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The Social Psychology of Design Thinking

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SUMMARY

This article examines the cardinal tenets of design thinking using the research, theory, and insights of social psychology. People's intuitions are often incorrect and, moreover, it is often difficult for people to revise their thinking. There are four principles common to many design thinking approaches: observe and notice; frame and reframe; imagine and design; and make and experiment. For each of these design thinking prescriptions, this article analyzes the social-psychological phenomena involved and illustrates practical applications from a real design thinking project at IDEO. Design thinkers and their companies can use these insights from social psychology to inform and inspire the design thinking process.

KEYWORDS: creativity, ideation, design thinking, innovation, social psychology

Design thinking has taken hold within organizations of all sizes, and design thinking classes, courses, and books have proliferated. It is important to identify and understand the social-cognitive mechanisms that influence the effectiveness of the design thinking approach to innovation. Several prescriptive models of design thinking have been advanced in the literature.[1] This article uses key elements of design thinking that includes four core tenets: observe and notice; frame and reframe; imagine and design; and make and experiment.[2] Core design thinking principles can be meaningfully informed using principles of social psychology. Many of the social-psychological principles can thwart the design thinking process if the designer is not aware of them.

The principles of social-psychological phenomena characterize much of human cognition and behavior and, in most cases, they are adaptive and useful. However, for the design thinker, knowledge of these cognitions and behaviors is important to set the stage for innovative insight and prevent unintentional bias. For example, Butler and Roberto's analysis of how cognition can interfere with innovation argues that cognitive obstacles can interfere and thwart the design

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thinking process.[3] Knowledge of social psychology can heighten awareness and is therefore useful for the design thinker who wants to optimize the innovation process.

A Social-Psychological Approach

Social psychology is concerned with understanding how and why people feel (emotion and motivation), think (cognition), and behave (action) in the actual or imagined presence of others; as such, the focus is on the person and the situation.[4] There are many benefits of examining how social psychology may inform design thinking. First, for design thinkers and their organizations to be successful, it is useful to understand the cause-and-effect relationships that explain human behavior and the effectiveness of design thinking. If design thinkers are unaware of particular phenomena in social science, they may fail to meet their stated objectives or focus on illusory information. Second, by linking design thinking with robust empirical research, we can provide a scientifically based theory-to-design-table methodology to guide the design thinker and suggest refinements and additions to current design thinking principles. Just as social psychology can explain shortcomings in the design thinking process, it also provides an account of why design thinking methods are particularly effective. Finally, research-based methods provide design thinking teams and leaders with powerful persuasion language in the event they encounter resistance within or outside the organization.

Design Thinking

We define design thinking as an analytic and creative process that engages people in opportunities to experiment, create, and prototype models, gather feedback, and redesign.[5] There are many different versions of the design thinking process and most of these approaches argue that design thinking is not a linear process. We organize our article in terms of the four design thinking tenets as articulated by Beckman and Barry.[6]

Observe and Notice

The first tenet of design thinking "observe and notice" sounds simple enough. This design thinking mandate demands that the perceiver look thoughtfully (without a preexisting script) at the (analog) world around them. In this sense, the first tenet of design thinking is not a *motivational* issue. Instead, observing and noticing is, in fact, a *cognitive* strategy that essentially challenges the design thinker to do three complex mental acts. The distinction between motivation and cognition is a core explanatory consideration in social psychology because, for a given behavior to change, the perceiver would use very different mechanisms.[7] First, the perceiver needs to *abandon their preexisting script* or cognitive lens. Second, the perceiver must learn *inductively, via inference*. And third, the perceiver must engage in *finding a pattern*. Viewed in this light, "observing and noticing" becomes much more challenging.

Noticing. It is essential that observers set aside their preexisting script. According to Schank and Abelson, people develop mental cause-and-effect sequences that guide their understanding of situations.[8] Script theory focuses on how perceivers quickly form causal understandings of events that lead to expected scenes. Max Bazerman's book *The Power of Noticing: What the Best Leaders See* takes the challenge of perception to center stage.[9] He argues that it is precisely because decision makers have existing schemas that they fail to notice what is clearly in their visual field.

