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CHAPTER 20

Behavior Change

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Goals

- Explain and exemplify user ability, motivation, and prompts in Fogg's model of behavior change
- Explain and exemplify how attitude, subjective norms, and perceived behavioral control shape an individual's intentions and thus their behavior in Ajzen's theory of planned behavior
- List other approaches to change behavior from the Design With Intent tool
- Apply persuasive design tools to drive user/consumer behavior for sustainability

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Why It Matters

All design influences user behavior. Many sustainability problems are problems of choices and lifestyles: overconsumption, the "throwaway society," and immediate gratification over long-term wellness. Changing people's behavior can guide them to reducing consumption, reusing and repairing products, traveling less far and less fast, etc. For some products, persuading users to behave more sustainably can have more positive impact than reengineering the product physically. Persuasive design interventions can be used instead of or in addition to better engineering.

Summary

- Fogg's model of behavior change says: motivation is whether people want to change, ability is whether people can change, and prompts are stimuli that provoke actual change.
- Ajzen's theory of planned behavior says: attitude is what a person thinks and feels, subjective norms are what that person thinks others believe, and perceived behavioral control is how easy or hard they think it is to change their behavior.
- Lockton's "Design with Intent" tool includes these and many more theories of change with 101 persuasion tactics grouped into eight theoretical "lenses."
- To encourage better behavior with your design, focus on the user experience, make it easy and compelling for the user to act better.

20.1 Designing Sustainable Lifestyles

Design for sustainable behavior includes anything that influences users to take concrete actions that are more responsible for the planet and society. Behavior design does not just happen in marketing materials, it suggests changing user behavior through interactions with the product or service itself (e.g., via features or interface).

Environmental consequences are usually abstract and psychologically distant to people—they will only happen in the future, or they affect the collective, not the individual. People are more likely to act on consequences that will happen immediately and that will bring them personal benefits, according to "construal level theory" by Trope and Liberman (2010). As a result, people who are environmentally concerned may still book an intercontinental flight to have exciting personal experiences.

Designing behavior also enables you to reach beyond your industry for bigger impacts. Arguably the most important design innovation in public transit in the last 50 years was not a redesign of trains or bus stops, but the Google Maps app on mobile phones adding transit trip planning (Figure 20.1). The app enables people to get transit information when and where they need it, even in cities they have never been to before, even in languages they don't speak. Digital products like this are often the most powerful persuaders, because they are so interactive.

Behavior design does not just happen in marketing materials, it suggests changing user behavior through interactions with the product or service itself (e.g., via features or interface). Digital products like the maps

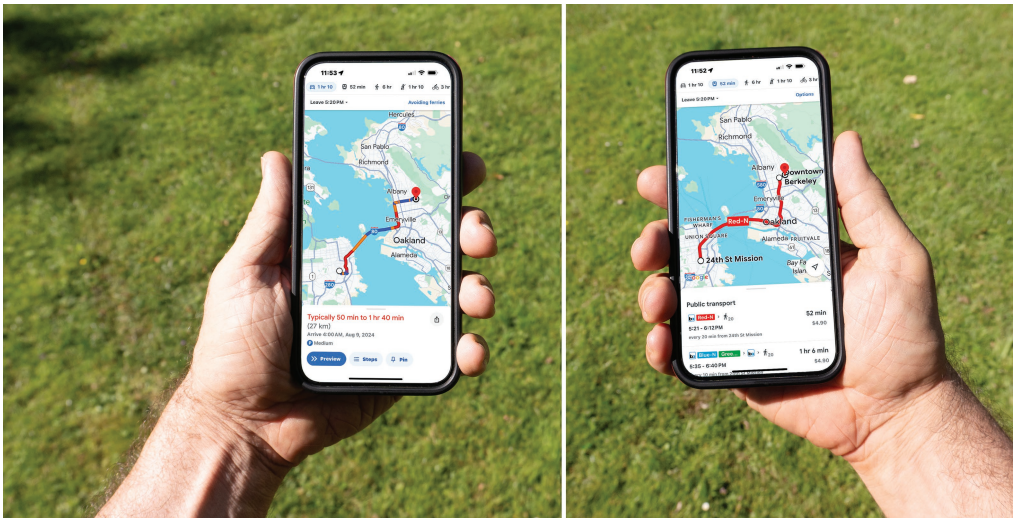

Figure 20.1 Google Maps driving directions and transit directions on a phone

app are often the most powerful persuaders, because they are so interactive.

