

Three Degrees of Influence

Your words and actions reach people you have never met

Who proposed the theory

Nicholas A. Christakis, a sociologist and physician at Harvard University, and James H. Fowler, a political scientist at the University of California, San Diego, proposed this social network theory in 2007.

It became widely known through their book *Connected: The Surprising Power of Our Social Networks and How They Shape Our Lives* (Little, Brown, 2009; Japanese translation: Kodansha, 2010).

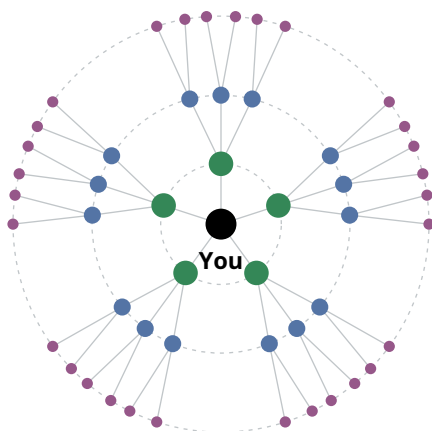
Their series of papers has appeared in leading academic journals, including the *New England Journal of Medicine*, the *British Medical Journal*, *Nature*, and *PNAS*.

The central proposition

"Our actions and words ripple through a network. They influence our friends (one degree), our friends' friends (two degrees), and our friends' friends' friends (three degrees). Beyond three degrees, however, the influence weakens and no longer has a meaningful effect."

Christakis & Fowler (2009), *Connected*

Figure 1 Three degrees from you



● 1 degree

● 2 degrees

● 3 degrees

Influence travels up to three degrees and then declines rapidly. Your happiness, health, and behavior reach even a friend of a friend of a friend whom you have never met.

How the statistics were gathered

Three degrees of influence is not simply an idea, but an empirical finding demonstrated by 20 years of longitudinal data analysis. The evidence came from the Framingham Heart Study, one of the longest-running health follow-up studies in the United States.

The underlying study

Launched in 1948 in Framingham, Massachusetts, this is one of the world's largest long-term health follow-up studies. Originally designed to investigate the causes of heart disease, it has followed more than 15,000 participants across three generations.

Today's familiar understanding that high blood pressure, cholesterol, and smoking are risk factors for heart disease emerged from this study.

Reconstructing the network

At each examination, participants recorded contact details for their closest friends, family, neighbors, and workplace contacts. These records were originally intended to help researchers locate participants if they moved.

Christakis and Fowler recovered handwritten administrative records kept since 1971 and reconstructed 20 years of connections: who was connected to whom, and how. Many of the friends named in the records happened to be participants in the same study, so health data were available for both people. This made possible a unique longitudinal study of networks and health.

Scale of the analysis

The analysis followed 4,739 people for 20 years, from 1983 to 2003, with up to seven observations. More than 50,000 social and family ties were fully mapped, including geographic information (addresses), workplaces, and family relationships.

The network was updated whenever participants moved, married, divorced, started a job, or died during those 20 years.

Measuring happiness

Happiness was measured using four items from the CES-D (Center for Epidemiologic Studies Depression Scale), a standard measure with validated psychometric properties. This is an established measurement method, not a subjective questionnaire.

Obesity was assessed using measured weight and height (BMI), while smoking information was extracted from medical records rather than self-reports.

Strengths of the method

This was a longitudinal study of changes in actual networks and health indicators over 20 years, rather than simply asking questions in a survey. It is considered among the most reliable studies of its kind.

There are limits to causal inference, as noted later, but no other social network study combines this scale, duration, and objective indicators.

Evidence of positive and negative spread

Christakis and Fowler's research, and subsequent studies, have shown a variety of phenomena spreading up to three degrees. Three degrees of influence applies not only to happiness and cooperation, but also to negative phenomena such as loneliness and depression.

