

CSC-LKYSPP BEHAVIOURAL ECONOMICS SYMPOSIUM 2018

Behavioural Insights (BI) and Technology: Augmenting Cognitive Biases to Improve Decision-Making 2 August 2018, Civil Service College

Lecture Notes

Speakers:

Associate Professor Hal Hershfield (UCLA) – [Adding the Self into Choice Architecture](#)

Professor Klaus Wertenbroch (INSEAD) – [Protecting Consumer Sovereignty in the Age of Big Data and Artificial Intelligence \(AI\)](#)

Ms Hefen Wong (Ministry of Manpower) – [Driving Transformation in MOM with Design Thinking, Behavioural Insights and Data Analytics](#)

Adding the Self into Choice Architecture By Associate Professor Hal Hershfield

PRESENT AND FUTURE TRADE-OFFS

- Many people struggle with decisions that involve trade-offs between present and future choices. Behaviourally-informed interventions can help people to manage these decisions better. Prof Hershfield cited an example of how the “Save More Tomorrow” programme helped employees saved more.¹ In this programme, employees committed to increasing their savings contribution rate even before receiving their pay increase. This rise in contribution rate kicks in automatically for the first paycheck after a salary increment. Without the automatic escalation feature, employees might be unwilling to increase their contribution rate after receiving a salary increment.
- Hershfield highlighted the following factors to increase the effectiveness of these interventions.
 - (i) The success of interventions depends on whether the choice architect has control over how choices are presented. For example, traditional workers are exposed to choice architecture established by their employers. In contrast, contract workers or freelancers do not operate in such controlled environments. In such situations, it would be difficult to modify the choice architecture to change their behaviours.
 - (ii) Choice architects need to make the right decision because their decisions could result in negative outcomes. For instance, a company’s savings plan with a default savings contribution rate of 3%

¹ Thaler, R. H., and S. Benartzi. “Save more tomorrow: Using behavioural economics to increase employee savings”. *Journal of Political Economy*, 112, 164-187. Accessed August 7, 2018. <https://www.journals.uchicago.edu/doi/pdfplus/10.1086/380085>

led to some employees reducing their initial contribution rate.² Because the default rate provided an anchor value, those who saved more before the introduction of this savings plan lowered their contribution rate to match the default rate. In this case, the choice architect needs to decide on the default contribution rate carefully in order to obtain the desired outcome.

- (iii) Interventions should aim to change people's motivation and not just their behaviour. A default savings contribution rate might change behaviour, but it does not change the way people think about these decisions. Hence, there is scope for interventions to focus more on the psychology of long-term decision-making.

HOW PEOPLE THINK ABOUT THEIR FUTURE SELF

- Because many problems involve trade-offs between the present and future, it is important to understand people's thinking about the present and future. Most of us have different and competing interests between the present self and future self. Studies have shown that we sometimes think of our future self as a different person. For example, people tend to think of their next birthday from their own eyes. However, when asked to imagine their birthday in 20 years' time, people tend to take on a third person perspective and picture their older self.
- People make decisions for their future self and others in a similar way. Participants in an experiment were presented with a concoction of disgusting liquid. They were asked to decide on the amount to be drunk from this liquid in 3 scenarios – by their present self, future self and others.³ The findings revealed that participants chose a lowest quantity of liquid for their present self. Interestingly, the amounts they decided for others and their future selves were similar. This confirmed the hypothesis that people treat the future selves like others during decision-making. The same observation was made on a neurological level (see **Box 1**).

Box 1: How the brain responds to future self and others

Research participants were scanned with fMRI⁴ while completing a task that required them to make judgements for the (i) current self; (ii) future self; (iii) current other; and (iv) future other.⁵ A unique word related to traits (e.g. 'Honourable') was displayed on the screen and participants had to choose one of the four options provided (see **Figure 1**).

² Beshears, J., J. J. Choi, D. Laibson, and B. C. Madrian. "The Impact of Employer Matching on Savings Plan Participation under Automatic Enrollment". *Research Findings in the Economics of Aging*, 311-327. Accessed August 7, 2018. https://www.hbs.edu/faculty/Publication%20Files/impact_of_employer_matching_f7c59a49-f2bd-4713-ba12-a960b5e66008.pdf

³ Pronin, E., C. Y. Olivola, and K. A. Kennedy. "Doing unto future selves as you would do unto others: psychological distance and decision making." *Personality and Social Psychology Bulletin*, 34, 224 – 236.

