

The Particle Whisperers

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As many parents know, it's often easier to keep your kids under control by exerting less authority rather than more. A child who fidgets uncontrollably in a confining booster seat, for example, may be perfectly content on a plain old chair.

A team of physicists at the Universitat de Barcelona has found that the same is true in controlling the movement of particles suspended in liquids. What's more, they speculate that many microscopic systems, macroscopic ecosystems, and human social systems may respond to a gentle touch for the very same mathematical reasons.

In order to test their hypothesis that heavy handedness can lead to loss of control, the researchers used optical tweezers to grab hold of floating microscopic beads. They then dragged the particles back and forth in the fluid as they ramped up the intensity of the lasers that formed the tweezers.

As they expected, increasing laser power provided an ever tighter grip on captured particles, but only up to a point. Eventually, ramping up the laser led to a poorer control of the particles, which jostled around more and more as the laser intensity increased.

The experiment was consistent with a simple mathematical model that the researchers suggest could be helpful in optimizing all sorts of systems, from high-resolution microscopes to managed ecosystems such as national parks. It could even help mathematically explain why overly strict social policies may lead to chaos and revolution, and how iron-

fisted fiscal policies can potentially drive economic systems to ruin.

Citation: G. Volpe, S. Perrone, J. M. Rubi, and D. Petrov, *Physical Review E* (forthcoming)

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