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Addressing Our Implicit Bias Against Embracing Creative Ideas

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Abstract

Addressing Our Implicit Bias Against Embracing Creative Ideas

The purpose of this Master's Project is to highlight the fact that we all carry an implicit bias against embracing creative ideas experienced as psychological reactions such as anxiety related to the uncertainties that surround truly creative ideas. Two main innovation processes, Creative Problem Solving and Design Thinking will be compared against suggestions by social psychologist and creativity researcher Jennifer Mueller for addressing this bias. One of the main areas of discussion will revolve around the need to balance two opposing mind-sets often used by decision-makers, which results in the ability to think more like an inventor. Characteristics of these two innovation processes will be compared against the characteristics of a how/best and a why/potential mind-set. Suggestions for further research will be included. My personal journey learning about the Creative Problem Solving process will be interwoven throughout this exploration.

Key words: bias against creativity, creativity, innovation, creative problem solving, design thinking, inventor mind-set, decision-making
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Section One: Project Background

Learning About the CPS Process

This past summer I met with 15 cohort members from around the world at the International Center for Studies in Creativity (ICSC), part of the Creative Studies Department of SUNY Buffalo to begin an exciting journey: gaining our Master's degree in Creativity and Change Leadership. The purpose of our initial two weeks on-campus surrounded something called “Creative Problem Solving” (CPS), an innovation process that has been researched and refined over the last 50 years by the Creative Studies department at SUNY Buffalo. This department was birthed through the vision of advertising executive Alex Osborn, whose initial goal of finding ways to increase the creativity of his employees later grew into developing a formal educational program in creativity that balanced both creativity application and research. Osborn emphasized the fact that creativity can be taught and was not a skill we were born with (or without). Osborn introduced an initial seven-stage version of a creative problem solving process (CPS) in his 1952 book, *Wake Up Your Mind*, and ten years later introduced a simpler, four-step CPS process: Fact-Finding, Idea-Finding, Solution-Finding, Action! (Isaksen, Treffinger, 2004, Puccio, Murdock and Mance, 2005).

Much research has gone into ongoing refinements to the CPS process over the last 50 years, starting with the work of Meadow and Parnes (1959), Meadow, Parnes and Reese (1959), and Parnes and Meadow (1959, 1960). A “Creative Studies Project” tested the impact of creativity courses on college students between 1969 and 1972 (Parnes, 1987; Parnes & Noller, 1972, 1973). CPS eventually moved beyond the Creative Studies department to being used “in the field” by educators and researchers. Comprehensive reviews and meta-analytic studies in the 1970's and 1980's demonstrated that CPS training had a consistently positive effect on creativity evaluations (Torrance, 1972; Torrance and Presbury, 1984; Rose and Lin, 1984).
In addition to researching and refining the CPS model, ICSC Creative Studies department head Gerard Puccio (1990, 2002) used cognitive problem solving style preference research to create an assessment tool called “FourSight,” as a way to measure individual cognitive problem solving preferences related to the four main stages of the CPS process. The FourSight assessment tool helps teams increase problem solving effectiveness by making sure to include people with preferences in all four main CPS stages of clarify, ideate, develop, and implement. FourSight also offers tools to strengthen people's problem solving skills when working in CPS problem solving stages that are not their specific cognitive problem solving preference.

Recent research on the CPS model (Isaksen & Treffinger, 2004; Puccio, Murdock & Mance, 2005) looked at how CPS was being used to meet clients' needs, leading to a revision of the model into three main components, which appeared in CPS Version 4.0: Understanding the Problem (Mess-Finding, Data-Finding, Problem-Finding); Generating Ideas (Idea-Finding); and Planning for Action (Solution-Finding, Acceptance-Finding).

In 2003 Puccio and Miller created the “CPS Learner's Model” which harkens back to the basic four main stages of CPS originally identified by Osborn:

**CPS by Osborn, 1962**  
Fact-Finding  
Idea-Finding  
Solution-Finding  
Action!

**CPS Learner's Model, 2003**  
Clarify Identify the challenge)  
Ideate (Generate ideas)  
Develop (Bring ideas to life)  
Implement (Give ideas legs)
In 2010 another version of CPS called the “Thinking Skills Model” was introduced, incorporating the work of Firestien, Miller & Vehar (2000), and Puccio, Murdock and Mance (2007). This model added a new executive thinking, metacognitive stage called “Assessing the Situation” that highlighted the critical need for a skilled facilitator to manage and strategically use appropriate CPS stages and tools to best fit each client's unique needs. The graphics of this CPS Thinking Skills model shows three main themes: clarification, transformation and implementation (similar to the three main stages of CPS 4.0), overlaid upon the four main CPS stages of the CPS Learner's Model. It is essentially blending previous CPS research with more current research, while updating its semantics.
relevant to leadership skills needed today such as “vision” and “transformation.”

The “Process Overview” on the back of the CPS Thinking Skills Model handout designed by ICSC graduate students Neilson and Thurber (2010), highlights the four main stages from the CPS Learner’s Model, while adding helpful guidance for facilitators with “Starters and Samples” as well as “Tools” and “Outcomes.”

![CPS Thinking Skills Model](image)

*Figure 2: CPS Thinking Skills Model, used with permission*

The CPS process has therefore undergone 50 years of refinements based on supporting research by applied creativity researchers who have recognized the need for a formal innovation process that follows some very specific rules (such as the need for both convergent and divergent thinking within each stage), while also providing flexibility, represented by the new stage of “Assessing the Situation,”
whereby facilitators can strategically identify those CPS stages that best fit client needs. The CPS Thinking Skills Model therefore represents a beautiful merging of past and current academic research.

**My Personal Interactions With the CPS Process**

One of my classes this summer involved learning to facilitate the CPS process, including practicing on my cohort as well as “in the field.” My experience of learning and facilitating the CPS process with my cohort felt transformational, even though we had only two weeks of in-class learning. We experienced a powerful bonding as a cohort, since we had to be vulnerable in identifying and sharing complex personal challenges from each of our lives that would benefit from applying the CPS process.

My very first exposure to the CPS process had actually occurred three years earlier while completing a distance undergraduate degree class. My learning contract for this class had encouraged me to “apply the CPS process to my personal life in some meaningful way.” Exercises each week guided me in writing about my application of CPS to a personal challenge that required a novel solution. I was encouraged to write for myself the details of how I was applying CPS, but I was only required to submit to the instructor in a weekly paper the general principles of how I was applying it.

This initial exposure to the CPS process had been valuable in helping me clarify important components of a very painful issue I struggled with. It encouraged me to identify novel solutions, showed me strategies for developing those ideas further, and helped me identify specific steps to bring much needed change to this area of my life. CPS also helped me assess what was holding me back from making those changes.

Despite having gained clarity about what steps I needed to take to address this struggle, I recall feeling a knot of fear in my gut as I tried to take some of the action steps towards the proposed changes. I recognized that my fear was about the unknowns and uncertainties regarding what my future would
look like if I made these changes. At that time, I felt very much alone in my attempts to apply the CPS process to my life, and was not yet able to address my fear of the unknown. I chose to hold on to the safety of the familiar, even thought I knew the familiar was not working at all....

Project Goals

Addressing Our Implicit Bias Against Embracing Creative Ideas

Using Creative Problem Solving

Social psychologist Jennifer S. Mueller published a book this year with a goal to disrupt the applied creativity industry. She makes the claim that we have more than enough innovation processes and tools to help organizations enhance their ability to generate novel solutions towards much needed creative change. Mueller provides us with research to prompt our thinking about the phenomenon that we all carry an implicit bias against embracing creative ideas. Mueller states that this bias originates from psychological responses such as anxiety and fear, which tend to arise when we are faced with the uncertainties and unknowns characteristic of truly novel ideas. She suggests that despite the fact that we all say we love and need creative ideas, when it comes to making decisions to move forward with those ideas, this bias often causes us to default to “safer,” “more familiar” solutions (Mueller, 2017).