There are many theories of how to encourage behavior change. This chapter mainly discusses models by B. J. Fogg (2009) and Icek Ajzen (1985) because they are the most widely used, have strong grounding in psychology research, and have been shown to predict behavioral outcomes well. The "Design with Intent" system by Dan Lockton includes these plus broader theories of change, with a very thorough list of actionable persuasion tactics. First, Fogg's model of behavior change generally results from the co-occurrence of three factors: motivation (if people want to do it), ability (if people can do it), and a prompt (a stimulus that provokes people to do it). He lists many tactics to build both ability and motivation. Second, Ajzen's "theory of planned behavior" assumes that people make intentional choices about their actions. These intentions are based on their individual attitude, subjective norms, and perceived behavioral control. In the end, though, people are complex and unpredictable, and small details of implementation can have surprising effects. Be prepared to try and test several strategies before you find the best one.

20.2 Fogg's Model of Behavior Change

According to Fogg's (2009) model of behavior change (or "persuasive design"), motivation, ability, and a prompt are all needed for behavior change to take place. Figure 20.2's action line shows that if people want to change their behavior and are able to do so, a behavior change is relatively easy. However, in many situations, people are lacking either motivation or ability or both, and then a prompt is likely to fail. Motivation and ability can also compensate for each other: if a person feels highly motivated to act, they will be more likely to put in great effort.

Possible motivators are pleasure/rewards, money or time, hope, social deviance, or

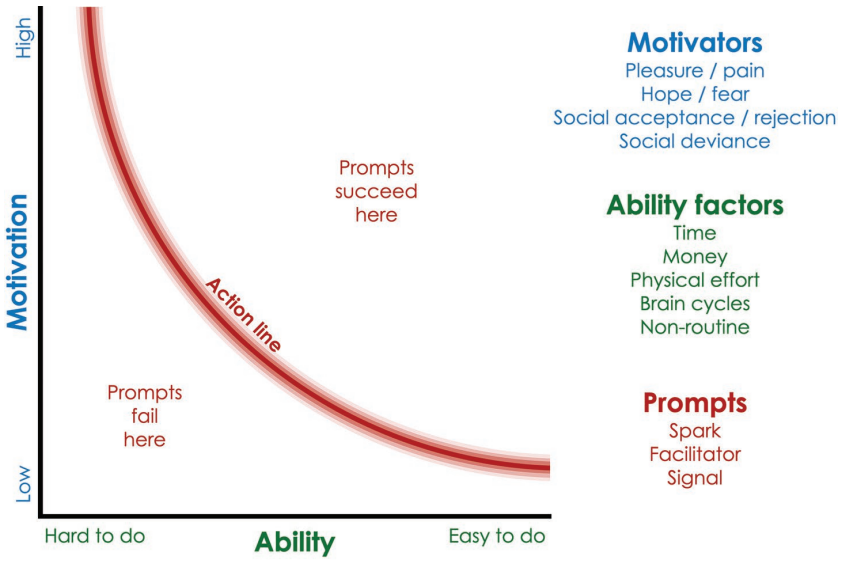

Figure 20.2 Fogg's model of behavior change

social acceptance. For example, Figure 20.1 shows that taking transit rather than driving during rush hour will save you time that day. For another example, if you're trying to persuade people to meet by videoconference rather than drive to physical meetings, you can make video calls more pleasurable by improving audio and video quality, or by providing features like transcripts or easy screen-sharing, thus increasing people's motivation to video call. Similarly, the desire to be socially accepted strongly influences people's behaviors. For example, if the social norm in an organization is to videoconference, individual employees will be more motivated to act accordingly. In addition, there may also be negative motivators if people strive to prevent pain, discomfort, fear, or social rejection. For example, people might be motivated to videoconference to avoid rush hour traffic, or avoid disapproving comments from coworkers.

Ability consists of five parts: reducing costs of money, time, physical effort, or brain cycles required (including going outside one's routine). It's more demanding to change one's behavior if it takes a lot of time, money, or physical effort, resulting in a lower perceived ability. For example, someone with an old computer that doesn't have videoconferencing software has much less ability than someone with the latest software and fast computer. Furthermore, the amount of brain cycles or cognitive effort can reduce people's ability. If a task takes ten steps, even if all ten are easy by themselves, the accumulation feels difficult. Also, someone who's already multitasking between several things will usually find an added thing overwhelming. Finally, people's ability is relatively low for non-routine behaviors, people find it easier to perform behaviors that they do regularly, because habits reduce brain cycles. The assessment of ability depends on the individual.

