

# Promoting Decision Making and Behavioral Change: Application of Psychology and Behavioral Economics to Nudge Design

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**Abstract:** Nudge design is a design approach that uses people’s psychological preferences and cognitive limitations to guide people to make choices. The theoretical basis of nudge design mainly comes from psychology and behavioral economics, among which limited rationality theory, cognitive behavior theory, and Fun theory are important theoretical frameworks. This paper summarizes the basic contents of these three theories and their application examples in nudge design. By analyzing the relevant cases of nudge design, the application effects of these three theories in different fields and scenarios are expounded, such as public transportation, environmental protection, health management, education and training, etc., to provide reference and enlightenment for the theory and practice of nudge design.

**Keywords:** Nudge design; Bounded rationality theory; Cognitive behavior theory; Fun theory

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## 1. Introduction

The importance of public design is that it can improve the quality of life of citizens, enhance social inclusiveness and participation, and promote social innovation and sustainable development. To strengthen the city brand, the city slogan and policy direction including administrative services, public design, etc., must be promoted consistently. At the same time, the concept of nudge design has been added to public design. The term “nudge” refers to not forcing or encouraging people to make a certain choice, but changing the environment of choice, so that people can make behavioral decisions that are more in line with their own or social interests <sup>[1]</sup>. The principle of nudge design is used in public design to guide people to make choices by changing the design of the environment or the way information is presented <sup>[2]</sup>.

## 2. The application of bounded rationality theory in nudge design

The theory of bounded rationality was put forward by Simon, who believes that people’s rationality is a kind of bounded rationality between complete rationality and irrationality <sup>[3]</sup>. This is due to the limitations of people’s

knowledge, time, computing power and other factors, making them unable to acquire and process all the information, and unable to predict and evaluate all the consequences, so they cannot make the optimal decision, but can only seek satisfactory or moderate solutions that are good enough <sup>[4]</sup>. The theory of bounded rationality emphasizes that people's decision-making is carried out in an uncertain and complex environment, and it is necessary to consider people's psychological and social factors, as well as the dynamics and diversity of the decision-making process and results <sup>[5]</sup>.

The theoretical basis of nudge design mainly comes from the theory of bounded rationality, which uses it to analyze and influence people's decision making and behavior. It reduces people's cognitive burden and increases people's welfare by setting default options, providing information prompts, simplifying choices, etc. The following are some examples of the application of the theory of bounded rationality in nudge design:

- (1) Public transportation: Battaglio traces the pioneering work of Herbert Simon, Daniel Kahneman and Richard Thaler to analyze how these theories can be applied to the improvement of public organizations and services. The research reveals the systemic effects of cognitive biases such as accessibility, loss aversion, and overconfidence/optimism on public decision-making, and discusses strategies for positively directing behavior through nudge and choice architectures. The study emphasizes the potential of behavioral science to enhance the effectiveness of decision making, noting the current lack of research on cognitive bias and limited attempts to apply nudge theory in practice <sup>[6]</sup>. This suggests that addressing methodological gaps in the field of public transportation by exploring the root causes of cognitive bias in depth and practice-testing interventions based on nudging can promote theoretical and practical development in the field of behavioral public administration.
- (2) Environmental protection: Green nudge has the potential to change people's behavior and positively impact the environment <sup>[7]</sup>. A variety of nudge techniques, such as prompts, sizing, proximity, presentation, priming effects, labeling, and functional design, can be used to promote pro-environmental behavior <sup>[8]</sup>. The application cases of these technologies show that people's decision-making processes can be effectively influenced by smart design choices architecture, thus promoting more environmentally friendly behavior patterns. These cases highlight the validity of nudge theory and the importance of ethical constraints in applying nudge theory to environmental protection strategies, while also pointing out the potential paradoxical effects and possible impacts on decision-makers' well-being that need to be considered when designing effective nudge strategies.
- (3) Health management: By changing the placement of food in the cafeteria, it successfully influenced the dietary choices of employees and promoted healthier food consumption <sup>[9]</sup>. The nudge strategy implemented by Marcano-Olivier et al. in school cafeterias effectively increased the probability of students choosing healthy food by providing advice and information. These studies show that nudge design based on the theory of bounded rationality can effectively change individual behavior and provide new strategies for health management <sup>[10]</sup>.

The practicability and limitation of bounded rationality theory can be obtained by analyzing the above cases. The theory of bounded rationality is generally applicable to explain human behavior of seeking satisfactory solutions when faced with complex decisions. Cultural differences may lead to different definitions of satisfactory solutions, with collectivist cultures focusing more on group satisfaction and individualistic cultures focusing on individual satisfaction. In addition, socioeconomic background has a significant impact on an individual's decision-making ability, and resource-poor environments may make people more inclined to short-term satisfactory solutions. The availability of information and decision-making habits and traditions in society also affect the application of bounded rationality theory.

### 3. Cognitive behavioral induction theory

The theory was proposed by Bandura, who believed that people's behavior is affected by their cognition, emotions, attitudes, beliefs and other psychological factors, which in return can be changed by external stimuli or internal feedback <sup>[11]</sup>. The core concept of cognitive-behavioral theory is self-efficacy, which is people's confidence that they can successfully complete a certain task or reach a certain goal <sup>[12]</sup>. Self-efficacy is an important factor that affects people's behavior and motivation <sup>[13]</sup>.