⁴ Functional Magnetic Resonance Imaging (fMRI) is a technique used to measure brain activity.

⁵ Hershfield, H. E., G. E. Wimmer, and B. Knutson. "Saving for the future self: Neural-measures of future self-continuity predict temporal discounting". *Social Cognitive and Affective Neuroscience*, 4(1), 85 – 92. Accessed on August 7, 2018. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2656877/>



Figure 1: An example of the experiment task⁶

Results

There was a higher neural activation level when people thought about current self-compared to future self and others. This supports the fact that future self-triggers similar neural activation solicited from thinking about other people.

CONNECTION TO FUTURE SELF AS A PREDICTOR OF DECISION-MAKING

- How we think of our future self is an important predictor of decision-making. The future self can be a different person, but what matters is who that person is. If there is no or little emotional connection to the future self, it is unlikely that people will make the right decision for their future self. Based on Hershfield’s and Kerbel’s research, it was found that people saved more over time if they feel more connected to their future self. This relationship was present even at different federal poverty levels in the United States and across other domains like eating habits as well as ethical decisions (e.g. tendency to cheat).

BRING THE FUTURE SELF CLOSER TO PRESENT SELF

- To complement traditional interventions, Prof Hershfield suggested bridging the gap between the present and future self (see **Box 2 and 3**).

Box 2: Taking responsibility for the future self

In a field experiment for a retirement savings programme, participants received one of two messages.⁷ Both messages carried the same intention but were framed differently. The first message focused on appealing to people’s sense of rational self-interest (e.g. *“It is in your best self-interest to save more”*) while the second message increased the saliency of future self (e.g. *“It is your responsibility to take care of your future self. His or her wellbeing depends on the decision you make now”*).

The ‘future self’ message brought about a larger increase in savings and those who saved more did so because they felt connected to their future selves.

⁶ Hal E. Hershfield, “Adding the Self into Choice Architecture”, Presentation slides, CSC-LKYSPP Behavioural Economics Symposium 2018, 7 August 2018.

⁷ Bryan, C. J., and H. E. Hershfield. “You owe it to yourself: Boosting retirement saving with a responsibility-based appeal”. *Journal of Experimental Psychology: General*, 141(3), 4290432. Accessed August 7, 2018. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3305824/>

Box 3: Future self in a virtual reality environment

Hershfield et al. conducted an experiment to test whether interactions with future selves would affect present decisions.⁸ In a virtual reality environment, participants were brought into a room and shown one of the two avatars (see **Figure 3**):

- (i) a realistic computer-processed version of their future self or
- (ii) their current self.



Figure 3: Example of avatars⁹

Those who saw their future selves displayed greater intentions to save for the future. However, Prof Hershfield cautioned that this intervention is costly and it would only be effective if the future self-looked realistic.

- The future self-need not always be visually vivid. It is the emotional connection to the future self that matters (see **Box 4**).

Box 4: An automatic savings account experiment in Mexico

Prof Hershfield ran a study in Mexico with ideas42 and the clients of a bank were randomly assigned to one of the following groups:¹⁰

- (i) Control Group: Clients were presented the option to enroll into an automatic savings account.
- (ii) Future Group: Clients answered a series of questions related to the future (e.g. “do you feel confident that you’ve saved enough money for this future?”) and thereafter, the financial advisor would read the responses back to the client.
- (iii) Past Group: Clients completed the same task as the future group, but were first asked to consider their past self and how their past self-helped their current self.

In the future group, 3.68% signed up for the automatic savings plan. In comparison, only 0.11% from the control group and 1.46% from the past group enrolled into the savings plan. Besides making the future self visually vivid, this is an alternative way to help people be connected to their future selves.

⁸ Hershfield, H.E., D. G. Goldstein, W. F. Sharpe, J. Fox, L. Yeykelvis, L.L. Carstensen, and J. Bailenson. “Increasing saving behavior through age-progressed renderings of the future self.” *Journal of Marketing Research*, 48, S23-S27.

⁹ Hal E. Hershfield, “Adding the Self into Choice Architecture”, Presentation slides, CSC-LKYSP Behavioural Economics Symposium 2018, 7 August 2018.

¹⁰ Shah, Hershfield, Mungula Gomez, and Fertig. Working Paper.

