

Personality and Social Psychology Review

<http://psr.sagepub.com/>

Evil Acts and Malicious Gossip: A Multiagent Model of the Effects of Gossip in Socially Distributed Person Perception

Eliot R. Smith

Pers Soc Psychol Rev 2014 18: 311 originally published online 12 April 2014

DOI: 10.1177/1088868314530515

The online version of this article can be found at:

<http://psr.sagepub.com/content/18/4/311>

Published by:



<http://www.sagepublications.com>

On behalf of:



<http://www.spsociety.org>
Society for Personality and Social Psychology

Additional services and information for *Personality and Social Psychology Review* can be found at:

Email Alerts: <http://psr.sagepub.com/cgi/alerts>

Subscriptions: <http://psr.sagepub.com/subscriptions>

Reprints: <http://www.sagepub.com/journalsReprints.nav>

Permissions: <http://www.sagepub.com/journalsPermissions.nav>

>> [Version of Record](#) - Oct 10, 2014

[OnlineFirst Version of Record](#) - Apr 12, 2014

[What is This?](#)

Evil Acts and Malicious Gossip: A Multiagent Model of the Effects of Gossip in Socially Distributed Person Perception

Personality and Social Psychology Review
2014, Vol. 18(4) 311–325
© 2014 by the Society for Personality
and Social Psychology, Inc.
Reprints and permissions:
sagepub.com/journalsPermissions.nav
DOI: 10.1177/1088868314530515
pspr.sagepub.com


Eliot R. Smith¹

Abstract

Although person perception is central to virtually all human social behavior, it is ordinarily studied in isolated individual perceivers. Conceptualizing it as a socially distributed process opens up a variety of novel issues, which have been addressed in scattered literatures mostly outside of social psychology. This article examines some of these issues using a series of multiagent models. Perceivers can use gossip (information from others about social targets) to improve their ability to detect targets who perform rare negative behaviors. The model suggests that they can simultaneously protect themselves against being influenced by malicious gossip intended to defame specific targets. They can balance these potentially conflicting goals by using specific strategies including disregarding gossip that differs from a personally obtained impression. Multiagent modeling demonstrates the outcomes produced by different combinations of assumptions about gossip, and suggests directions for further research and theoretical development.

Keywords

person perception, communication, gossip, multiagent modeling

The process of person perception is central to virtually all human social behaviors. Our impressions of others influence whether we will cooperate with them, fall in love with them, aggress against them, seek their advice, or trust persuasive messages from them. As a result, person perception has been a major focus of research within social psychology (Carlston & Schneid, in press; Gilbert, 1998). Most such research has had a conceptual focus on cognitive and affective processes within the individual perceiver, and has advanced this focus by applying methodologies drawn from the cognitive psychological laboratory tradition. Thus, participants are usually isolated and given carefully controlled stimulus materials, on the basis of which they make judgments and decisions, often with response times being measured.

Despite the evident successes of this research approach, it omits an important aspect of person perception: In everyday life, person perception is ordinarily performed not by isolated individuals but as a form of *socially distributed* cognition (Smith & Collins, 2009). Perceivers share their impressions with others and draw on information provided by others, as well as directly observing and interacting with social targets. The result is not simply an impression represented in one perceiver's mind, but an impression that is socially shared and consensual (to a greater or lesser extent) and is often explicitly communicated. In short, people gossip.

This article first reviews prior theoretical discussion of gossip, including its definition, functions, and relevant social-psychological processes. Fuller reviews appear in Foster's (2004) and Smith and Collins' (2009) works and there is no intention to reiterate them here, but simply to give an overview. The article then focuses on the possibility of false gossip, which has been considered in the literature mostly in areas far distant from social psychology (especially theoretical biology). Finally, the article presents a multiagent model examining the extent to which gossip can serve the oft-emphasized function of alerting group members to norm violators, while not allowing them to be influenced by false or malicious gossip.

Gossip: Theoretical Background

Definition

In the research literature, gossip is generally defined as informal talk about absent third parties (Foster, 2004).¹ The

¹Indiana University, Bloomington, USA

Corresponding Author:

Eliot R. Smith, Department of Psychological and Brain Sciences, Indiana University, 1101 E. Tenth St., Bloomington, IN 47405, USA.
Email: esmith4@indiana.edu.

qualification “informal” is intended to exclude formal communications such as letters of reference (although like ordinary gossip, those let the communicator’s impression of the target influence the recipient’s). Although gossip has a negative connotation in most people’s mind, virtually all explicit definitions include positive as well as negative information (e.g., Baumeister, Zhang, & Vohs, 2004; Ellwardt, Labianca, & Wittek, 2012; Foster, 2004; Giardini, 2012). As De Sousa (1994) observed,

If gossip is defined as malicious and harmful talk about the private lives of others, . . . then to discuss its moral worth is superfluous. . . . Clearly, the methodologically superior approach is that which does not prejudge questions of value at the stage of initial definition of the subject matter. (p. 26)

A close parallel is the term *stereotype*, which also has a negative connotation to the lay person but has invariably been defined in research usage to include positive as well as negative beliefs about a social group’s characteristics (making the relative balance of positive and negative valence an empirical question).

Perspectives on Gossip

Gossip has been studied from many disciplinary and conceptual perspectives. Sociologists have frequently examined questions about the structure of the social network through which gossip flows, what types of individuals (e.g., high- vs. low-status people) are frequent participants in or targets of gossip, and the role of gossip in organizational functioning (e.g., Burt, 2005; Eder & Enke, 1991; Ellwardt et al., 2012; Kniffin & Wilson, 2005; Wittek & Wielers, 1998).

Sociological and social-psychological perspectives typically emphasize gossip’s role in norm enforcement or social control. Gossip can spread information about norm violators that allows other group members to avoid or sanction them, thereby increasing the costs and diminishing the likelihood of such violations. Evidence is clear (Beersma & Van Kleef, 2011; Piazza & Bering, 2008) that recognizing that others may gossip about them does have a deterrent effect, for example, increasing people’s contribution to a group effort (i.e., decreasing free riding, a violation of a group norm to contribute). Other functions of gossip are also widely recognized. In spreading information about norm violations, gossip also serves to teach members the content of norms (Baumeister et al., 2004). Gossip allows individuals to better understand themselves by comparing themselves with others (Wert & Salovey, 2004). Gossip has also been shown to promote bonding among individuals who share gossip, which may prepare them for coordinated action with regard to the gossip target and also increases overall cohesion in the group (Dunbar, 2004; Foster, 2004; Peters & Kashima, 2007). In addition, gossip has been seen as a vehicle for the exercise of power, increasing the gossipers’ status perhaps

by transmitting positive information about friends and negative information about enemies (Farley, 2011; McAndrew, Bell, & Garcia, 2007). Finally, gossip serves functions of sheer relaxation and entertainment (De Sousa, 1994). All of these important functions help explain why gossip is so frequent, estimated at up to 70% of all talk (Foster, 2004).

Gossip has also been addressed from perspectives more distant from the social and behavioral sciences, including evolutionary biology, especially with regard to its role in the evolution of cooperation (Nowak, 2006). Typically, agents are assumed to interact in pairs over time, and each interaction partner can choose to benefit the other (cooperate) at a cost to itself. The benefit is assumed to be greater than the cost, so if both cooperate, both are better off than if neither cooperates. It is well established that reciprocal cooperation (I’ll cooperate with you if you cooperate with me) is one way for cooperation to evolve and become established in a population of self-interested organisms (Axelrod & Hamilton, 1981). But as populations become larger, one-shot interactions among strangers are more prevalent than repeated interactions with neighbors or known others, so reciprocity alone is insufficient. Indirect reciprocity is a solution to this issue: I’ll cooperate with you if you cooperate with others (Nowak & Sigmund, 2005). My knowledge about your general cooperation is based on your reputation, spread through gossip. Mathematical analyses and multiagent simulations establish that this process can indeed lead to generalized cooperation in a population, with agents cooperating not on the basis of reciprocity with this specific interaction partner, but because a cooperative reputation will cause them to be rewarded by other agents (Giardini & Conte, 2012; Savarimuthu, Purvis, Purvis, & Savarimuthu, 2013; Takahashi, 2000). Viewed in a different light, this is another way of saying that gossip is useful for identifying norm violators so that others can withhold cooperation from them. In this case, the norm is a very specific one saying “cooperate with other cooperators.”

