

Virtual peer pressure in citizen science

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Screenshot of the Brooklyn Atlantis interface. Researchers found that competition from even a virtual peer can encourage participants to contribute more often. Credit: Journal of the Association for Information Science and Technology 16 AUG 2016

Peer pressure is a proven social motivator, and seeing a friend or colleague succeed at a task can boost individual effort. Researchers at the New York University Tandon School of Engineering probed this

decidedly human attribute—sensitivity to competition from peers—and found that not only is virtual pressure from a computer-simulated peer just as motivating as the real thing, but that "fake" competition can be used for the good of science.

The research team formulated a mathematical model of human behavior that successfully predicted group responses across conditions—one they hope other researchers will use to overcome the notoriously difficult task of encouraging wide participation in scientific projects.

Maurizio Porfiri, professor of mechanical and aerospace engineering and director of the Dynamical Systems Lab at NYU Tandon, and Oded Nov, associate professor of technology management and innovation, designed an experiment to test whether virtual peer pressure could boost individual participation in a [citizen science](#) project they founded in 2012, Brooklyn Atlantis. The research team included Jeffrey Laut, a recent NYU Ph.D. graduate, and Francesco Cappa, a visiting student.

Citizen science projects rely on volunteers from the general public to aid professional scientists by collecting and reporting data using their home computers or smartphones. Familiar examples include projects tracking the movement of monarch butterflies, efforts to identify new planets, and even an online game challenging users to find new ways to fold protein structures.

Brooklyn Atlantis is a [citizen science project](#) supported by the National Science Foundation that revolves around a mobile robot designed by Laut as part of his dissertation. The instrumented mobile robot serves as prototypes for water drones that Laut and Porfiri hope to commercialize through a recent New York State Energy Research and Development Authority (NYSERDA) grant. The robot patrols the Gowanus Canal, the notoriously polluted Brooklyn waterway and Superfund site, transmitting a constant stream of data on water quality and temperature, as well as

images both above and below the waterline. Citizen scientists volunteer to view the images and create "tags" to identify objects in the photos, which may include humans, wildlife, or specific pieces of litter or debris.

All crowd-sourced science projects face a similar challenge: Despite having many registered participants, the majority of contributions come from a small, highly engaged group of volunteers. Increasing participation levels has long been a goal.



The Brooklyn Atlantis project's marine robot which plies the Gowanus Canal to collect data and images of wildlife. Credit: New York University

The research team created an experiment to determine if the presence of a virtual peer could enhance volunteer contributions. They redesigned the interface of the Brooklyn Atlantis page where users view and tag images, adding an indicator bar at the top of the screen to display the number of times another participant had tagged the same image. This was the performance of the virtual peer, and the researchers created five distinct scenarios for the virtual peer's performance.

Splitting the 120 participants, they formed a [control group](#) with no virtual peer and two groups for which the virtual peer's performance varied according to an independent algorithm. For the three remaining groups, the virtual peer's performance varied in relation to the user: One consistently underperformed the real user, one consistently outperformed, and the other performed on par with the real user.

The results show that pressure from a virtual peer can influence the behavior of a citizen scientist. The highest-performing group of real users—the ones who tagged the most objects in Brooklyn Atlantis photos—were those who saw a virtual peer that consistently outperformed them. Conversely, the group who saw a virtual peer that underperformed them contributed fewer tags than any other group, including the peer-free control group.

The group whose virtual peer matched their own level of activity also tagged more objects than a control group, indicating that perhaps the mere presence of a peer leads to increased performance.

"Social comparison is a strong driver of behavior, and it's exciting to see that even simulated performance was enough to influence our participants to tag more or fewer objects. Even more exciting was the fact that we can anticipate such a response using a mathematical model," Porfiri said. He noted that the real-life participants mostly mirrored the activity of the simulated participant, indicating that this sort of norm-setting may help boost participation in citizen science projects.

"The study taught us how the design of a social participation system can benefit from incorporating social psychology research," Nov explained.

The researchers believe that these findings add to the growing body of research into how to increase engagement in citizen science projects. Alongside issuing rewards, points, or other forms of "gamification,"

using peer performance as a motivator shows clear promise. Further research is needed to determine a level of competition that is healthy rather than counterproductive.

More information: Jeffrey Laut et al. Increasing citizen science contribution using a virtual peer, *Journal of the Association for Information Science and Technology* (2016). [DOI: 10.1002/asi.23685](https://doi.org/10.1002/asi.23685)

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