The last factor that is needed for behavior change is a prompt, also known as a trigger.

A prompt is something that pushes people to perform a behavior. For example, a calendar event popping up inviting you to a video call. Three types of prompts exist: sparks, facilitators, and signals. "Sparks" increase the person's motivation, for example by evoking a feeling of pleasure. "Facilitators" enable a person to behave in the desired way and thereby increase their ability. "Signals" work if a person is already both motivated and has the ability, just needing a reminder or notification to do it now. A popup invitation to a video call might be a signal, but if it also lets you push a single button to join the call, it's also a facilitator.

Design interventions can increase both people's ability and motivation, moving them to different parts of Figure 20.2's graph. Even when both are high, the behavior still may not happen automatically if it's outside the user's current habits. Hence the need for prompts.

Because design for sustainable behavior is about changing user behavior through interaction with the product, or software app, or product-service system itself (not just marketing around the product), it is all about user experience design. By changing either the physical product design, digital interaction design, service design, or the communication related to it (e.g., packaging or user manual), it is possible to boost either motivation or people's ability.

Design for sustainable behavior can happen on macro or micro levels. In Google Maps, there's very little persuasion toward transit, but lots of people use the app. This is sometimes called "microsuasion." You can also make a product that exists entirely to change behavior; this is called "macrosuasion." Such products are often only used by a small specific target audience. For example, a car-sharing app allows users to get rid of their own car by letting them rent a car on demand, but that app would be used much less than Google Maps, which comes with the phone and handles all mapping. Both microsuasion and macrosuasion can nudge people's behavior in both the short term and the long term.

There is power in behavior change. That means there can also be unintended consequences of persuasion that you want to avoid. For example, if the car-sharing app were designed to reduce overall driving but ended up persuading users to drive more by swapping their previous bike trips with car trips, it would increase their environmental impact. This is called a "rebound effect." As a designer, it is important to think through whether your design interventions may bring about possible rebound effects.

20.3 Ajzen's Theory of Planned Behavior

The theory of planned behavior (TPB) says that a person's behavior comes from their intentions, and those intentions come from a combination of three components: attitude, subjective norms, and perceived behavioral control, shown in Figure 20.3 (Ajzen, 1985). Attitude is an individual's evaluative response to an object, such as a product, brand, organization, or behavior. It includes a cognitive component (beliefs, knowledge) and an affective component (feelings, emotions) and has strength and a sense of direction. For example, whereas one person can have a strong, positive attitude toward riding a bicycle, another can have a weak, but negative attitude toward the same behavior. According to the theory of planned

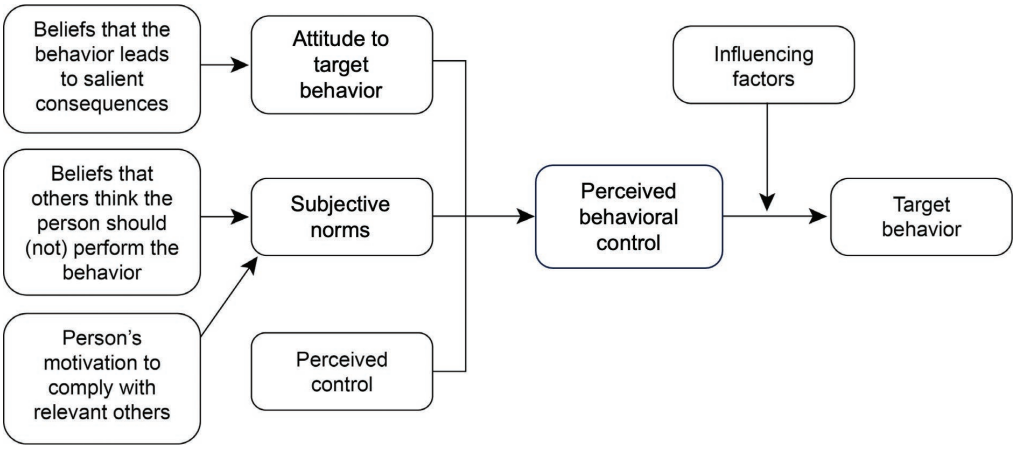

Figure 20.3 The theory of planned behavior
Source: Redrawn from Ajzen (1985).

behavior, people are more likely to change their behavior if they are positive about this behavior.

