I, Bennett R Nestok, hereby submit this original work as part of the requirements for the degree of Master of Design in Design.

It is entitled:
Uninhibited Ideation: Childhood Games as Design Methods

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Uninhibited Ideation:
Childhood Games as Design Methods

A thesis submitted to the Graduate School of the University of Cincinnati in partial fulfillment of
the requirements for the degree of
Master of Design

In the School of Design of the College of Design, Architecture, Art, and Planning by

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Abstract

This thesis investigates childlike thinking as a means toward creative practice through researching literature, constructing a set of original childlike thinking design methods, and testing these methods using burgeoning design practitioners. Scientific studies show that creativity wanes with age. This thesis indicates which phase within the design process benefits most from creative thinking, positing that childlike thinking can increase creative thinking through molding childhood games (e.g., Musical Chairs) into design ideation games. Five main creativity criteria are used to measure the outcomes of the game testing, and in the end the experimental group (who played design ideation games) is proven more creative than the control group (who did not play games). Both groups report how they would label their thinking throughout the design ideation process. The game-playing group's self-labeling proves more creative than the non-game-playing group. Ultimately, the results indicate that game-playing during the design ideation phase produces about 170% more ideas. This thesis concludes with thoughts on further studies regarding the facilitation of creative childlike thinking.

Keywords: childlike creativity, childhood games, childlike thinking, creativity, design methods, design process
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Throughout the course of my thesis on childlike thinking, I've learned many incredible aspects of the human brain. Early on, I realized that the adult human skull cannot expand. However, when the brain learns and develops new skills, it must alter its structure in order to accommodate new items.

So what does it do? The only thing it can do: it folds in on itself. In order to combine two ideas you've never combined, your brain must connect two parts of the brain that have never connected. So when we think with novelty, we are utilizing those folded-inward areas (the areas close to the center of the brain), whereas thinking with logic utilizes areas closer to the outside. Anthropologically, it’s the opposite of superposition, which means that when we think with divergence, we are making a voyage into the heart of the brain.

Isn't it strange that in order to mentally journey outward to things not yet considered, we must physically journey inward to the center of our brains? I love this. For anyone out there
struggling to be creative these days, I'll leave you with an insight that might make you a bit more confident. You don't need to try too hard to contrive something unique; it exists just a few inches behind your eyes. In essence, what you seek is at the very center of you!

Well...at least in a physical sense.
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Introduction and Problem Area

Perhaps the most ubiquitous keyword across all types of design is ‘user.’ Designers of every discipline are taught to design keeping in mind their specific audience, above all else. When learning user-centered design, design students realize that communication occurs most efficiently when molded to the experience of every possible type of user. One way to approach this is to create a different design for each type of user. Another, perhaps more efficient way, is to design something universal, one thing for all users combined and averaged. One might call these two options either designing for all average users, or designing for all users averaged. Either way, designers must work to appease their stereotypical users. True, each member of the audience is unique, but the designer has to get into the mindset of designing for the everyman, the person embodying the most commonplace aspects across all potential users. This commonplace-mindedness regarding the user makes designers susceptible to thinking in commonplace terms—thinking without novelty—arguably lessening the inherent creativity of their creations.

In recent years, more and more designers have begun to call out a need for less cliché and more creativity in design. Arguably, creativity in any field catalyzes and nurtures progress, not to mention an overall push toward new perspectives. Additionally, “creativity is an important component of psychological well-being and one that has been increasingly emphasized in the literature” (Zabelina & Robinson, 2010, p. 57-65). However, this call for less cliché goes largely unanswered since designers prioritize function above all other things, including imagination. The modern world is filled with solutions molded to widespread problems, solutions that are cliché due to the banality of the very issues they seek to solve. This societal dearth of creativity has led to blame pointed in all directions.
Perhaps the most poignant argument blames society itself. With enough experience intermingling with society, a human being becomes part of society. Such experience is a normal part of human life, beneficial in many ways, but it may not be such a good thing when it comes to creativity. Statistics show that experience strips away creativity; “while 98% of kindergarten children score in the genius range for divergent thinking, the percentage significantly shrinks the more formal education the child receives” (Wing, 2012). Some say, “creativity declines in adulthood as we become more aware of the notions of right and wrong answers” (Rettner, 2011). Designers’ lack of creativity, then, seems to hinge on the fact that the professional world itself—which encompasses design—constitutes working professionals, i.e., experienced adults. Tragically, it appears that Futurist Buckminster Fuller’s famous quote holds true: “All children are born geniuses and we spend the first six years of their lives degeniusing them.”

