



Supporting decisions for sustainability

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Acknowledgements

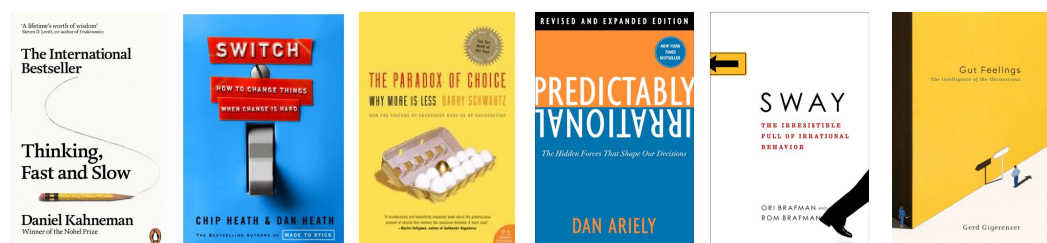
- Doug Bessette
- Joule Bergerson
- Victoria Campbell-Arvai
- Richard Grogan
- Robyn Wilson
- Carbon Management Canada
- Compass Resource Management
- Inshtrix Research LLC
- Michigan State University Board of Trustees
- U.S. National Science Foundation
- Suncor Energy

Two Questions

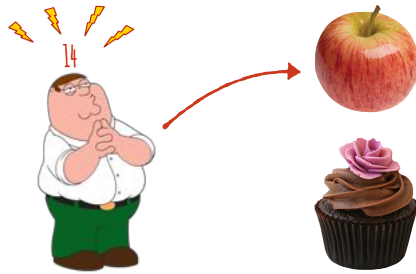
1. **What progress has been made** in developing models that are appropriate for supporting decisions related to sustainability?
2. **What new efforts might be required** to address needs and opportunities related to sustainability?

Research on decision-making is popular...

- Over the past several years, there has been an explosion of popular interest in research on human judgment and decision-making.

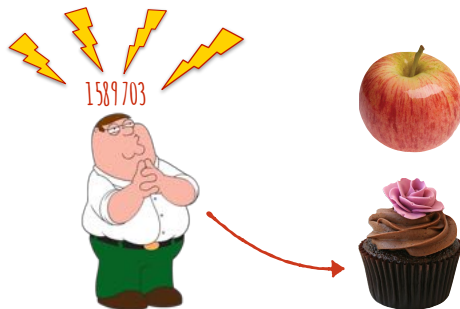


Emotion vs. Cognition



Baba Shiv, and Alexander Fedorikhin. 1999. Heart and Mind in Conflict: The Interplay of Affect and Cognition in Consumer Decision Making. *Journal of Consumer Research* 26: 278-292.

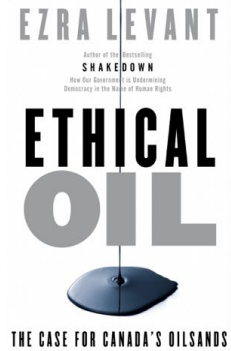
Emotion vs. Cognition



- If processing resources are limited, spontaneously evoked affective reactions rather than cognitions tend to have a greater impact on choice.
- As a result, people are more likely to choose alternatives that are superior on affective dimensions, but inferior on cognitive dimensions.

Baba Shiv, and Alexander Fedorikhin. 1999. Heart and Mind in Conflict: The Interplay of Affect and Cognition in Consumer Decision Making. *Journal of Consumer Research* 26: 278-292.

Tradeoffs and Preferences



Tradeoffs and Preferences



Tradeoffs and Preferences



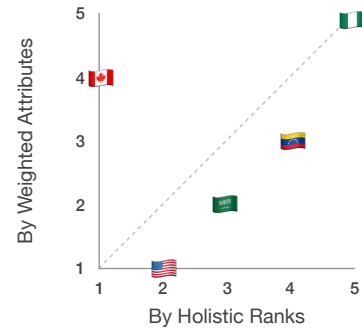
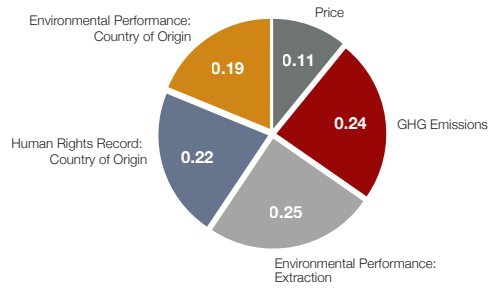
Bessette, D. and J. Arvai. 2014. A lack of internal consistency plagues consumer and policy preferences. *In prep.*