- Changing the way people mentally time-travel to the future is another way of connecting the present and future self. For example, people were 5% more likely to enroll into a savings plan when they first thought of the future and brought it back to the present.¹¹

MAKE THE SACRIFICE LESS ONEROUS FOR THE PRESENT SELF

- Besides changing the relationship between the present and future self, interventions could aim to make the sacrifice less onerous for the present self (see **Box 4**).

Box 4: Digital nudges to increase savings

10,000 new users were asked if they would like to register for an automatic savings account on a mobile phone app.¹² They were assigned randomly to one of these three categories: (i) \$150 per month; (ii) \$35 per week; and (iii) \$5 per day. All options would have resulted in the same savings amount per month (i.e. \$150), but the options were framed differently to vary the sense of sacrifice felt by the present self.



Figure 4: Sign-ups for Autonomic Savings

Result

Approximately four times as many users signed up for the \$5/day option compared to the \$150/month option (see **Figure 4**). By reducing the sacrifice incurred by the present self, people would have an easier time making the right decision. The same outcome was observed (i.e. more selected the option with a ‘smaller’ trade-off) when the experiment was replicated with two other saving plans of \$30/month and \$7/week (see **Figure 4**).

¹¹ Christensen, Hershfield, and Maglio. Working Paper.

¹² Hershfield, H. E., S. Shu, and S. Benartzi. “Temporal Reframing and Savings: A Field Experiment”. SSRN Working Paper.

Protecting Consumer Sovereignty in the Age of Big Data and Artificial Intelligence (AI)

By Professor Klaus Wertenbroch

RESISTANCE TO PERSONAL NUDGES?

- Nudges customised to each individual could potentially harm consumer welfare by threatening people's sense of identity and "free will". Wertenbroch presented on how "personal nudges" might be implemented without imposing such harms. Postulated in 2013 by nudge theory pioneer Cass Sunstein, personal nudges now seem feasible, thanks to advances in predictive analytics using big data and algorithms. Wertenbroch pointed out that in the right circumstances, big data paired with algorithms would make it seem that a computer knew a person's preferences better than herself.
- Many people already disliked how algorithms and big data were used. Some examples: Uber and Amazon used these to price-discriminate, which some felt was unfair; the EU banned software that could detect customer emotions from video images and photos; and political consultancy Cambridge Analytica closed after revelations about its wrongful use of millions of Facebook users' data.
- He added that when measured, such personalised targeting might seem to have small effects. However, small shifts in behaviour or decisions could have a huge impact in certain scenarios. For example, the 2016 U.S. presidential election was decided by just 80,000 voters in three states, or 0.03% of total votes cast.

THE IMPORTANCE AND IMPACT OF EXERCISING FREE WILL

- Wertenbroch asserted that personal nudges may not always improve an individual's welfare, because people value the exercise of their "free will". Algorithms trained with big data could thus challenge many people's beliefs about their "free will". The recommended decisions would come across as more deterministic, hence making people feel threatened and causing them to choose sub-optimal options they would not usually choose (see **Box 1**).

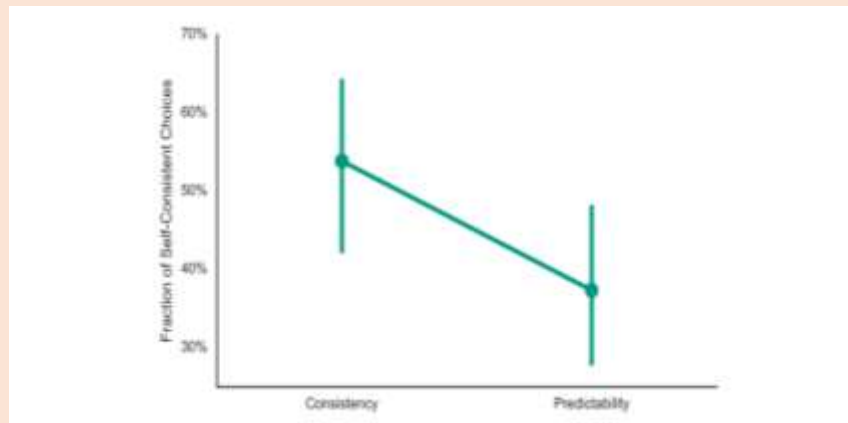
Box 1: Exercising Free Will in Decision-making

Wertenbroch and co-researcher Schrift ran an experiment where they randomly sorted participants into 1 of 2 treatment groups. They then asked each one about her preferences for vacation packages. Next they presented 5 packages, and asked her to choose 1. Some additional information was given to each participant, framed in two different ways even though they were mathematically the same:

1. "Predictability" framing – that her choices could be predicted;
2. "Consistency" framing - that her choices were consistent with her preferences

Unknown to the participant, the researchers had already identified which of the 5 packages she would most likely pick based on her preferences. Wertenbroch and Schrift wanted to see how the framing would affect the likelihood of her picking her preferred choice.