Some creativity experts agree with Fuller, suggesting that the key to thinking creatively is thinking like a child. Designers sometimes cite this idea. Famed designer Paul Rand believed that “the more childlike a designer could think by combining two or more ideas, the more unique and creative a solution would be developed, particularly during the sketching phase of the design process” (Hembree, 2006). This topic area—thinking like a child in order to think more creatively during the design process—began to interest the author during a graduate level design class focused on user-centered research and design methodologies aimed at making students more empathetic during the design process. The specific assignment that eventually inspired and informed this thesis asked students to pick a research methodology (or create an original research methodology) and use it to go about designing an artifact meant to solve a specific issue. In the author’s case, the issue entailed designing to solve any or all bemoaned problems of the e-reading experience.
The original research method introduced and pursued in the study was called the Why Chain Method. In this method, the designer A) interviews five participants regarding the e-reading and traditional reading (t-reading) experience, B) codes these interviews into overall insights (positives and negatives of the e- and t-reading experience), C) writes each insight on a note card, and D) has a new participant take a sheet of paper and write down—for each insight—an answer to why this insight is true, continually on each subsequent line (i.e., a series of Why Chains) until the most recent “Why” is too intellectually deep to be continued. (For an example, see Figure 1.) In other words, the participant is asked to answer why the Number 1 insight is true, and then on the next line answer why that just-written Why is true, and on the next line answer why that even newer Why is true, and so on, continually until the newest Why becomes too deep to be extended with more Whys.
The logic behind this method rests on childlike thinking. An article entitled "THE CREATIVITY CRISIS," by Po Bronson and Ashley Merryman, proves that children are, indeed, more adept than adults at questioning things:

Preschool children, on average, ask their parents about 100 questions a day. Why, why, why—sometimes parents just wish it’d stop. Tragically, it does stop. By middle school they’ve pretty much stopped asking. It’s no coincidence that this same time is when student motivation and engagement plummet. They didn’t stop asking questions
because they lost interest: it’s the other way around. They lost interest because they stopped asking questions.

This method proved effective, in that—after subsequent phases of data coding—the method resulted in a substantial set of qualities desired by the average user regarding a hypothetical hybridized (integrating both e- and t-reading) design intervention.

The professor and students collectively deemed the method effective due to the potency and specificity of the study’s overall findings. The Why Chain Method was inspired by thinking back to childhood, when one might ask his or her parent a question like “Why is the sky blue?”

The parent would answer something along the lines of, “Because molecules in the air scatter blue light from the sun more than they scatter red light.” The child would respond, “Why?” and the parent would say, “Because blue light travels as shorter, smaller waves.” The child would respond, “Why?” again and again until eventually the parent would have to respond to an extremely deep question such as “Why do people exist?” and the parent would be stumped.

The logic behind choosing this as a research method was—in order to arrive at the root problems behind user unease with the e-reading experience—what better way than to ask a chain of interlinking, ever-deepening, root-of-the-problem questions?

The Why Chain Method engendered a series of other child-inspired (self-explanatory) research methods, including the I Know You Are But What Am I Method, the Stop Repeating Me Method, and the I’m Going To Tell Method. Rumination on childlike thinking led to the conclusion that it
is useful in design. After all, design is an inherently creative process, children are known to be the most creative of all age groups, and scientific studies report that creative genius wanes with age; thus, childlike thinking may be pursued in order to keep oneself wildly creative as an adult.

Early ideation phases within the design process benefit from creativity. Some designers practice ideation in two parts: Part 1 focusing on breadth of ideas, and Part 2 distilling these ideas into only those most relevant, the logic being that more breadth in Part 1 leads to more possible creative ideas to explore in Part 2. The general purpose of this study is to determine the usefulness of childlike thinking within design thinking by exploring various methods and validating whether adults can use them to be more creative. This study will determine the ways children think that are different from the ways adults think, determine methods for implementing these thinking modes, and test one of these methods. This study seeks to uncover ways to make design ideation outcomes more creative (i.e., more breadth of novel ideas, leading to a larger number of eventual potential creative ideas to explore). This study seeks to conclude with whether or not childlike thinking can positively impact design thinking, culminating in a set of categories and examples of childlike thinking design methods.

2. Research Question

This study seeks to answer whether an original childlike thinking method can positively impact creativity within the design process. The method—which will be described in greater detail later in this study—entails the customization and integration of childlike games within ideation phases within the design process.
2a. Overview

Throughout history, numerous methods aimed at increasing creativity have been conceptualized. Thus far, the study of creative thinking methods has been typified by smatterings of methods, often simply numbered, listed, and labeled as something along the lines of ‘101 Creative Thinking Techniques to Help You Brainstorm.’ From the professional world to academia, creative thinking methods are most often strung together in this way.

This experimental study is unique in that it proposes both a set of categories of methods for thinking like a child (some found, and some original to this study) in order to be more creative, as well as a set of three childlike thinking categories comprising aspects of childlike thinking. This study is also original in that it does not test the validity of childlike thinking as a means toward creativity (as such has been proven in numerous studies), but rather, this study tests the helpfulness of childlike thinking within design thinking through an experiment using games from childhood, reengineered to fit a specific design motive: in this case, ideation.

Aside from this original method, other methods anthologized and originated within this study will include priming toward childlike thinking, shutting off and/or activating specific areas of the brain relevant to childlike thinking, exercises designed to simply mimic adjectives that describe childlike thinking, exercises designed to mimic the habits of children, and exercises designed to mimic childlike thinking through the pursuit of child life contexts.

2b. Hypothesis

This study’s overall hypothesis is that childlike thinking is useful within design thinking, through the use of childhood games modified into ideation games. More specifically, the idea is that
childlike thinking can make design thinking processes more uninhibited, leading to a higher degree of novelty within ideations, which in turn would lead to a higher degree of creativity (i.e., novelty AND relevance) in subsequent designs. This study pursues childlike thinking in design ideation phases through games from childhood, customized so as to facilitate design-related brainstorming.