Mueller makes a number of suggestions for “disrupting our thinking” in order to move beyond just saying we love creativity, towards embracing creative ideas that can bring much needed change. As a Master's student having just studied the CPS process at the ICSC, I am trying to figure out how I might offer this process knowledge in a relevant way as an innovation consultant in the future. This led to my first goal for this Master's Project:

*Goal #1: I would like to better understand the CPS process and how it aligns with the suggestions Mueller makes for addressing our bias against embracing creative ideas.*
Addressing Our Implicit Bias Against Embracing Creativity

Using Design Thinking

A second goal of this Master's Project surfaced when interviewing professional creativity experts about their use of CPS “in the field.” At the Creativity Expert Exchange Conference (CEE) in October of this year, I heard a number of speakers and attendees talk about the fact that they use both CPS and Design Thinking (DT) processes when coaching their clients towards embracing creative change and innovation. For one of my ICSC Master's classes, I had to interview innovation coach and Haas School of Business MBA instructor Helene Cahen, whose consulting business is based in California. She explained that she finds it imperative to use a combination of CPS and Design Thinking (DT) to help her clients embrace creative change. She sees these two approaches as complementary, and that by using both processes, she can powerfully address clients' anxieties about unknowns and uncertainties related to embracing novel solutions. Thus my second goal for this Master's Project:

Goal #2: I would like to better understand the Design Thinking process, and how this process aligns with the suggestions Mueller makes for overcoming our implicit bias against embracing creative ideas.

Finding Examples of Combining CPS and Design Thinking

As I began pondering and researching CPS and DT, I noticed the lack of an innovation process model that demonstrated how to effectively combine both CPS and DT processes, despite the fact that practitioners in the field were obviously using both in a complementary fashion. At the October 2017 Creativity Expert Exchange (CEE) Conference, I was excited to discover that two of our head professors at the International Center for Studies in Creativity (ICSC) had combined both the CPS and DT processes into a new model which they called the “Creative Process Mashup.” This was presented
in their new book, *Organizational creativity: A practical guide for innovators and entrepreneurs* (Puccio, Cabra & Schwagler, 2018). As a graphic designer, one question that plagued me was whether it was possible to come up with an innovation model that combined CPS and DT in a more organic manner that demonstrated the idea of innovation as an *ongoing process*.

When attending the CEE Conference, I was able to hear Mike Ackerbauer, an alumni from the Master's program in Creativity at ICSC, present how he uses the CPS process to support and complement a new “Design Thinking Innovation Loop” model that was recently unveiled by IBM. I was stunned and excited to see this new Design Thinking Innovation Loop model which elegantly communicated in a graphic manner the circular, system-based, ongoing nature of innovation (picture the symbol for infinity).

Ackerbauer's knowledge of the CPS process gained through the ICSC program plus years of applying and teaching it while working “in the field” at IBM, enabled him to see the relevance of using CPS as the “underlying skeleton” to more clearly define the stages of innovation represented by the IBM Design Thinking Innovation Loop model (thus combining these two processes). He also recognized the value of overlaying the FourSight Assessment tool created by Puccio (1990, 2002) onto the Design Thinking Innovation Loop model to identify team member cognitive problem-solving stage preferences for each quadrant of the Loop. This would enable clearer understanding of why some teams were getting hung up in specific stages of what was meant to be a continuously flowing innovation loop/process. Mike generously offered to connect with me on Zoom to help me understand the relevance and value of applying the CPS models to the IBM Design Thinking Innovation Loop (and the FourSight process related to innovation team building and effectiveness).

This has led to the third goal of this Master's Project:

*Goal #3: I would like to study and better understand Mike Ackerbauer's research which provided a ‘real life' example of combining CPS with DT.*
The IBM Design Thinking Innovation Loop model combined with CPS appears to powerfully and simply addresses the implicit fears felt by innovation teams, IBM gate-keepers and customers, related to the uncertainties associated with truly novel ideas. I have not received permission to share visuals of Mike's work which is yet to “go public,” but will share some general principles.

### Section Two: Literature Review

#### Overview

The year 2017 is characterized by massive changes in every facet of technology and communications, as well as an increasing pace of change. Rapidly accelerating technological advances and this increased pace of change have led to greater awareness of the need for innovation in order to gain and maintain market advantage. Organizations are competing in a “hyper-competitive” market where their survival depends on their ability to offer their customers innovative solutions (Amabile et al., 1996; Boisot, 1998; Mueller, 2017; Sigala Chalkiti, 2015). According to Mueller (2017) this has led to millions of dollars being spent on creativity consultants, workshops and related activities by businesses, highlighting the pressure they feel to gain market advantage through innovation. However Innovation often involves embracing the unknown, being willing to take some risk, and managing our own and others' anxieties about these unknowns (Mueller, 2017).

Amabile (1988) states that organizational innovation is defined as “the successful implementation of creative ideas...” (p. 26). This definition highlights the need for both generating and implementing of creative ideas in order to achieve innovation. Representing the building block of innovation, creativity is defined as the production of both novel and useful ideas (Stein, 1974; Amabile, 1983).

The case for valuing and implementing creative ideas to drive innovation is clear. However,
according to evidence from implicit attitude test (IAT) research by Mueller et al. (2011), despite the fact that people said they loved creativity, they simultaneously showed negative associations towards it. People demonstrated a positive response to the concept of creativity, and at the same time harbored implicit, unconscious, negative associations, which led them to downgrade the value of creative ideas. This concept is confirmed by research showing that organizations, scientific institutions, and decision-makers have all rejected creative ideas, while claiming at the same time that creativity is an important goal (Ford & Gioia, 2000; Mueller, 2012, 2017; Staw, 1995; West, 2002).

Mueller's most recent work (2017) appears to be aimed at disrupting the field of applied creativity, which is known for producing and marketing many different idea generation processes and tools (eg. CPS and Design Thinking). She suggests that there are enough idea generation tools available today, and more than enough creative ideas available to organizations. Mueller believes that the phenomenon of organizations paying for creativity training to generate more creative ideas, but then choosing to embrace familiar and less novel solutions, is explained by their implicit negative association with creative ideas, as demonstrated by her IAT research (Mueller, 2017). These implicit negative associations represent a psychological response (often viscerally felt as anxiety and fear) related to the uncertainties and unknowns associated with truly novel ideas. Mueller further suggests that all of us (even she herself) can experience strong feelings of dislike and distrust regarding the ambiguity and uncertainty that novel ideas signify (Mueller, 2017). As the pace of global change increases, how well organizations are able to embrace change by adapting and managing their anxiety about the ambiguity and uncertainty surrounding novel ideas will determine an organization's ability to survive (Mueller, 2013; 2017).
Various Psychological Processes Constraining Our Ability to Embrace Creative Ideas

Decision-Maker Mind-Sets: How/Best and Why/Potential

Mueller identifies two main mind-sets that decision-makers tend to employ. One she calls the “how/best” mindset, which involves finding the most feasible and valuable solution now, with little tolerance for uncertainty or risk. Decision-makers using this mindset analyze a proposed solution formulaically, with a goal of efficiency, using existing knowledge and reference points for analysis (i.e., best practices, benchmarking). How/best decision-making works well in situations where solutions are easily definable and comparable to similar, already accepted solutions, with metrics available towards forecasting potential future success (Ford & Gioia, 2000; Mueller, 2014, 2017).

The second decision-maker mind-set described by Mueller is the “why/potential” mindset, which demonstrates more openness to learning the future value of an idea, a greater willingness to learn from failures, and a higher level of tolerance for uncertainty and risk (Mueller, 2017). She compares this type of decision-making to that which inventors use, when they display openness to changes which might improve a proposed solution, and a willingness to accept ambiguity and unknowns related to truly novel ideas, which tend to have no future metrics or similarity-based reference points (Mueller, 2017; Kirby, D. 2006).

According to Mueller (2017) decision-makers have a tendency to overuse how/best decision-making practices which are suitable for well-defined problems, by applying this same type of thinking towards ill-defined ones. Mueller further suggests that using how/best thinking does not work well if novelty is required, since this thinking tends to result in premature negative judgements about less familiar ideas which carry some level of uncertainty and risk. In addition, how/best thinking tends to involve efficiency-based premature closure about solutions, and a lack of openness to the potential of small adjustments leading to better solutions.
Mueller states that her research shows “a focus on money, metrics, and a “how/best” mind-set, will kill the ability to recognize early-stage ideas as great opportunities” (Mueller, 2017, p. 164-165). As a previous assistant instructor at Harvard and Wharton, she also suggests that the how/best mind-set is instilled by most MBA programs and corporate contexts. She further states that decision-makers have a tendency to rely on a how/best mind-set based upon their level of uncomfortableness with uncertainty, as well as their need to protect their own reputations (Mueller, 2014, 2017).

**Constraints of the Decision-Making Role Itself**

Taking on the role of decision-maker can affect evaluation of creative ideas, since decision-makers not only feel anxiety about the uncertainty of creative ideas, but also feel the need to manage the perceptions of others regarding their decision-making ability, which is often judged based upon performance outcomes of failure or success (Geissner & van Knippenberg, 2008). Mueller's research demonstrated that just by taking on a decision-maker role people shift into a predominantly how/best mindset (Mueller, 2017). Those who believed they were in a decision-maker role rated creative ideas as “super creative” only if these ideas had lots of Facebook likes and Kickstarter investors, demonstrating reliance on benchmarking, best practices, and existing social acceptance metrics for assessing the value of a creative idea. This strategy is often used by decision-makers for reducing their own feelings of anxiety related to the uncertainty of novel ideas, and to avoid any chance of failure out of concern for how others will perceive them as leaders (Mueller, 2017).