Inductive learning. Inductive learning involves making inferences based upon limited information. People are remarkably adept at drawing inferences; however, they often err on the side of confirmatory information processing, such that they see what they expect to see.[10] Research suggests that people make inferences so quickly, that they are sometimes unaware that they have already made one.[11] For example, in one investigation, people were shown very brief film clips of a professor and were asked to predict the course ratings that the instructor would receive.[12] People were remarkably accurate in their predictions, but were unable to fully articulate how they arrived at their predictions.

Pattern recognition. One hallmark of expertise is the ability to find patterns in chaos or complex stimuli. Pattern recognition is facilitated when perceivers use schemas or scripts to make sense of stimuli.[13] For example, a characteristic of expert chess players is the ability to quickly recognize game patterns.[14] However, expertise can often preclude the observer from finding patterns and can sometimes lead the expert to see patterns that are not actually there, a type of cognitive bias. For example, in one investigation, professional traders were seated in front of computer terminals that depicted dynamic stock information. They were told to press keys on the terminal to attempt to manipulate the movement of the data. They quickly claimed success in finding a pattern; however, there was no relationship between the keys and the data.[15]

Inattentional blindness. A few years ago, a grainy black-and-white video went viral that depicted a basketball game. Nonprofessional players tossed a ball back and forth for about 20 seconds, and during the video, a large person in a gorilla suit walked through the game. The question was would perceivers notice the person in the gorilla suit. The startling answer was no. Only about 17% of viewers noticed the person in the gorilla suit. This was not a matter of attention or motivation, as viewers were intently fixated on the screen (ostensibly counting throws). Rather, the inability to notice the gorilla person was due to a cognitive phenomenon called *inattentional blindness*, which refers to the fact that when perceivers are focused on one aspect of their visual world, they have effectively tuned out other aspects.[16] This phenomenon can be auditory as well. For example, researchers played a garbled message that most listeners could not understand. However, when listeners heard a clear version of the message, they were able to accurately perceive the garbled message.[17] When the clear message preceded the garbled message, the language centers of the brain were activated,

thereby allowing for enhanced signal-to-noise language detection. Even more disconcerting, highly trained professionals are also "blind" when performing technical tasks. For example, 20 (out of 24) trained radiologists did not see a tiny gorilla inserted in a lung scan![18]

Illusion of transparency. The illusion of transparency refers to the fact that people believe that their mental and physical states are more vivid and noticeable than they actually are. In one clever illustration of what is known as the "spotlight effect," students were donned with an embarrassing Barry Manilow T-shirt and had to walk around their college campus.[19] All the T-shirt wearers were convinced that other students not only saw the horrific T-shirt but were also mocking them. In fact, very few people even noticed the T-shirts. Consider the research on the limits of perspective-taking and the "curse of knowledge," which finds that people often cannot take the perspective of others once they are aware of something.[20] For example, in one study by Keysar, perceivers had to instruct someone where to look for a "tape" in a room containing several items, including a cassette tape and a roll of tape. Few of the perceivers anticipated that another person might be confused as to which kind of "tape."[21] In 1990, Martin Marietta deployed a satellite into the wrong orbit when engineers instructed the computer programmers to open the bay door to the hatch containing the satellite. The programmers opened the "wrong door," although they had followed the instructions correctly, costing $500M. The "design" of the hatch created a situation ripe for miscommunication.[22]

Application. Inattentional blindness was a key element in a project at IDEO in which the design team staged a clever demo to examine shoppers' experiences. In this application, the potential client was a grocery store chain that wanted to collaborate with a design consultancy to increase their customers' engagement with the in-store shopping experience. In order to determine just how much customer *engagement* presently existed in the retailer's stores, the team designed a little experiment. They wanted to find out what shoppers would "notice" when something out of the ordinary appeared in the store. In part as an homage to Simons and Chabris's "gorilla" research mentioned above, an IDEO designer donned a gorilla suit and walked casually through the store aisles, examining fruit and other packaged products as shoppers went about their normal routines. The question was would the shoppers—with kids in tow, armed with their grocery lists—notice? With a video camera capturing the experiment, surprisingly few adult shoppers noticed the large gorilla shopping in their vicinity, as many of them were multitasking, using smartphones, and going through the rote motions of their usual shopping. However, kids in the store immediately noticed the gorilla. Why? It was not likely that the kids were "motivated" to notice. It was the fact that they did not have a "script" to follow. They were open to noticing the gorilla precisely because they did not have a "to do" list that needed to be accomplished, an established routine to follow, or a smartphone to compete for their attention.