Possibility of False Gossip

As noted earlier, status or power enhancement is one of the potential functions of gossip (McAndrew et al., 2007). Yet the possibility of false, manipulated gossip has rarely been considered (e.g., it is hardly mentioned in Foster’s influential 2004 review). Giardini (2012) makes the important point that a gossipier who falsely reports direct knowledge of a target’s norm-violating behavior may be exposed to punishment (either by the gossip recipient or by the target) if they learn of its falsity. But gossipers may attribute the information to other sources (“I hear that . . .” or “They say . . .”) to avoid such punishment. Giardini argues that the possibility of escaping responsibility in this way is essential for gossip to exist at all, and to serve its functions (see also Giardini & Conte, 2012).

How can recipients avoid being misled by false gossip? Scattered studies have addressed this issue. Hess and Hagen

(2006) assumed that gossip can be intentionally manipulated, and used scenario studies to examine the conditions under which people may discount its truth value (e.g., when they receive the same message from only one source versus multiple independent sources). Sommerfeld, Krambeck, and Milinski (2008) had participants play a series of cooperation games with different partners, and receive gossip about the partners' levels of cooperativeness. Like Hess and Hagen, they also proposed that effects of false gossip can be mitigated when perceivers receive gossip from multiple sources.

However, most detailed analyses of ways to deal with false gossip come from well outside social psychology, from theoretical biology or computer science perspectives. Savarimuthu et al. (2013) advance a technical model of how a population of artificial agents (software programs) can establish cooperation and exclude free riders. Drawing on work on the evolution of cooperation (e.g., Nowak & Sigmund, 2005, as reviewed earlier), they make gossip (i.e., inter-agent communication about other agents' levels of cooperation) a key part of their system. In contrast to previous work on the topic, they consider the potential impact of false gossip and show that their proposed system is robust when only a small proportion of gossip is assumed to be false, but breaks down as the proportion approaches 50%. Laidre, Lamb, Shultz, and Olsen (2013) show that agents connected in a network through which information flows can use a specific decision rule that involves comparing multiple messages, to attempt to correct false information. However, they assume that messages are corrupted by random noise, rather than by agents who intentionally send false information.

In summary, from most perspectives including sociology, psychology, and evolutionary biology, the primary focus is on the positive functions of gossip, especially the detection of norm violators or free riders (e.g., non-cooperators). Little work has addressed the possibility of false and manipulated gossip, although the strategic use of gossip to increase power is sometimes mentioned as a function. When manipulated gossip is considered, proposed solutions usually involve trusting gossip only when it is received from multiple sources (e.g., Hess & Hagen, 2006; Laidre et al., 2013; Sommerfeld et al., 2008).

Social-Psychological Considerations

Utility of Gossip

As would be expected from the functional benefits discussed earlier, people do frequently engage in gossip (Foster, 2004). Most obviously, information from others may reveal insights into targets that would be difficult or impossible for the perceiver himself or herself to obtain, such as knowledge about rare negative behaviors. For example, learning from others that a target occasionally flies into an aggressive rage allows the individual to avoid this target, at considerably less risk

and cost compared with experiencing such behaviors firsthand. In effect, a social network is a distributed surveillance system, monitoring the behavior of members of the network more effectively than a perceiver could alone (Craik, 2008). Indeed, people have been shown to rely on gossip in preference to target's direct self-reports, in a context where a positive self-report might be exaggerated (Stiff & Van Vugt, 2008). Other studies likewise show that gossip about targets' behaviors can be even more influential than direct observations of that behavior (Sommerfeld, Krambeck, Semmann, & Milinski, 2007). People evidently recognize the group-serving and norm-defense functions of gossip, passing gossip along to benefit others even when there is no possibility of reciprocal or other benefit to the self (Feinberg, Willer, Stellar, & Keltner, 2012).

Potential Unreliability of Gossip

Despite its usefulness, gossip has weaknesses as well. Most obviously, information from others may be less reliable than information observed firsthand. There are several reasons for this. First, targets may actually treat different individuals differently. If a target is pleasant with most people but harbors a strong dislike for a specific individual, gossip from others will be questionably useful in allowing the individual to predict the target's behavior. Second, different perceivers apply different biases, stereotypes, and schemas in the process of person perception (e.g., Mohr & Kenny, 2006). As a result, even if the target behaves consistently, Perceiver A's impression (communicated through gossip) may differ from Perceiver B's impression, rendering it less useful to B. Third, biases may enter into the communication process itself, as when information communicated from person to person becomes more stereotypic (Lyons & Kashima, 2003). And communicated information about a target's behavior may leave out important situational information, producing more extreme impressions (Gilovich, 1987). None of these types of biases involve intentional distortion.

Of course, gossip can also be intentionally biased, as when people praise their allies and bad-mouth their enemies. McAndrew et al. (2007) found just such patterns in a study of college students, who were especially likely to pass on negative information about their romantic rivals, or positive items about friends or romantic partners. Motives behind such biased gossip obviously include the desire to increase one's own status or power within a group (see Farley, 2011), as discussed earlier.

Avoiding Influence From False Gossip

How can people avoid being influenced either by unintentionally biased or intentionally manipulated gossip? One approach is to identify individuals who transmit false gossip and tag them as unreliable, avoiding incorporating their reports into one's own impressions of targets. However, I

propose that such strategies based on the source of the gossip are likely to be ineffective, compared with strategies based on the content of the information. There are several reasons for this. First, the communicator might lie about the source of the gossip (e.g., saying “I hear that . . .”). Giardini (2012) argued that communicators frequently do this to avoid responsibility for making false statements, or because they do not wish to reveal the actual source (e.g., if they learned the information in a discreditable manner such as through eavesdropping). Second, communicators might simply have forgotten the source of a specific item of information. Third, even if communicators know who they learned an item from, they generally will not know who conveyed it to whom before that point—and corruption or manipulation could have taken place at any of those exchanges. Someone who tells you false gossip may have heard it in exactly that form from others, and in such a case the communicator should not be blamed, punished, or have future communications viewed with suspicion. Fourth, also because the full path of gossip information from its originator to one’s own ear is generally unknown, even hearing the same gossip from two or more distinct communicators does not establish its validity, as some have suggested (e.g., Hess & Hagen, 2006; Sommerfeld et al., 2008). This is because the multiple communicators could have obtained the information from a common source.

All these considerations mean that people are unlikely to be able to reliably tag specific communicators as purveyors of false gossip. This forces them to rely on the content rather than the source of the information. The essence of a content-based strategy involves disregarding gossip that is significantly discrepant from the recipient’s existing knowledge. This idea has a long history, of course, dating back at least to Sherif and Hovland’s (1961) proposal that information falling into a “latitude of rejection”—overly discrepant from one’s own belief or attitude—would not be accepted. With regard to gossip specifically, there is evidence that people do this. Sommerfeld et al. (2008) found that when people receive three consistently negative gossip statements about a target, they did not expect the target to be that negative: “They might have told themselves ‘he/she can’t be that bad’” (p. 2534), in other words disregarding gossip whose content violated their expectations—even though the three sources agreed. Conversely, some research suggests that people give extra attention and weight to information communicated from others when it agrees with directly observed information. Collins, Percy, Smith, and Kruschke (2011) found this pattern and suggested that people are especially influenced when they perceive agreement between socially transmitted and directly observed information, although their studies are not in a gossip context.

A different content-based strategy for assessing the reliability of gossip is to compare two or more gossip messages and trust them if they agree rather than disagree. Obviously this is easier if the messages are received simultaneously so that they can be compared side by side (as assumed by

Sommerfeld et al., 2008). In the more realistic case where messages are received over a period of time and perceivers update their impression of the target as each message is received, this strategy will yield similar results to the strategy of disregarding discrepant messages. This is because when a message that differs from others is received, the impression will likely already reflect the impact of other, earlier arriving messages, and the differing message can be disregarded.

In summary, social-psychological processes sometimes create false or biased gossip, whether through unintentional distortions of interpretation, memory, or communication, or through intentional manipulation. I have argued that strategies based on identifying the source of an item of gossip are unlikely to be useful for avoiding influence by false gossip, because source information can be falsified (Giardini, 2012) and because the complete path of information across many links in the social network is difficult to determine. Instead, perceivers are more likely to use a content-based strategy, ignoring information that is too discrepant from their own current beliefs or from other contemporaneously available information. Can such a strategy succeed, both allowing a perceiver to make use of gossip for its valuable functions while avoiding being influenced by false gossip?