They found that those given the “predictability” framing were much less likely to choose their preferred choice:



This was evidence that people valued exercising their “free will” to the extent that they would do so even if it meant choosing something they did not prefer.

Reference: Schrift and Wertenbroch, in progress.

- Hence policymakers should frame optimal decisions predicted by big data and AI as being consistent with people’s preferences. This would come across as less deterministic than a path that has been predicted ahead. Nudges would then be more acceptable and people would be less resistant to making the most optimal choice.

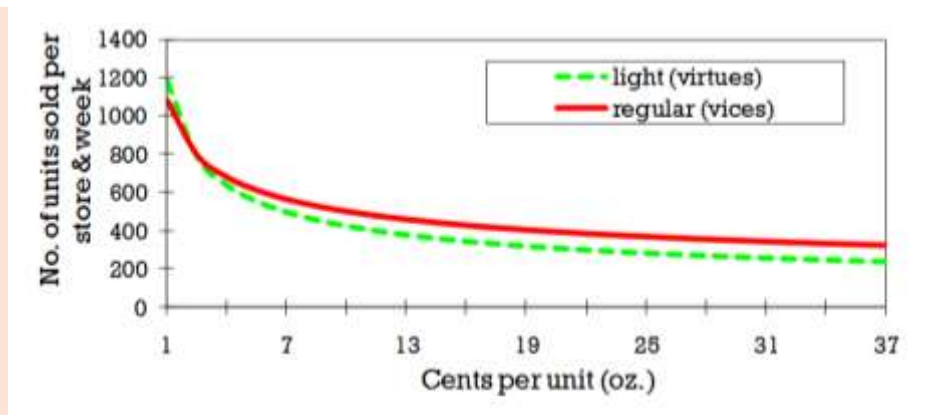
WORKING WITH PEOPLE’S PRECOMMITMENT AND SELF-CONTROL

- Wertenbroch also recommended that in controlling vices, governments should explore how to strengthen people’s attempts at self-control. This was in addition to how governments typically seek expert advice, and estimate negative externalities when designing regulations.
- He highlighted that people who had habits that seemed addictive or unproductive e.g. smoking, also tended to take steps to limit harm from those actions. This group of people seek measures to protect themselves from giving in to future temptations and impulses (see **Box 2**).

Box 2: Paying more for Unhealthy Versions of Food

Wertenbroch’s own experiments showed that people practiced some degree of self-control even as they consumed unhealthy foods.

For instance, Wertenbroch used supermarket scanner data to compare how the quantities sold of regular and “light” i.e. healthier foods changed with their prices. He found that given the same fall in price, consumers bought less of a regular food compared to its light version (i.e. demand for the regular version was less price-elastic):



Werthenbroch called this consumption behaviour --- when prices fall, people buy less of the regular version compared to the light version --- a “pre-commitment premium”. This showed that consumers exercised some level of self-control in the consumption of the regular version.

Source: Werthenbroch 1998, *Marketing Science*

- He suggested that policymakers set up processes that look for such “strategic pre-commitment” behaviours in retail data, and offer these self-aware people help with their pre-commitment or self-control measures. Werthenbroch also suggested that consumers who do not adopt pre-commitment devices may be less self-aware, and may thus benefit from personal nudges (powered by algorithms).

Driving Transformation in MOM with Design Thinking, Behavioural Insights and Data Analytics

By Ms Wong Hefen, Deputy Director, Co-Lab, Ministry of Manpower (MOM)

INTRODUCTION

- Governments in many countries are embarking on public sector transformation. Examples of how the Singapore public service is transforming through digitalisation include our Smart Nation efforts and the Moments of Life initiative. Moments of Life enables citizens to access integrated services delivered by multiple government agencies through one single platform. Various agencies have also been taking on projects which use technology to bring about behavioural change. Examples include the Health Promotion Board (HPB)'s National Steps Challenge and the Public Utilities Board (PUB)'s introduction of benchmarks in their water bills to show users how efficient they are compared to their neighbours.

