

THE VACCINATION GAME

by Eve Krakow

When deciding whether or not to vaccinate their child, parents weigh the benefits against the risks. Yet their choice is also influenced by other people's choices. For example, if everyone around them is vaccinated, they may be tempted not to vaccinate thinking that their child is protected through herd immunity.

"In this case, even a slight perceived risk can tip the scales in favour of non-vaccinating behaviour and cause a decline in vaccine uptake," says Chris Bauch, a mathematician at the University of Guelph, Ontario.

Bauch and David J.D. Earn, a mathematician at McMaster University, Ontario, used "game theory" to analyze human behaviour when it comes to making decisions on vaccinating their child. They believe such modelling could be of use to policy-planners.

Game theory involves understanding strategic interactions in a group. *"The best example is a game like poker, where you pick your strategies according to what you think other people will do,"* explains Bauch. *"You try to maximize your payoff."*

The key prediction made in this research is that vaccination coverage levels will tend to recover more slowly after a scare than

the rate at which they initially dropped. More generally, the authors want to emphasize that when vaccination is voluntary, high coverage levels are inherently instable. *"Voluntary policies are victims of their own success,"* says Bauch. *"Once coverage is sufficiently high, people get complacent."*

Edward Kaplan, a professor of public health at the Yale School of Management, specializes in the use of mathematical modelling to help make better decisions. He suggests one way to counter the problem raised by this study would be to provide incentives for people to vaccinate, such as reductions in insurance premiums. *"When individuals act in their own interests, one rarely arrives at a result that is best for the group."*

Bauch believes this kind of research could influence policy-makers. However, it will take more time before a model can be developed to answer specific policy questions. ♻️

"Voluntary policies are victims of their own success"

Ref.: Bauch CT, Earn DJD. Vaccination and the theory of games. *Proceedings of the National Academy of Sciences of the United States of America* 2004;101(36):13391-13394.

The Bulletin is a publication of the Centre of Excellence for Early Childhood Development, one of four Centres of Excellence for Children's Well-Being funded by the Public Health Agency of Canada. The views expressed herein do not represent the official policies of the Public Health Agency of Canada. The Centre identifies and summarizes the best scientific work on social and emotional development of young children and makes this information available to service planners, service providers and policy-makers.

The Centre's partners are the Public Health Agency of Canada, Université de Montréal, Centre de recherche de l'Hôpital Sainte-Justine, Fondation Jules et Paul-Émile Léger, Canadian Paediatric Society, Montreal Children's Hospital, Canadian Child Care Federation, University of British Columbia, Institut national de santé publique du Québec, Dalhousie University, IWK Health Centre, Centre de Psycho-Éducation du Québec, Queen's University, First nations of Quebec and Labrador Health and Social Services Commission, Invest in Kids, Fondation Lucie et André Chagnon.

We are grateful to the Fondation Jules et Paul-Émile Léger for their financial contribution to produce this bulletin.

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Scientific Proofreading: Cathy Barr, Chris Bauch, Pascal Belin, Éric Fombonne, Tod Kippin, Ian Krantz, Michael Meaney, Dessa Sadovnick, Paul Sandor and Moshe Szyf
Layout: Guylaine Couture
Printing: QuadriScan

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ISSN 1499-6219
ISSN 1499-6227