contrasts with the ethnographic backgrounds provided by Ellickson (1991), Acheson (1988), Knez and Simester (2001), and Hamilton et al. (2003).

More than simply knowing more context for the individuals studied by Ellickson (1991), Acheson (1988), Knez and Simester (2001), and Hamilton et al. (2003) than we do for studies involving listening to strangers, we know that each of their studies involved groups dealing with social or collective problems. In an evolution-

ary context, we know that members of each of these groups shared common fates with one another. We know further that each case entailed a fitness or reward structure that benefited responsible group-level production. In contrast, the people observed by Dunbar et al. (1997), who were unfamiliar to the researchers, do not necessarily share common fates, nor do they necessarily monitor mutual, consequential interests. One can infer from our synthesis of these earlier studies that the likelihood of gossip emerging in a given environment is partly a function of the interdependence of an organization's members and partly a function of the presence of conflict within—or facing—an organization.

## POPULATION STRUCTURE OF ROWING TEAMS

Rowing teams provide an attractive environment for studies of gossip because the performance of a given boat is not simply the sum of its individual rowers. Instead, balance and coordination are necessary "group-level skills" that must exist if the crew has a chance of approaching its full potential. As several of the rowers who were part of the case study commented, if you place a team's best individual rowers in the same boat, it is very possible that you will end up creating a "meathead boat" that lacks the otherwise intangible cooperation found in high-performance teams.

Rowing teams also permit a clear view of the variable levels of selection that can affect different communities. Within the sport of rowing, almost all of the rewards available to participants exist at the level of teams. Newspapers, in fact, struggle with the fact that their traditional "athlete of the week" sections fail to respect the group nature of rowing teams. Editors are forced to change their templates and honor a crew as the "team of the week" or to pick one of several rowers within a boat and invite alienation from rowing fans. The group nature of rowing teams selects for an alignment of individual interests with group-level interests and consequently helps to make any subversion of the group interests more apparently "individual" in nature. The common use of rowing imagery by commercial advertisements reflects this understanding as well.

These same features of rowing teams also make the groups attractive subjects for human evolutionists. Unlike in other sporting teams, the scale and interdependence within crews is more comparable to what is approximated to have been normal within the Environment of Evolutionary Adaptedness (EEA) (e.g., Bowlby 1969; Foley 1995/1996; Tooby and Cosmides 1992). Rowing teams, which are commonly populated by approximately 50 people, arguably require greater coordination than any other group sport. Competitive amateur crews that lack paid administrators, such as the one described in this paper, require additional kinds of coordination to attain basic organizational goals (e.g., fundraising) that are separate from inter-team performance goals.

It is important to add that failure is an option for rowing teams just as it is for other organizations. During our study, for example, we observed one team at a comparable competitive level whose members verged on mutiny and dissolution

through the course of a season because the rowers were (or at least claimed to be) dissatisfied with their coach. Although our case study does not feature a team close to mutiny or dissolution, the existence of such organizations is more than an imagined, hypothetical possibility.

## METHODS

Gossip has been studied through paper-and-pencil tests (e.g., Wilson et al. 2000), computer simulations (e.g., Prietula 2001), and an increasing array of "unobtrusive measures" that include eavesdropping on strangers in public places (e.g., Dunbar et al. 1997) and an Electronically Activated Recorder (EAR) that integrates experience sampling method with novel audio-recording devices (Mehl and Pennebaker 2003). Anthropological reports on gossip have tended to present qualitative data drawn from conversations among familiars. Our methods sought to integrate the quantitative sampling that is characteristic of research conducted by psychologists with the context richness characteristic of anthropology.

Our case study is based on qualitative and quantitative observations of a university rowing team drawn over an 18-month period when the first author was a member of the team. After choosing to study a rowing team for our study, we gained permission from a competitive team's head coach and captain as well as the relevant Institutional Research Board. We sought this approval before starting our research just as a more traditional ethnographer would seek initial approval from a village's leaders. Members of the team subsequently provided informed consent that their activities would be the subject of observation and study.

## HYPOTHESES

In order to test a multilevel selectionist model of gossip, we should imagine how gossip would appear if it were primarily self-serving or group-serving (Sober and Wilson 1998):

If gossip were used by members of the crew for self-serving purposes, we would expect negative and positive personal talk to occur irrespective of group benefits and costs. In such a scenario, we would expect the use of gossip by random members of a team seeking relative status gains over other random team members. We would also expect such patterns to exist unconditionally across time and context.