The IDEO team quickly realized that, to meaningfully redesign the in-store shopping experience, the grocery store needed to do much more than simply

change the layout of displays and the color of signage. They needed to reclaim the attention of shoppers in new and unexpected ways. A new "shopping script" would either need to integrate the customer's smartphone into the design or create a catalyst for shoppers to relinquish their smartphone (e.g., by equipping carts with charging cradles).

Frame and Reframe

The second tenet of design thinking is to try several frames or lenses to view the problem. For the design thinker, this is the equivalent of looking at a problem from many different vantage points. The paradox is that the design thinker must first put aside all frames and lenses to first observe and notice and then be ready to experiment with new lenses and frames. This is difficult to do because of the *perseverance effect*, which refers to the fact that, once a given frame has been used to interpret a situation, people are reluctant to abandon it.[23]

Gain and loss frames. Daniel Kahneman won the Nobel Prize in economics for his work on cognitive framing.[24] His work is not just applicable to economists. His work directly relates to the design thinker in that when a perceiver regards a situation to be a choice between two attractive options, they will tend to be risk averse by choosing the sure thing; however, when the same options are viewed as losses, they will be risk seeking. Kahneman demonstrated this with financial choices. For example, consider choice A: win $10,000 for sure; or choice B: play a game in which you have a 50/50 chance of winning $20,000 or nothing. Most decision makers overwhelmingly prefer choice A. According to Kahneman, that is because most perceivers are risk averse, meaning that they would rather make a sure gain than risk a loss. However, when the same situation is framed as a loss, meaning that the decision maker must now choose between losing $10,000 or playing a game in which there is a 50/50 chance of losing $20,000 or losing nothing, most people opt for the gamble. Thus, decision makers are risk averse for gains and risk seeking for losses. There is a direct linkage to behavior with perceivers and consumers opting for sure things in the face of gains but showing risky behavior in the face of loss.

Promotion and prevention frames. The work of Tory Higgins on promotion and prevention frames helps us with the design thinking implications. Higgins's argues that, at any given time, people are either focused on attaining certain attractive goal states (promotion frame) or attempting to avoid unattractive, negative outcomes (prevention frame).[25] Promotion and prevention frames can either be a trait disposition or temporarily activated.[26] Subtle factors can trigger or "prime" promotion versus prevention frames and consequently lead to very different behaviors and decisions. For example, in one study, people were told to pull an object toward them, thereby inducing a promotion frame.[27] Other people were told to push an object away from themselves, thereby inducing a prevention frame. When they were later put in a completely different situation, those who had been in a promotion frame (pulling) were more attracted to a neutral object than those who had been in a prevention frame (pushing). Similarly, an investigation of entrepreneurs in several industries revealed that promotion-focused

entrepreneurs were better able to detect opportunities and ultimately were more innovative than were prevention-focused entrepreneurs.[28] Similarly, promotion focus leads to increased job crafting behaviors.[29] In contrast, prevention goals generate stress and reduce subjective well-being.

Designers are mindful of promotion frames when they are creating products and services focused on helping people make positive changes in their lives. A domain in which this frame is particularly important is healthcare—specifically, the management of chronic conditions. In one particular project focused on diabetes management, an IDEO team discovered that traditional clinical goals of diabetes management (such as losing weight and controlling blood sugar levels) to prevent further progression of the disease were inadequate in motivating many patients to make healthy changes to their habits and routines. By contrast, setting social and emotional goals (such as being able to walk a 5k or to dance with one's daughter at her wedding) were *highly* motivating. As a result of this insight, the team made setting personal life goals (social and emotional) a core service element of the product they designed, changing the patient's mindset from prevention to promotion in the process.