The subjective norms are what your user believes other people's attitudes are (e.g., friends, spouses, parents, coworkers, etc.). If people who are important to the user consider a certain behavior to be important, the user will be more inclined to change their behavior, too.

Perceived behavioral control is how easy or difficult your user thinks the behavior is for them to perform in their specific context. Obviously, the easier they think it is to do something they want to do, the more likely they are to do it, as with Fogg's model of ability and motivation. The difference is that here it is perceived ability.

The three components of intention also influence each other. If your user's friends are enthusiastic about the behavior, your user's attitude will likely become similar; if their parents are enthusiastic, their attitude might become negative. Behaviors that seem difficult or inconvenient drive more negative attitudes, but an extremely positive attitude might lower perceived difficulty. Finally, of course, behavioral control has some direct relationship to behavior: even if your user has good intentions, they would not do the behavior if it is too hard. This component clearly overlaps with the ability factor of the Fogg model.

As a designer, you can focus on all components in the TPB to create new design interventions that will encourage people to change their behavior. Please be aware that even when people have the intention to perform a certain behavior, this will not necessarily result in executing this behavior.

There may be influencing factors that prevent the person from doing so, as shown in Figure 20.3. An example would be if someone wants to take the bicycle to travel but sees that it has a flat tire and decides to take the

car instead. As a designer, it is important to think through potential influencing factors and explore possibilities to prevent these from inferring with the behavior change.

20.4 Design Tactics to Change Behavior

Both Fogg and Ajzen discuss the many specific tactics designers can use to influence user behavior. Their recommendations overlap greatly, so the list below includes both, but organizes them by Fogg's categories of ability and motivation.

20.4.1 Ability to Change

As mentioned above, people often encounter barriers to sustainable lifestyles. How can you give users more ability to do their desired behaviors?

20.4.2 Convenience

Making things easier or more convenient increases ability by saving time, physical effort, and/or brain cycles. For example, if you are trying to help your users reduce their environmental impacts from transportation, you can make it easier to use transit and bicycles instead of cars. Some examples are separating bike lanes from car traffic, and providing ways for bikes to get on transit (see Figure 20.4).

You can also make unsustainable behaviors less convenient. Some interventions in the domain of transit are to have less parking for cars, or by making it more expensive. Beware that people will like your company more if you only do positive things, not negative things; you might accompany any inconvenience with more convenience somewhere else. For example, less parking near desired destinations could be paired with more parking by transit stations.

Figure 20.4 Easy transport of bicycles in public transport

20.4.3 Defaults

Setting defaults increases ability by solving the non-routine problem (a default becomes a new routine), and saving brain cycles, perhaps also time and money or physical effort. Most people don't bother to change the factory settings on a product, so why not make the most sustainable settings the default? An example is a washing machine that automatically activates the eco-mode as the default program to wash (see Figure 20.5).

20.4.4 Leading the Process

Leading the user through the behavior when the process is complicated improves ability by solving the barriers of brain cycles and non-routine. In this respect, it is worthwhile to

Figure 20.5 Eco-mode as the default mode

explore design interventions that use the rich possibilities of mobile devices, because they are almost always with the user. For example, a mapping app that shows public transit options and gives you turn-by-turn directions in real time is a great way to prompt more transit use.

20.4.5 Calculate/Simulate/Measure

Helping the user understand both the consequences and the requirements for their action by calculating, simulating, or measuring increases ability by reducing their brain cycles; it may also save them time and money they would spend to calculate themselves, and can help overcome non-routine by showing benefits. For example, Google Maps not only tells users where to go on a map (a simulation of reality), it also calculates the time and cost, giving users the ability to plan and compare public transit options to driving or other modes.

20.4.6 Real-Time Feedback

Giving users feedback on the environmental or social impacts of product use right at the moment of action is much more powerful than feedback at other times, because it eliminates the need to remember (brain cycles). It may also help overcome non-routine by showing impacts the user didn't know previously. For example, a car showing gas mileage in real time allows users to see the impact of driving faster than necessary, or coasting to a stop, or other behaviors in the moment when they can still do something about it. Only seeing their gas consumption the next time they fill up the gas tank a week later is both too late to act and eliminates the specificity of knowing what moments were good and bad.