If gossip were used by members of the crew for group-serving purposes, we would expect negative and positive personal talk to be non-randomly directed in ways that support group-beneficial rules. We would expect the derision of violations against group-beneficial norms and the affirmation of behavior that serves the group admirably. We would also expect that patterns of gossip would change according to the presence or absence of conflict in the organization.

## QUALITATIVE OBSERVATIONS DRAWN FROM CASE STUDY

The university rowing team that permitted our study was a tightly knit "club" organization that competed with crews from other colleges and universities across the northeastern United States. The team's management was shared by a dedicated, unpaid coach and members of the team who were elected to serve in administrative capacities (e.g., president, treasurer, and secretary). Members of the team worked closely with their elected officers and coach to raise funds, clean their facilities, and, of course, train and compete against other crews. In addition to the time and energy that members contributed to these activities, they also paid a fee each semester for the purchase of uniforms and other necessary supplies. Consistent with their fee structure, the crew experienced variable degrees of turnover, incorporating new members and losing former members each semester.

In exchange for all of these costs, the rowers and coach are enticed neither by salaries nor by the promise of individual rowing rewards. Instead, the individual incentives to participate include opportunities for physical, psychological, and social development. Many members proudly told us how their active participation in the team resulted in very significant improvements in their body image and their physical health. Most members clearly drew on the group for the benefit of psychologically and socially rewarding connections. One practical example is that almost all team members routinely ate breakfast together each morning in campus cafeterias after returning from early morning (dawn) practices. In addition, senior members of the team regularly took turns hosting team parties on Friday or Saturday nights.

During the three semesters of our case study, most members of the crew appeared to be either happily and deeply committed to the team or they withdrew. In one case, though, a member of the men's novice squad attempted to remain on the crew for a semester without "pulling his weight." This member, identified here as "the slacker," had decided to skip almost all of the daily and rigorous off-season practices that are held indoors and away from water. And even when that semester's racing season began, the slacker still did not contribute as much as other members of his squad. In effect, he was free-riding on the efforts of his rowing-mates since each member of the boat was guaranteed by the design of the sport to be rewarded and punished in competition as a whole.

The slacker's most egregious offense occurred during one of the weeks when practices were being organized two times each day. While this rigorous schedule was accepted by all other members as a necessary sacrifice, the slacker informed his rowing mates one morning that he would not come to the afternoon session because "he was tired." Since the fatigue of twice-a-day practices was shared commonly within the team, the slacker's excuse was treated as an insult by his mates. The slacker was routinely the butt of jokes and the target of verbal sticks and stones, but on this day he was also the subject of personal threats (because rowing teams

need to be fully intact to practice since coordination and balance are so integral to boat-level performance).

As we reported elsewhere (Kniffin and Wilson 2004), the slacker's behavior also impacted the way in which fellow team members viewed his physical attractiveness. When we compared ratings of the slacker's physical attractiveness offered by strangers and by fellow crew members, we found that strangers rated him as relatively attractive whereas familiars rated him as relatively unattractive. Although Merry (1984) has argued that gossip needs to be consequential to function as a deterrent to anti-social behavior, these results point to important fitness-related effects that accompany negative gossip. Assuming a correlation between perceived physical attractiveness and potential reproductive fitness, the slacker's inferior contributions to the team's operations reduced his potential reproductive fitness among familiars within the crew. In the broader social environment replete with strangers, the slacker's relationship to his team had no impact; however, our finding would presumably have been more important in the EEA when mutually exclusive social groups were not so abundant and accessible.

As one might expect, the slacker did not remain very long with the team; instead, he left after the first semester of our study (i.e., his second semester of participation). Gossip as a social control has two likely end-points: reforming an individual's behavior or rejecting the person's behavior. In this case, gossipers intended reformation as the near-term goal, at least, but their actions ultimately contributed to rejection of uncooperative behavior.

We can refer to the aforementioned slacker in the singular because there were no comparable slackers during the other two periods of study. The presence and absence of a slacker within the crew correlated with a change in the way that rowers interacted with each other. Our experiences suggested, for example, that gossip was an activity that emerged during periods when there was a slacker within the organization. Rather than rely on anecdotal narratives, however, we tested our hypotheses quantitatively and systematically.