Central traits. People form impressions of others very quickly. However, when they do so, not all trait information is weighed or evaluated in the same fashion. Some traits are given much more weight than others and, in fact, lead to very different impressions. These are known as *central traits*.[30] To see how central traits organize and drive impression formation, consider two individuals, Pat and Taylor. Pat is "warm, intelligent, perceptive, and ambitious." Taylor is "cold, intelligent, perceptive, and ambitious." Most people form vastly different impressions of Pat and Taylor, even though they share three out of four traits. Pat is viewed as a benevolent person who seems to have emotional intelligence. Taylor is viewed as a ruthless, power-driven person. Why? "Warm" and "cold" are central traits and they not only organize impressions, but also color other information. Similarly, physical touch creates a scaffold for the development of meaning. For example, touching hard versus soft objects influences subsequent impressions of unrelated people and objects, suggesting that, as designers work with materials and objects, their design choices can be affected.[31]

Cognitive set effects. The *cognitive set* effect refers to the fact that once people learn a method for solving a problem, they apply that solution to other problems, just as when someone with a hammer continues to see nails.[32] Sounds rational, right? Well, using previously learned solutions is rational if future problems are indeed replicas of old problems. However, this is often not the case. In this sense, people can get in a rut and often not see solutions that are readily obvious to the person who has not been exposed to prior solutions. What is the key to breaking the cognitive set? As strange as it sounds, encountering failure or obstacles can prompt problem solvers to put down their hammers and start examining other potential solutions. As an application, consider what has become quite a famous design research story at IDEO. A team of IDEO designers was working on

a project for a global pharmaceutical company in the field of rheumatoid arthritis. The client made a drug that helped patients manage the painful and debilitating symptoms of their disease to minimize their impact on daily life. Despite producing an effective medication to alleviate these symptoms, the client had a hypothesis that the medication's traditional pharmaceutical packaging was causing difficulty for arthritic patients to open.

In order to better understand the problem and the opportunities that might exist for improvement, the IDEO team interviewed and observed several patients going about their daily routines in their homes. In one particular case, the team interviewed an elderly arthritic woman who claimed that she had no problems at all opening her medication. Recognizing that people will often say one thing and do another, and knowing the impact that a cognitive set might have on behavior, the team asked the woman one important final interview question: "can you show us how you open your medication?"

What happened next shocked the team. The woman took her pill bottle out of a drawer and placed it on a meat slicer. She then used the meat slicer to cut open the top of container so that she could access the medication inside without having to go through the painful step of twisting the cap off herself.

What is remarkable about this example is that this behavior of appropriation had become so routine in this woman's life that it no longer struck her that the behavior was unusual or out of the ordinary. Designers need to be mindful of the fact that people's interpretation of their own behavior is subject to a cognitive set effect, and they must thoughtfully construct their research approaches to account for this phenomenon.

Analogical reasoning. Analogical reasoning is a powerful form of problem solving and creative idea generation. The ability to see parallels between situations and problems that on the surface appear quite different is the essence of analogical reasoning. A major hindrance to analogical reasoning is the inability to see the deep structure of problems and instead only pay attention to the surface structure.[33] As a scientific illustration, consider how researcher Keith Holyoak examined surface versus structural similarity in analogical reasoning.[34] All participants were confronted with a medical problem in which a patient needed radiation treatment to shrink a tumor near his lung. The challenge was that high doses of radiation would indeed shrink the tumor, but damage the surrounding healthy tissue. Lower doses of radiation would preserve the healthy tissue, but not be sufficient to shrink the tumor. What to do? As it turns out, the "elegant" solution is to use several low-dose radiation rays that penetrate the body from different angles (thereby preserving the healthy tissue), but ultimately converge on the cancerous tumor as a combined whole (thereby shrinking the tumor). Only about 10% of participants solved the problem using the "elegant" solution in a finite amount of time. A while later, participants were confronted with a new problem—this time involving an evil dictator holding a fortress hostage. There were several roads that led to the fortress and the question was how to

capture the evil dictator. If a large army was sent down one of the roads leading to the fortress, they could overtake the dictator, but their weight and mass would no doubt detonate the landmines planted on the roads. If a smaller number of troops were sent, they could avoid tripping the landmines, but they would not have sufficient force to overtake the evil dictator. Only about 40% of the participants who had previously seen the solution to the tumor problem recognized the analogy: the tumor is akin to the dictator and the troops are analogous to the radiation. The elegant solution in this case is to send small numbers of troops down each of the roads to converge on the fortress at the same time.