Goals of This Article

This article explores this dilemma and possible perceiver responses to it, using multiagent modeling (Smith & Conrey, 2007). Multiagent modeling offers a way to understand the results that emerge when multiple processes operate interdependently and simultaneously, as many autonomous agents (such as person perceivers and targets) interact over time. The outcomes of such interactions may be much less predictable than when a small number of processes operate within a single agent. As laid out by Smith and Conrey (2007), a multiagent model is a set of simulated agents representing people who follow specific behavioral rules (such as dyadic interactions and cognitive processes of impression formation and updating). The model is run on the computer, to generate predictions about the patterns of impressions that result, and to examine effects of varying the basic rules. The overall goal is to conduct rigorous, reproducible thought experiments (Railsback & Grimm, 2012) mapping out the consequences of different assumptions.

Smith and Collins (2009), in the most direct forerunner to the current article, built a multiagent model that incorporated three general processes. Perceivers interacted with targets, updating their impressions (representing simply valence) based on their behavioral observations of targets. Perceivers could also actively decide whether or not to interact with specific targets, based on the positive or negative valence of their current impressions. Finally, perceivers exchanged their impressions as gossip, and used others’ impressions to update their own. While the model may appear overly simple,

modelers generally hold that seeking to incorporate all the complexity of real-world behavior risks making the reasons for a model's behavior opaque, undermining the objective of understanding the phenomena (see Smith & Conrey, 2007, for an elaboration). Limiting the model to a small number of basic processes is essential to generate insights.

In this article, this model is adapted to incorporate three factors relevant to the gossiper's dilemma described above. First, I examine what happens when a small number of social targets are evil, displaying rare but extremely negative behaviors. This is a situation in which we might expect gossip to be functional by helping perceivers identify them (see Feinberg et al., 2012). Second, I examine the situation where some gossip is malicious, intended to defame specific targets, to see whether perceivers can avoid being misled. Although the functionality of gossip is often discussed in the literature, as noted above, this side of the coin has rarely been examined. Third, in both of these situations, the model is used to assess the effects of various perceiver strategies, including whether to use gossip at all, whether to solicit gossip about specific targets or to allow communicators to talk about a target about whom they have an especially negative impression, and whether to intentionally disregard gossip that appears to be inaccurate. The hypotheses are the following:

Hypothesis 1: Incorporating gossip into their impressions will allow agents to be more successful in identifying evil targets.

Hypothesis 2: Receiving gossip about communicators' especially negative impressions will be more adaptive than asking communicators to report their impressions of specific targets (who might not be particularly negative).

Hypothesis 3: The content-based strategy of disregarding gossip that differs too much from a perceiver's current impression should allow avoiding influence from maliciously manipulated gossip.

To make the issues addressed in the model concrete, imagine that you are one of a number of newly hired employees in an organization. As you seek to learn the ropes, you may approach a number of more senior employees for information and advice. Each time you interact with one of them, their interpersonal behavior may be friendly or cold, and their advice may be more or less useful; you will naturally form and update evaluative impressions of these individuals. Imagine that a few of these individuals, although generally offering useful advice, on occasion fly into a rage, berating you as an ignoramus for asking stupid questions, thoroughly shredding your self-esteem. Naturally you would like to know who is prone to such negative behavior, ideally without having to experience it yourself, so that you can avoid being assigned to future projects with them. Thus, you may ask your fellow newbies for their impressions of the old hands, hoping to benefit from their hard-earned experiences.

In so doing, though, you may obtain information that has been distorted or manipulated. For example, one of your fellows may ascribe negative behaviors to a perfectly innocent senior employee, motivated by a past misunderstanding or personality conflict. How can you obtain the benefits of valuable information derived from gossip, while avoiding being manipulated by false reports?

Overview of the Model

The multiagent model is a modification of the model described in Smith and Collins' (2009) work. Its assumptions will be described under several headings and are summarized using the standardized Overview, Design concepts, and Details (ODD) protocol (Railsback & Grimm, 2012; see the appendix). Fundamentally, it involves 20 targets (an arbitrary number) who exhibit various behaviors, and 20 observers who form impressions of the targets based on those behaviors. (These could be assumed to be the same individuals as in Smith and Collins, with each observer also a target, but for simplicity we treat them here as two separate sets of people.) An impression in this model is a single number, representing valence. Zero is neutral, negative values indicate dislike, and positive values indicate liking.

Assumptions About the Basic Person Perception Process

The core of the model involves assumptions borrowed by Smith and Collins from Denrell (2005), who presents empirical evidence supporting these specific assumptions and parameter values. Observers and targets interact in dyads on multiple trials. On each trial, the target produces a behavior with a valence drawn from a normal distribution with a fixed mean (+0.5 for "normal" targets but a different value for the evil targets described below), and a standard deviation of 1.0. The slightly positive mean value is intended to represent the common assumption that positive (kind, moral) acts are more frequent than negative (cruel, immoral) ones. The observer averages the new behavioral observation with the observer's existing impression, using an equally weighted average, $\text{new impression} = (\text{old impression} + \text{new observation}) / 2.0$. This may seem to be overly recency weighted, but Denrell (2005) shows that it is the best fit to empirical data on impression formation with sequential observations. Although negativity biases have frequently been documented in social judgments (Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001), this model's integration rule does not weight negative information more heavily than positive. This is mainly because of Denrell's evidence supporting this simple, unbiased integration rule, but it also reflects another consideration to be discussed below.

Denrell (2005) as well as Smith and Collins (2009) further assume that observers may use their current impression to decide whether to interact with a target on a future

occasion. Interaction is less likely the more negative the impression is, with interaction likelihood following a Luce choice function, $p = \exp(3 \times \text{impression}) / (1 + \exp(3 \times \text{impression}))$. With the parameters Denrell uses, the probability of interaction for an impression of -1.0 is .047, for -0.5 it is .18, and for 0.0 (neutral impression) it is .50. The function is symmetric, so the probability of interaction for a positive impression of $+0.5$ is .82 and for $+1.0$, it is .953. Although Denrell uses 3 for the parameter value, it can be varied (see robustness analyses later in this article). Smaller values make the probability of interaction vary more linearly with the valence of the impression, whereas larger values make the pattern more like a step function (interact if and only if valence is above a threshold value). If the observer chooses not to interact with a target on a particular trial following this decision rule, the observer's impression remains unchanged. I use two versions of the model, one that allows this decision process and one that does not (so interaction takes place on each trial, regardless of the observer's impression).

Assumptions About Gossip

These assumptions are also mostly borrowed from Smith and Collins (2009). Each observer is assumed to gossip on a specific proportion of trials, with gossip replacing a direct interaction with a target. So in a model run involving 100 trials pairing Observer X with Target Y, if Observer X gossips .4 of the time, X will have 60 direct interaction opportunities (not all of which may take place, based on the decision rule just described) and on 40 trials, Observer X will gossip instead of interacting with Y.

Two different versions of gossip can be used in the model. One (that used by Smith and Collins) we term *directed* gossip: On a gossip trial, Observer X picks a different observer Z and obtains Z's current impression of Target Y specifically—the target with which Observer X would otherwise have interacted with on this trial. It is as if, instead of interacting with Y, X asks a friend “what do you think of Y?” The third party's impression is used to update Observer X's current impression of Target Y using the same impression-formation averaging formula.

The alternative assumption is termed *interesting* gossip: Observer X still picks a third-party observer Z but obtains Z's impression of the target of whom Z holds the most negative impression. It is as if X asks Z, “tell me some juicy, interesting gossip,” and hears about the target Z dislikes most. This impression is used to update Observer X's current impression of that target, using the same impression-formation averaging formula.

Finally, in one version of the model, we add an assumption that observers may try to protect themselves against influence by biased or malicious gossip. This takes the form of a simple threshold: If gossip conveys information that differs from the observer's current impression of the relevant target by more than 1.0 in absolute value, the observer will

disregard that gossip (not using it to update the current impression). Above, it was noted that the model's impression integration rule does not assume a negativity bias. An additional reason for that specification is that a negativity bias might be seen as artificially making this “disregard” rule more effective, in that malicious gossip would make observers' impressions more extremely negative, making it even easier for other observers to disregard them.

Evil Targets and Malicious Observers

To address the questions laid out in the introduction, we use two versions of the model. In one, a small proportion of the targets (4 of 20) are assumed to be evil. On 5% of trials, they produce highly negative acts—with a mean 5.0 lower than the overall mean (-4.5 rather than $+0.5$) and standard deviation of 1.0. On all other occasions, their behaviors have a slightly more positive mean of $+0.75$ so that overall, their behaviors have the same mean valence ($+0.5$) as all other targets. One could consider these targets as analogous to sociopaths, who act unusually charming most of the time as a mask for their tendency to produce rare, extremely negative behaviors. The key question in this situation is whether observers can form impressions that differentiate the evil targets from the other, normal targets.