MOM'S TRANSFORMATION EFFORTS

- The Ministry of Manpower (MOM)'s efforts to drive transformation began in 2009, when it introduced the method of Design Thinking as part of its Business Process Re-Engineering efforts to deliver a world-class work pass service.
- Over the years, MOM improved user experiences in the following areas:
 - Redesigned 4 customer service centres to enhance customer experiences
 - Re-did MOM's official website and content to make information more accessible and reader-friendly
 - Rebuilt MOM's Work Pass Integrated System for Foreign Domestic Workers with AGILE development methodologies to make it more user-friendly
- In 2013, MOM began to experiment with the new methods of Behavioural Insights and Data Analytics by setting up the Behavioural Insights & Design Unit and Business Analytics Competency Centre. In 2017, the teams were merged to form Co-Lab, a centralised multi-disciplinary team specialising in the disciplines of Behavioural Insights and Design, Business Analytics and Enterprise Information Management.
- MOM uses a framework, named 'Understand-Design-Test', which combines design thinking, behavioural insights and business analytics to create human-centred policies and data-driven decisions. An example of how the 'Understand-Design-Test' framework had been applied was MOM's ongoing efforts to transform its regulatory approach to promote greater ownership for workplace safety and health among companies.

TRANSFORMING OCCUPATIONAL SAFETY AND HEALTH

- The construction sector is a comparatively risky sector. Although the number of fatal injuries has been dropping since 2011, it still accounts for 29% of total fatal injuries in the workplace in 2017. MOM embarked on an initiative to explore how regulation of the sector could be improved, and how the emergence of new technologies could lead to changes in behaviour.
- *(1)Understand:*

MOM carried out more than 30 in-depth user interviews with employers, workers, safety officers and MOM inspectors. These interviews surfaced challenges on the ground, such as the conflict that safety officers faced between implementing safety practices and ensuring these practices did not delay project timelines. The interviews also helped MOM realise that, although employers found MOM inspections useful, they may not have seen MOM inspectors as collaborative or helpful.

- *(II) Design:*
MOM co-designed behavioural interventions with relevant stakeholders based on the process of workplace inspections:
 - Pre-Inspection: MOM sent letters to employers to inform them about their workplace safety and health (WSH) performance compared with their peers. The letters drew management's attention to their company's records and highlighted the risks of poor WSH practices.
 - During Inspection: MOM co-designed a checklist with inspectors to help uncover the deeper causes underlying WSH lapses. This could include a lack of clarity in the definition of roles or lack of communication among various parties in a worksite. The completed checklist that was given to company reps at the end of the inspection provided salient and timely systemic advice on how to resolve and prevent future lapses.
 - Post-Inspection: MOM sent letters to employers to update the management about the results of their inspections, and reinforced the systemic advice on how they could improve their WSH practices.

- *(III) Test:*
The interventions were tested through a randomised controlled trial. Although positive outcomes were observed for the treatment group (as shown by a six-fold reduction in enforcement actions), the results were not found to be statistically significant because of the small sample size.

- Nonetheless the interventions helped MOM attain resource savings by focusing their efforts on companies with poorer WSH records. Qualitative research also revealed the impact that the interventions had on changing companies' compliance behaviour.

- Ms Wong shared that MOM is scaling these interventions up for the entire construction sector, and considering how they could be adapted for other sectors such as manufacturing.

- MOM was also looking into the use of other technological tools. For instance, Co-Lab was developing predictive analytics models to prioritise resource allocation, and interactive data dashboards to improve feedback loops. It was also partnering GovTech to explore how sensors and the Internet of Things could be used to promote self-regulation.

CONCLUSION

- Ms Wong ended by sharing three insights for agencies intending to embark on transformation, based on Co-Lab's experience:
 - 1) Understand the problem we're trying to solve**
Identify the issue in the ecosystem which needs to be solved first, before considering which technological solutions are appropriate.

2) Find the right method to solve it

Combine quantitative and qualitative methods for more rigorous analysis. For example, data can provide information about what is happening, while qualitative research can help to explain how and why things are happening.

3) Create safe spaces for experimentation

Consider suspending Key Performance Indicators (KPIs) for officers when they engage in trials. This would free them to experiment without fear of contravening organisational KPIs.