**Decision-Maker Fear of Failure**

Social identity analysis research of Geissner and van Knippenberg (2008) showed that leaders are perceived more positively after a failure if they had previously behaved in such a way that affirmed the social identity of the group they lead, called “group prototypicality,” referring to the degree that a leader is seen to embody the group identity. Unfortunately this pressure may cause leaders to feel they must align their behavior and decision-making with the values of the group, adding to concerns about
embracing novel ideas that the group as a whole may be feeling anxiety about.

Rus et al. (2008) suggest that leaders are more likely to use social reference information (social acceptance via social media stats, etc) for decision making when their self identity is strongly tied into these types of social references. They may be very hesitant to embrace any ideas that do not include proven social acceptance stats for guiding their decision-making about the potential of a novel idea to succeed or fail.

Decision-makers with high levels of knowledge in a certain domain who encounter uncertainties surrounding novel ideas may be extremely uncomfortable admitting to themselves or others that they don't have all the answers, especially regarding whether an idea will succeed or fail. This will be extremely hard for any decision-maker who believes they need to exude a confident, knowledgeable persona as a leader. This may lead to intense negative implicit or explicit emotional reactions to a novel idea, such as feeling powerless, a lack of control, or of being threatened (Mueller, 2017).

**Decision-Maker Concern For Image Management**

Amabile's 1983 research demonstrated that decision-makers were perceived as more intelligent when they rejected a new idea, versus when they accepted it. Therefore decision-makers may implicitly feel that there is more for them to lose when they accept a new idea than when they reject it (Amabile, 1983; Mueller, 2017). Decision-maker's own anxiety about uncertainties surrounding a novel idea, combined with worry about group prototypicality (Geissner & van Knippenberg, 2008), as well as how people might perceive them if they accept (versus reject) a novel idea (Amabile, 1983), may therefore cause feelings of pressure to downgrade their assessment of the value of creative ideas (Mueller, 2017).

**Decision-Maker Construal Levels and Concrete vs. Abstract Thinking**

Research by Mueller et al. (2013) suggests that having abstract versus concrete mental representations of ideas may powerfully impact our assessment of novel ideas. This concept is derived
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from research in the field of “construal theory,” or our mental representations of ideas, categorized as “low-level” and “high-level” construals. High-level construals relate to abstract mental representation of distant events, capturing the gist of an idea and emphasizing goals and end or future states.

Alternatively, low-level construals are more concrete mental representations of familiar ideas, using supporting concrete information, such as details of exactly how to carry out an idea (Mueller et al, 2013).

Those using low-level construals (mental representations) when assessing ideas are using the narrower mental processing of a concrete mind-set, meaning they will feel more comfortable with familiar ideas. Those using low-level construal mental representations tend to diminish creativity ratings of unfamiliar ideas due to feelings of anxiety that arise since they cannot use abstract thinking to gather the gist of a new idea, cannot use any familiar benchmarks to compare it against, and cannot perceive of potential end states (Mueller, 2013).

Increased psychological distance (high-level construals) has been shown to enhance abstract thinking, which is linked to increases in creative cognition (Forster, Friedman, & Liberman, 2004). Related to this, further research (Forster, 2009; Forster, Liberman & Shapira, 2009) shows that exposure to novel, unfamiliar stimuli tends to activate global, abstract processing (Forster, Margue, & Gillebaart, 2010). Mueller therefore suggests that the tendency to think in abstract ways may influence our assessments of creative ideas and that exposure to unfamiliar stimuli may be an effective way to prepare for understanding and assessing novel information (Mueller, 2013, 2017).
Mueller Suggestions for Overcoming Our Bias Against Embracing Creative Ideas

Balance How/Best and Why/Potential Mind-Set

“The intuitive mind is a sacred gift and the rational mind is a faithful servant.”

Albert Einstein

Mueller suggests that sole use of a how/best mind-set of reliance on best practices, past metrics and social media acceptance stats, represents a “manifestation of the status quo bias” (Mueller, 2017, p. 78). Since the how/best mind-set is represented by Mueller as a poor fit for assessing novel ideas, and also represents a form of cognitive bias, I made the assumption that Mueller would suggest switching to the why/potential mind-set for achieving the “self-disruption” needed for recognizing and embracing creative ideas. Instead Mueller emphasized the need for a balance between these two mind-sets (2017). For instance, there needs to be details for “why” a creative idea has potential to solve a problem, as well as details of “how” this creative solution will be implemented (Mueller, 2017).

Supporting Mueller's concept of a need to balance the how/best and why/potential mind-sets of decision-making, earlier research by Isenberg (1984) gave examples of how truly successful executives don't just use formulaic, rational thinking when addressing daily challenges and decision-making. Isenberg's (1984) research gave suggestions for how executives could improve their “abilities to think,” which represented a combination of rational thinking skills with what appear to be characteristics of Mueller's why/potential mind-set. Isenberg (1984) suggested: “bolster intuition with rational thinking;” and “offset tendencies to be rational by stressing the importance of values and preferences, of using imagination, and of acting with incomplete information;” as well as “don't be afraid to act in the absence of complete understanding, but then cherish the feelings of surprise that you will necessarily experience” (p.90).

Isenberg (1984) states: “By now it should be clear that intuition is not the opposite of rationality, nor is it a random process of guessing. Rather it is based on extensive experience both in
analysis and problem solving and in implementation...managers often combine gut feel with systematic analysis, quantified data, and thoughtfulness” (p.86). This sounds exactly like the balance of how/best and why/potential mind-sets that Mueller is suggesting for self-disruption, in order to overcome our anxiety related to the uncertainties associated with truly novel ideas.

**Balance How/Best and Why/Potential Mind-Sets by Thinking Like an Inventor**

**Accept the Unknowable and Go With Your Gut**

Mueller's book (2017) includes an interview of Dr. Thomas Fogarty who has over 125 patents to his name for inventions in the medical industry. He is currently a well-known investor and entrepreneur, with a role of assessing others' creative ideas. He assesses others' creative ideas with his inventor's perspective, learned from disrupting the medical industry with his totally “out of the box” ideas in what was traditionally a conservative, data-driven industry.

As part of thinking like an inventor, Mueller (2017) shared Dr. Fogarty's suggestion that you have to accept that true metrics about a creative idea are unknowable, and choose instead to go with your gut. Accepting the unknowable, and going with your gut, Mueller (2017) suggests, is a way to think like an inventor, which helps towards managing your anxiety about embracing creative ideas.

**Using Metrics to Identify What Can Be Improved Upon**

According to Mueller (2017), when people assess creative ideas using the how/best mind-set, their use of metrics is primarily for “red flagging” any and all problems associated with those creative ideas. Inventors also value and use metrics when available, but for a different purpose. They use metrics to assess where and how creative ideas can be improved upon, demonstrating a combination of both how/best and why/potential mind-sets (Mueller, 2017).
Expand Upon Our Definitions

Identify and Challenge Our Assumptions

Fogarty suggests we need to think like an inventor and bring to light all the definitions of a creative idea we are assessing, then intentionally challenge ourself to expand those definitions. He also recommends trying to identify what assumptions we are making about what we are assessing, and then play the role of devil's advocate, in order to challenge those assumptions. This is a strategy I first learned about in a decision-making class that was one of the few things known to help in overcoming biases (Bazerman & Moore, 2013).

Inventors Use a Defined Process for Learning How to Make a New Idea Work

Mueller suggests that the definition of an inventor is someone who is “willing to use a process to learn how to make a new idea work” (p. 83). She shares Amabile's definition of an “invention process” as: “finding a problem, gathering information, generating options, testing the options, validating a solutions, then starting again if you fail” (p. 83) (Amabile, 1996). Note how this appears to be a combination of both the CPS and Design Thinking processes....