Tradeoffs and Preferences

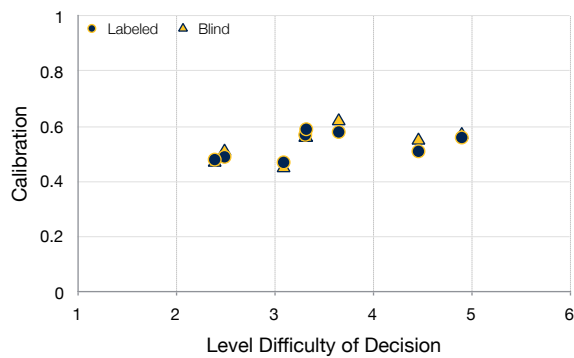


Attribute	Units	Preferred Direction	Canada Oil Sands	Saudi Arabia Conventional	Nigeria Conventional	Venezuela Heavy	Texas Offshore
Price per Litre	\$/L (CDN)	Lower	CA\$1.35	CA\$1.35	CA\$1.35	CA\$1.35	CA\$1.35
Well-to-Wheels GHG Emissions	Kg CO ₂ /L	Lower	3.7	2.7	3.3	3.3	2.9
Environmental Impact: Extraction Method	1 - 7 Scale	Lower	7	1	4	4	2
Overall Human Rights Score: Country of Origin	1 - 7 Scale	Higher	7	1	4	3	7
Overall Environmental Performance: Country of Origin	1 - 10 Scale	Higher	7.3	6.7	3.9	5.8	6.8

Tradeoffs and Preferences



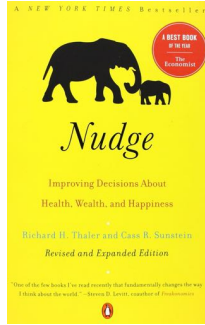
Tradeoffs and Preferences



- Choosing a Restaurant
- Buying a Mobile Phone
- Buying a Car
- Renting a Home
- Petrol Preferences
- Investment Portfolios
- Climate Change Mitigation Strategies
- Military Interventions in Syria



Nudge-mania!



The promise of asymmetric interventions for addressing risks in environmental systems

Victoria Campbell-Arval^{1,2}, Joseph Arvai^{1,2,3}

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Abstract. Recent studies suggest that people do not make decisions rationally. Instead, they are influenced by the way choices are presented to them. This is the concept of "nudging". In this paper, we explore the potential of asymmetric nudges to address environmental risks. We discuss the concept of asymmetric nudges and provide examples of how they can be used to address environmental risks. We also discuss the potential of asymmetric nudges to address environmental risks in a variety of contexts, including health, wealth, and happiness.

Keywords: asymmetric nudges, environmental risks, decision-making, behavioral economics

1 Introduction

Recent studies suggest that people do not make decisions rationally. Instead, they are influenced by the way choices are presented to them. This is the concept of "nudging". In this paper, we explore the potential of asymmetric nudges to address environmental risks. We discuss the concept of asymmetric nudges and provide examples of how they can be used to address environmental risks. We also discuss the potential of asymmetric nudges to address environmental risks in a variety of contexts, including health, wealth, and happiness.

Motivating Sustainable Food Choices: The Role of Nudges, Value Orientation, and Information Provision

Victoria Campbell-Arval^{1,2}, Joseph Arvai^{1,2}, and Linda Kalof^{1,3}

Abstract

Small, everyday changes in people's behavior can have significant positive environmental impacts. To this end, the research reported here focused on the role of an asymmetric intervention (a "nudge") in motivating choices with positive environmental outcomes. The context of this research was motivating government food choices to combat obesity. An experiment was conducted in which a default menu presenting only appealing or unappealing meal-free meal options was compared with more conventional menu configurations. The use of a default menu increased the probability that study participants would choose a meal-free meal option and the probability increased when appealing default meal options were provided. Neither the provision of information on the menu nor the environmental value orientation and worldview of participants contributed to the logistic model. These results suggest that default-based interventions can be important tools in increasing environmental behavior and can serve to complement information and education efforts over the long term.

Keywords: nudges, sustainable food choices, value orientation, information provision, environmental behavior

1 Introduction

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Executive Order – Using Behavioral Science Insights to Better Serve the American People

EXECUTIVE ORDER

BETTER SERVE THE AMERICAN PEOPLE

A growing body of evidence demonstrates that behavioral science insights – research findings from fields such as behavioral economics and psychology about how people make decisions and act on them – can be used to design government policies to better serve the American people.

Where federal policies have been designed to reflect behavioral science insights, they have substantially improved outcomes for the individual, families, communities, and businesses those policies serve. For example, automatic enrollment and automatic escalation in retirement saving plans have made it easier to save for the future, and have helped Americans accumulate billions of dollars in additional retirement savings. Similarly, streamlining the application process for federal financial aid has made college more financially accessible for millions of students.