Note that to form such differentiated impressions, the impression-formation process has to produce nonlinear effects, so that that an experience of an extremely negative behavior cannot be compensated for by several subsequent positive behaviors. A linear rule (such as a simple average of the valence of the behaviors) would allow the slightly positive behaviors produced by the evil targets on 95% of trials to compensate for their 5% of strongly negative behaviors. Two aspects of the model can generate nonlinear effects. One is the version of the model in which observers actively decide whether to interact with a target based on their current impressions. This decision process means that a single negative action may make the impression sufficiently negative to greatly reduce the likelihood of further interactions, so its negative effect on the impression will not be compensated by future, more positive actions. The second possibility is the “interesting” gossip mode, where a single negative action may make this observer's impression of this target so negative that it has a high probability of being passed along to other observers in gossip, spreading the information through the social network beyond the reach of compensation by future, more positive actions.

In the other version of the model, all targets are normal, producing behaviors with the same mean of $+0.5$. But one observer offers highly negative, malicious gossip about four specific targets. When asked about one of those targets (in directed gossip) or when asked to give “interesting” gossip, this observer reports a strongly negative (-5.0) impression of those targets. The key question in this situation is whether the other observers are susceptible to this

negatively biased gossip, and form impressions of the specific targets that are more negative than their impressions of the other targets.

Results

All results shown here are means over 100 independent runs of the model in each of 16 conditions. Each run involves 100 opportunities for interaction between each of the 20 observers and each of the 20 targets (hence 40,000 trials). The 16 conditions are (Evil targets/Malicious observers) \times (Directed/Interesting gossip) \times (Decision/No decision) \times (Disregard/No disregard). Figures plotting results show the last 2×2 as 4 panels of the figure.

Evil Targets

When the model is run with four targets who produce rare, extremely negative behavior, the key question is whether the observers can form impressions that successfully differentiate those “evil” targets from the other, normal ones. That would be adaptive, allowing the observers to avoid attempting to cooperate with the evil ones (and opening themselves up to exploitation), or forming long-term relationships with them. To examine this question, Figure 1a shows the average impression observers form of the normal (clear bars) and evil (shaded bars) targets. The averages are across all 20 observers, and also across the 16 normal and 4 evil targets. The four panels of the graph show four different versions of the model. In the top row (No decision), observers interact unconditionally with targets on each trial, while in the bottom row (Decision), observers decide whether to interact on each trial based on the valence of their current impression, as previously described. In the left column (No disregard) observers incorporate all gossip into their impressions. In the right column (Disregard), observers ignore gossip that is too discrepant from their current impression.

Within each panel are shown the results for four different observers, who gossip different amounts. One observer never gossips (all trials involve an opportunity to interact with a target) whereas the second observer gossips on 20% of trials, the third observer on 45% of trials, and the fourth observer on 95% of trials.

Figure 1b shows the average number of extremely negative acts that the observers experience in the same set of conditions, as a proportion of the expected number. That is, for the observer who never gossips, all 100 trials are interactions with the target, and we would expect five of those to involve extreme negative behaviors (because the evil targets emit such behaviors 5% of the time). In contrast, the second observer gossips on an expected 20 of the 100 trials, so only 80 trials involve direct interaction; the expected number of extreme negative behaviors is 5% of 80, or 4 rather than 5. Thus, the graph shows the number of bad acts as a proportion of the number the observer would be expected to encounter,

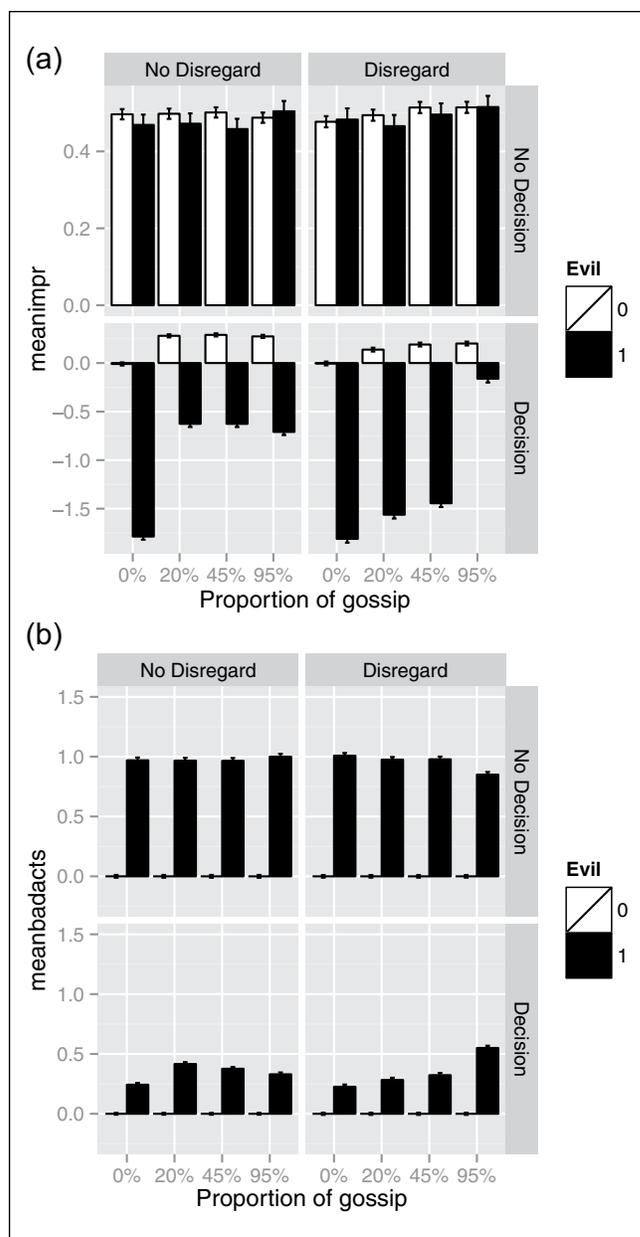


Figure 1. (a) Mean impression of normal (clear) and evil (shaded) targets under different conditions, with directed gossip. (b) Mean proportion of especially bad acts relative to the expected number (see the text) suffered by observers in different conditions, with directed gossip.

based on the different observers’ differing numbers of trials involving interaction with the targets.

Figure 1 shows the results with the Directed gossip version of the model. Note first that in the top row (unconditional interaction with targets) there is no ability to detect the evil targets, even with gossip. As a result, as Figure 1b shows, observers in this No decision condition are fully exposed to these targets’ bad actions. For observers who do not gossip, the Decision version of the model (refusing interaction when

the impression is negative) allows detection of the evil targets, while reducing the cost to the observer (number of bad acts experienced) by about three quarters. Gossip does not destroy this ability, but interestingly, appears to weaken it, both reducing the negativity of the impression of the evil targets and somewhat increasing the number of bad acts experienced. This is because many gossip sources may be observers who have not yet experienced the rare negative acts, and so will have neutral to slightly positive impressions of these targets. Disregarding discrepant gossip (right-side panels) reduces this effect of gossip. Other than this one case, the left versus right panels are generally similar, showing that disregarding discrepant gossip generally makes little difference.

Figure 2 shows results with the “Interesting gossip” version of the model. With this specification, even in the No decision/No disregard version (top left panel), observers who gossip can detect the bad targets. Observers who can decide whether to interact (bottom panels) also successfully detect the bad targets.

However, with No decision, the cost to the observers (number of bad acts experienced) is high—even though “Interesting” gossip allows the formation of more negative impressions of the evil targets. This is because in the No decision condition, regardless of the valence of an impression, interaction occurs unconditionally on each trial. (The negative impression is still useful, because the observer could use it to avoid entering into significant romantic or cooperative relationships with the targets.) As in Figure 1, the Decision version of the model greatly reduces the number of bad acts experienced, and gossip reduces it further in the No disregard case (bottom left) though the effects are weak in the Disregard case (bottom right). Thus, disregarding discrepant gossip has little effect if observers can decide whether to interact (bottom row), but greatly weakens the ability to detect evil targets in the No decision case.

