Gossip is All About Friends, Physicists Say

November 1 2007, by Laura Mgrdichian

The extent and speed that gossip spreads largely depends on how many friends the subject of the gossip has, according to recent work by a group of physicists.

The group, which includes scientists from institutions in Germany, Brazil, and Switzerland, developed a model for the spread of gossip among students at an American school.

The model uses survey data from more than 90,000 students in 84 schools who were asked about other students they had personal contact with, such as eating lunch or studying. It introduces concrete quantities that define how widely and quickly gossip can spread among students, a segment of the population in which gossip is particularly prevalent.

“At a first glance, our central hypothesis may seem obvious: In social systems the number of friends influences the danger of being gossiped,” said Pedro Lind, a physicist at the Institute of Computational Physics at the University of Stuttgart, in Germany, to *PhysOrg.com*. “But the hypothesis says more than that: Our results show that the optimal number of friends to minimize gossip spreading is neither very large nor very low.”

So if a student has too few or too many friends, the danger of being the subject of a piece of gossip goes up. The optimal number depends on the size of the social network: the larger the network, the larger the optimal number.

In the model -- which Lind proposed together with his colleagues, physicists Luciano da Silva, José Andrade, and Hans Herrmann -- each student in the network is represented by a node. Each node is connected to several others, defining each student's "nearest neighbors," or friends. The model introduces two terms, the "spreading factor" and "spreading time."

When a gossip is introduced by one student (the originator) that targets another student (the victim), the spreading time is the minimum time it takes for the gossip to spread to all of the victim's accessible friends. The spread factor is the fraction of the victim's friends that ultimately hear the gossip. It has a maximum value of 1, which corresponds to the case in which all of the victim's friends have heard the gossip.

When using the student-survey data, the model states that the optimal number of friends a student should have in order to minimize gossip spreading is about six.

The model also shows that, when the number of friends is sufficiently large, the time it takes for the gossip to spread to all the victim's friends grows logarithmically (i.e. by powers of 10) as a function of the number of friends. Therefore, beyond the optimal number, having more friends makes the risk of gossip greater, but slows the spread.

This research is published in the September 27, 2007, online edition of *Physical Review E.*

Citation: Pedro G. Lind, Luciano R. da Silva, José S. Andrade, Jr., and Hans J. Herrmann, "Spreading gossip in social networks" *Phys. Rev. E* **76**, 036117 (2007)