To more fully realize the benefits of behavioral insights and deliver better results at a lower cost for the American people, the Federal Government should design its policies and programs to reflect our best understanding of how people engage with, participate in, use, and respond to these policies and programs. By improving the effectiveness and efficiency of Government, behavioral science insights can support a range of national priorities, including helping workers to find better jobs, enabling Americans to lead longer, healthier lives, improving access to educational opportunities and support for success in school, and accelerating the transition to a low-carbon economy.



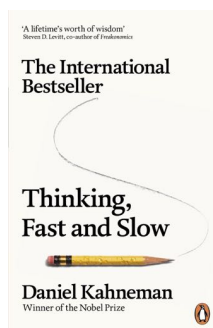
“Eat To Get Slimmer”



A heavy lift, instead of a nudge



A heavy lift, instead of a nudge



Improved decision quality isn't just a function of speed.



A heavy lift, instead of a nudge

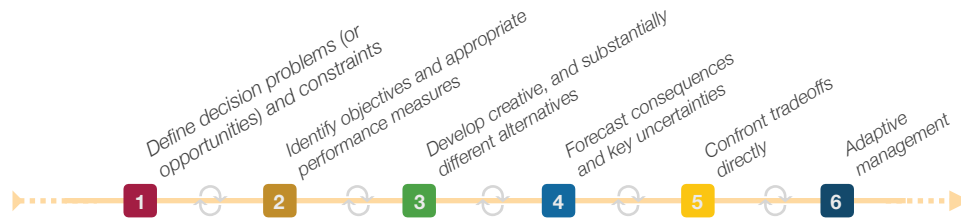
- A commonly accepted narrative about how to improve decision-making about in the name of sustainability — and all kinds of policies for that matter — includes:
 - **Consultation** involving decision-makers, key stakeholders, and content area experts.
 - Access to **high-quality information** (science, local knowledge, etc.) upon which to base choices: science-based decision making.
 - Processes (or environments) that facilitate **negotiation**.
 - The importance of fostering **transparency** and building **trust** with respect to the participants and the process: “*Fairness*” and “*Competence*”



Two Questions

1. What progress has been made in developing models that are appropriate for supporting decisions related to sustainability?
2. What new efforts might be required to address needs and opportunities related to sustainability?

Decision aiding for sustainability



Decision aiding for sustainability

BETTER DECISIONS

An appeal for smarter decisions

JOSEPH ARVAN

Policy-makers need to understand the science behind decision-making behaviour if they hope to get better at it.

Four anseliores la qualite de leurs decisions, les responsables politiques doivent mieux comprendre les fondements scientifiques des processus decisionnaires.



A person who lives and works in Calgary and needs to identify with people even that live out of context, I have written about coalition law between the Calgary and these decisions and the national and international that they will be in with from projects. I have also written from a perspective on energy. The decision-making process is a complex one, and it is not always clear how to make the best decision. In the case of my views on specific issues, I have little interest in taking a biological and social science approach to government. I am more in government as a public and independent thinking people. I have been the deputy minister of the West Wing and advise the prime minister on energy and natural resources. I have been a member of the House of Commons and the Senate. I have been a member of the House of Commons and the Senate. I have been a member of the House of Commons and the Senate.

A high-quality decision-making process is one that accounts for the human factors that are often overlooked. It is not just about the science of decision-making, but also about the psychology of decision-making. It is about the science of decision-making, but also about the psychology of decision-making. It is about the science of decision-making, but also about the psychology of decision-making. It is about the science of decision-making, but also about the psychology of decision-making.

Joseph Arvan is the former Chief of Applied Decision Systems in the Department of Energy and the University of Calgary. He is a member of the 13 National Academy of Science/Panel on Environmental Change and Energy. He can be reached at arvan@erbinstitute.ca.

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Decision aiding for sustainability

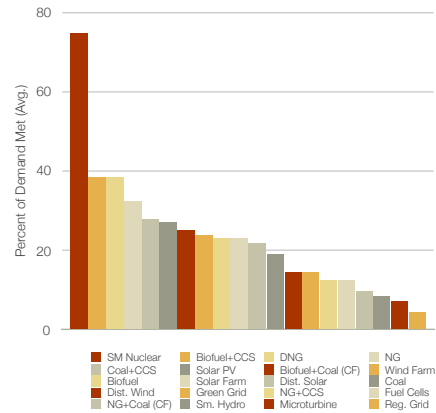


- An applied research effort to design and test a decision-aiding approach for energy transitions.
- Initial test site was MSU's TB Simon Power Plant. Subsequent research in partnership with industry partners in Canada.
 - Highly interdisciplinary research.
 - Multi-party research involving corporate, government, and public stakeholders.
- Peak Electricity: 99.3 MWh
- Peak Thermal: 1.3×10^6 lb/h