## QUANTITATIVE OBSERVATIONS DRAWN FROM CASE STUDY

In order to quantify the uses of language within the crew, we collected conversation data that are otherwise accessible only to "insiders." We organized the conversation data temporally according to the three semesters of study since membership changes with each academic term, and since both the fall and spring semesters include competitive racing periods.

Conversation was typically recorded only for members of the novice male squad—a subgroup within the team—because it included one of us as a member. Following Dunbar et al. (1997) with minor modifications, conversation was classified according to the categories shown in Table 1 for (1) the opening remarks of a discussion and (2) each 30-second interval completed in a discussion-thread. Given the short interval length and relatively long duration of conversation topics, this method comes

*Table 1.* Description of Different Use-Functions of Conversation among Crew Members

| | |
|---|---|
| General Crew | Includes talk about boats, boat maintenance, upcoming races, and logistics for practices. |
| Non-Crew Discussion | Includes talk about cars, money/bills, traffic, food, health, weather, "the news," "politics," television, and radio. |
| Personal | Includes general talk about one's own past experiences, jobs, etc. Also includes "neutral" talk about others. |
| Positive Personal Talk | Includes positive comments made about other crew members. |
| Negative Personal Talk | Includes negative comments made about other crew members. |

much closer to being identified as "predominant activity sampling" rather than the "time sampling" technique criticized by Mann et al. (1991).

Our categories include three sets that do not entail evaluative comments about other members of the organization and two sets that do qualify as "gossip" but are distinguished according to whether the gossip is flattering or derogatory. Most examples of Negative Personal Talk target "the slacker" such as "I don't understand how he accomplishes anything in life," "He just doesn't have the crew mentality," and "I'm gonna kill him." Examples of Positive Personal Talk generally praise exemplars of the "crew mentality" who appear to place the interests of the team ahead of their own. Respectively, these kinds of gossip are symbolic avenues for punishment and reward within the organization.

Data for the first semester of the project were reconstructed into this categorization from extensive field notes whereas data recorded during the other two semesters were categorized directly. Conversation was usually recorded during car rides between the university campus and the boathouse that was used during practices. Car rides were considered the ideal place for data collection because they provided a convenient, structured, and regularly reliable reason for groups to remain stable and relatively relaxed for 15–20 minutes at a time, depending on traffic.

Typical car rides included three or four crew members in addition to one of us (KMK). To minimize artificial biases stemming from the researcher's presence, participation in the conversations was avoided by following the general rule to "speak only when spoken to." Further, because the role of researcher was clearly stated, team members did not expect KMK to share personal opinions; instead, it was expected that the researcher was someone who asked questions and otherwise observed.

## RESULTS

Table 2 presents the number of sampling sessions and the aggregate measure of time devoted to each category of conversation for the three semesters. Negative Personal Talk occurred infrequently during the second and third semesters but was the most common category of conversation during the first semester, when "the

*Table 2.* Types and Absolute Frequency of Conversation Topics over Three-Semester Period, for University Rowing Team Members ($N$ = number of conversations). Across semesters, the proportion of conversation devoted to both Negative and Positive Personal Talk was greater when a slacker was present (Mann-Whitney U = 24, $p < 0.05$ for negative talk; U = 63, $p < 0.05$ for positive talk).

| | *Semester 1* | *Semester 2* | *Semester 3* |
|---|---|---|---|
| General Crew | 63 | 34 | 34 |
| Non-Crew Talk | 42 | 104 | 20 |
| Personal Talk | 36 | 133 | 5 |
| Negative Personal Talk | 102 | 2 | 9 |
| Positive Personal Talk | 24 | 0 | 0 |
| | ($N$ = 10) | ($N$ = 12) | ($N$ = 6) |

slacker" was present. The majority of negative talk was directed at this one individual whether he was absent or present.

Perhaps more surprisingly, *positive talk* about others occurred exclusively during the first semester and was directed at several of the hardest-working members of the team, not just a single member. This second finding contrasts with Alexander's (1997:4) observation that formal laws, at least, do not reward people for law-abiding behavior. This finding is worth emphasis because it is difficult to imagine positive talk about teammates to be "self-serving."