Identify and Use Constraints

Defer Judgement

According to Mueller (2017), there is ample research demonstrating that “if you give idea developers a moderate number of constraints and guidelines, they can develop higher-quality creative solutions” (Mueller, 2017, p. 96) (Moreau & Dahl, 2005). Thinking like an inventor and identifying constraints early, viewing those constraints as opportunities, and adopting a problem-solving (versus just a problem-finding) process enables a decision-maker to lead others in identifying and developing quality solutions (Mueller, 2017)). Mueller points out the importance of deferring judgment on both ideas, others, and ourselves as part of this process.
ADDRESSING OUR IMPLICIT BIAS AGAINST EMBRACING CREATIVE IDEAS

Lead the Process Not The Outcome

For those leaders willing to let go of fear about being perceived negatively for admitting they don't know all the answers, there is opportunity to lead others in the process of innovation. By letting go of solution-finding themselves, they can instead focus on leading others in the innovation process by setting clear guidelines, identifying and communicating constraints, keeping inventors on track, and encouraging the project's direction (Mueller, 2017). Similar to inventor Fogarty, by admitting they can't know all the answers and managing their own anxiety about this fact, leaders have the opportunity to manage the anxiety of those they lead by including them in an invention/innovation process that balances the how/best and why/potential mind-sets. Leading others in this type of inventor-like innovation process should make evaluation of the creative outcomes more efficient, since those participating in the process will now feel more ownership, more confidence, and less anxiety about uncertainties related to their proposed creative solutions.

Other Ideas for Balancing How/Best and Why/Potential Mind-Sets

Combine Opposing Decision-Maker Mind-Sets

Another way to balance the how/best and why/potential mind-sets of decision-making is to give two decision makers with opposite concerns (each representing one of the two mind-sets) equal decision-making authority regarding assessment of creative ideas (Mueller, 2013). Mueller suggests “letting them have the hard conversations and allow them to strike the right balance” (p.164). For instance a Chief Innovation Officer (CIO) could collaborate with a Chief Financial Officer (CFO) to blend opposing mind-sets when decision-making. An example given by Mueller was Pixar giving shared power on a movie production between the director in charge of creative production and the producer, who managed budget, schedules, etc. (Mueller, 2017).
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Mental and Behavioral Priming

Mueller suggests that, aligned with judgement and decision-making experts, we are anchored in the way that we think (Bazerman & Moore, 2013; Mueller, 2017). For instance, we tend to repeat our typical way of assessing ideas, even when we are assessing ideas that require a different approach (such as truly novel ideas). One way we can move outside of our typical pattern of assessing ideas is to start a creative evaluation session by discussing an inventor that everyone admires who was initially considered quirky or weird for their radical idea(s) (Mueller, 2017). This “mental priming” activity helps us be more open to unusual ideas. Mueller also suggests mentally priming ourselves for assessing creative ideas by taking a moment to think about a problem we ourselves are passionate about solving that requires a totally radical solution (Mueller, 2017).

Increase Affective States for More Creative Cognition

Ashby and Isen (1999), and Amabile, Barsade, Mueller and Staw (2005) proposed that increases in affective states have a positive influence on our creativity. Humor often improves affective states, thereby also contributing to our creativity, while helping release anxiety and tension. Therefore it would be valuable to increase our affective states by doing something fun and humorous before or at certain appropriate points during a problem-solving process (Mindness, 2017).

Construal Theory, Abstract Thinking and Exposure to Unfamiliar Stimuli

Mueller makes the suggestion that a tendency to think in abstract ways may positively influence our assessments of creative ideas (Mueller, 2013). Exposure to novel, unfamiliar stimuli has been shown to activate global, abstract processing, increasing peoples' abilities to combine unrelated and previously unknown images or concepts (Forster, Marguc, & Gillebaart, 2010). Exposing people to unfamiliar sights, sounds or smells therefore has potential to increase the ability to enter a higher-level construal (mental processing space), characterized by more abstract thinking. This has potential to reduce the anxiety felt by decision-makers who previously were stuck in low-level construals regarding
ideas that were not familiar, or that did not include specific metrics explaining exactly how an idea would look or perform in the future (Mueller, 2013, 2017).

Evaluating the Roles of CPS and Design Thinking to Address our Bias Against Embracing Creative Ideas

CPS Characteristics

The most salient characteristics of the Creative Problem Solving process (CPS) that I recall from my classes at ICSC this summer, and from my experiences working with the process both personally and while facilitating it with my cohort and practice sessions “in the field” are:

- A flexible process for addressing complex, ambiguous challenges and managing change
- Balances both divergent and convergent thinking
- Based upon four main steps: clarify, ideate, develop, and implement
- Includes tools available within each step to do deeper work if necessary
- Outcome is a detailed plan of action with specific action steps chosen by the client and dates
- Each of the four steps of the CPS process include both divergent and convergent thinking
- Resource Group assists client with divergent thinking (brainstorming) steps
- Client does all of the convergent thinking steps to hone in on what “feels right to their gut,” jumps out at them, shows new insights or a promising direction, or “nails it”
- Divergent thinking includes rules/principles of deferring judgement, striving for wild and unusual ideas, aiming for quantity, and always includes options to allow incubation
- Depending on where someone is in their challenge, they can start wherever they need to in the CPS process (flexibility)
• CPS sessions always started with a fun brainstorming challenge to create a fun, light atmosphere

• Encouraged playing of music at certain points during facilitation to expose people to unfamiliar stimuli, and encourage relaxed and positive affect/emotions.

Guidelines/Rules for Divergent Thinking

• defer judgement

• go for quantity

• make connections

• seek novelty

• allow for incubation

Guidelines for Convergent Thinking

• apply affirmative judgement

• keep novelty alive

• check choices against your objectives

• stay focused

• allow for incubation

CPS Tools Available

Tools for Clarify Stage:

Explore The Vision “it would be great if....”

Formulate Challenges “how might we...?”

• Ladder of Abstraction

• Mind Mapping
ADDRESSING OUR IMPLICIT BIAS AGAINST EMBRACING CREATIVE IDEAS

- Storyboarding
- Highlighting

**Tools for Ideate Stage:**

**Explore Ideas (short idea statements)**
- Brainstorming
- Brainwriting
- Visual connections
- Forced connections
- Excursions
- Highlighting

**Tools for Develop Stage:**

**Formulate Solutions (What I see myself doing is....)**
- POInt
- Evaluation Matrix
- Card Sort
- Paired Comparison Analysis

**Tools for Implement Stage:**

**Explore Acceptance**
- Assistors & Resistors
- Stakeholder Analysis

**Formulate A Plan (Action Steps)**
- Action Sequencing
- Performance Dashboard
Design Thinking Characteristics

Hasso Plattner, edited the 2016 book *Design Thinking Research: Making Design Thinking Foundational*. In the preface of this book he explains that David Kelley, founder of the design firm IDEO, created the d.school at Stanford in 2006 to enable students and faculty from all departments to join together in order to tackle “wicked problems and complex challenges,” for which traditional approaches to problem solving tended to fall short, and which therefore required brand new approaches and creativity” (2016, Preface, p.v). The goal of the d.school was to develop innovative solutions that integrated the needs of people, leading to “human-centered solutions” (Plattner, Meinel, Leifer, eds., 2016).

David Kelley's definition of Design Thinking is: “a human-centered approach to innovation that draws from the designer's toolkit to integrate the needs of people, the possibilities of technology, and the requirements for business success” (Tischler, 2009). As Tim Brown, CEO of the design and innovation firm IDEO puts it, “Design thinking is all about upgrading within constraints” (Turnali, 2015). This ties in with Mueller's suggestions for overcoming our bias against embracing creative ideas by changing our mind-sets in order to think like an inventor, which includes recognizing constraints and approaching them as opportunities (Mueller, 2017).

Similar to Mueller's suggestion of a need for a shift in our “mind-sets,” Platter states that design thinking is a holistic innovation process that requires a shift in mind-set as well as a shift in how people think and act. He suggests that design thinking requires curiosity and an open mind, thinking in terms of opportunities versus restrictions, and viewing challenges from a human perspective; leading to solutions that are “technically feasible, economically viable, and desirable for the target group” (2016, Preface p.v). Plattner states that they are currently researching the underlying principles of DT in order to more clearly define it, but its focus is clearly on “human needs, empathy, and team work, as well as a
This paper uses the process model and definition of design thinking as originated around 2003 by David Kelley. The following excerpt from an interview with him in 2009 by Linda Tischler for a CO.Design blog article helps explain his perspective on the design thinking process:

Design thinking represents a serious challenge to the status quo at more traditional companies, especially those where engineering or marketing may hold sway. Patrick Whitney, dean of the Institute of Design at the Illinois Institute of Technology (IIT), who sends many of his graduates off to Ideo, says he sees this resistance all the time. “A lot of my students have MBAs and engineering degrees. They’re taught to identify the opportunity set, deal with whatever numbers you can find to give you certainty, then optimize.” But some problems need to be restated before a big, new idea can be hatched. It often helps to take the problem and break it apart, before putting it back together in a whole new way — the synthesis or abstraction step. That’s where the creative leap often occurs and what Ideo’s process is designed to unearth.