Malicious Observers

The previous model runs show that, as expected, gossip can be helpful in allowing observers to draw on others’ knowledge and form negative impressions of evil targets. However, gossip can also open us up to manipulation by those who intentionally plant overly negative (or overly positive) information about others. Negatively slanted information is of special interest in our modeling here, for two reasons. One is its comparability with the model of evil targets just presented. The other reason is that in the Decision version of the model, malicious negative information has every opportunity to be effective: By making observers’ impressions negative, it will likely prevent their interacting with the targets and potentially obtaining firsthand information that could correct their impressions (Denrell, 2005). In contrast, a malicious observer who tried to create an overly positive impression of a specific target (an ally, for example) would face the problem that the positive gossip would encourage observers

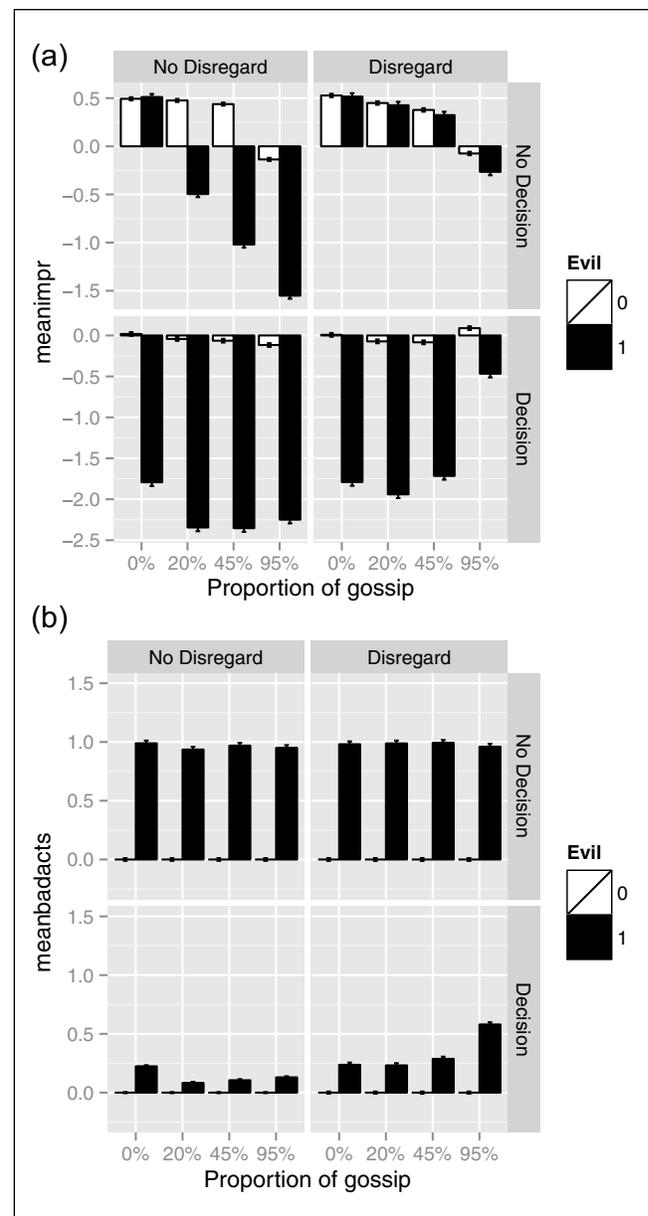


Figure 2. (a) Mean impression of normal (clear) and evil (shaded) targets under different conditions, with *interesting* gossip. (b) Mean proportion of especially bad acts relative to the expected number (see text) suffered by observers in different conditions, with *interesting* gossip.

(in the Decision condition) to interact with the target and likely correct their overly positive impression to be closer to reality.

In this version of the model, all targets are normal. But one observer offers highly negative, malicious gossip about four specific targets whenever asked about one of those targets (in directed gossip) or when asked to give “interesting” gossip. The key question now is whether observers can avoid being influenced by the malicious gossip. Thus, ideally (in contrast to the earlier models) the clear and shaded bars

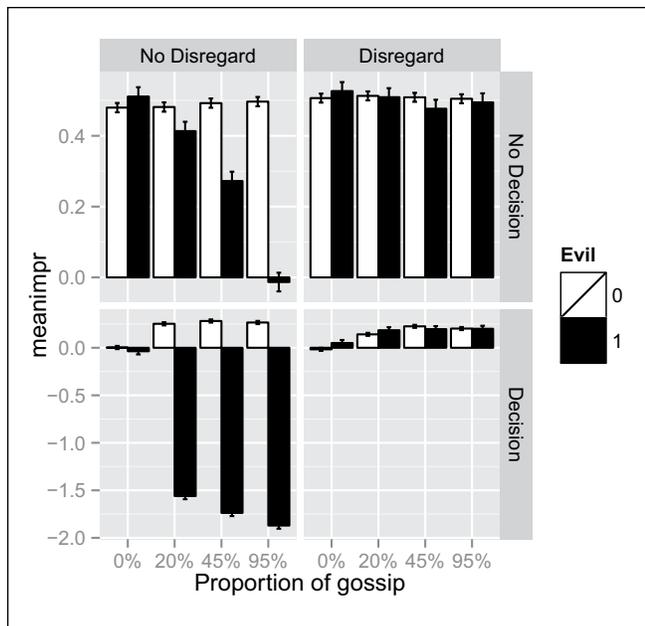


Figure 3. Mean impression of normal targets (clear) and targets who are the subject of malicious gossip (shaded) under different conditions, with *directed* gossip.

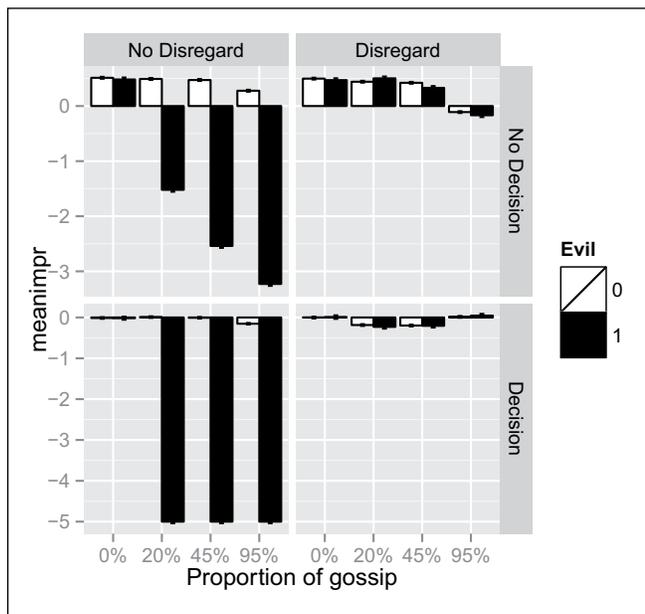


Figure 4. Mean impression of normal targets (clear) and targets who are the subject of malicious gossip (shaded) under different conditions, with *interesting* gossip.

would be similar, indicating that observers are uninfluenced. Figures 3 and 4 (for directed and “interesting” gossip, respectively) show largely similar patterns, as do the Decision and No decision versions of the model. In the No disregard case, only the observer who does not gossip is uninfluenced.

Interesting gossip (compared with directed gossip) does result in stronger effects of malicious gossip. However, disregarding discrepant gossip eliminates influence by the malicious gossip.

Discussion

Summarizing the results with regard to detecting evil targets, observers who unconditionally interact with the targets (No decision) and who do not gossip are unable to detect them. However, either making impression-based decisions about interaction (Decision condition) or engaging in gossip allows discrimination of the evil targets. “Interesting” gossip is more effective than directed gossip, allowing detection of the targets even in the No decision condition where directed gossip leaves the observers vulnerable. The ability to make decisions about interaction also greatly reduces the cost of obtaining adequate information to form discriminating impressions, by subjecting the observers to a much smaller number of the evil targets’ extremely negative actions.

Turning to the second problem we posed for our observers, avoiding influence by malicious negative gossip, we find that disregarding gossip that deviates too much from one’s current impression unconditionally protects against malicious gossip. Interestingly, the Disregard condition generally does not weaken observers’ ability to discriminate the evil targets, except in one specific condition: No decision + Interesting gossip.

Overall, therefore, the best strategy for an observer is to (a) decide on each occasion whether to interact with a target, based on the valence of the current impression; (b) gossip to draw on others’ impressions rather than relying completely on one’s personal observations; but (c) disregard gossip information that is too discrepant from one’s own current impression. If observers follow these recommendations (bottom right panel of each set of four), the difference between directed and “interesting” gossip does not matter much.

