

USING NUDGES IN E-HEALTH SOLUTIONS TO IMPROVE PATIENT OUTCOMES

Nudge: what are we talking about?

In the Schiphol airport in Amsterdam, they had the innovative idea to etch houseflies into the urinals in the men's rooms. They found that if men had a target to aim at, spillage and subsequent cleaning costs were reduced by 80%.¹ This is a good example of a "nudge." Nudges originate in the field of behavioral economics, which was developed by picking and choosing from economics, psychology and other behavioral sciences in order to better understand human behavior and decision-making. In the 1970s and 80s, Daniel Kahneman and his colleague Amos Tversky wrote several papers on judgment and decision making, leading to a Nobel prize in 2002.² In 1977, a young visiting scholar named Richard Thaler became friends with Kahneman and Tversky. In 1980, Thaler published a paper building on his work with Tversky, combining behavioral science with economics at a time when economic theory almost universally assumed people thought rationally.³ Thaler himself eventually won the Nobel in 2017.⁴

For a long time, the field of economics championed the idea that humans' preferences are stable over time, predictable, and above all, *rational*. The shocking new idea that underlies the rapid rise of behavioral economics as a field is that humans are actually not at all rational, and their behaviors and preferences can vary wildly. However, their behavior can be influenced if we understand the origins of these variations. Thaler and his colleague Cass Sunstein published a book on this topic, called *Nudge*, which was revised and updated in 2021.¹ A nudge is something "that alters people's behavior in a predictable way without forbidding any options or significantly changing their economic incentives." It must be "easy and cheap to avoid." In this way, people's good intentions can be transformed into actions.

This is done by using "choice architecture," presenting options in a certain way to influence decisions one way or another. In order to do this, choice architects can use knowledge of mental shortcuts that people often take, one of any number of heuristics described by Daniel Kahneman and Amos Tversky in numerous articles and later in Kahneman's book *Thinking, Fast and Slow*.⁵ People use these mental shortcuts to make decisions quickly, when missing information, or when overwhelmed by too much information. But the decisions they make in this way are often biased or not in their best interests. More on a few of these heuristics will be discussed below.

In addition to the housefly in the urinals mentioned above, several other public spaces have used choice architecture to influence people's behavior for either individual or common good. Open stairwells can encourage workplace interaction and walking.¹ Similarly, “piano” stairs in a Stockholm subway encourage people to take the stairs instead of the escalators.⁶ Food placed at eye level is more likely to be chosen in a store or buffet.¹ Nudges and choice architecture also exist in the healthcare industry, and their presence has increased since the beginning of the pandemic.

Why do we use behavioral sciences and, in particular, the nudge in e-health solutions?

The goal of all e-health solutions is to have a positive and sustainable impact on a patient's life. Given the biases we all share, in order to have this impact we have to change patients' behavior to be consistently better for them. With carefully curated nudges, we can help patients develop healthier habits and better adhere to treatments plans, and we can optimize digital solutions and treatments for individuals by putting them at the center of their treatment decisions. Lastly, perhaps with the greatest impact, we can reduce risky or non-beneficial behavior and thus improve preventative health care.

One major obstacle between patients and good decisions is the lack of immediate feedback from healthy or unhealthy decisions. There is certainly long-term feedback, but it is not linked closely enough with the initial behavior to have any effect on it. Many decisions in healthcare have a large impact on a patients' lives yet do not provide feedback, or the immediate feedback is the opposite of the long-term effects. For example, eating that piece of chocolate cake is so good in the moment, but overindulging in chocolate cake over time may lead to obesity. Exercising is hard, especially when trying to establish an exercise routine, but its long-term advantages are numerous. Using nudges, e-health solutions can capitalize on biases to influence patients in gentle, nonrestrictive ways to make better decisions for their health on a daily basis, while still allowing them complete freedom to make whatever choice they like.

Using nudges effectively and long-term in e-health solutions

Nudges can be used to encourage long-lasting engagement throughout an e-health program, starting on day one with enrollment. Even pre-enrollment, nudges can be used to increase patient awareness of digital health solutions and to make it easy for them to incorporate these solutions in their lives. By efficiently using choice architecture, good behaviors can be made easier than suboptimal behaviors, allowing the patient to take control of their own health.