It took Kelley a while to appreciate the power of stepping back before forging ahead. In the mid-1980s, he says, he used to write proposals with the various phases of the process — understanding, observation, brainstorming, prototyping — priced separately. Clients invariably would say, “Don’t do that early fooling around. Start with phase three.” Kelley realized that the early phases were where the big ideas came from — and what separated his firm from a bunch of management consultants. “That moment was really big for me,” he says. “After that, I’d say, ‘No way, I won’t take the job if you scrap those phases. That’s where the value is (Tischler, 2009).

The two figures below represent design thinking models by IDEO and Stanford's d.school, both organizations founded by design thinking originator David Kelley (with Tim Brown). When you google “design thinking” you find a huge number of different “design thinking” models that claim to represent this concept, but are a variation on the two original models by the d.school and IDEO.
Design Thinking Original Models: Stanford d.school and IDEO

Figure 3: d.school Design Thinking Model

Figure 4: IDEO Design Thinking Model
Section 3: Project Outcomes

Overview

Mueller Suggests Overcoming Our Bias Against Embracing Creative Ideas By:

- Combining/Balancing How/Best and Why/Potential Mind-Set
- Thinking Like An Inventor

Mueller (2017) Suggests This Can Be Achieved By:

- Using a Problem Solving Process (vs. just looking for problems)
- Fully Defining the Problem
- Expanding our Definitions of the Problem
- Challenging our Assumptions
- Approaching Constraints as Opportunities
- Deferring Judgement
- Admitting We Don't Have All the Answers
- Using Abstract Thinking and Mental Priming for Openness to Novel Ideas
- Leading the Process Versus the Outcome
- Being Willing to Hear Opposing Viewpoints
- Accepting Failure as a Learning Opportunity
- Trying Again

A Balance of How/Best and Why/Potential Mind-Set Enables Us To “Think Like An Inventor”
Ways CPS Aligns With “How/Best” Mind-Set

- CPS as an organized process to guide problem solving
- CPS Rules of Convergent Thinking: Stay focused, check objectives
- CPS Clarify Stage Data Questions
- CPS Clarify Tool: “Mind Mapping” for organizing potential challenges to address
- CPS Clarify Tool: “Ladder of Abstraction” for helping define challenge in more concrete terms
- CPS Clarify Tool: “Highlighting” for converging on ideas that seem best fit
- CPS Ideate Tool: “SCAMPER” for building on existing (familiar) ideas
- CPS Develop Tool: “Targeting” for comparing current options against an ideal state
- CPS Develop Tool: “Managing Risk” for identifying options to minimize risk
- CPS Develop Tool: “Paired Comparison Analysis” comparing all options to set priorities
- CPS Develop Tool: “Evaluation Matrix” for narrowing options and building consensus
- CPS Develop Tool: “Card Sort” for grouping and ranking options
- CPS Develop Tool: “POInt” for assessing concerns
- CPS Highlighting Tool: Go with what “doable”
- CPS Implement Tools: “Stakeholder Analysis” identify key measures important to Stakeholders
- CPS Implement Tool: “Assisters & Resistors” for in-depth analysis to leverage help and plan for resistance ahead of time
- CPS Implement Tool: “Action Sequencing” for detailed steps of action
- CPS Implement Tool: “Performance Dashboard” use of charts and graphs for at-a-glance metrics (most important indicators chosen based on measures that matter to identified key stakeholders)
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Ways CPS Aligns With “Why/Potential” Mind-Set

❖ CPS Divergent Rules of Brainstorming: **Defer Judgement**

❖ CPS Rules of Brainstorming: **Seek Wild, and Unusual Ideas**

❖ CPS Rules of “Brainstorming” Divergent Thinking Tool: **Build on Others' Ideas**

❖ CPS Rules of “Highlighting” Convergent Thinking Tool: **Be affirmative**

❖ CPS Rules of Highlighting” Convergent Thinking Tool: **Go with novelty**

❖ CPS Rules of “Highlighting” Convergent Thinking Tool: **Go with gut feeling**

❖ CPS Rules of “Clustering” Convergent Thinking Tool: **Combine similar ideas into new themes**

❖ CPS Clarify Stage: **Phrases challenges as questions (recognize potential)**

❖ CPS Clarify Stage: **Look at challenge from as many angles as possible**

❖ CPS Clarify Stage: **Define challenge in as many ways as possible**

❖ CPS Clarify Stage: **Identify and address hidden assumptions about challenge**

❖ CPS Clarify Tool: “Ladder of Abstraction” for helping to define challenge in more abstract terms

❖ CPS Tool: “Storyboarding” as a visual tool to create a vivid image of potential goal as well as a map to visualize navigating potential blocks

❖ CPS Ideate Tool: “SCAMPER” encourages looking at challenge in many different ways

❖ CPS Ideate Tool: “Forced Connection” makes association between challenge and unrelated ideas for generating brand new ideas/solutions

❖ CPS Ideate Tool: “Excursion” enables incubation, mental rest, and association between unrelated stimuli seen/experienced on excursion and challenge

❖ CPS Develop Tool: “POInt” acknowledges issues/concerns, addresses them as opportunities

❖ CPS Develop Tool: POInt: encourages new thinking from issues addressed
ADDRESSING OUR IMPLICIT BIAS AGAINST EMBRACING CREATIVE IDEAS

Additional Suggestions by Mueller

To Enhance Thinking Like An Inventor

CPS and Mental/Behavioral Priming

- CPS Process & Positive Affect: Fun/Humorous Brainstorming Warm-up prior to all Brainstorming
- CPS Process: Play Music as appropriate to increase positive affect, relaxation
- CPS Process of Highlighting: Give Resource Group games, fun tactile and visual items while Client converges enabling fun, relaxation, incubation, and association of unrelated items to challenge
- CPS Process: Lead mental imagery for relaxation and imagination

CPS, Abstract Thinking, and Exposure to Unfamiliar Stimuli

- CPS Clarify Tool: “Ladder of Abstraction” for clarifying the challenge in both abstract terms (move up the ladder) and concrete terms (move down the ladder)
- CPS Ideate Tool: “Excursion” taking a break from challenge and exposing ourselves to unfamiliar stimuli while allowing incubation and combining of unrelated ideas
- CPS Ideate Tool: “Forced Connection” makes association between challenge and unrelated ideas for generating brand new ideas/solutions
A Balance of How/Best and Why/Potential Mind-Sets Allows Us To “Think Like An Inventor”

Ways Design Thinking Aligns With “How/Best” Mind-Set

- Design Thinking utilizes **scientific research** as much as possible
- Design Thinking provides decision-makers with **prototypes to help visualize outcomes**
- Design Thinking includes **business viability** as a part of its original synergistic model
- Design Thinking includes **technological viability** as part of its original synergistic model
- Design Thinking claims a **“bias towards action”**
- Design Thinking encourages **taking a stand with a point of view/insight learned about challenge to address**

Ways Design Thinking Aligns With “Why/Potential” Mind-Set

- Design Thinking offers a design thinking **process** for addressing innovation
- Design Thinking encourages **openness to a process of exploration**
- Design Thinking encourages “**breaking problems apart” to view them from many angles**
- Design Thinking encourages **sketching ideas of radical ways to meet user needs**
- Design Thinking emphasizes **multi-disciplinary teams** to encourage **diversity of ideas**
- Design Thinking emphasizes a **collaborative design process, encouraging positive affect**
- Design Thinking creates a **safe atmosphere encouraging open sharing of solutions**
- When solutions are shared **openness to “capturing of feedback” is encouraged**
- Design Thinking uses **iterative prototyping to improve upon ideas**
Additional Suggestions by Mueller

To Enhance Thinking Like An Inventor

Design Thinking and Mental/Behavioral Priming

- Design Thinking includes **use of music to create positive affect**
- Design Thinking **uses the room layout and to encourage active posture and to make connecting with others easy** during team-facilitated learning of the process
- Design Thinking **activities are chosen to encourage empathy and understanding**
- Design Thinking **encourages learning through experience**
- Design Thinking **encourages digging deep for stories, feelings, and emotions of users**
- Design Thinking encourages interviewers to **take time to really listen to the reactions and questions (feedback) of the users, versus acting on an urge to defend our ideas**
- Design Thinking encourages those offering their solutions to **first think about how those solutions fit the context of the user's life**
- Design Thinking encourages testers to **let go of their prototypes both physically and emotionally and instead view it as a tool to gain new insights from the user**

Design Thinking, Abstract Thinking, and Exposure to Unfamiliar Stimuli

- Design Thinking includes **in-depth interviewing to gain new, deep understanding and insights about user challenges**
- Design Thinking encourages **experiential research** to better understand a challenge
- Design Thinking encourages **storytelling, personal connection, and interactive activities to better understand a user's unique perspective**
- Design Thinking uses storytelling, visuals, and experiences to **communicate vision in a**
ADDRESSING OUR IMPLICIT BIAS AGAINST EMBRACING CREATIVE IDEAS

meaningful way

- Design Thinking uses visual tools like storyboard sketching and photography to encourage expression of novel ideas in a way users (including decision-makers) can imagine them.
- Design Thinking encourages their interviewers to view their actions as not just testing ideas but to view the process as a way to learn about the feelings and world view of others.
- Design Thinking values diversity of backgrounds, ideas, perspectives, experiences.
- Design Thinking iterative prototyping creates something new that the user can engage and interact with, enabling them to experience the innovation.