Disregarding discrepant gossip protects well against malicious gossipers. But why does it not damage observers’ ability to learn (correctly) about the actual evil targets? The answer is that gossip is “filtered” and moderated as it is passed from one observer to another. Imagine an observer who has a neutral to positive (+0.5) impression of an evil target and then experiences one of his rare, extremely negative acts (−4.5). The resulting impression is the average of the two, −2.0. Suppose this observer then communicates that impression to another observer who holds an impression of −1.5, which is approximately the average impression held by observers who gossip (Figure 1 or 2, Disregard + Decision condition). The impression will be within the range (±1.0) so it will not be disregarded as discrepant, and will make the recipient’s impression more negative, −1.75. As this process is repeated, it can be seen that repeated transmission of the impression from one person to another “filters” it, reducing its initially extreme negativity and allowing its effects to

spread. In contrast, the Disregard condition effectively blocks any influence from the malicious gossip, because the communicated impression (-5.0) will be too discrepant from most observers' impressions and will be ignored.

One empirical study recently confirmed some predictions of this model. Feinberg, Willer, and Schultz (2014) had participants in groups of four play multiple rounds of a public-goods game. In this game, the group benefits most when all players contribute their resources to a common fund that is then multiplied and returned in equal shares to all players, but each individual player benefits most by keeping their resources while hoping to benefit from others' contributions. So a selfish or uncooperative player reduces all other players' earnings from the game. Each group of four played a series of games, and participants were then reassigned to new groups with a completely different set of players. In some conditions, at the time of reassignment, participants were allowed to gossip by writing a note about one of their former group members, to be shared with that individual's new partners (who would otherwise have no way of knowing about the individual's level of cooperativeness). Finally, in some conditions, after receiving the gossip, participants could vote to exclude a specific player from their group before game play began. Results showed that the combination of gossip and the ability to exclude a player who was described as selfish and uncooperative led to the highest level of contributions. This parallels the model results showing that using gossip and being able to decide whether to interact with a target produce generally favorable outcomes. The Feinberg et al. study differs from our model in important ways. Their players interacted in groups of four to play a public-goods game (rather than interacting in dyads with a potentially negative target). Their players had no opportunity to integrate their personal experiences with gossip, because the receipt of gossip and the vote on excluding players occurred before any personal interaction with new players. Finally, Feinberg et al. did not consider the possibility of false and malicious gossip. Still, the convergence of their findings with the model predictions suggests that these conclusions may have some generality.

Limitations and Future Directions

Uncertainty analysis. One important limitation is that because this model is highly abstract, most parameter values are somewhat arbitrary. There is no clear way to estimate most parameters from data, the one exception being the basic formula for updating impressions using new behavioral observations, which Denrell (2005) validated using data from impression-formation experiments. To address this limitation, it is important to show that the model's behavior is not highly sensitive to the specific values of the parameters, using an approach termed uncertainty analysis (Railsback & Grimm, 2012). The main runs of the model (results shown in the figures) used fixed values of the parameters, as shown in

Table 1. For the uncertainty analysis, 100 additional runs were made in each of the 16 conditions, with parameter values for each individual run drawn randomly from a rectangular distribution with the range shown in the last column of the table. Thus, for example, in one run the overall mean valence of targets' acts might be $.782$, and the constant in the decision function might be $-.343$. Graphical summaries of the results of these runs are qualitatively similar to (indeed, virtually indistinguishable by eye from) the figures depicting the main runs. Thus, the meaningful patterns in the results hold for parameter values randomly varying within a fairly broad range, and are not unique to a specific set of fixed values.

Directions for modeling. One minor extension of the model would have observers keep track of what gossip they hear from whom. This would allow a different strategy for attempting to avoid being influenced by malicious gossip: using discrepant gossip only when similar information is heard from two or more different sources. Of course, this strategy would be ineffective under several circumstances. For example, several malicious observers might be in cahoots, agreeing to defame the same targets. Even without conspiracy or prearranged agreement, several observers may share a group membership that leads them all to evaluate particular targets negatively, through the operation of typical ingroup-outgroup dynamics. And as argued in the introduction, several sources who communicate similar information might have all originally gotten it from the same person. Even information heard from multiple sources might not be truly independent, and the recipient is rarely in a position to know this.

There are two other directions for future extension of the model. Both would require changing the model so that (as in Smith & Collins, 2009) the observers and targets are the same individuals, rather than using the simpler specification that they are separate sets of people.

The first direction is to have observers form impressions not just of others as individuals, but of their relationships. The social cognition of others' relationships is an understudied topic (see Frey & Smith, 1993; Kenny, Mohr, Bond, & Horn, 1996; Krackhardt, 1987), and it will often be limited by the availability of information. However, people may tell you about their friends and enemies, or you may be able to observe who hangs out with whom, and who avoids or argues with whom. If observers can gather information about relationships, it should help them calibrate how much reliance to place on gossip. That is, if A tells you wonderful things about B (whom you know to be A's best friend) or terrible things about C (whom you know to be A's worst enemy), you can discount or ignore the gossip. Conversely, negative gossip from A about B or positive gossip from A about C should be given extra weight. If the model is extended to incorporate impressions of relationships, it should probably also include the possibility that gossip can be about relationships rather

Table 1. Model Parameters, Base Values Used in Main Runs, and Range of Values Used in Uncertainty Analysis.

Parameter	Description	Base value	Range for uncertainty analysis
Number of trials	Number of trials per target, per observer (i.e., a run has $n_{\text{trials}} \times n_{\text{targets}} \times n_{\text{observers}}$ trials)	100	—
Number of targets		20	—
Number of observers		20	—
Targets' acts (M)		+0.5	0.0 to 1.0
Targets' acts (SD)		1.0	—
Probability of gossip	(rather than direct interaction with target) Varies across observers within each run	0.0 to 0.95	0.0 to 0.95
Constant in decision function	Luce choice function = $\exp(C + S \times \text{impression}) / (1 + \exp(C + S \times \text{impression}))$ C value makes interaction more or less likely overall (Decision version only)	0.0	-1.0 to 1.0
Slope in decision function	S value controls the sensitivity of interaction decision to impression valence. 0.0: constant probability of interaction regardless of valence. High values: an increasingly sharp threshold, with interaction unlikely below the threshold, likely above it (Decision version only)	3.0	2.0 to 5.0
Disregard threshold	If gossip differs from the observer's current impression by more than this amount, it is ignored (Disregard version only)	1.0	0.5 to 2.0
Number of evil targets	(Evil targets version only)	4	—
Negativity of evil acts	Evil acts are this much more negative than the overall mean (Evil targets version only)	-5.0	-3.0 to -7.0
Frequency of evil acts	Evil acts are this proportion of evil targets' acts (Evil targets version only)	.05	.02 to .10
Number of malicious observers	Number of observers who give false negative gossip (Malicious gossip version only)	1	—
Number of malice targets	Number of targets about whom malicious observers give false negative impressions (Malicious gossip version only)	4	—
Malicious gossip value	Impression transmitted by malicious gossip (Malicious gossip version only)	-5.0	-3.0 to -7.0

than individuals (e.g., A tells B that C and D are friends or enemies).

A second direction is to incorporate meta-gossip. In the current model, an observer may disregard gossip when it differs too dramatically from the observer's current impression. We could add the assumption that the observer stores an impression of the source of such discrepant gossip as an "unreliable gossip." This would permit discounting future gossip from the same source (even if the future information is not itself highly discrepant). That impression could even be passed along to other observers, with A telling B that C is an unreliable or biased source of gossip. This would be gossip about gossip, or meta-gossip. Again, additional implications of such an assumption would have to be spelled out. Meta-gossip as well as gossip might be strategically manipulated, or unintentionally biased by interpretive, memory, or communication processes. It therefore might be unreliable. Should B take meta-gossip at face value, or evaluate it against B's own impression of the target C (parallel to the Discrepancy version of the current model)?

Both of these potential extensions offer the potential of interesting model behavior, but both press up against the limits of complexity that is desirable in a model. The problem is

not technical (programming either set of additional assumptions would be straightforward) but conceptual: Once a model reaches a certain level of complexity, the underlying reasons for its behavior become murky, and the very purpose of modeling—to better understand a phenomenon—is lost (Smith & Conrey, 2007).

Directions for empirical research. A final way to build on this model is to conduct empirical studies aimed at examining some of the processes assumed in the model (cf. Feinberg et al., 2014, described earlier). Such studies could use a paradigm similar to that of Waggoner and Smith (2013). They recruited participants for a study of "person perception and chat." Working at computers in individual cubicles, participants saw information about targets (e.g., material from Facebook profiles) and rated the targets, with their ratings supposedly sent to the other participants in the same session. They then received ratings supposedly representing those other participants' impressions (but in reality, researcher controlled). Thus, direct target information and gossip-provided information were independently manipulated. Waggoner and Smith's (2013) studies showed that people are influenced by gossip, even when they have access to rich

information about the targets directly, and even when they know that the gossip is based on very limited information.