Positive spread

Happiness. Having a happy close friend increases your probability of being happy by 15.3%. The increase is 9.5% at two degrees and 5.6% at three degrees. [BMJ, 2008]

Cooperation. Experimental economics studies confirmed that cooperative behavior cascades up to three degrees. Altruism is contagious. [PNAS, 2010]

Quitting smoking. Smoking cessation was shown to spread collectively through social networks. [NEJM, 2008]

Negative spread

Loneliness. Loneliness also spreads up to three degrees. It spreads more strongly among women, and more strongly through friends than through family. [Journal of Personality and Social Psychology, 2009]

Depression. Depressive symptoms also spread up to three degrees. Female friends have a particularly strong influence. [Molecular Psychiatry, 2011]

Obesity. When a person becomes obese, the probability that a friend becomes obese rises by 57%; the increase is 37% for spouses and 40% for siblings. [NEJM, 2007]

Smoking. Smoking behavior also spreads collectively through a network. People who smoke tend to be connected to other people who smoke. [NEJM, 2008]

Happiness spreads more strongly than unhappiness

Each additional happy friend raises mood by 9%, whereas each additional unhappy friend lowers it by only 7%. In other words, happiness spreads through a network slightly more strongly than unhappiness.

Christakis: "On average, being connected to other people makes people happier than being unconnected." [Science; Christakis & Fowler, 2008]

Why influence fades after three degrees

1. Intrinsic decay of information. Like a game of telephone, information and emotions become distorted and diluted each time they pass from one person to another.

2. Network instability. Relationships beyond three degrees are more likely to change over time and are less stable.

3. Evolutionary constraints. Humans evolved in small groups of a few dozen people. The brain is optimized for relationships within three degrees.

Influence in the social media age

If social media lets one person reach tens of thousands of people, is three degrees of influence outdated? Fowler himself conducted a decisive experiment addressing this question.

A Facebook experiment with 61 million people

Bond, Fariss, Jones, Kramer, Marlow, Settle, and Fowler. *Nature*, 2012.

On the day of the 2010 U.S. midterm elections, 61 million Facebook users were randomly assigned to three groups:

Group 1. An informational message encouraging users to vote.

Group 2. The same message plus photographs of friends who had already voted (a social message).

Group 3. A control group that received no message.

A Facebook experiment with 61 million people

The Facebook IDs of 6.3 million users were matched against actual voting records, which were public data. The researchers analyzed whether people had seen the message and whether they had actually voted. This was the largest interpersonal experiment ever conducted.

Figure 2 Votes generated by Facebook messages

Direct effect

People who saw the message



Indirect effect

Through friends



Total



What the experiment found

1. A single message led a total of 340,000 people to go to the polls, as confirmed by actual voting records.

What the experiment found

2. The indirect effect was more than four times the direct effect. The fact that friends had voted moved people more than the message itself.

3. Almost all the influence was transmitted by close friends: the top 20% of friends by frequency of interaction on Facebook. Of hundreds of followers or friends, only a small minority changed people's behavior.

Greater reach and the continuing role of strong ties

What the Facebook experiment revealed.

"Close friends exerted about four times as much influence as the message itself. Online mobilization works because it spreads through networks of strong ties that already exist offline."

Bond, Fowler et al. (2012), *Nature* 489:295-298

What this means

Social media has expanded the reach of information by orders of magnitude. It has become technically possible to deliver a message to 61 million people.

Yet the influence that actually changes behavior and beliefs is still limited to strong ties. Even with tens of thousands of followers, only a small minority actually change behavior: close friends.

Three degrees of influence remains fundamentally unchanged in the social media age. Indeed, the Facebook experiment showed that face-to-face networks and social media operate according to the same logic.

Christakis and Fowler's original research on face-to-face networks and Bond and colleagues' Facebook experiment reinforce one another. In both, influence reaches up to three degrees through strong ties.

Do influencers overturn three degrees of influence

No. An influencer with 100,000 followers:

- Can deliver information to 100,000 people, a capability that did not exist before social media.
- Changes the behavior of only a few dozen to a few hundred of those people.
- Remains only a weak tie even for those few dozen to a few hundred people.