Is There Research on Impact of CPS and DT Processes?

Research on Impact of CPS

Research results throughout the 1980's onwards on the effectiveness and impact of CPS training in organizations showed changes in both employee and manager attitudes and behaviors, which appear related to moving from a how/best mindset towards more of a balance between how/best and why/potential mindsets. Results showed an increase in acceptance of uncertainty, avoidance of premature negative judgement about novel ideas, increased openness to new ideas, a greater preference/acceptance for generating a diverse set of alternatives (labeled “active divergence”), as well as an increased avoidance of premature convergence or closure about solutions (Basadur, Graen & Green, 1982; Basadur, Pringle and Kirkland, 2002; Fontenot, 1983; Ma, 2006; Puccio, Murdock & Mance, 2005; Puccio, Firestien, Coyle & Masucci, 2006).
Research on Impact of DT

If you search the term Design Thinking online you will find many variations to the original design thinking model created by David Kelly, founder of IDEO. These models usually represent the same general principles as the original DT model, with slightly different semantics created by innovation consultants who may be attempting to present their own version of DT.

A main difference between the DT and the CPS processes, is that design thinking is much newer, having only become defined as a formal process in 2003 when David Kelley, in a meeting with Tim Brown of IDEO, stopped calling their company's approach “design” and started calling it “design thinking,” with a focus on design methodology (Tischler, 2009).

In a chapter called, Measuring the impact of design thinking in Understanding innovation: Design thinking research: Making design thinking foundational (Schmiedgen, Spille, Koppen, Rhinow, & Meinel, 2016), five main insights are given summarizing their recent research into if and how organizations measure the impact of design thinking:

- Many very different practices are labeled design thinking – making them challenging to analyze.
- Even though respondents reported some kind of impact, very few actually measure it.
- Some utilize evaluative tools but do not seem to consider their tools to be valid (or “real” measurements)
- Those who do measure the impact of design thinking have manifold of ways in doing so, even though some of the methods seem a bit manufactured (fabricated) as one respondent commented. The strongest measuring theme was customer feedback and satisfaction.
- The impact of design thinking is very different to quantify and appears to be a so-called butterfly effect.

(p. 168)
In a Forbes article, Liedtka states: “But using design thinking to make innovation a genuine organizational capability means moving beyond great stories and new vocabulary - it requires old fashioned process and tools that we know institutionalizing anything in organizations requires...” (Liedtka, 2015). As with the Creative Problem Solving process and tools, it may take many years to create research-based Design Thinking processes and tools. This should be one of the goals of design thinking scholars from the Stanford d.school and elsewhere for the future.

**Two Examples of Combining CPS and DT**

**Model: Creative Process Mashup (Puccio, Cabra, Schwagler, 2018)**

The Creative Process Mashup (Puccio, Cabra & Schwagler, 2018) merges Design Thinking and CPS by blending the DT priority of a user-based focus to the CPS stage of Clarify, resulting in activities to “observe and define” in order to more deeply “Understand” users. The Develop stage of CPS is now labeled “Experiment” as ideas are now actively and creatively “developed and validated” through iterative prototyping and openness to feedback from users. Blending Design Thinking empathy-based exploration and development of ideas with prototyping and feedback with the CPS process potentially makes possible even more of a balance of how/best and why/potential mind-sets, suggested for overcoming anxiety about the uncertainties surrounding creative ideas (Mueller, 2017).
Real Life Example: Applying CPS to the IBM Design Thinking Innovation Loop

ICSC graduate and IBM Agile Academy employee Mike Ackerbauer is currently doing research on the value of applying the CPS process and FourSight Assessment to the IBM Design Thinking Innovation Loop. As Mike shared in a personal correspondence (December, 2017):

I have tended to refer to CPS as the “underpinnings” of the Agile and Design Thinking frameworks. To me, each are elegant perspectives on creative problem solving, with a specific goal in mind:

Design Thinking: Customer Focus

Agile: Customer Value

In both cases, it's just a matter of laying out each framework's specific practices on a continuum to see how they might map to CPS. From there you can make some strong inferences about where and how teams will most likely rise and fall creatively based on their creative problem solving preference.

(Personal Correspondence, December 2017).

Using CPS and FourSight as “underpinnings” of the IBM Design Thinking Innovation Loop helps to clarify the characteristics of problem solving that happens within each quadrant of the Loop. It also helps explain cognitive problem solving preferences required to assemble innovation teams that are well balanced in both how/best and why/potential mind-sets, to keep “restless innovation” flowing through the Loop, despite uncertainties about the unknown.

IBM design thinking empathy-based exploration enables clearer understanding of the users, keeping all innovation efforts customer-focused. Agile thinking, according to Ackerbauer helps drive efficiency in order to increase value to the customer, thus aligning with Design Thinking's additional goals of ensuring technological feasibility and financial viability. Ackerbauer's suggestion of applying CPS and FourSight to the both the Agile Thinking and Design Thinking frameworks supports both why/potential (Design Thinking) and How/Best (Agile Thinking) mind-sets, to create more of a
balance between these opposing ways of thinking, which according to Mueller's research (2013, 2017), enables us to think more like inventors in order to overcome our implicit bias against embracing creative ideas.

IBM states on their website:

Some of us thrive in uncertainty. Some of us went to school for it. But for others of us, the fear of making the wrong move can paralyze us, trapping us in a cycle of doubt and inaction. After all, what do you do when you don’t know what to do? In the midst of this uncertainty, design thinking provides us a model for action. We call this model The Loop: a continuous cycle of observing, reflecting, and making. It drives us to understand the present and envision the future. It enables us to build on our successes and learn from our failures along the way. When taken to heart, the Loop keeps us moving forward despite the uncertainty the future may hold.

Source: https://www.ibm.com/design/thinking/loop

Source: https://www.ibm.com/design/thinking/loop
| Why/Potential Mind-Set | Accept the Unknowable | Go With Your Gut | Use Metrics to Identify What Can Be Improved | Expand Definitions | Identify and Challenge Assumptions | Use a Defined Process To See How to Make An Idea Work | Identify and Use Constraints | Defer Judgement | Mental and Behavioral Priming & Positive Affect | Expose to Unfamiliar Stimuli & Increase Abstract Thinking | Lead the Process Not the Outcome | Combine Opposing Mind-Set | Seek Novelty | View Idea From Many Angles |
|------------------------|------------------------|------------------|-----------------------------------------------|-------------------|-------------------------------|---------------------------------|----------------------------|----------------|-----------------------------------------------|-------------------------------------------------|---------------------------------------------|---------------------------|-----------------------------------------------|
| CPS Process            | X                       | X                | X                                             | X                 | X                             | X                               | X                         | X              | X                                             | Facilitator Role                                               | X                                             | X                                   | |
| Brainstorming/Divergent Thinking Rule |                     |                  |                                               |                  |
| Convergent Thinking/Highlighting Rules | X | X | X | X | X | X | X | X | X | Brainstorm Rule |
| Clarify Stage          | X                       | X                | X                                             | X                 | X                             | X                               | X                         | X              | X                                             | |
| Phrase Challenges as Questions |                   |                  |                                               |                  |
| Storyboard Tool        | X                       | X                | X                                             | X                 | X                             | X                               | X                         | X              | X                                             | |
| Ladder of Abstraction  | X                       | X                | X                                             | X                 | X                             | X                               | X                         | X              | X                                             | X | X | |
| Mind Mapping           | X                       | X                |                                               | X                 | X                             | X                               | X                         | X              | X                                             | |
| Ideate Stage           | X                       | X                | X                                             | X                 | X                             | X                               | X                         | X              | X                                             | |
| Forced Connections     | X                       |                  |                                               |                  |
| Excursion Tool         | X                       |                  |                                               |                  |
| Scamper                | X                       | X                | X                                             | X                 | X                             | X                               | X                         | X              | X                                             | |
| Escursions             | X                       | X                | X                                             | X                 | X                             | X                               | X                         | X              | X                                             | |
| Develop Stage          | X                       | X                | X                                             | X                 | X                             | X                               | X                         | X              | X                                             | |
| POInt Tool             | X                       | X                | X                                             | X                 | X                             | X                               | X                         | X              | X                                             | |
| Evaluation Matrix Tool | X                       | X                | X                                             | X                 | X                             | X                               | X                         | X              | X                                             | |
| Card Sort Tool         | X                       |                  |                                               |                  |
| Targeting Tool         | X                       | X                | X                                             | X                 | X                             | X                               | X                         | X              | X                                             | |
| Managing Risk          | X                       | X                | X                                             | X                 | X                             | X                               | X                         | X              | X                                             | |
| Paired Comparison Analysis |                  |                  |                                               |                  |
| Assisters and Resisters | X                 | X                | X                                             | X                 | X                             | X                               | X                         | X              | X                                             | |
| Stakeholder Analysis   | X                       | X                | X                                             | X                 | X                             | X                               | X                         | X              | X                                             | |
| Action Steps           | X                       | X                |                                               |                  |
| Performance Dashboard  | X                       |                  |                                               |                  |
| Learning Cycle Tool    | X                       | X                | X                                             | X                 | X                             | X                               | X                         | X              | X                                             | |