A similar paradigm could be used to investigate several issues raised by the multiagent model. These include novel and virtually unexplored questions about how and whether people try to protect themselves against manipulated gossip. Are participants spontaneously sensitive to the possibility of inaccurate, manipulated gossip? If so (or if they are explicitly alerted to the possibility), how do they try to protect themselves from it? For example, do they disregard gossip that differs from their own impressions, or use gossip only when two or more others offer similar impressions? Are there individual differences in people's preferences for gathering firsthand information versus obtaining gossip from others (paralleling the assumption in the model that different observers gossip with different frequencies)? Such differences might be driven by different weights placed on the desire for a broad sample of information even if some might be unreliable, versus vigilance against being misled or manipulated.

A variant of this paradigm would have participants not just obtain information about targets but actually interact with them, in a Prisoner's Dilemma or similar game in which cooperation yields monetary rewards but being exploited by an uncooperative other is costly (for a similar approach, see Feinberg et al., 2012). Would participants update their impressions of particular targets as they interact repeatedly with them? Would they use negative impressions to cut off interaction with uncooperative targets, as assumed in the Decision version of this model (from Denrell, 2005)? And would the fact that actual interaction with targets could prove costly increase people's reliance on gossip information? The issues considered in this simple model open up a variety of interesting research questions that have received little or no attention to date, many of which are fundamental to person perception when it is considered as a socially distributed task implemented through gossip.

Conclusions

In summary, this work suggests a solution to the gossiper's dilemma. As a new member of an organization, use gossip to draw on others' experiences with the individuals you must get to know and work with. Doing so will help you protect yourself against those with a tendency to perform rare, negative behaviors. However, it is wise to ignore gossip that is overly discrepant from your current impression. This work also offers a methodological example of multiagent modeling, as a tool for tracing the consequences of basic assumptions about person perception as it occurs in its social context, drawing on gossip and not simply on individual observations as laboratory studies so often assume. Finally, substantively, these models begin to illuminate some of the complexities that arise when person perception is treated as a socially distributed process (Smith & Collins, 2009).

Appendix

ODD Description of Model

Overview

1. Purpose: An adaptation of the socially distributed person perception and gossip model of Smith and Collins (2009) to incorporate three factors relevant to the "gossiper's dilemma," the idea that using gossip information may enrich our impressions but leaves us open to manipulation. First, we examine what happens when a small number of social targets are evil, displaying rare but extremely negative behaviors, opening up the possibility that gossip may help perceivers identify them. Second, we examine the situation where some gossip is malicious, intended to defame specific targets, to see whether perceivers can avoid being misled. In each of these situations we assess the effects of various perceiver strategies, including the amount of gossip, processes involved in gossip communication, and intentional disregard of gossip that appears to be inaccurate.

2. Entities, states, variables, and scales: There are two types of entities, targets (who emit behaviors) and observers (who observe those behaviors and form impressions of the targets). Observers also communicate their impressions among themselves in the form of gossip. The basic event in the model is an interaction (between an observer and a target, or between two observers who pass gossip). The main variables are each observer's impression of each target, encoded as a single number whose value represents valence (0.0 = neutral).

3. Process Overview and Scheduling: The model runs for $n_{\text{target}} \times n_{\text{observer}} \times 100$ time ticks, so that each observer has 100 trials, which can be either an opportunity for interaction with a target OR for receiving gossip.

Design concepts

The *basic principle* in the model is forming accurate or useful impressions. Variations in the rules for target-observer interaction or for using gossip are investigated to see how they contribute to impressions.

Sensing involves an observer obtaining a single behavior from a target, or learning another observer's impression of a specific target.

There is *stochasticity* in that targets' behaviors are drawn from a distribution with a fixed mean but with a standard deviation of 1.0. Thus, observers' impressions of the same target will vary over time, and from observer to observer.

Adaptiveness is part of the model in the form of one variant rule: In some conditions, observers choose whether or not to interact with a target based on the valence of the current impression. Thus, a sufficiently negative impression will stop future interaction with that target.

Outputs are mainly the impression values. Other aspects of the program's operation are recorded as supplemental data.

Details

1. Initialization: Each target is assigned a mean value for the behaviors it will generate, +0.5. In the evil target version, a subset of targets produce rare (5% of the time), extremely negative (valence = overall mean – 5.0) behaviors, compensated by making the other behaviors slightly more positive so the overall mean valence is still 0.5. Observers are initialized with a constant value indicating the proportion of trials on which they will seek gossip (rather than interacting directly with targets), and these vary from 0.0 to 0.95 across the 20 observers.

2. Input Data: None.

3. Submodels:

Basic person perception process. The core of the model involves assumptions borrowed by Smith and Collins from Denrell (2005). Observers and targets interact in dyads on multiple trials. On each trial, the target produces a behavior with a valence that is drawn from a distribution with a fixed mean (+0.5 for “normal” targets but a different value for the evil targets described below), with a standard deviation of 1.0. The observer in turn averages that behavioral observation with the observer’s existing impression, using an equally weighted average (i.e., new impression = (old impression + new observation) / 2.0). In one version of the model, observers may use their current impression to decide whether to interact with a target on each trial (after the first trial with each target, on which interaction always takes place). Interaction is less likely the more negative the impression is, with interaction likelihood following a Luce choice function, $p = \exp(C + S \times \text{impression}) / (1 + \exp(C + S \times \text{impression}))$. Parameter values are $C = 0.0$ and $S = 3.0$. **The model is run both with and without this Decision feature.**

Gossip. These assumptions also mostly derive directly from Smith and Collins (2009). Each observer is assumed to gossip (rather than having an opportunity to interact directly with a target) on a specific proportion of trials. So if a run involves 100 trials pairing observer X with target Y, and observer X gossips .4 of the time, there will be 60 direct interaction opportunities (not all of which may take place, following the decision rule just described) and on 40 trials, observer X will gossip instead of interacting with the target.

There are two versions of gossip in the model. One (that used by Smith & Collins) we term “directed” gossip: On a gossip trial observer X picks a different observer Z and obtains Z’s current impression of target Y specifically—the target with which observer X would otherwise have interacted with on this trial. The third party’s impression is used to update observer X’s current impression of target Y using exactly the same equally weighted averaging formula.

The alternative assumption is termed “interesting” gossip: Observer X still picks a third-party observer Z but obtains

Z’s impression of the target of whom Z holds the most negative impression. This impression is used to update observer X’s current impression of that target, using exactly the same equally weighted averaging formula. **The model is run in separate versions with directed gossip and interesting gossip.**

Finally, in one version of the model we add an assumption that observers may try to protect themselves against influence by biased or malicious gossip. This takes the form of a simple threshold: If gossip conveys information that differs from the observer’s current impression of the relevant target by more than 1.0 in absolute value, the observer will disregard that gossip (not using it to update the current impression). **The model is run both with and without this Disregard feature.**

Evil targets and malicious observers. To address the research questions we use two versions of the model. In one, a small proportion of the targets (4 of 20) are assumed to be evil. Specifically, on a small proportion of occasions they produce highly negative acts—with a mean of –4.5 (rather than +0.5) and standard deviation of 1.0. On all other occasions, their behaviors have a slightly more positive mean of +0.75 so that their overall mean behaviors have the same mean (+0.5) as all other targets. The key question in this situation is whether observers can form impressions that differentiate the evil targets from the other, normal targets.

In the other version of the model, all targets are normal. But one observer offers highly negative, malicious gossip about 4 specific targets. When asked about one of those targets (in directed gossip) or when asked to give “interesting” gossip, this observer report a strongly negative (–5.0) impression of those targets. The key question in this situation is whether the other, regular observers are susceptible to this negatively biased gossip, and form impressions of the specific targets that are more negative than their impressions of the other targets. **The model is run separately with evil targets and with malicious observers (never both).**

Acknowledgment

Thanks to Elizabeth Collins and Frederica Conrey for major contributions to work on which this article is based, and to Winter Mason, Steven Sherrin, and Ashley Waggoner Denton for comments on earlier versions of the article.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This work was facilitated by a grant (BCS-094911) from the National Science Foundation.

Note

1. In common language, gossip is often confused with rumor. However, in the scientific literature, their definitions are distinct. Rumor is defined as an unverified belief that is topically relevant (Bordia & DiFonzo, 2004), generally concerning issues of major significance to a group (e.g., rumors of upcoming layoffs spreading among a group of employees) rather than about the personal characteristics of an absent other.