Contextually, the author posits that childlike thinking is most useful in earlier, fluency-focused design phases, in which far-fetched ideas are allowed and in fact encouraged. This hinges on the fact that in design, a common practice is to engage in ideation phases that work to distill all ideas into only the most relevant, plausible, and/or potentially impactful ideas, in that to create something truly creative, one must create something incorporating both “novelty and usefulness” (Sharen, 2010).

2c. Methodology

This study will take the form of three main components, the first being research into the ways children think, including theories on why they consistently score as more creative than adults. The second component will be a series of methods—some found, some original to this study—meant to foster childlike thinking modes. The third component will be a design study involving a group of participants, the results of which will illuminate whether the tested method is viable as a creativity-inducing design method.

The study will involve two groups of design students—one control group and one experimental group—each selected from Professor Emily Verba Fischer’s course entitled Communication Design Overview. One group of students will ideate using supplied childlike creative thinking
methods, while the other group will ideate using their own preferred methods. These two
groups of students were selected because of their placement within the Bachelor of Science in
Graphic Communication Design curriculum at the University of Cincinnati, because at this point,
they have yet to experience co-op, a hallmark of the University of Cincinnati’s practicality-based
philosophy.

UC’s celebrated co-op system was founded in 1906, and is the first co-op program in the world.
Under the semester system, enrolled co-op students must alternate terms of coursework with
terms of career-related experiences between their sophomore and senior years. Students
typically complete three to five co-op terms prior to graduation. In other words, co-op students
must accumulate five total semesters of full-time internships by the time they graduate with
their bachelor’s degrees. The benefits of the co-op system are extraordinary; what better way
to prepare for the real world than real-world experience?

However, this study calls into question the impact the co-op experience has on the creativity of
students. Perhaps the focus on style and function (i.e., adherence to brand and trend) inherent
to these internships may negatively impact the creativity of co-op students. For this reason, the
author believes that the chosen Communication Design Overview students (set to experience
co-op in a few months’ time) are thus far unhindered by real-world experience in design. The
students were also chosen because they have not yet chosen a specific area of focus to study
within their major (e.g., interaction design, motion design, or print design).

After the experimental activity, students will fill out worksheets describing how they believe
they were thinking throughout the activity; ideally, their answers will match the words
described within the research regarding the ways in which children think. Then, the author will tabulate the results of the ideation activity, in essence grading the creativity of the ideas generated across both groups of tested students in order to gauge whether the tested method does, in fact, impact the creativity of those involved.

3. Literature Review

3a. Introduction
Prior to the aforementioned study, the author perused research pertaining to creativity and childlike thinking.

3b. Creativity: Criteria and Factors
In an article entitled "Creativity Components," psychologist and neuroscientist Sandeep Gautam explains the commonly cited criteria of creativity: flexibility, originality, fluency, and elaboration. He specifies these as criteria in that these four aspects may be used to gauge the inherent creativity of something.

Flexibility, he argues, “captures the ability to cross boundaries and make remote associations,” and “is measured by number of different categories of ideas generated” (Gautam, 2012). By ‘remote associations,’ he means one’s ability to discern relationships between things that are not often associated with one another.
Originality, he argues, “measures how statistically different or novel the ideas are compared to a comparison group,” and “is measured as [the] number of novel ideas generated” (Gautam, 2012). By ‘novel,’ he means new or unusual in an interesting way.

Fluency, he argues, “captures the ability to come up with many diverse ideas quickly,” and “is measured by the total number of ideas generated” (Gautam, 2012). By ‘diverse,’ he means showing a great deal of variety.

Elaboration, he argues, “measures the amount of detail associated with the idea,” and “has more to do with focusing on each solution/idea and developing it further” (Gautam, 2012).

For the purpose of this study, the criteria of creativity will entail these four qualities, as well as utility; after all, “a product is creative when it is (a) novel and (b) appropriate” (“What is Creativity?”).

In terms of the factors of creativity, Gautam cites surprise, originality, beauty, and utility. He specifies these as factors in that these four qualities may be pursued as ingredients when striving to generate something that can be labeled as creative.

Surprise, he argues, is “whether one produces something that continues captivating attention, even though it becomes familiar over time,” which “may result from rare and remote association of ideas or a recombination process that brings familiar things together in an unfamiliar/unexpected way,” i.e., “the ability to think beyond
conventional boundaries or categories, loosen up the associations and make remote associations between and within categories,” which “is also related to flexibility with which you can walk across categories and disciplines” (Gautam, 2012).

Beauty, he argues, is “whether one produces something that is appealing and aesthetically satisfying,” and “is related to fluency scores or the ease with which you can ideate” (Gautam, 2012).

Lastly, utility, he argues, is “whether one produces something that is useful,” which entails “the ability to see if the solution actually solves the problem,” as well as “the ability to elaborate an idea and add details to it, so as to make it useful/relevant” (Gautam, 2012).