Real-time feedback can also be more individually targeted, which makes it more effective. The car showing real-time gas mileage above shows it to the person driving now. Seeing consumption when filling the tank could include other drivers' behavior as well, making it less clear.

20.4.7 Motivation to Change

Even if your users have the ability to change their behavior, they need to want to. How can their interactions with your product or service build their motivation?

20.4.8 Rewards/Punishments

Rewards and punishments provide simple Pavlovian pleasure/pain. Rewarding the behavior you want to encourage will make it more likely for the user to do it again. For example, a fitness tracker that congratulates your user for biking today. Consider how to design these rewards, as they need to be sufficiently strong and relevant to motivate people to take action. An example of punishment is a car that beeps at your user

Figure 20.6 The JouleBug app's scoreboard and points

Source: John Williard, johnwilliard.com.

for leaving the lights on. It's usually best to minimize punishment, though—your users will like you more for positive reinforcement.

Sophisticated versions of rewards and punishments can "gamify" your user experience, prompting users to "level up" into higher and higher levels of green behavior. This can be great for turning short-term actions into long-term goals. For example, the "JouleBug" phone app encourages users to recycle and save household energy by giving points for different actions, challenges to accomplish, and scoreboards ranking players against each other (see Figure 20.6).

20.4.9 Attractive/Likeable

Attractive or likeable products stimulate pleasure or social acceptance feelings. Even though we all know products are inanimate objects, we often treat them in semi-social ways. Your user's feelings toward the product matter—can you design in an emotional connection? This motivates people to use it and keep it in service longer, like a beloved old car or favorite mug.

20.4.10 Modeling Behavior

Showing your user someone else behaving a certain way can inspire your user to do the same thing, by stimulating feelings of social acceptance and hope; this is "modeling" behavior. It's especially effective when the other person is someone that your user aspires to be, or likes, or is attracted to. For example, on Instructables.com, many people have shown how they have modified their bikes to carry cargo so they do not need a car (see Figure 20.7).

20.4.11 Pride

Conversely, people like looking good to other people—pride stimulates feelings of social

Figure 20.7 Modeling bicycle usage can inspire your users to use bicycles rather than cars
Source: based on the Autodesk Sustainability Workshop.

acceptance and hope and pleasure. When sexy electric sports cars appeared, even people who didn't care about sustainability started switching to electric.

20.4.12 Social Interaction

Humans are social creatures, so one of the strongest motivators is social acceptance, which happens in social interactions. Letting your users connect with others through the desired behavior builds confidence, comfort, and competence. It might provide peer pressure. It also associates the feelings of the relationship with the behavior. These relationships can be cooperation, like your fitness tracker helping you find other cyclists to ride with, or it can be competition, like winning a prize for riding the most. Social interactions can also include rejection and fear and pain, but it's usually best to drive positive experiences for your users.

20.4.13 Prompting Change

Remember, ability and motivation are often still not enough, people may need a prompt at the right time and place to act. Most of the time, a simple notification such as a blinking light or sound or message can prompt a behavior, as described above. Sometimes, however, it's not enough. You can increase the insistence of the signal

Figure 20.8 Nagging to motivate users

by nagging (reminding your user frequently until they do it). For example, a car's "Check engine" light keeps reminding users until they deal with it (see Figure 20.8). Unlike pleasure/pain motivators, it's a gentle but persistent request. However, if it's over-used, it becomes annoying.

20.5 Combining Multiple Theories into One Tool

The Design with Intent (DwI) toolkit by Dan Lockton, available at http://designwithintent.co.uk, is intended to "describe systems (products, services, interfaces, environments) that have been strategically designed with the intent to influence how people use them" (Lockton et al., 2010). It collects many different theories of change, not just one like Fogg or Ajzen. Thus, it also includes a broader range of persuasion tactics: 101 cards or "patterns" organized into eight theoretical "lenses" (see Figure 20.9). The eight lenses are a way of grouping the 101 persuasion tactics by disciplinary worldviews or fields of research. The descriptions given here are based on Lockton's introduction to the DwI toolkit.

The **architectural lens** takes the physical environment as starting point and uses insights from environmental design (in architecture, urban planning, and traffic management) to influence user behavior. For example, the labyrinth-like interiors in casinos and department stores (like IKEA) force you to walk past endless rows of slot machines or products before you reach the exit or cash register. This increases the chance that you will engage by gambling or buying something.

