



# How to promote public acceptance of science and technology with uncertainty: A behavioral economics approach

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## Abstract

The benefits and effects of newly developed, "unknown" scientific technologies often appear "uncertain" to the general public, making their acceptance challenging or slow. My study examines how to facilitate voluntary public acceptance of scientific technologies (e.g., vaccines and contact-tracing apps) during the COVID-19 pandemic, using insights from behavioral economics and nudge. The research develops and evaluates communication strategies designed to encourage adoption and provides policy recommendations for real-world implementation. Additionally, this study investigates the societal divisions that emerge between adopters and non-adopters (e.g., vaccinated vs. unvaccinated individuals) and examines how these divisions evolved over the multi-year pandemic. The findings contribute to both the academic literature on behavioral interventions and the development of evidence-based policy measures for future public health crises.

## Background & Results

My study examines the potential of nudge communication to accelerate the societal adoption of science and technology by promoting acceptance. While such communication strategies have been shown to increase uptake, their effectiveness may vary in dynamic environments, such as infectious disease pandemics, where factors like the emergence of viral variants or changes in the risks of severe illness rapidly alter the context. Our findings highlight a critical concern: without timely adjustments to the content and target of communication, these strategies may risk exacerbating societal divisions between those who accept and those who resist new technologies. Addressing this issue will be essential to fostering societal acceptance of science and technology while mitigating potential negative effects. Future research should focus on developing adaptive communication frameworks that balance the need for promoting acceptance with minimizing division.

## Significance of the research and Future perspective

In March 2021, an online survey experiment was conducted in Japan with 1,595 participants to evaluate the effects of three nudge messages on willingness to vaccinate against COVID-19, decision autonomy, and psychological burden. Statistical analysis showed that a message emphasizing social influence ("Your vaccination will encourage those around you to get vaccinated") increased vaccination intent among older adults. Messages framed as a loss ("If you don't get vaccinated, the vaccination rate among those around you will not progress") or using descriptive norms ("X out of 10 people your age plan to get vaccinated") strengthened vaccination intentions among elderly individuals already planning to vaccinate. However, the loss-framed message increased psychological burden and did not affect young people's intentions.

In January and February 2022, a game experiment with vaccinated (N=796) and unvaccinated participants (N=782) measured "in-group favoritism" in monetary allocations. Vaccinated individuals

als favored others with the same vaccination status, while unvaccinated participants showed no such attitude. Among unvaccinated individuals unable to vaccinate for health reasons, allocations favored vaccinated pairs. Continued experiments revealed that the divide between vaccinated and unvaccinated individuals deepened over time. These findings suggest that tailored communication strategies and interventions are critical to addressing societal divisions and promoting vaccination uptake.

- This vaccine has been shown to be **effective in preventing the onset of COVID-19**.
- In other words, **vaccination can reduce the likelihood of you developing COVID-19** when you are infected.
- Vaccination may cause fever and pain and swelling in the vaccinated arm.
- In rare cases, adverse reactions of anaphylaxis may occur; however, it has been shown that these reactions are not a serious problem if handled appropriately. Vaccination sites in Japan are prepared to handle these reactions appropriately.

**The more people who receive this vaccine,  
the more people who have an intention to do so.  
Your vaccination uptake can encourage  
the vaccination uptake of the people around you.**

Fig.1 Effective Nudge-based Message

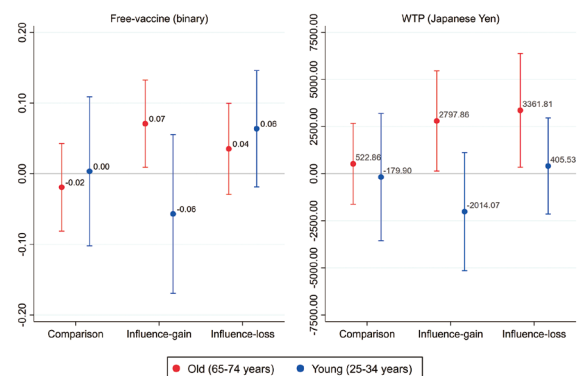


Fig.2 Message Effects on Vaccination Intention

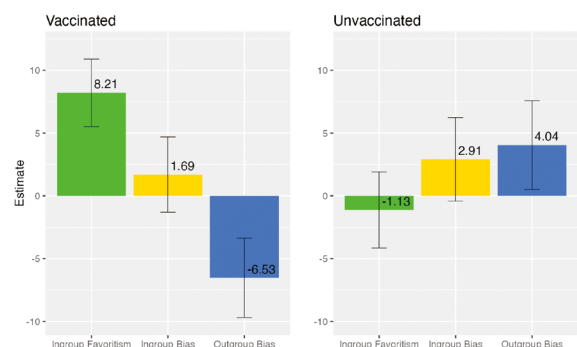


Fig.3 Ingroup Favoritism of Vaccinators and Non-vaccinators

## Patent

Sasaki, Shusaku; Saito, Tomoya; Ohtake, Fumio. Nudges for COVID-19 voluntary vaccination: How to explain peer information? Social Science & Medicine. 2022, 292, 114561. doi: 10.1016/j.socscimed.2021.114561

## Treatise

Sasaki, Shusaku; Kurokawa, Hirofumi. Vaccination and discrimination: Experimental evidence during and after the COVID-19 pandemic. Osaka University CiDER Discussion Paper. 2024, 001.

Sasaki, Shusaku; Ohtake, Fumio; Saito, Tomoya. Confronting "an unknown vaccine" with behavioral economics, Nippon Hyoron sha co., Ltd. 2025. ISBN:978-4-535-54074-3

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## Keyword

behavioral economics, nudge, technology adoption, uncertainty