As mentioned, this study will implement all criteria of creativity listed above, which will also entail Gautam’s factors of originality and utility as, one might say, criteria-factor hybrids. Surprise and beauty will not be evaluated due to the intrinsically high subjectivity of these terms in comparison to all others listed above, or, the fact that ‘surprise’ and ‘beauty’ typically reflect “the perspective through which the speaker views reality” when being written (“Difference Between Objective and Subjective,” 2009).

3c. Childlike Thinking and Creativity: Skepticism

In 2014, design researcher Soren Petersen, Ph.D., conducted a study entitled “Does Child-like Thinking Produce Innovative Designs?” Within his study, he invited 80 fifth through eighth grade students from Nalanda Public School in Mumbai, India—along with 60 design
professionals from Seoul, Hong Kong, and Copenhagen—to create innovative concepts. He asked the students to design backpacks for students living in Copenhagen, Denmark, and their ideas were compared with the designers’ ideas. (The designers had been asked to ideate and design a broad range of consumer products.)

To gain an overview of the creativity of the two groups, he “then positioned their concepts in a Market-Technology risk matrix,” and from this, he found “that the students mainly came up with incremental concepts, while the designers were generating a wider range of breakthrough market and technology innovations” (Petersen). He posits that “the fact that children mainly think up incremental designs probably comes as no surprise;” after all, “design is a recombination of existing elements and children, by virtue of their youth, have yet to build up a knowledge base of others’ needs, wants, and desires;” they “are also only in the early beginning stages of gaining an understanding of the solutions available to fulfill these desires” (Petersen).

Essentially, the students' lack of knowledge and experience with other cultures meant that they projected their own needs onto others, instead of ideating on their users’ needs. However, this does not necessarily discount their inherent creativity. In fact, Petersen found that their limited understanding of technology resulted in designs with extremely futuristic/cartoony concepts involved. Petersen went on to say that “children thrive on design challenges,” and that they obviously “love to learn new things and translate them into ideas of their own.” Their sketches, he claimed, “exuded passion and joy, something that can only help them in the future at becoming the very best that they can be in their chosen fields of endeavor” (Petersen).
Thus, it appears that thinking like a child can be beneficial to creativity, in that doing so leads to fervent and passionate ideation. Still, Petersen concludes with skepticism regarding childlike thinking and innovation, saying that “it is important to keep a child-like innocence and open-mindedness throughout one’s life,” but “years of learning are required in order that one’s contribution to change in the world be breakthrough and not simply incremental.”

The authors of another study also raise skepticism regarding creativity in children, in that fluency of ideation “is dependent on the maturation of the frontal cortex, which is immature among children,” therefore, “to the extent that manipulating a childlike mindset is beneficial to creative performance, it is unlikely to involve the fluency of creative output” (Zabelina & Robinson, 2010, p. 57-65). Others even assert that creativity has nothing to do with being either a child or an adult, in that “there are certain innate features of the brain that make some people naturally prone to divergent thinking” (Bronson & Merryman, 2010). In other words, creativity is all about inherent brain structure, and creativity in a person may simply be the proverbial ‘luck of the draw.’ (More information regarding the neuroscience behind childlike thinking and creativity will be mentioned later on.)

Other studies cite the downfalls of the ways children think; the childlike mind is conducive to “becoming understandably more distracted by more and more interesting things” (Stevens, 2014). In fact, children may be inherently lacking in numerous facets of the creative process, in that experts on creativity collectively agree “fact-finding and deep research are vital stages in the creative process” (Bronson & Merryman, 2010). Still, many studies continue to cite children as more inherently creative thinkers than adults.
3d. Childlike Thinking and Creativity: Positivity

In a study entitled “UNLOCK YOUR CHILDLIKE ABILITY TO DESIGN WITH CONFIDENCE,” web designer Tom Kenny takes the stance that children do, in fact, think more creatively than adults; he groups insights from numerous sources, indicating that one’s “innate creativity departs as [he or she grows] up and we have to start treating it as a muscle that weakens if we don’t exercise it.” He goes on to blame the fear of failure that adults have and that children lack, in that this fear “is an insurmountable hurdle for some, preventing them from trying anything or really pushing themselves to be better” (Kenny). He emphasizes the idea that practicing childlike thinking can slowly transform you into a more effectively creative person.

He also asserts that experimenting is key in design; “you can’t possibly create something great every single time you sit down to design, so you’re going to have to try multiple approaches for almost every project,” and due to the nature of childlike thinking, “tapping into the child’s mind,” will most likely “make experimenting much [more] natural” (Kenny).

He cites playfulness as key to creativity, because in a moment of childlike play, “you’re much more in touch with your unconscious,” and when you “defer decisions as long as possible, it’s giving your unconscious the maximum amount of time to come up with something” (Kenny). Simply put, Kenny argues that the two things that cause childlike minds to be so creative are A) being comfortable with a problem staying unresolved for lengthy amounts of time, and B) engaging in playful thinking.