Research on analogical reasoning and creative idea generation reveals that people often fail to see parallels between problems that have different surface structures, yet similar deep structures.[35] For example, in one investigation, managers were presented with two business cases to read and study.[36] The surface structures of the business cases were markedly different, one involving an international supplier and another involving a cash crop farming situation; however, they shared the same underlying concept (leveraging different forecasts to move past a deadlock). Some people were explicitly told to compare the two business cases and derive a common principle; others were not explicitly asked to compare the cases. One week later, all participants were challenged with a novel situation (in which the underlying principle could be applied for win-win gain); those who had compared the situations created more innovative, win-win solutions to the novel problem than did those who did not compare the previous cases.

Application. Consider how a team of IDEO designers used analogical construal to immediately reframe a client's challenge. In this case, the client was a large, global beef company based in Australia. One of the company's most prestigious products was its high-end Wagyu beef, a delicacy that can often command enormous premiums when served in restaurants.

The challenge for the client was not the quality of their product, but rather how to make customers' aware of the product's quality. The beef the company produced was superior in almost every regard, winning top prizes at global Wagyu competitions against competitors from more traditional Wagyu-producing countries such as Japan. The issue was that when their product was featured on restaurant menus, diners were unaware of just how special it was. The magic of the product was being lost on its journey from the farm to the plate.

To overcome this challenge, the IDEO design team used principles of analogical reasoning to draw an analogy between high-end beef and another commodity product category that has found ways to make its unique offerings stand out: wine. Borrowing a page from the wine industry's playbook, the team created a "Reserve List" for top-flight Australian Wagyu at select steakhouses around the country and, like a thoughtfully curated wine list, added tasting notes for the beef. The notes, which featured descriptions such as "intense precision marbling delivers expansive depth and complexity balanced with underlying notes of grain and

caramel," were not contrived, but instead pulled directly from the judges' comments at the competitions they scored so highly in.

The tactic was a winner, and restaurants that implemented it saw a material lift in the sales of Australian Wagyu; and, in many cases, these same restaurants were able to increase the price-per-ounce of the product without affecting sales volume.

Now, consider how the leader of a large medical devices company (GE) used an unlikely analogy between a medical suit and a bridal gown to solve a design challenge. The leader was faced with a daunting task: how to design a medical suit to protect health workers from highly contagious bacteria? In this case, an alarming number of healthcare workers became infected after treating infected patients. The problem? The medical "suit" had too many points of failure. In one case, there were 38 steps to donning and doffing the medical suit. The team decided to involve a nonhealth expert as a way of using an analogy—Jill Andrews, who is a world-renown wedding dress designer. True, she does *not* have a degree in virology or infectious medicine, but she knows a lot about how brides dress, undress, and what is takes to put on a wedding dress, wear it all day, regulate heat, and still looking stunning. In this partnership, participants formed eight teams to work on the design. By the end of the weekend, they had used plastic sheets, zippers, and even cardboard and pipe cleaners to build prototypes. Jill Andrews helped narrow the prototypes, aiming for solutions that were tangible to design in a relatively short amount of time. The result? A single-piece, fully integrated suit that cut the removal process by three-quarters of an hour to just five minutes. It takes the wearer just eight steps to shed it. "It's all engineering," Andrews said. "If you can build a bra, you can build a bridge."[37]

Imagine and Design

The third tenet of design thinking, imagine and design, is arguably the heart and soul of design thinking. Presumably, after designers have observed and used several frames, they can start to develop designs as teams. Thus, design thinking may begin as a largely individual process, but transforms to a group process. At this point, it is useful to examine the practice of group brainstorming.

Group ideation and group size. There is a near-perfect negative linear relationship between group size and creative idea generation. Stated simply, as group size increases, per-person productivity of ideas decreases.[38] Most people find this empirical fact distasteful because they believe in the power and synergy of teams. Unfortunately, quantity and quality are intimately related: larger teams not only generate fewer ideas, they generate lower quality ideas.[39] There are a variety of techniques that can be used to optimize group ideation and the design thinking process, including brainstorming, brainwriting, and speedstorming.[40]

Brainstorming. Developed by advertising executive Alex Osborn in the 1950s, brainstorming is a ubiquitous business best practice. However, Osborn's four

cardinal rules of brainstorming—expressiveness, nonevaluation, quantity, and building—are routinely violated by well-meaning "creatives" in organizations. For example, one study found that groups often never suggest more than two ideas in a typical brainstorming session.[41] Another investigation reported that certain types of evaluation might actually simulate the creative process. For example, criticizing an idea helps ideation, but criticizing the idea generator hurts ideation.[42]