ADDRESSING OUR IMPLICIT BIAS AGAINST EMBRACING CREATIVE IDEAS
## ADDRESSING OUR IMPLICIT BIAS AGAINST EMBRACING CREATIVE IDEAS

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(Above) Table 2: Comparing Characteristics of DT Against Characteristics of How/Best and Why/Potential Mind-Sets

What am I going to do with it?

Professionally

I would like to further research how innovation consultants combine CPS and Design Thinking
in their practices, and how they see this influencing decision-maker bias against embracing creative ideas. I would then like to find a way to brand and market a combination of these innovation processes, offering a **holistic** innovation process to help organizations manage anxiety due to uncertainties of embracing creative ideas. I am still trying to figure out whether to call this an “invention” or an “innovation” process when combining these two processes.

I will need to spend some time apprenticing with current innovation coaches and learn from them, as I have only book knowledge on this subject. The one weakness I have is a lack of “in the field” experience. One major strength that I have is that I am very good at communicating ideas as long as I understand and believe in the value of those ideas. I now believe that the CPS process is more relevant than ever today, and when combined with DT – is a powerful “invention process” that will help guide decision makers through the critical change process of identifying and embracing innovative solutions.

I would like to research how to go about teaching CPS to young people who are disadvantaged. This concept comes from a November 29, 2017 Freakonomics Radio Podcast called, “Are We Running Out of Ideas?” which suggested that there is a great need in our country for more inventors. Research looking at data from 1.2 million inventors in the U.S. from 1996-2014 showed that people from the top 1% of income distribution in our country are ten times more likely to become inventors, versus people from the lower 50% of the income distribution, demonstrating a huge barrier towards disadvantaged people becoming inventors (Bell, Chetty, Jaravel, Petkova, Van Reenan, 2016).

This podcast asked the question, “How can we increase the chances of disadvantaged kids becoming inventors? What type of policy interventions are needed? My thought in response to this was how do we go about teaching middle schools kids Creative Problem Solving and/or Design Thinking?

**Personally**
My ability to move forward with CPS action steps in addressing very hard change in my personal life was made possible due to the meaningful relational connection I experienced while working through CPS with my cohort this past summer. Despite my anxiety about facing the unknowns of moving forward with much needed change, I felt bolstered by the support of my cohort as we used CPS to develop many ideas of how to manage the areas I was most afraid of facing. Addressing those areas of concern as part of the CPS POInt tool made it possible for me to reframe my thinking about these issues (experiencing “transformation” as per the Thinking Skills model of CPS).

I understood the fact that it is normal to feel anxiety about the uncertainties of the future. I will now be intentional about not panicking when I feel the lingering presence of fear/anxiety about the unknown that lays ahead. I now understand that by embracing the uncertainties of the future I will be able to move forward one action step at a time, enjoying growth and the many surprises that will most certainly appear as part of this process of healthy personal change....

I have shared below my use of one of the many CPS Tools that helped me work through this much needed process of personal change. The CPS “Targeting Tool” helped me clarify visually where I was at that point in time versus the target (where I wanted to be). The “pulls” represented forces in my life that pulled me towards the target center (where I wanted to be) and the “pushes” were forces that pushed me away from the target's center. This was completed at the end of my two weeks on campus studying CPS in the summer of 2017.
Section 5: Key Learnings

As I worked at creating my outline for this Master's Project, I recognized my tendency to want to research deeply and to lose clarity in the process. Creating an outline forced me to keep an eye on the goals of this project, and not to get too bogged down in peripheral research that looked intriguing. I still did some wayfaring in that as I worked through writing out of my ideas as part of the “fleshing out” of this paper, better ways of organizing the material became clear to me. This only happened after I had finished writing a section and had taken a break away from the paper for a bit. When I came back to it, I could see with clarity what was preventing me from communicating what I really wanted to say. It dawned on me that if someone left paper writing of this magnitude to the last minute, they would not experience the benefit of stepping away and coming back to their work in order to view it with fresh eyes, as I had been able to do many times.
One very interesting struggle for me was the lack of motivation that I felt about half way through this project. I was not connecting much with my professor and felt very isolated in my work. The most interesting part of this type of project for me is reading through research and assimilating and synthesizing ideas. Once I had finished most of that, the prospect of formally writing this paper appeared dull and daunting.

It became clear to me that I am motivated by relationship with others. In other words, I seem to need interpersonal connection at some level beyond mere basic factual discussion in order to enjoy pushing myself above and beyond in order to do outstanding work. I always thought of myself as a highly intrinsically motivated learner. This project showed me that I need some form of meaningful relational connection in order to be fully motivated in my work. This is eye opening for me, as I have always worked on my own and pushed through boredom, stress and loneliness to get projects done. This time I was feeling a lack of motivation which was shocking to me, and actually scared me in that I did not know how I would complete my work on time. I reached out to some other students and to another professor who values meaningful, regular connection with distance students and this helped me to feel motivation again to push onwards....

Section 6: Summary/Conclusion

According to Mueller, Amabile (1996) defines an “invention process” as: “finding a problem, gathering information, generating options, testing the options, validating a solutions, then starting again if you fail” (p. 83). This “invention process” described by Amabile represents a combination of Creative Problem Solving and Design Thinking innovation processes, capable of enabling a balance of how/best and why/potential mind-sets, and enabling us to think like an inventor.
In doing so, we may be able to better manage our anxiety about uncertainty related to embracing creative ideas. We will also be better able to help others manage their anxiety by including them as participants in this “invention process.” By thinking like an inventor we have the privilege of choosing to combine both our rational and intuitive selves, and in so doing, are much more likely to embrace much needed, novel ideas that have potential to drive new innovations.

CPS has existed for half a century, with refinements to its model's structure and semantics, while maintaining the main principles set forth by its originator Alex Osborn. Continued refinements over the next 50 years might include such things as addition of tools within the various CPS stages that help users further manage their anxiety about uncertainties surrounding novel solutions. Research over the last 30 years on the impact of CPS has shown that it can bring changes that result in thinking and behaving more like an inventor, which is the main premise of Mueller's research on how to overcome our implicit bias against embracing creative ideas.

Table 1 suggests that CPS has much potential to balance both why/potential and how/best mindsets. This may be due to its developers making sure CPS is a formal yet flexible creative process that can be taught and applied in practical ways across all domains, while being backed by academic research. This journey of the development of the CPS process over half a century is an example in itself of a beautiful balance between both why/potential and how/best approaches.

The Design Thinking process has potential to impact people's aversion to embracing novel ideas by providing an innovation process that is empathic and experience-based. The more people feel understood, and the more they are able to actually experience a novel idea in some tangible way (versus just hearing or reading about it), the more likely they will be able to overcome their anxiety about the uncertainties related to those ideas.