Similarly, an extremely thorough study entitled “Child’s Play: Facilitating the Originality of Creative Output by a Priming Manipulation,” by Darya L. Zabelina and Michael D. Robinson,
concludes that childlike thinking can result in increased creativity. Their study considers the potential effects of childlike thinking techniques on people of various ages “in the context of the two Big 5 personality traits—extraversion and openness to experience—that are of most importance in understanding creative performance” (Zabelina & Robinson, 2010, p. 57-65). Their study also elaborates modern definitions of originality and fluency; something “is original to the extent that it is novel and unique among the population of interest while still feasible and sensible,” while “fluency is defined in terms of the number of responses generated, whether they are original or not” (Zabelina & Robinson, 2010, p. 57-65).

The authors also believe in the childlike mindset’s facilitation of creative originality. They reference a study that distinguishes “preconventional, conventional, and postconventional thinking styles and [links] them to distinct developmental phases” (Zabelina & Robinson, 2010, p. 57-65). The referenced study entails the following:

In the preconventional developmental phase (ages 6 – 8), children’s creative productions are often spontaneous and novel, in part due to a lack of self-censure (Cropley, 2001).

In the conventional developmental phase (ages 8 –12), creative productions are increasingly rule bound, to the detriment of their originality.

In the postconventional developmental phase (12–adulthood), there is some degree of freedom from rules, but creative productions are still guided by logic and routine. This framework (Rosenblatt & Winner, 1988), as well as others (Case & Mueller, 2001;
Piaget, 1926), therefore suggests that originality may be facilitated by childlike thinking processes.

Zabelina and Robinson go beyond exaltation of childlike thinking’s link with creativity, going so far as to denounce the creative ability of adults. They posit that, from a complementary perspective, adults accumulate habitual strategies when dealing with tasks, and do so by depending upon the use of symbols to denote propositions, terms, and relations in order to assist reasoning (i.e., symbolic logic). Thus, the general goal of the average adult mind, when presented with a problem, is to create the ‘correct’ solution, which may serve to undermine creative thinking.

The authors also assert that experience may very well be the culprit, in that the younger a person is, the more creative the person seems to be; in an educational context, “higher levels of artistic creativity and aesthetic expression [are observed] among preschool children relative to older children” (Zabelina & Robinson, 2010, p. 57-65). In fact, this suggests that educational training after one’s preschool years may be likely to undermine the processes that produce creative thinking and creative output. A similar study found that less creative children often berate their more creative peers due to their apparent eccentricity. A similar dynamic has been noted among teachers; “although teachers [agree] with the abstract goal of fostering and encouraging creativity in children, their in-class demeanor and nonverbal behaviors [appear] to be antithetical to such a goal” (Zabelina & Robinson, 2010, p. 57-65).

Indeed, a teacher’s focus on outcomes is proven to undermine intrinsic motivation, leading to low levels of creativity. It is only fitting that a question of central interest in this study is
“whether such inhibitory influences on creative performance are irreversible or, rather, mutable” (Zabelina & Robinson, 2010, p. 57-65). In other words, there is logic behind the idea that manipulating a childlike mindset can facilitate creative originality. The study by Zabelina and Robinson strives to “facilitate a childlike mindset by asking individuals to imagine that they [are] 7-year-old children with free time,” hypothesizing that “assignment to the childlike mindset condition [will] lead to higher levels of creative originality on an objective task” but “that effects of this type might be somewhat particular to individuals who are typically serious and sober, rather than spontaneous, in their daily behaviors” (Zabelina & Robinson, 2010, p. 57-65).

Through use of priming using the phrase “You are 7 years old” on the experimental group in a study encouraging ideation on what to do on a snow day, results proved that “written responses from the experimental condition were very different,” typically focusing on “desires rather than obligations and often involved playing with friends or seeking rewards from the environment (e.g., candy),” thus, “the manipulation appeared highly successful in encouraging spontaneous and playful thinking in the childlike mindset condition” (Zabelina & Robinson, 2010, p. 57-65). Mood was also taken into consideration; the group found that “the manipulation of a childlike mindset facilitated creative performance only at low levels of extraversion” (Zabelina & Robinson, 2010, p. 57-65). Zabelina and Robinson also stated the following:

> Our results therefore suggest that developmental trends in creativity over time (Gardner, 1982) may reflect changes in task mindset as much or more so than they reflect changes in brain maturation or educational practices. In other words, it is possible to recapture the spirit of play and exploration characteristic of childlike thinking.
Although we are unaware of any previous studies that have facilitated creative originality by a manipulation of the present type, our results are nonetheless consistent with other theories and sources of data.

They came to this conclusion:

The idea that there is an “inner child” within each of us that can facilitate creative performance is somewhat ubiquitous in popular culture. The inner child is presumably playful in nature, not especially self-conscious, and less bound to societal restrictions and rules (Gardner, 1982). Studies in personality and social psychology have increasingly demonstrated the benefits of this mode of being, thereby demonstrating empirical support for longstanding humanistic assumptions (Sheldon & Kasser, 2001). In short, although it is often beneficial to approach life tasks as a conventional adult, it is not always beneficial to do so. The domain of creative originality is one realm in which play and exploration appear particularly beneficial.

(The fact that the “inner child is presumably playful in nature, not especially self-conscious, and less bound to societal restrictions and rules” [Zabelina & Robinson, 2010, p. 57-65] will be referenced later on in this study, when the author articulates the three main components of childlike thinking: playfulness, recklessness, and humorousness.)