Brainwriting. The key problem in brainstorming is that people in groups often self-censor and cannot generate ideas because they need to be polite and listen to others—something called the politeness ritual.[43] Since the advent of brainstorming, more effective idea generation techniques have been developed by design thinkers and their firms as well as by laboratory social scientists. For example, brainwriting is an extension and modification of brainstorming.[44] Specifically, brainwriting is the simultaneous generation of written ideas by members of groups. This is usually accomplished by instructing individuals in the group to record all of their ideas silently for a few minutes after which a facilitator collects the ideas. As compared with brainstorming, brainwriting is dramatically superior. This can be seen in the lab, as well as in practical applications. For example, one meta-analysis revealed that groups that engage in brainwriting generate about 2.5 times the volume of ideas and have a significantly greater percentage of their ideas judged to be of higher quality.[45] Similarly, in idea generation sessions at companies like IDEO, designers regularly use highly structured, iterative approaches to dramatically increase the volume of ideas.

Speedstorming. Speedstorming—a mash-up of brainstorming and speed-dating—is akin to pairwise brainstorming. Everyone in a group has an opportunity for a two-person brainstorm with everyone else in the group. Speedstorming is an ideal method for approaching complex problems and has been successfully implemented in multidisciplinary teams in the public sector[46] (e.g., city and community innovations), education[47] (e.g., ideathons in undergraduate education), as well as nanoscience collaborations.[48]

Application. IDEO uses a clever mix of brainstorming, brainwriting, and speedstorming during the ideation phases of projects. IDEO brainstorms begin with carefully crafted questions and prompts that focus the attention of the group on a specific set of challenges. The group focuses on one prompt at a time, with time limits set at the beginning of each brainstorm session. Designers then take a few minutes to themselves to reflect on the prompts and jot down or sketch up a few ideas on Post-it Notes. Once everyone has some time to reflect, designers begin sharing their concepts with the group, sticking the ideas to the wall as they are shared. Once ideas are on the wall, they are discussed and, more importantly, built upon by other members of the group that may have been inspired by the concepts being shared.

This method embodies many of the insights that laboratory researchers have scientifically tested. For example, prompts, small teams, focused questions,

and visualization of ideas in the form of pictures (rather than merely words) are all part of the effective IDEO design arsenal. Visualization, unlike prose, is faster to communicate, allows others to quickly see a prototype, and is more amenable to collaboration by others.[49]

Make and Experiment

Following the group ideation process, teams narrow the set of ideas and begin the process of experimentation and testing. The fourth principle of design thinking is "make and experiment." Embedded in this prescription is the concept of play and also the concept of rapid iteration and learning. Sounds easy enough, but people not familiar with design thinking are reluctant to consistently fail and experiment.

Fixed versus growth mind-sets. Carol Dweck observed that, at very young age, many girls have self-labeled themselves as "not good at math" and perform worse than boys on math tests.[50] These girls seem to ascribe to a theory that there is a genetic difference in mathematical proclivity. So Dweck began to experiment with the concept of fixed versus growth mindsets.[51] The idea is that if people think that ability is genetically determined they will not bother to try because "what is the point." However, if people believe that ability or skill is a matter of practice, they will try. Consider, for example, an intriguing investigation of creativity in negotiation. Some managers were led to believe that negotiation was a trait disposition—that is, you are either born with it or not. Others were led to believe that negotiation was a matter of practice. Those who approached the task believing that effort and practice were pivotal reached more creative, win-win agreements as compared with those who thought negotiation was genetically determined.[52]

The key question is what to do if a learner has a fixed mind-set and is, therefore, self-limiting. It may be all in the HMW ("How Might We?").[53] HMW questions are what design thinkers use to get past constraints. Because HMW questions ask the user to imagine the factors that would accomplish the goal, this empowers the user (and the designer) to think of situational factors that lend themselves to change as opposed to immutable factors. Groups that adopt an HMW focus are more likely to persist and be creative than those who do not think about possibilities.