Nudge design is designed to motivate or inhibit behavior by using positive or negative emotional triggers, providing social approval or social pressure, and motivating goals or values. The goal of nudge design is to increase people's sense of self-efficacy, making them more confident and motivated, and more willing to make better choices. The following are examples of the application of cognitive-behavioral induction theory in nudge design:

- (1) Environmental protection: The environmental garbage bag designed by Colenso from New Zealand, this project aims to raise people's awareness of the dangers of illegal dumping and encourage them to use environmental garbage bags. By changing people's awareness of illegal dumping, let them realize that this behavior will not only damage the environment, but also damage their social image and moral sense. By using environmentally friendly garbage bags, people may feel positive feedback that they are contributing to the conservation of nature and beautification of the community, thus enhancing their self-efficacy.
- (2) Health management: The "cigarette butt ballot bin" found in London, UK, is an environmentally friendly new way to clean the streets, conceived by the London Environmental Protection Agency. People are encouraged to express their views and opinions on different voting topics while protecting the environment. This "cigarette butt ballot bin" answers questions by setting different questions to get people to think about their choices and compare them with others, thus discarding their cigarette butts in the ballot bin. This changes people's perception of cigarette butt discarding from a meaningless act to a meaningful one, thereby increasing their emotional satisfaction and motivation for the act.
- (3) Education and training: The school can attract students' attention by designing some interesting walks and eye-catching footprints and palm prints near the hand-washing and cleaning area. Footprints guide students along a specific path, increasing their interaction and participation in the surrounding environment. As students follow the footprints, they are naturally led to the hand cleaning station. This enables students to get into the habit of washing their hands after a lesson or meal.

These examples demonstrate the effective application of cognitive behavioral induction or nudge theory in different fields. By changing individuals' cognitive and emotional responses, nudge design can promote more positive behavior changes, improve individuals' sense of self-efficacy, and thus achieve the purpose of improving social behavior patterns.

### 4. The application of Fun theory in nudge design

The Fun theory was proposed by Bartle, who argued that people have different preferences for different types of fun, and that fun is one of the main motivations for people to participate in games or activities. The central concept of Fun theory is player types, which is the classification of fun that people have. Fun theory states that different player types have different effects on engagement and satisfaction with a game or activity <sup>[14]</sup>.

Nudge design uses Fun theory to increase people's engagement, by using challenges or rewards, stories or humor, exploration or creation, etc., to meet people's different fun needs. The purpose of nudge design is to increase people's sense of fun and make them more willing to participate in games or activities, so that they can

make better choices. Here are some examples of how Fun theory can be used in nudge design:

- (1) Public transport and health management: In 2009, Volkswagen transformed a subway staircase in Stockholm, Sweden, into a giant piano. As people walk up and down the stairs, a different piano key sounds are made with each step. This is to ensure that more people forgo the escalator and opt for a healthier stair climb. As a result, 66 per cent of people ditched the escalator for the stairs that day. The goal of the event is to raise awareness of physical health by using creative and fun ways in public places.
- (2) Environmental protection: In order to solve the littering problem, Copenhagen has developed a litter prevention program, strategically placed trash cans, and designed green footprints to guide people to the trash cans. This kind of boost design is very effective, increasing people's sense of participation in environmental protection and bringing people fun.

## 5. Case analysis and summary of nudge

The success of nudge design lies in its transparency and reversibility, ensuring that users can freely choose whether to follow nudge recommendations while understanding the purpose of nudge <sup>[15]</sup>. Transparency requires that the design and implementation process of the nudge strategy be clearly visible to the user and avoid misdirection. Reversibility, on the other hand, means that users can easily change or revoke their choices without restrictions. This design principle guarantees user autonomy while making nudge strategies more user-friendly and flexible, helping to increase public acceptance and engagement.

## 6. Conclusion

This study explores the application of psychology and behavioral economics theories to nudge design and shows how human psychological tendencies and cognitive limitations can be used to guide more rational and beneficial decision making. By analyzing the practical cases of bounded rationality theory, cognitive behavior theory and Fun theory in public transportation, environmental protection, health management and other fields, it can be concluded that nudge design has significant potential to promote individual and social well-being. These cases show that nudge design can effectively influence and improve people's behavior without depriving them of freedom of choice. The success of nudge design lies in its transparency and reversibility, which ensures that users are free to choose whether or not to follow nudge recommendations while fully understanding the purpose of nudge. This design principle not only guarantees the autonomy of the user, but also makes the nudge strategy more user-friendly and flexible, thus increasing the acceptance and participation of the public.

To sum up, this study not only provides valuable reference and inspiration for the theory and practice of nudge design, but also provides a strong proof of the value of interdisciplinary research in solving practical problems. In the future, nudge design is expected to continue to give play to its potential in more fields to promote social innovation, sustainable development and harmonious development of individuals and society through smart design strategies.

## Disclosure statement

The author declares no conflict of interest.

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