Zabelina and Robinson conclude by saying that “what appears to be common to multiple theories of creativity is engagement with a task, playfulness in this regard, and a lack of self-conscious monitoring of output,” and “in dispositional terms, it would be of interest to
determine whether more creative individuals view themselves as more childlike in their approach to creative performance tasks,” and “in experience-sampling studies, it would be important to determine whether flow and creativity co-occur with tendencies to view the self as more childlike versus adultlike in nature.” (This idea of self-labeling when it comes to creativity will be incorporated later on in the experiment of this study.)

Zabelina and Robinson assert that their results suggest that interventions “facilitating a focus on fun and spontaneity are likely to be effective,” and that potential interventions along such lines might include “exercises designed to facilitate a childlike mindset, games, and/or interventions designed to focus individuals on what they want to do rather than what they feel that they have to do” but “of most importance, our results reveal that even very short-term interventions designed to focus individuals on spontaneous thinking and play are likely to be effective in fostering creative originality.”

3e. Thoughts Going Forward

Clearly, professionals are at odds regarding whether children are, in fact, more creative than adults, and whether a childlike mindset is conducive to creative thinking. One major question jumps out: younger children have been scientifically proven to be more creative than older children; what exactly causes the preconventional age (ages 6 to 8) to be so creative (i.e., what are children in that age range doing)? The author noted this question, and proceeded to research the potential usefulness of childlike thinking within design thinking.
4. Usefulness of Childlike Thinking Within Design Thinking

As mentioned above, various entities cite childlike thinking as useful within the design process. For those unfamiliar with the field of design and design thinking, further descriptions are below.

4a. Design Thinking and Process: Nebulous Origins

The idea of design as a way of thinking in the sciences is first noted in Herbert A. Simon's 1969 book *The Sciences of the Artificial*, but came to true prominence in Peter Rowe's 1987 book *Design Thinking*, whose description of methods and approaches used by architects and urban planners was a significant early usage of the phrase 'design thinking' in design research literature. Rolf Fasté expanded on the ideas presented in these works at Stanford University in the 1980's and 1990's, teaching what he termed "design thinking as a method of creative action" (Cohen, 2014). This new idea—design thinking—was soon adapted for business purposes by Fasté's Stanford colleague David Kelley, founder of creative thinking giant IDEO in 1991.

Before long, this notion of 'design thinking' began to encompass more and more. The article "Wicked Problems in Design Thinking" expressed a broader view of the term, describing it as addressing "intractable human concerns through design" (Buchanan, 1992, p. 5). From then until now, the word *design* and idea of *design thinking* have transformed and grown, and design thinking is now applied to all fields rather than simply architecture, urban planning, and graphic communication.

Nowadays, design thinking is commonly described as a “formal method for practical, creative resolution of problems and creation of solutions” with the intent to instill an improved future result (Cohen, 2014). It is a form of solution-focused thinking, beginning with a goal. By considering both present and future conditions and parameters of the problem, designers can even explore and pursue alternative solutions concurrently.

Depending on the design entity, the design process can take many forms, and can encompass a myriad of potential stages—linear or simultaneous, depending on preference and context—within which problems are framed, questions are asked, more ideas are created, and—ideally—the best answers are chosen. A common design process encompasses the following stages, as mentioned in the SAP User Experience Community’s article entitled “Introduction to Design Thinking”:

1. Define (articulate the problem)
2. Research (gather information regarding the problem)
3. Ideate (brainstorm potential solutions to the problem)
4. Prototype (create initial versions of potential solution ideas)
5. Choose (after testing prototypes, choose which one best solves the problem)
6. Implement (elaborate upon and launch the most effective idea)
7. Learn (learn from user interaction and use this knowledge in future designs)
This study examines the integration of childlike thinking within the design process. The concept will be elaborated upon, but for one to understand the overall idea of childlike thinking as a design method, one must first understand the various aspects of childlike thinking.

4c. Childlike Thinking and Design

Due to their inherently childlike nature, numerous design phases benefit from childlike thinking methods. For one, children are inherently novel thinkers for reasons mentioned above (e.g., a lack of experience-based bias), so childlike thinking is useful within design/divergent thinking phases within the design process. (Many designers refer to the holistic design process as being creative across all phases.)

Design thinking also “identifies and investigates with both known and ambiguous aspects of the current situation in order to discover hidden parameters and open alternative paths which may lead to the goal” (“Design Thinking”), and since children are apt to discover hidden parameters and thrive on ambiguity due to their immediate unbiased analysis (due to a lack of experience), childlike (unbiased) thinking has a place in design thinking. Designers also “problem solve by synthesis” (“What is Design Thinking?,” 2012) and children are proficient at uniquely combining multiple (seemingly unrelated) thoughts due to their lack of experience in the real world.

In an article entitled “What is Design,” design thinking experts at the HPI-Stanford Design Thinking Research Program and Stanford Center for Design Research, Christoph Meinel, and Larry Leifer, assert that there are four rules to design thinking, which happen to be conducive to how children think:
The Human Rule

This rule asserts that all design activity is social in nature. For reasons mentioned above—as well as the fact that early on, children are taught the Golden Rule (i.e., “[treating] others like you’d want them to treat you”)—children are apt to treating each other nicely (“Beyond the Golden Rule,” 2005).

