

GDP up, happiness down

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The gross domestic product of the United States -- that oft-cited measure of economic health -- has been ticking upward for the last two years.

But what would you see if you could see a graph of gross domestic happiness?

A team of scientists from the University of Vermont have made such a graph -- and the trend is down.

Reporting in the Dec. 7 issue of the journal [PLoS ONE](#), the team writes, "After a gradual upward trend that ran from January to April, 2009, the overall time series has shown a gradual [downward trend](#), accelerating somewhat over the first half of 2011."

"It appears that happiness is going down," said Peter Dodds, an applied [mathematician](#) at UVM and the lead author on the new study.

How does he know this? From Twitter. For three years, he and his colleagues gathered more than 46 billion words written in Twitter [tweets](#) by 63 million Twitter users around the globe.

In these billions of words is not a view of any individual's state of mind. Instead, like billions of moving atoms add up to the overall temperature of a room, billions of words used to express what people are feeling resolve into a view of the relative mood of large groups.

These billions of words contain everything from "the" to "pancakes" to

"suicide." To get a sense of the emotional gist of various words, the researchers used a service from Amazon called Mechanical Turk. On this website, they paid a group of volunteers to rate, from one to nine, their sense of the "happiness" -- the emotional temperature -- of the ten thousand most common words in English. Averaging their scores, the volunteers rated, for example, "laughter" at 8.50, "food" 7.44, "truck" 5.48, "greed" 3.06 and "terrorist" 1.30.

The Vermont team then took these scores and applied them to the huge pool of words they collected from Twitter. Because these tweets each have a date and time, and, sometimes, other demographic information -- like location -- they show changing patterns of word use that provide insights into the way groups of people are feeling.

The new approach lets the researchers measure happiness at different scales of time and geography -- whether global patterns over a workweek -- or on Christmas.

And stretched out over the last three years, these patterns of word use show a drop in average happiness.

Or at least a drop in happiness for those who use Twitter. "It does skew toward younger people and people with smartphones and so on -- but Twitter is nearly universal now," Dodds said, "Every demographic is represented."

"Twitter is a signal," Dodds said, "just like looking at the words in the New York Times or Google Books." (Word sources that the team is also exploring in related studies). "They're all a sample," he says. "And indeed everything we say or write is a distortion of what goes on inside our head."

But -- like GDP is a distortion of the hugely complex interactions that

make up the economy and yet is still useful -- the new approach by the UVM team provides a powerful sense of the rising and falling pulse of human feelings.

"Individual happiness is a fundamental societal metric," the researchers write in their study. Indeed the ultimate goal of much public policy is to improve and protect happiness. But measuring happiness has been exceedingly difficult by traditional means, like self-reporting in social science surveys. Some of the problems with this approach are that people often don't tell the truth in surveys and the sample sizes are small.

And so efforts to measure happiness have been "overshadowed by more readily quantifiable economic indicators such as [gross domestic product](#)," the study notes.

The new approach lets the UVM researchers almost instantaneously look over the "collective shoulder of society," Dodds says. "We get a sense of the aggregate expressions of millions of people," says Dodds's colleague Chris Danforth, a mathematician and a co-author the study, while they are communicating in a "more natural way," he says. And this opens the possibility of taking regular measures of happiness in near real-time -- measurements that could have applications in public policy, marketing and other fields.

The study describes hundreds of insights from the Twitter data, like a clear weekly happiness signal "with the peak generally occurring over the weekend, and the nadir on Monday and Tuesday," they write. And over each day happiness seems to drop from morning to night. "It's part of the general unraveling of the mind that happens over the course of the day," said Dodds.

In the long-term graph that shows an overall drop in happiness, various ups and downs are clearly visible. While the strongest up-trending days

are annual holidays like Christmas and Valentine's Day, "all the most negative days are shocks from outside people's routines," Dodds say. Clear drops can be seen with the spread of swine flu, announcement of the U.S. economic bailout, the tsunami in Japan and even the death of actor Patrick Swayze.

"In measuring happiness, we construct a tunable, real-time, remote sensing, and non-invasive, text-based hedonometer," the Vermont scientists write. In other words, a happiness sensor.

Right now the sensor is only available to the researchers, but Dodds, Danforth and their colleagues have in mind a tool that could go "on the dashboard" of policy makers, Dodds says. Or, perhaps, on a real estate website for people exploring communities into which they might move, or, simply, "if someone is flying in a plane they could look at this dashboard and see how the city below them is feeling," he says.

Of course feelings change quickly and the nature of happiness itself is one of the most complex, profound issues of human experience.

"There is an important psychological distinction between an individual's current, experiential happiness and their longer term, reflective evaluation of their life," the scientists write, "and in using Twitter, our approach is tuned to the former kind."

And looking ahead, the Vermont scientists hope that by following the written expressions of individual [Twitter](#) users over long time periods, they'll be able to infer details of happiness dynamics "such as individual stability, social correlation and contagion and connections to well-being and health."

Dodds and his colleagues are no strangers to the debates over the role of happiness that can be traced back through Brave New World to Jeremy

Bentham, Thomas Aquinas, and Aristotle. "By measuring happiness, we're not saying that maximizing happiness is the goal of society," Dodds says. "It might well be that we need to have some persistent degree of grumpiness for cultures to flourish."

Nevertheless, this study provides a new view on a compelling question: why does [happiness](#) seem to be declining?

Provided by University of Vermont

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