Statistical analysis of these data are complicated by the fact that adjacent sampling units (30-second intervals) are not necessarily independent events. For example, 24 units devoted to positive talk on a single day could reflect a single 12-minute conversation that would be better regarded as one data point rather than as 24 data points. A more conservative approach is to treat each sampling session as an independent event and to compare the ten sampling sessions during the first semester when the slacker was present to the eighteen sampling sessions when slackers were absent. By this criterion, the proportion of conversation devoted to both negative and positive talk about others was greater when a slacker was present (Mann-Whitney U = 24, $p < 0.05$ for negative talk; U = 63, $p < 0.05$ for positive talk). Statistical significance is not surprising, given the magnitude of the differences shown in Table 2. These data also confirm our general impression that criticism of the slacker and praise of the hardest-working members of the team were long-running themes that lasted the entire semester, including many instances outside of car rides that were less amenable to quantitative sampling.

Our results are consistent with the conditions we hypothesized to exist in organizations where gossip primarily serves the group. Our results show that (1) negative and positive personal talk was non-randomly directed in ways that supported group-beneficial rules; (2) violations against group-beneficial norms were derided and behavior that served the group admirably was affirmed; and (3) patterns of gossip

changed as a function of whether or not conflict (e.g., the slacker) existed in the organization.

## DISCUSSION

Gossip has simultaneously been characterized as a tool of abuse in the context of contemporary workplaces (Davenport, Schwartz, and Elliott 1999) and as a "weapon of the weak" in the context of peasants attempting to resist control by elites (Scott 1985). Sports teams such as the one we studied are sufficiently egalitarian that it is difficult to view gossip as a tool of either the powerful or the weak. This environment helped us avoid some of the difficulties of studying gossip (e.g., Noon 2001) in addition to providing us with an example where individual and group interests can clearly diverge and overlap.

While our study is a single case, it does suggest that gossip can be used within groups to enforce norms, both negatively and positively, and that participant-observation research is needed, in some cases at least, to observe these events. The natural- or quasi-experiment afforded us by the presence and absence of the slacker provided a variable that lets us see night-and-day differences in conversation topics. With this one study, we cannot be certain that it was the presence or absence of a slacker that was responsible for the changes, but the effect appears sufficiently strong to merit further studies exploring this variable's importance. Future studies might also consider the extent to which males and females might respond differently to slackers (e.g., Wilson and O'Gorman 2003) in comparably naturalistic settings.

The multilevel questions considered by our study suggest that gossip is a tool that is available and functional for groups sharing common fates. Since we assume that groups of humans regularly shared important fates in the EEA, the very modern example of a competitive rowing team gives us a window into the dynamics that we expect to have prevailed across evolutionary time. Just as earlier researchers (e.g., Hamilton et al. 2003) have found that "mutual monitoring" of small-scale work teams can enhance an organization's performance, our study showed that gossip was important to the maintenance, or survival, of the crew. More ambitious and expensive research would consider the questions asked by our study for a series of teams competing in the same league, thereby allowing tests for any relationships between their social organizations and relative team performance, or fitness.

While our case study does not consider teams or organizations outside of crew, we can speculate that gossip within organizations that are part of close-knit leagues or meta-organizations will have a broader scope and at least one more level of organization. Members of the crew described in our case study spent little time talking about members of other teams in part because the crew was not part of a league that competed frequently. We further expect that there would be more talk across team boundaries in sports—or other enterprises—where there is more direct, physical interaction across teams (e.g., defending, tackling, or targeting).

Finally, we expect that the different reward structures for team enterprises such as baseball, football, or basketball also increase the pressure to engage in self-serving gossip since rewards—and punishments—tend to be tied more closely to individual performance than is the case with crews. Our case study provides useful empirical grounding for studies involving these structural, across-activity differences.

The multilevel selectionist perspective tested by our study contributes to research concerning gossip as well as organizational planning managed by business leaders. The model of gossip supported through this study suggests that when rewards are partitioned at the group level on a scale that permits mutual monitoring, individuals will use gossip as a tool to defend and affirm group-beneficial norms. Although contemporary industrial organizations are more explicitly and intentionally managed than groups prevalent in the EEA, our paper suggests practical benefits to be gained from evolutionary studies of behavior.

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