The Ambiguity Rule

This rule asserts that design thinkers must preserve ambiguity within the design process, as a means toward lengthy ideations and iteration phases leading to well-thought-out design decisions and solutions. Children are inherently fearless, divergent thinkers, and due to their immediate unbiased thinking (resulting from their lack of experience), children thrive on ambiguity. In other words, a large part of the design problem solving activity “consists of problem definition and problem shaping” (Tovey, 2015) and children love to problem shape more so than to problem solve, thus the idea of design problems as ‘wicked problems’ suits children well.

Problem shaping in children is often evident in what is known as the act of creating *paracosms*, or, custom fantasy worlds; “in middle childhood, kids sometimes create” their own “fantasies of entire alternative worlds,” and sometimes “even create languages spoken there;” this type of play “peaks at age 9 or 10, and it’s a very strong sign of future creativity;” one “Michigan State University study of MacArthur ‘genius award’ winners found a remarkably high rate of paracosm creation in their childhoods.” (Bronson & Merryman, 2010).
The Re-design Rule

This rule asserts that all design is re-design. As stated above, children are great ideators due to their inherently divergent mindset.

The Tangibility Rule

This rule asserts that the act of making ideas tangible (e.g., through paper prototyping) facilitates more efficient communication throughout the design process. Children thrive on creating tangible things; tangible-mediated learning has been proven “to allow children to combine and recombine the known and familiar in new and unfamiliar ways,” and studies have proven that, when enacting creative activities, children are “fully engrossed throughout their participation” in acting with “tangibles and each other” (Price et al., 2003, p. 169-185).

There are also “factors which can slow or halt the design thinking process; fear, resistance and playing the devil’s advocate,” many of which are seen mostly in adults; “these attitudes introduce destructive negativity” (Berilette, 2010). Fear of failure or fear of criticism “may prevent someone from even beginning to apply methods and processes to achieve their goals,” since “both have psychological effects which divert someone from focusing on solutions and shifting their focus to doubts of self-worth, anxieties of ‘will it be good enough,’ or procrastination” (Berilette, 2010). Resistance can inhibit design thinking by causing a person to reprioritize the main goal and shift efforts to other tasks that may need to be done. Another adult-only thinking habit—playing the ‘devil’s advocate,’ or, providing constant nay-saying—is an embodiment of negative criticism which stops further ideation towards a solution, which,
according to creativity experts Tom and Dave Kelley, ought to be banned from the room during ideation.

This study asserts that, while childlike thinking is beneficial across all design phases, childlike thinking is most beneficial to early phases within the design process due to the earlier phases’ focus on divergent thinking, a type of thinking proven to be most conducive to the childlike mindset. This study also emphasizes that the further one goes through the design process (Define, Research, Ideate, Prototype, Choose, Implement, Learn), the more appropriate it is to adopt more adultlike thinking processes, in that more and more convergent decisiveness is needed when approaching a design solution.

4d. Pros and Cons: Childlike Thinking vs. Adult Thinking

In many ways, childlike thinking aspects can be thought of as superior to adult thinking aspects. Design is an inherently creative process, and studies have proven that children are more creative than adults, in that children are consistently measured as creative geniuses, and this quality is known to fade as each year of education is added...or, as inventor and Futurist Buckminster Fuller once said, “All children are born geniuses,” and we spend the first years of their lives “degeniusing them” (Wing, 2012).

In a similar vein, studies have shown that adults are “biased by prior assumptions” (the overall effect of experience), paying less attention to current evidence and more attention to how their past experience relates to their current experience (Lucas et al., 2014, p. 284-299). Children can also “learn the abstract properties of causal relationships using only a handful of events” (Lucas et al., 2014, p. 284-299), implying that they experience things in the here and now,
compared to past-oriented adult thinking. Simply put, children have an upper hand at creativity due to their ignorance of the world, a direct result of inexperience.

However, many adult thinking aspects are superior to childlike thinking aspects. With age and experience, various virtuous qualities increase while various iniquities decrease. More specifically, conscientiousness, agreeableness, openness, and extraversion increase with age, while neuroticism decreases (Roberts & Mroczek). For the purpose of this study, the specific elements of childlike thinking are reviewed in detail prior to the evaluation of childlike thinking methods as viable tools within creative design thinking.

4e. The Three Elements of Childlike Thinking

Literature avers that there are numerous aspects of childlike thinking that are not nearly as prominent in the minds of adults. Assimilated research reveals that these aspects are playfulness/imagination, open-mindedness, thinking with levity, interacting healthily with others (including forgivingness), lowered inhibitions (filterlessness when thinking and speaking), thought confidence, and synthesized/mixed thinking. The author went through several iterations of distilling and categorizing these aspects.

In the first iteration, this group was a list of playfulness, openness to possibilities (including open-mindedness), thinking with levity (funniness), healthy interaction with others, lowered inhibitions (including filterlessness), forgivingness, confidence, and mixed thinking. By the final iteration, three main categories of childlike thinking aspects had materialized.
A. Playfulness

Playfulness encompasses the aspects of healthy interaction with others, forgivingness, synthesized thinking, and open-mindedness.