References

- Axelrod, R., & Hamilton, W. (1981). The evolution of cooperation. *Science*, *211*, 1390-1396.
- Baumeister, R. F., Bratslavsky, E., Finkenauer, C., & Vohs, K. D. (2001). Bad is stronger than good. *Review of General Psychology*, *5*, 323-370. doi:10.1037/1089-2680.5.4.323
- Baumeister, R. F., Zhang, L., & Vohs, K. D. (2004). Gossip as cultural learning. *Review of General Psychology*, *8*, 111-121.
- Beersma, B., & Van Kleef, G. A. (2011). How the Grapevine keeps you in line: Gossip increases contributions to the group. *Social Psychological & Personality Science*, *2*, 642-649. doi:10.1177/1948550611405073
- Bordia, P., & DiFonzo, N. (2004). Problem solving in social interactions on the Internet: Rumor as social cognition. *Social Psychology Quarterly*, *67*, 33-49.
- Burt, R. S. (2005). *Brokerage and closure*. Oxford, UK: Oxford University Press.
- Carlston, D. E., & Schneider, E. D. (2013). Trends in social cognition research. In D. E. Carlston (Ed.), *Oxford handbook of social cognition* (pp. 894-916). Oxford, UK: Oxford University Press.
- Collins, E. C., Percy, E. J., Smith, E., & Kruschke, J. K. (2011). Integrating advice and experience: Learning and decision making with social and nonsocial cues. *Journal of Personality and Social Psychology*, *100*, 967-982. doi:10.1037/a0022982
- Craik, K. H. (2008). *Reputation: A network interpretation*. New York, NY: Oxford University Press.
- Denrell, J. (2005). Why most people disapprove of me: Experience sampling in impression formation. *Psychological Review*, *112*, 951-978.
- De Sousa, R. (1994). In praise of gossip: Indiscretion as a saintly virtue. In R. F. Goodman (Ed.), *Good gossip* (pp. 25-33). Lawrence: University Press of Kansas.
- Dunbar, R. (2004). Gossip in evolutionary perspective. *Review of General Psychology*, *8*, 100-110.
- Eder, D., & Enke, J. (1991). The structure of gossip: Opportunities and constraints on collective expression among adolescents. *American Sociological Review*, *56*, 494-508.
- Ellwardt, L., Labianca, G. J., & Wittek, R. (2012). Who are the objects of positive and negative gossip at work?: A social network perspective on workplace gossip. *Social Networks*, *34*, 193-205. doi:10.1016/j.socnet.2011.11.003
- Farley, S. D. (2011). Is gossip power? The inverse relationships between gossip, power, and likability. *European Journal of Social Psychology*, *41*, 574-579. doi:10.1002/ejsp.821
- Feinberg, M., Willer, R., & Schultz, M. (2014). Gossip and ostracism promote cooperation in groups. *Psychological Science*, *25*, 656-664.
- Feinberg, M., Willer, R., Stellar, J., & Keltner, D. (2012). The virtues of gossip: Reputational information sharing as prosocial behavior. *Journal of Personality and Social Psychology*, *102*, 1015-1030.
- Foster, E. K. (2004). Research on gossip: Taxonomy, methods, and future directions. *Review of General Psychology*, *8*, 78-99.
- Frey, K., & Smith, E. (1993). Beyond the actor's traits: Forming impressions of actors, targets, and relationships from social behaviors. *Journal of Personality and Social Psychology*, *65*, 486-493.
- Giardini, F. (2012). Deterrence and transmission as mechanisms ensuring reliability of gossip. *Cognitive Processing*, *13*(Suppl. 2), 465-475. doi:10.1007/s10339-011-0421-0
- Giardini, F., & Conte, R. (2012). Gossip for social control in natural and artificial societies. *Simulation*, *88*, 18-32. doi:10.1177/0037549711406912
- Gilbert, D. T. (1998). Ordinary personology. In D. T. Gilbert & S. T. Fiske (Eds.), *The handbook of social psychology* (4th ed., Vol. 2, pp. 89-150). New York, NY: McGraw-Hill.
- Gilovich, T. (1987). Secondhand information and social judgment. *Journal of Experimental Social Psychology*, *23*, 59-74.
- Hess, N., & Hagen, E. (2006). Psychological adaptations for assessing gossip veracity. *Human Nature*, *17*, 337-354.
- Kenny, D. A., Mohr, C. D., Bond, C. F., & Horn, E. (1996). Do we know how much people like one another? *Journal of Personality and Social Psychology*, *71*, 928-936.
- Kniffin, K., & Wilson, D. S. (2005). Utilities of gossip across organizational levels. *Human Nature*, *16*, 278-292.
- Krackhardt, D. (1987). Cognitive social structures. *Social Networks*, *9*, 109-134.
- Laidre, M. E., Lamb, A., Shultz, S., & Olsen, M. (2013). Making sense of information in noisy networks: Human communication, gossip, and distortion. *Journal of Theoretical Biology*, *317*, 152-160. doi:10.1016/j.jtbi.2012.09.009
- Lyons, A., & Kashima, Y. (2003). How are stereotypes maintained through communication? The influence of stereotype sharedness. *Journal of Personality and Social Psychology*, *85*, 989-1005.
- McAndrew, F., Bell, E., & Garcia, C. (2007). Who do we tell and whom do we tell on? Gossip as a strategy for status enhancement. *Journal of Applied Social Psychology*, *37*, 1562-1577.
- Mohr, C. D., & Kenny, D. A. (2006). The how and why of disagreement among perceivers: An exploration of person models. *Journal of Experimental Social Psychology*, *42*, 337-349.
- Nowak, M. A. (2006). Five rules for the evolution of cooperation. *Science*, *314*, 1560-1563. doi:10.1126/science.1133755
- Nowak, M. A., & Sigmund, K. (2005). Evolution of indirect reciprocity. *Nature*, *437*, 1291-1298. doi:10.1038/nature04131
- Peters, K., & Kashima, Y. (2007). From social talk to social action: Shaping the social triad with emotion sharing. *Journal of Personality and Social Psychology*, *93*, 780-797. doi:10.1037/0022-3514.93.5.780
- Piazza, J., & Bering, J. (2008). Concerns about reputation via gossip promote generous allocations in an economic game. *Evolution & Human Behavior*, *29*, 172-178.
- Railsback, S. F., & Grimm, V. (2012). *Agent-based and individual-based modeling: A practical introduction*. Princeton, NJ: Princeton University Press.
- Savarimuthu, S., Purvis, M., Purvis, M., & Savarimuthu, B. T. R. (2013). Gossip-based self-organising agent societies and the impact of false gossip. *Minds and Machines*, *23*, 419-441. doi:10.1007/s11023-013-9304-8

- Sherif, M., & Hovland, C. I. (1961). *Social judgment: Assimilation and contrast effects in communication and attitude change*. New Haven, CT: Yale University Press.
- Smith, E. R., & Collins, E. C. (2009). Contextualizing person perception: Distributed social cognition. *Psychological Review*, *116*, 343-364. doi:10.1037/a0015072
- Smith, E. R., & Conrey, F. R. (2007). Agent-based modeling: A new approach for theory-building in social psychology. *Personality and Social Psychology Review*, *11*, 87-104.
- Sommerfeld, R. D., Krambeck, H.-J., & Milinski, M. (2008). Multiple gossip statements and their effect on reputation and trustworthiness. *Proceedings of the Royal Society B: Biological Sciences*, *275*, 2529-2536. doi:10.1126/science.288.5467.850
- Sommerfeld, R. D., Krambeck, H.-J., Semmann, D., & Milinski, M. (2007). Gossip as an alternative for direct observation in games of indirect reciprocity. *Proceedings of the National Academy of Sciences of the United States of America*, *104*, 17435-17440. doi:10.1073/pnas.0704598104
- Stiff, C., & Van Vugt, M. (2008). The power of reputations: The role of third party information in the admission of new group members. *Group Dynamics: Theory, Research, and Practice*, *12*, 155-166. doi:10.1037/1089-2699.12.2.155
- Takahashi, N. (2000). The emergence of generalized exchange. *American Journal of Sociology*, *105*, 1105-1134.
- Waggoner, A. S., & Smith, E. R. (2014). *Third-party influences on impression formation: When self and others disagree about social targets*. Unpublished manuscript, Department of Psychological and Brain Sciences, Indiana University, Bloomington.
- Wert, S., & Salovey, P. (2004). A social comparison account of gossip. *Review of General Psychology*, *8*, 122-137.
- Wittek, R., & Wielers, R. (1998). Gossip in organizations. *Computational & Mathematical Organization Theory*, *4*, 189-204.