# Twitter reveals how future-thinking Americans are and how that affects their decisions

February 6 2018, by Carol Clark

Credit: Emory University

Individuals who tend to think further into the future are more likely to

invest money and to avoid risks, finds a new paper by psychologists at Emory University. *The Proceedings of the National Academy of Sciences (PNAS)* published the research, which tapped big data tools to conduct text analyses of nearly 40,000 Twitter users, and to run online experiments of behavior of people who provided their Twitter handles.

The researchers also found an association between longer future-sightedness and less risky decision-making at a U.S. state population level.

"Twitter is like a microscope for psychologists," says co-author Phillip Wolff, an Emory associate professor of psychology. "Naturalistic data mined from tweets appears to give insights not just into tweeters' thoughts at a particular time, but into a relatively stable cognitive process. Using social media and big-data analytical tools opens up a new paradigm in the way we study human behavior."

Co-author Robert Thorstad, an Emory PhD candidate in the Wolff lab, came up with the idea for the research, worked on the design and analyses, and conducted the experiments.

"I'm fascinated by how peoples' everyday behavior can give away a lot of information about their psychology," Thorstad says. "Much of our work was automated, so we were able to analyze millions of Tweets from thousands of individuals' day-to-day lives."

The future-sightedness found in individuals' tweets was short, usually just a few days, which differs from prior research suggesting future sightedness on the order of years.

"One possible interpretation is that the difference is due to a feature of social media," Wolff says. Another possible reason, he adds, is that prior studies explicitly asked individuals how far they thought into the future

while the *PNAS* paper used the implicit measure of previous tweets.

While the relationship between future-sightedness and decision-making may seem obvious, the researchers note that previous findings on the subject have not been consistent. Those inconsistencies may be due to factors such as observer bias in a laboratory setting and small sample sizes.

The *PNAS* paper used a suite of methods (such as the Stanford CoreNLP natural language processing toolkit and SUTime, a rule-based temporal tagger built on regular expression patterns) to automatically analyze Twitter text trails previously left by individual subjects. Experimental data was gathered using the Amazon crowdsourcing tool Mechanical Turk, a web site where individuals can complete psychology experiments and other internet-based tasks. Participants in the Mechanical Turk experiments were asked to supply their Twitter handles.

In one experiment for the *PNAS* paper, Mechanical Turk participants answered a classic delay discounting question, such as: Would you prefer $60 today or $100 in six months? The participants' Tweets were also analyzed. Future orientation was measured by the tendency of participants to tweet about the future compared to the past. Future-sightedness was measured based on how often tweets referred to the future, and how far into the future.

The results showed that future orientation was not associated with investment behavior, but that individuals with far future-sightedness were more likely to choose to wait for future rewards than those with near future-sightedness. That indicates that investment behavior depends on how far individuals think into the future and not their tendency to think about the future in general.

A second Mechanical Turk experiment used a digital Balloon Analogue

Risk Task (BART). Participants' could earn real mean every time they inflated a balloon, but each inflation could lead to the balloon popping, resulting in no money earned for that trial. If participants stopped inflating before the balloon popped, they could bank the money that they have earned and proceed to the next trial.

The BART participants' tweets were also analyzed. The results showed that those with longer future-sightedness were less likely to take the risk of fully inflating the balloon.

Another study in the *PNAS* paper focused on Twitter users whose profiles tied them to a particular state. About eight million of their tweets were analyzed for future-sightedness.

The researchers measured a state's risk-taking behaviors at the population level using the proxy of publicly available statistics, such as seat-belt compliance rates, drunken driving rates and teen-aged pregnancy rates. The results showed that shorter future-sightedness measures for tweets from individual states correlated closely to higher rates of risky behaviors, in a pattern similar to the results of the individual experimental studies.

To measure a state's investment behavior, the researchers used state statistics for spending on state parks, pre-kindergarten education, highways and per-pupil education. The researchers found that states that invested more in these areas were associated with tweets from individuals with longer future-sightedness, but not at a statistically significant level.

The researchers controlled for state demographics such as political orientation, per capita income, household income and GDP. "We found that, while demographics are important, they couldn't explain away the effects of future-thinking," Wolff says.

The estimated 21 percent of American adults who use Twitter tend to be younger and more technologically literate than the general population, Thorstad concedes. But he adds that Twitter's demographics are not that far off from the general population in terms of gender, economic status and education levels. And the percentages of Twitter users living in rural, urban and suburban areas are virtually the same.

"Twitter can provide a much broader participant pool than many psychology experiments that primarily use undergraduates as subjects," Thorstad notes. "Big-data methods may ultimately improve generalizability for psychology results."

"Through social media, we're amassing huge amounts of data on ourselves, behaviorally and over time, that is leaving behind a kind of digital phenotype," Wolff adds. "We're now in an age where we have big-data analytical tools that can extract information to tell us something indirectly about an individual's cognitive life, and to predict what an individual might do in the future."

**More information:** Robert Thorstad et al. A big data analysis of the relationship between future thinking and decision-making, *Proceedings of the National Academy of Sciences* (2018). DOI: 10.1073/pnas.1706589115

Provided by Emory University