In one study, management students were challenged with a complex task that required productivity analysis, strategy, and human resource management.[54] One group was told, "as you probably know, management and leadership skills are a matter of talent, and this task will determine whether you have those skills." Another group did the exact same task, but was told, "as you probably know, management and leadership skills are developed through practice, and this task will give you an opportunity to cultivate those skills and learn." Everybody did the same task, yet there were stunning differences between the performance (and attitudes) of the "fixed" versus "growth" mindset groups. The groups that believed that leadership skills were malleable—that is, could be

developed through practice—learned more, looked directly at their mistakes, were able to adjust their strategy during the task, and, most importantly, thoroughly enjoyed the experience more than the group who believed that performance was strictly ability based. Thus, the behavior and creativity of the groups were strongly determined by a few small, but powerful turns of phrase.

Application. Core to the practice of design thinking is a bias toward frequent prototyping—embodying one's ideas, making them real enough to test in the market. To prototype effectively, a growth mindset is essential. Often innovators forget that the purpose of a prototype is to help answer questions and to learn, not to validate the final idea in one fell swoop. With this goal in mind, designers will begin prototyping very early in the design process, being careful to match the fidelity of their prototypes with the fidelity of the questions they are answering.

For example, in the early stages of concept development, when questions about the idea are quite fundamental and broad, designers will deliberately prototype in *low-fidelity* media (e.g., sketches, cardboard models, and storyboards), clearly signaling to those they are sharing them with that the idea is still in formation, nonprecious, and that constructive critique and feedback is not only welcome, but also essential ("You won't hurt my feelings if you don't like this concept—it only took a few minutes to construct, so fire away!"). Designers appreciate that the only way to make an idea better is to make mistakes and learn lessons as quickly and early in the process as possible.

To help illustrate this idea, consider a set of prototypes that a team of IDEO designers used to test some of their assumptions during a project for Air New Zealand. The airline approached IDEO to help redesign the long-haul flight experience, including the layout and facilities in the cabin (i.e., the seating in the economy and business class), as well as the service and entertainment system. At the early stages of the project, the focus was put on the environment and how to optimize that for the user (traveler), building on the growth mindset principle. Accordingly, the team used materials they found around the office to test, modify, and eliminate different concepts as quickly and cheaply as possible. In one particular instance, when attempting to reimagine how economy class passengers might be able to enjoy a more restful flight, the idea of "bunkbeds" was raised (similar to those you might find in sleeper cars on trains). In order to test the desirability and feasibility of this concept, the team found some office chairs that were roughly the width of economy class airplane seats and created rows of three seats of this makeshift configuration. They then invited some of the airline executives to test the prototype experience by laying in the chairs stacked on top of one another to imagine what such an experience might feel like on an actual airplane. Suffice it to say, the prototype proved that this was a pretty undesirable way to travel and the team moved on to their next idea.

The point of this story is not that the prototype failed. In fact, exactly the opposite! The low-fidelity experiment proved quickly and cheaply that putting bunkbeds in the economy cabin of an airplane was a bad idea. Answering this

question about the desirability of the concept was the job the prototype was hired to do. In this case, fast failure was success. The team learned something from the experiment and moved forward with new concepts. One such concept, the "Sky Couch" wound up being a winner. This seating innovation allows three adjacent seats to transform into a simple bed, as armrests disappear and a footrest appears, for two adults to lie down and sleep. In this way, economy class passengers can relax and stretch out during a long-haul flight, a luxury previously available only to first class passengers.

Conclusion

In this article, we have examined research on social psychology that is relevant to understanding and leveraging the power of design thinking. The social-psychological principles we explored influence how design thinkers approach the process of innovation, embark on projects, and also influence how users respond. The design thinker who possesses a thoughtful awareness of how subtle, yet powerful social-psychological factors influence perception, engagement, and behavior can gain greater insight into the needs of the user and also positively influence the innovation process. Indeed, as organizations are increasingly challenged to focus on design, the principles we have outlined have wide implications. One of the most common explanations offered by managers when asked why a particular innovation project was not successful is that the people involved were not motivated or otherwise found at fault. Known as the "fundamental attribution error," the tendency to assign fault to largely immutable factors, such as lack of motivation or incompetence, may unwittingly stymie the design thinking innovation process by limiting the search and exploration of factors that can be more readily changed or manipulated.[55] A solid grasp of social-psychological principles equips the design thinker with a wide array of tools that focus on situational factors that can profoundly affect the success of the creative process.

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Notes

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