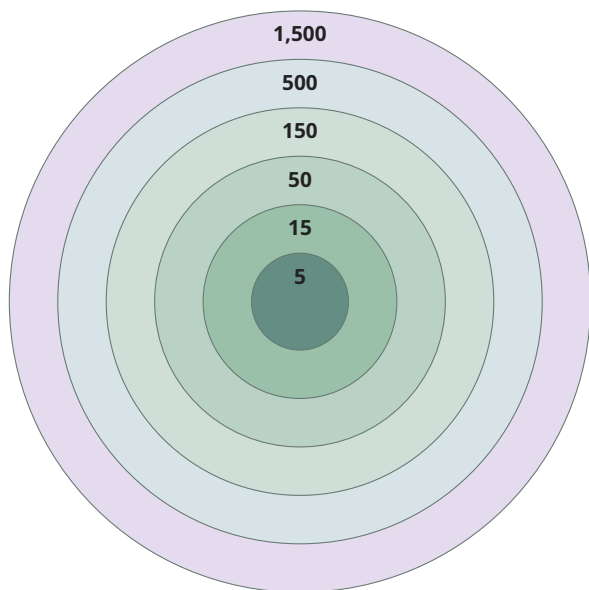
What really changes behavior is what close friends say: the 20% of friends with whom people interact regularly.

Reach and influence (behavior change) are different things. The Facebook experiment clearly distinguished these two concepts, which are often confused in the social media age.

How many close friends do we have

The Facebook experiment defined close friends as the top 20% by frequency of interaction. Structurally, how many people can humans feel close to? Research by Robin Dunbar, an evolutionary anthropologist at the University of Oxford, offers an answer.

Figure 3 Nested limits of human relationships



Dunbar's layers

5 people | Support clique. Your closest relationships; people you can rely on in a crisis.

15 people | Sympathy group. Close friends with whom you can discuss deeply personal matters.

50 people | Close network. People you could invite to dinner.

150 people | Stable relationships. Dunbar's number: the limit for remembering people's names and relationships.

500 people | Acquaintances. People you know to some extent.

1,500 people | Recognizable faces and names. People you can recognize, close to the upper limit.

Dunbar's layers and the evidence

Dunbar has repeatedly examined these layers through face-to-face surveys, telephone call frequency, and interaction frequency on social media. Each layer is roughly three times the size of the previous one (5, 15, 50, 150). The numbers vary among individuals, but the structure itself is observed universally across humanity.

A note on criticism

In 2021, a Stockholm University study argued that Dunbar's number lacks statistical support and noted that different calculation methods produce very different numbers (Lindenfors et al., *Biology Letters*). Dunbar himself acknowledges that 150 is not an exact figure but an estimate with a range of 100 to 230.

The important point is not the exact number, but the layered structure of human relationships.

Applying this to our scale

Using the research above, we can estimate how far our influence might reach within three degrees. These headcounts are estimates; their order of magnitude matters more than the precise numbers.

Three assumptions about strong ties

Assumption A | Strict. Five people: the support clique. This is most consistent with the context of Christakis and Fowler's research.

Assumption B | Intermediate. Fifteen people: the sympathy group, or close friends with whom we can discuss deeply personal matters.

Assumption C | Broad. Twenty percent: the criterion used for close friends in the Facebook experiment. Twenty percent of a 50-person network is around 10 people.

When 50 people take action

Estimate 1 A dialogue event with 50 people

A (5 people) | Thousands

1 degree: 250 people

2 degrees: 1,250 people

3 degrees: 6,250 people

B (15 people) | Over 100,000

1 degree: 750 people

2 degrees: 11,250 people

3 degrees: 168,750 people

C (10 people) | Tens of thousands

1 degree: 500 people

2 degrees: 5,000 people

3 degrees: 50,000 people

When 10 people take action

Estimate 2 A workshop with 10 people

A (5 people) | Around 1,000

1 degree: 50 people

2 degrees: 250 people

3 degrees: 1,250 people

B (15 people) | Tens of thousands

1 degree: 150 people

2 degrees: 2,250 people

3 degrees: 33,750 people

C (10 people) | 10,000

1 degree: 100 people

2 degrees: 1,000 people

3 degrees: 10,000 people

Conclusion

Whichever assumption we use, the influence of a 50-person dialogue event extends through three degrees on the order of several thousand to well over 100,000 people; for a 10-person workshop, it reaches from around a thousand to tens of thousands.

What matters is not the exact number, but the structural fact that your words and actions travel farther than you imagine. That remains fundamentally unchanged in the social media age.

Key references

Academic papers and books cited in this material, arranged by publication year within each group.

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