Decision aiding for sustainability



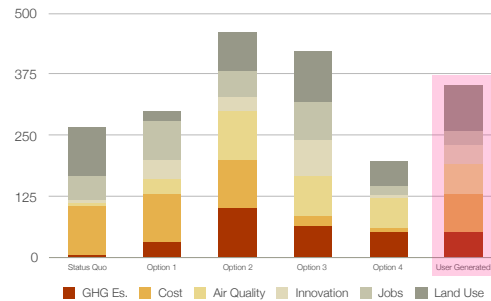
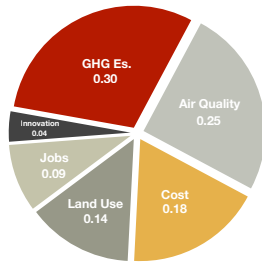
Interactive software developed by Compass Resource Management, Vancouver, BC, Canada. Database from Black & Veatch, Overland Park, KS, USA.



Decision aiding for sustainability

Performance Indicator	Units	What's Better?	Portfolio 1: Status Quo	Portfolio 2	Portfolio 3	Portfolio 4	Portfolio 5	Your Portfolio
Cost	additional cost / yr	Less	\$0	\$88	\$544	\$362	\$776	\$1,686
GHG	% reduction from current	More	0%	28%	91%	64%	100%	55%
Air Emissions	% reduction from current	More	0%	13%	84%	27%	100%	88%
Local Jobs	full time equivalent	More	0	5	41	39	60	36
Land Use	increase in acres	Less	0	13	13	54	18	48
Innovation	relative scale	More	1	1.6	2.5	2	3	2.7

Performance Indicator	Units	What's Better?	Worst	Best	Importance (1 = Most, 5 = Least)	Relative Weighting
Cost	additional cost / yr	Less	\$1,686	\$0	3	70
GHG	% reduction from current	More	0%	100%	1	100
Air Emissions	% reduction from current	More	0%	100%	2	90
Local Jobs	full time equivalent	More	0.0	60.0	4	50
Land Use	increase in acres	Less	54.0	0.0	4	50
Innovation	relative scale	More	1.0	3.0	5	20



Decision aiding for sustainability

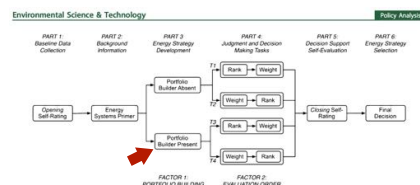


Figure 1. Research design.

Table 3. Mean Self-Ratings Elicited from Participants by Treatment

self-rating item	treatment 1		treatment 2		treatment 3		treatment 4	
	\bar{x}	SE	\bar{x}	SE	\bar{x}	SE	\bar{x}	SE
1. satisfaction with decisions ^a	3.70	0.16	3.80	0.16	5.51	0.18	5.33	0.19
2. stress during decision making ^a	3.13	0.23	3.10	0.22	3.28	0.23	3.48	0.22
3. difficulty of decision making task ^a	3.35	0.20	3.67	0.29	3.57	0.18	3.56	0.20
4. level of accuracy of decisions ^a	3.63	0.18	3.65	0.18	4.72	0.21	5.21	0.20
5. amount of information provided ^b	3.54	0.16	3.68	0.20	4.23	0.16	4.86	0.16
6. comfort with input supporting actual energy decisions ^a	4.89	0.20	5.05	0.21	5.09	0.22	4.92	0.22
7. knowledge level (ΔK) ^c	0.81	0.13	0.96	0.13	1.05	0.16	1.25	0.12

^a7-point Likert scale where 1 = "none at all", 4 = "moderate", 7 = "very". ^b7-point Likert scale where 1 = "not enough", 4 = "just enough", 7 = "too much". ^cValues indicate changes from beginning to end in terms of participants' responses on 7-point Likert scale where 1 = "very little", 4 = "average", 7 = "great deal".

- Positive evaluations from users:
- Significant increases in learning about energy transitions
- High self-reported ease-of-use (of decision-support tools)
- High self-reported internal consistency
- High overall self-reported satisfaction with process
- High self-reported comfort with final decisions
- A paired-down version of this decision-support platform is on display in the NAS's Koshland Science Museum in Washington, DC.
- <https://koshland-science-museum.org/sites/all/exhibits/mitigationsim/index.html>

Bessette, D., J. Arvai, and V. Campbell-Arvai. 2014. Decision support framework for developing regional energy strategies. *Environmental Science & Technology*, 48:1401-1408.



Thank you



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