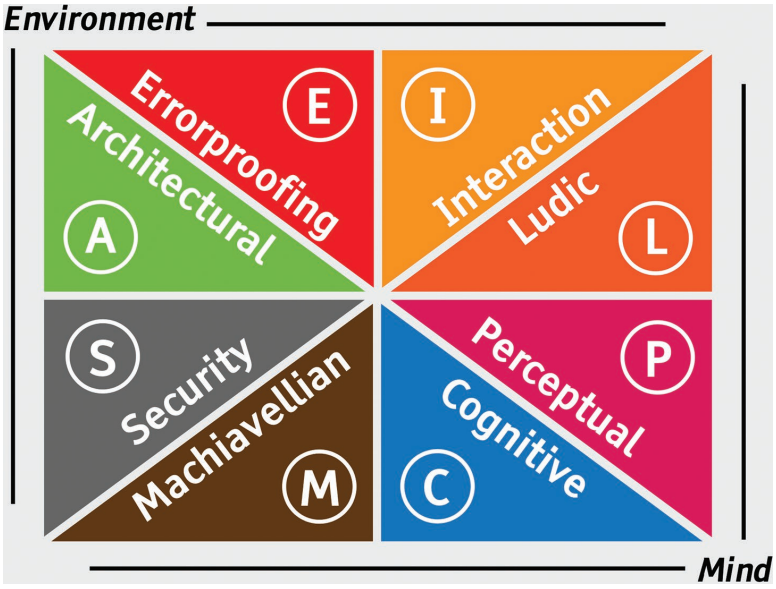

Figure 20.9 Lenses of the toolkit

Source: Lockton et al. (2010).

The **errorproofing** lens tries to help users avoid "errors" (deviations from the target behavior), either by making it easier for users to work without making errors, or by making errors impossible in the first place. It's often found in ergonomics and health and safety-related design. Errorproofing doesn't care whether the user's attitude changes, as long as the target behavior is met.

The **interaction lens** looks at users' interactions with the system and how it influences their behavior. Much used strategies are feedback, progress bars, and previews (used in human-computer interaction), but the lens also includes patterns from persuasive technology, building on B.J. Fogg's work.

The **ludic lens** is derived from games and play, ranging from basic social psychology mechanisms such as goal-setting via challenges and targets, to common game elements such as scores, levels, and collections.

The **perceptual lens** combines ideas from product semantics, semiotics, ecological psychology and Gestalt psychology, addressing how users perceive patterns and meanings as they interact with the systems around them. These are mostly visual, but they need not be: sounds, smells, textures, and so on can all be used, individually or in combination.

The **cognitive lens** draws on research in behavioral economics and cognitive psychology looking at how people make decisions, and how this is affected by heuristics and biases. For instance: "give your system a personality," "provoke empathy," "use reciprocation." These tactics draw particularly heavily on the work of Robert Cialdini, Dan Ariely, Richard Thaler, and Cass Sunstein.

The **Machiavellian lens** comprises design patterns which all embody an "end justifies the means" approach of the kind associated with Niccolò Machiavelli. These will often be considered unethical, but nevertheless are commonly used to control and influence consumers through pricing structures, planned obsolescence, lock-ins, and so on, and are central to work by authors such as Vance Packard and Douglas Rushkoff.

The **security lens** represents a "security" worldview, i.e., that undesired user behavior is something to deter and/or prevent though countermeasures designed into products, systems and environments, both physically and online, with examples such as surveillance (watching from above in a power hierarchy), "sousveillance" (watching from below), and "peerveillance" (watching peers).

20.6 How to Use the Toolkit

There are different ways you can use the Design with Intent toolkit. It was originally developed to help inspire brainstorming and idea generation, but it can also be used to analyze existing examples of design that influences behavior. See examples of two cards in Figure 20.10.

20.6.1 Can You…? What If…? How Could You…?

Each pattern is phrased as a question—a provocation to invite discussion about the behavior change question or brief you're considering. You could go through all the cards and quickly decide the patterns' relevance to your brief based on whether the answer is "Yes," "No," "Good," "Bad," "Not sure," etc.

Figure 20.10 Two patterns from the Architectural Lens

20.6.2 Going Through Lens by Lens

Lay out all the cards, grouped by lens, and go through each lens seeing whether the questions inspire any concepts for addressing your problem. In groups (e.g., 4 or 8 people) it often works well for one or two people to take a lens and become "mini-experts" for a few minutes before reporting back to everyone else. A group discussion can then proceed to refine the ideas.