After an initial "honeymoon" period of high motivation, there is often a low period when risk of attrition is elevated. Nudges can be especially important at this time to help patients maintain engagement through their e-health digital interface. One effective method is through positive reinforcement and feedback for their ongoing engagement.

Nudges and choice architecture must be designed keeping human behavior and predispositions in mind. As behavioral scientists have taught us over the past few decades, humans do not always behave rationally, but they do behave in certain predictable ways. Also, unsurprisingly, individuals behave differently from one another given the same situation. To address this challenge, Observia has designed a [behavioral diagnostics system](#) called SPUR™, which gathers individual information about each patient in order to decipher their behavior.

This information is then put into action using d.tells™, an intelligent engine for [personalizing e-health solutions to individual patient needs](#). Topics and tools that are important for the patient are put toward the forefront, and message timing, tone, and medium can all be optimized to best "nudge" the person toward their healthiest lifestyle.

Universal biases can be nudged

As mentioned above, Kahneman and Tversky's work, including Kahneman's landmark book *Thinking, Fast and Slow*,⁵ defined a number of heuristics, cognitive shortcuts that we all use in our daily lives, often unknowingly. These heuristics can help inform nudges by giving us a general insight into humans' irrationality. Their overall model of decision making is known as "**prospect theory**" – when making decisions or predictions about an uncertain future, we tend to overvalue losses and undervalue gains. Negative results from our actions will have a stronger effect on our decisions about the future than the equivalent positive results. If a medication's side effects are unpleasant but its benefits for the patient outweigh these side effects, the patient may need extra nudges to see this cost/benefit ratio accurately. For example, instead of explaining the side effects of a medication as compared to the benefits, citing the risks of *not* adhering (a potential negative result) as well as the benefits of adhering can nudge a risk-averse patient towards adherence.

One common heuristic especially relevant in health care is the "**availability heuristic**" – we estimate the likelihood of an event based on how easy it is for us to imagine it, not on its objective probability. If the patient cannot easily imagine a given outcome – perhaps it is simply outside of their experience – their behavior will be driven by this misconception. For example, to convince patients to adhere to a new treatment regimen, such as management of a newly-discovered allergy, frequent informational nudges reminding them of its importance and the consequences of non-adherence may be necessary. We can also provide them with testimonials of other patients in similar situations to increase the messages' impacts.

In general, people want to take care of their health; they just suffer from another phenomenon called "**ego depletion**" – the fact that all of us have limited willpower or concentration. If someone uses up willpower in one domain of life, such as work or taking care of others, they have less to use on their own health. Nudges to aid patients through this ego depletion can include automatic reminders of appointments or medications and notifications specific to a patient's condition, such as air quality warnings for someone with asthma. The whole experience should be streamlined, minimizing the amount of interaction required from the user. Patients are constantly required to stay on top of daily tasks, whether following a particular dietary or lifestyle change or simply keeping track of multiple medical appointments, and this is why nudges are very appropriate and highly impactful in healthcare.

1. Thaler RH, Sunstein CR. *Nudge: The Final Edition*. Penguin Publishing Group; 2021. <https://books.google.fr/books?id=Lus2EAAAQBAJ>
2. Daniel Kahneman – Facts. Nobel Prize Outreach. Published 2021. Accessed October 10, 2021. <https://www.nobelprize.org/prizes/economic-sciences/2002/kahneman/facts/>
3. Thaler R. Toward a positive theory of consumer choice. *J Econ Behav Organ*. 1980;1(1):39-60. doi:10.1016/0167-2681(80)90051-7
4. Richard H. Thaler – Facts. Nobel Prize Outreach. Published 2021. Accessed October 11, 2021. <https://www.nobelprize.org/prizes/economic-sciences/2017/thaler/facts/>
5. Kahneman D. *Thinking, Fast and Slow*. Farrar, Straus and Giroux; 2011. <https://books.google.fr/books?id=ZuKTvERuPG8C>
6. Piano Stairs - From Movement to Mozart. Design of the World. Published 2021. Accessed October 11, 2021. <https://www.designoftheworld.com/piano-stairs/>