As a fairly new innovation process model (formally created in 2003) Design Thinking would benefit from much more formal research regarding details of its impact upon users, including decision-
ADDRESSING OUR IMPLICIT BIAS AGAINST EMBRACING CREATIVE IDEAS

makers. Table 2 suggests that there is potential for Design Thinking to achieve Mueller's suggested balance between why/potential and how/best mind-sets as they further develop the characteristics and tools that might align with the how/best mind-set. Their two original models (d.school and IDEO) from Figures 3 and 4 suggest that a priority of the Design Thinking is to consider if a novel idea is technically feasible and if it is financially viable. These two characteristics suggest some alignment with the how/best mind-set to help balance the richness of its ability to align with the why/potential mind-set.

Both CPS and DT processes are often combined in unique ways by innovation consultants in order to best customize innovation coaching to meet clients' unique needs. The more consultants can understand the characteristics, processes and tools available with each process, the more intelligently they can create innovation coaching programs to help their clients overcome their implicit bias against embracing creative ideas. If the concept of helping clients overcome anxiety about uncertainty is a crucial ingredient to enable them to embrace truly novel ideas in order to bring much needed creative change and innovation, then more research on the topic of innovation processes and their ability to balance why/potential and how/best mind-sets is extremely relevant and important.

Questions That Arose For Further Study:

- Why is Design Thinking so hard to define?
- What characteristics of Design Thinking make it so appealing and popular?
- Why does CPS not have the same type of appeal/popularity as Design Thinking, even though it has been around longer to garner lots of research regarding its effectiveness in changing mind-sets, and in providing a problem-solving process that enables people to effectively tackle the “wicked” or complex and ambiguous challenges that are being faced today?
The following excellent question posed by Joshua Boland regarding the November 29, 2017 Freakonomics Radio Podcast, “Are We Running Out of Ideas?”

What if it’s not an idea problem at all? What if our modern economic apparatus, with its emphasis on data and predictions, is too risk averse to make the same leaps of faith that it used to? How many ideas do we pass up out of fear of failure because there is already a good enough solution? If that is the case, then our current model might actually be slightly discouraging to rapid economic growth because it can’t predict original success and drives investors away from innovators with good but untested ideas.

Also, can an economy really grow unless entirely new industries are added to the system regularly, or will it just eventually reach an equilibrium based on available resources and demand for existing products?

Maybe some industries are innovation averse. New ideas are often destabilizing to industries, and industries that are well established or slow to adapt may resist them willfully. One can see why one might choose to slow growth and focus on efficient use of resources rather than maximizing growth. It creates more stable economies with less industry upsets due to radical innovations (like all the truck drivers suddenly being replaced by automated trucks and demolishing an entire job market). Slow progress is also much more predictable than rapid advancement, making investment decisions easier.

It has a sort of internal logic to it as well. You will only get incremental progress if you only ever get better at what you are already doing because the system is not really growing as a whole; it’s just becoming more efficient. This can decrease resource demand per unit of product made and allow for more of the same types of things to be made, but not necessarily for the creation of entirely new kinds of things. To make something that has never been made, you must do things that have never been done; you must invent an industry and develop it.

An original idea that is completely unfamiliar, but could change everything and create a new industry, has a quality of uncertainty that we don’t like to invest in. For example, to Hollywood producers, it is economically better to just make endless permutations of the same hit movies and incrementally improve the execution as a means of providing entertainment than it is to reinvent the way movies are filmed and distributed in hopes of radically increasing productivity overnight. The first option is relatively easy and provides the illusions of certainty because of past experiences, while the second option sounds like a lot of work with no guarantee of reward.

If the goal is to maintain a slow and steady income for many years, then the first option is an optimal strategy. However, Amazon didn’t become dominant in the book publishing industry because they made better books year over year. Instead, they revolutionized distribution by doing things that had never been done before and then developed not just one, but several industries around the new model.

I’m not saying we should abandon our current models and thinking, but might this line of inquiry be worth investigation? If it has any truth, how do we correct for it? Thoughts? (Freakonomics Podcast Listener Response, 2017).
References


doi: 10.2189/asqu.2005.50.3.367


ADDRESSING OUR IMPLICIT BIAS AGAINST EMBRACING CREATIVE IDEAS

14, 395-408.


doi:10.1111/caim.12023


doi:10.1207/s15326934crj1804_3


ADDRESSING OUR IMPLICIT BIAS AGAINST EMBRACING CREATIVE IDEAS


### Appendices

**Appendix A: Models**

1. **Creative Problem Solving Model Progression**

#### OSBORN’S SEVEN-STEP CPS PROCESS (v1.0)

1. **Orientation:** Pointing up the problem
2. **Preparation:** Gathering pertinent data
3. **Analysis:** Breaking down the relevant material
4. **Hypothesis:** Piling up alternatives by way of ideas
5. **Incubation:** Letting up to invite illumination
6. **Synthesis:** Putting the pieces together
7. **Verification:** Judging the resultant ideas

*Source: Alex Osborn’s Applied Imagination - First edition, 1953*

#### OSBORN-PARNES FIVE-STAGE CPS MODEL (v2.2)

*Source: Neisser, Parnes, & Biondi, 1976*
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CREATIVE PROBLEM SOLVING (v3.0)

Divergent Phase
- Experiences, rules, and situations are associated with a problem. Openness to experience, exploring opportunities.
- Data are gathered; the situation is examined from many different viewpoints; information, impressions, feelings, etc., are collected.
- Many possible statements of problems and sub-problems are generated.
- Many alternatives and possibilities for responding to the problem statement are developed and listed.
- Possible sources of assistance and resistance are considered; potential implementation steps are identified.

Problem Sensitivity
- Challenge is accepted and systematic efforts undertaken to respond to it.
- Most important data are identified and analyzed.
- Ideas that seem most promising or interesting are selected.
- Several important criteria are selected to evaluate ideas. Criteria are used to evaluate, strengthen, and refine ideas.
- Most promising solutions are focused and prepared for action. Specific plans are formulated to implement solutions.

Convergent Phase

New Challenges


CPS COMPONENTS AND STAGES (v4.0)

Understanding the Problem
- Seeking opportunities for problem solving.
- Establishing a broad, general goal for problem solving.
- Examining many details, looking at the mess from many viewpoints.
- Determining the most important data to guide problem development.
- Considering many possible problem statements.
- Constructing or selecting a specific problem statement.

Generating Ideas
- Producing many, varied, and unusual ideas.
- Identifying promising possibilities, alternatives or options having interesting potentials.

Planning for Action
- Developing criteria for analyzing and refining promising possibilities.
- Choosing criteria, and applying them to select, strengthen, and support promising solutions.
- Considering possible sources of assistance / resistance and possible actions for implementation.
- Formulating a specific plan of action.

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COMPONENTS OF CPS (v5.0)


CPS v6.1™ FRAMEWORK

Source: Isaksen, Dorval, & Treffinger, 2000

Isaksen, Dorval & Treffinger, 2000
Miller, Vehar, Firestien, 2004
Creative Problem Solving Thinking Skills Model, used with permission 2017
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Design Thinking Original Models by Stanford d.school and IDEO

d.school Design Thinking Model

IDEO Design Thinking Model

Source: IDEO
Examples of Many “Other” Design Thinking Models Found Online

Source: www.thechangedirectors.co.uk

Source: Wharton Innovation via www.medium.com
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THE DESIGN THINKING PROCESS

INSPIRATION

IDEOATION

IMPLEMENTATION

DESIGN THINKING
A FRAMEWORK FOR INNOVATION

EMPATHISE
What is the problem? Define the challenge & explore the human context

IDEATE
How do we solve it? Brainstorm ideas good & bad, don’t stop at the obvious

DEFINE
Why is it important? Research, observe, understand & create a point of view

TEST
Does it work? Implement the product, show & don’t tell, start to refine the product

PROTOYYPE
How do we create it? Start creating, experiment, fail cheap & fast

Source: www.interaction-design.org

Source: www.billyloizou.com
IBM Design Thinking Innovation Loop

The Loop drives us
Understand the present and envision the future in a continuous cycle of observing, reflecting, and making.

Observe ⇒
Immerse yourself in the real world.

Reflect ⇒
Come together and look within.

Make ⇒
Give concrete form to abstract ideas.

Source: https://www.ibm.com/design/thinking/loop

Figure 5: Creative Process Mashup used by permission
Appendix B: List of web-sites

Jennifer S. Mueller
http://jennifersmueller.com

Creative Problem Solving
International Centre for Studies in Creativity (ICSC)
http://creativity.buffalostate.edu

FourSight Assessment
https://foursightonline.com

Design Thinking
IDEO
https://www.ideo.com

Stanford d.school
https://dschool.stanford.edu

IBM Design Division
Design Thinking Innovation Loop
https://www.ibm.com/design/thinking/loop
Appendix C: Additional Resources