20.6.3 Cards or Worksheets

The worksheets, available at http://designwithintent.co.uk/downloads/, are good for group work or where you want an overview of each lens, while the cards enable more detailed deliberations over each pattern—or looking at sets of a few patterns rather than all of them.

20.7 Testing and Ethics

Because people are complicated and unpredictable, behavioral design interventions should not be based on theory alone. Several alternatives should be tested, in as close to real-world target user contexts as possible. Testing can be done using any standard tools for testing user interface design. The most common is "A/B testing," where users get randomly assigned interface A or interface B, and their actions are measured to see which interface produces more of the desired behavior.

Ethics must also be considered when influencing user behavior. Users can be manipulated to act against their best interests. There is a book and website called "Evil by Design: Interaction Design to Lead Us Into Temptation" that's both a good tutorial on behavior design and a warning to not misuse it. When you design persuasion into your products or services, take time to think about unintended consequences that might harm your users, others, or the environment. For example, instead of guiding people to better decisions, you can rob them of choices that would benefit them. Or you could cause "rebound effects" where your users accidentally increase their environmental impacts—you might make shared cars to reduce overall car usage, only to find you accidentally motivated people to switch to shared cars from public transport.

Resources and References

Resources for Further Study

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How to Apply #20: Behavior Change Brainstorm
Time Estimate: 2–3 Hours

Goal: Brainstorm persuasive design strategies to solve one of your sustainability priorities.

STEP 1: Brainstorm Designs to Change User Behavior
Time Estimate: 20–40 Minutes

Hold a brainstorm session to generate ideas for reducing your product's environmental impacts by changing the user's behavior. Choose one of your Design Brief priorities to focus on.

Brainstorm off of specific tactics, or general theories, of Fogg/Ajzen/Lockton. Your brainstorm should:

- Have 30+ ideas. Brainstorm off of multiple persuasion tactics or theories, with at least ten ideas for each one. For example, ten ideas that increase ability, ten ideas increasing motivation, and ten ideas for prompts (Fogg's behavior model). Or ten ideas for Lockton's "angles" pattern, ten for the "converging & diverging" pattern, etc.
- Bonus: Have some "microsuasion" ideas, where behavior change is prompted via a small feature in a larger product (e.g., in Google Maps, there are buttons for transit or biking directions, but the app is used for much more), and some "macrosuasion" ideas, where the sole purpose of the product is to persuade you (e.g., Quitnet.com, a website dedicated to helping people stop smoking).
- Focus on the design of your product system and the user experience. It can include revised product design, or an auxiliary product or service, such as user interactions with packaging, customer support, retail environment, additional devices, etc. Don't be afraid to add new functionality to your product!

STEP 2: Narrow Down Your Brainstorm Options to Three or Four Best Ideas
Time Estimate: 15–40 Minutes

Think of the relevant evaluation criteria (using different stakeholder perspectives) based on your Design Brief to evaluate your ideas. Use these criteria to rate your ideas and narrow down your brainstorm into the selection of three or four best ideas.

STEP 3: Estimate Idea Impacts, and Choose One Final Idea

Time Estimate: 20 Minutes–2 Hours

Estimate the improvement in impacts of your best ideas using LCA, an eco-label scorecard, or other quantitative analysis. Use the results to decide on a final idea to continue with. (You could also decide to pursue multiple winners, or combine ideas.)

Illustrate the final design intervention with a sketch, storyboard, customer journey or rendering to clearly convey the idea, its benefits and the user experience.

STEP 4: Document Your Design Process

Time Estimate: 15–40 Minutes

Create a PDF showing your brainstorm, the best design intervention(s), and the reasons for your choice. Describe why it is the best of all your new ideas.

Checklist for Self-Assessment

To score your success on this exercise, see if you…

- ☐ *Brainstormed 30+ ideas, including ideas about ability, motivation, and prompts (Fogg's behavior model) or multiple Theory of Planned Behavior factors, or multiple Design with Intent patterns.*
- ☐ *Had 5+ microsuasion ideas and 5+ macrosuasion ideas.*
- ☐ *Showed the analysis to choose the 3–4 best ideas.*
- ☐ *Showed sketches of the 3–4 best ideas.*
- ☐ *Showed the LCA or other analysis you did to choose the final design.*
- ☐ *Illustrated and explained the final design intervention(s).*
- ☐ *State how much you expect the winning design to improve ecological impact.*