B. Recklessness

Recklessness encompasses lowered inhibitions and confident thinking.

C. Humorousness

Humorousness entails the natural proclivity toward levity-based thinking.

Numerous studies claim that these three elements of childlike thinking—playfulness, recklessness, and humorousness—are ingredients to creativity. Multiple theories of creativity posit that creativity entails “engagement with a task, playfulness in this regard, and a lack of self-conscious monitoring of output” (Zabelina & Robinson, 2010, p. 57-65). In other words, playfulness and recklessness are paramount to creativity.

The third ingredient, humorousness, has also been observed; in a brainstorming study, “improvisational comedians generated 20 percent more ideas than professional product designers did, and the comedians generated ideas that were also rated 25 percent more creative” (Ma). Accordingly, it must be that “humor, lightened mood, and mental spaciousness are important when it comes to encouraging creativity, ideation, and problem solving,” and humor “releases tension, which can lead to perceptual flexibility—a required component of creativity” (Ma).
Humor and laughter, then, are “effective tools for strengthening human connection and controlling group behavior” (Ma), so it makes sense why an integral part of a game experience is laughter. In fact, “it is believed that wit, being spontaneous humor production, is strongly related to creativity as both involve making non-obvious connections between seemingly unrelated things,” since “something is funny as a result of a pairing of ideas or situations that are divergent from [what may be] expected” (Kudrowitz, 2010).

In summation, these childlike thinking aspects—playfulness, recklessness, and humorousness—have been proven to coincide with creativity. Studies also show that creativity is inherent to games and game play.

4f. Children, Games, and Creativity

A study of nearly 500 12-year-olds “found that the more kids played video games, the more creative they were in tasks such as drawing pictures and writing stories,” (Henion & Jackson, 2011). In fact, “a growing body of university research suggests that gaming improves creativity, decision-making, and perception” (Hotz, 2012). More specifically, the aforementioned three aspects of childlike thinking—playfulness, recklessness, and humorousness—are conducive to game play.

In terms of playfulness, “distinct types of free play are associated with high creativity” (Bronson & Merryman, 2010) in early childhood. “Preschoolers who spend more time in role-play (acting out characters) have higher measures of creativity,” which may be attributed to the idea that “voicing someone else’s point of view helps develop their ability to analyze situations from different perspectives,” while, “when playing alone, highly creative first graders may act out
strong negative emotions: they’ll be angry, hostile, anguished;” the hypothesis, then, “is that play is a safe harbor to work through forbidden thoughts and emotions” (Bronson & Merryman, 2010).

Recklessness has also been proven to be conducive to healthy game play; according to many studies, “people show very little inhibitions and fear in games” (Kaveh, 2010), most often showing fewer inhibitions and instances of fear than in everyday life. Recklessness has even been linked to healthy existence from a survival standpoint; humanity’s “propensity for willful recklessness becomes less puzzling when placed in an evolutionary context” in that studies prove that risky behavior, when pursued in groups, leads to more misfortune per individual than in non-risky groups, but yields more gains in the risky group than in the non-risky group; in essence, reckless beings “take the biggest chances, but they leave more genes” (Konner, 1990). Risk taking is simply “part of being alive;” after all, “for many of us, life seems compromised by the endless calculation of possible risks” and “such calculation carries a cost—in attention, in inhibition, in self-image, in fun” but “the fun is not incidental;” “it is evolution’s way of reminding us of what we were designed for” (Konner, 1990).

In terms of games, humorousness is more grounded in emotion than recklessness, and has been proven in many studies to be “a fundamental component of games” (Lepre, 2015). Humor “can support the design” of games “by smoothing and sustaining the game mechanics,” and besides, “using humor can make games richer, more engaging, as well as fun” (Dormann & Biddle, 2009, p. 802-824). Games “can draw on the functions of humor in the real world for enhancing communication, learning, and social presence;” with the use of humor, game
participants “can still be serious but also entertaining and funny” (Dormann & Biddle, 2009, p. 802-824).

Incongruity also plays a role in enhancing games; “it seems that unexpectedness and surprise are important elements of humor in computer games, and these make players laugh when they play” (Dormann & Biddle, 2009, p. 802-824). Also, with "co-located gamers, laughing and making jokes not only release tension but can also support friendship, because in this way friends do not get mad at each other;” indeed, humor “can bring relief from tension and frustration with game-play—another important role for humor in game design” (Dormann & Biddle, 2009, p. 802-824). Humor is inherently social, so its connection to collaborative play makes sense; “humor is very much a social phenomenon;” a “pervasive feature of active social interaction, and we rarely laugh when alone” (Dormann & Biddle, 2009, p. 802-824).

By nature, it benefits player-to-player dialogue; “as well as serving to support the structure of groups, humor is also important at the smaller scale of interpersonal relationships” in that it “fosters an increase in interpersonal competencies” (Dormann & Biddle, 2009, p. 802-824). Humor may be used “to build attitudes and skills for establishing interactions and maintaining relationships with others” (Dormann & Biddle, 2009, p. 802-824). Humor “greases the wheels of conversation, plays a transitional role, and provides a conventional way for people to drive forward in dialogues;” moreover, “humor assists face-saving behavior in negotiation and mediation, easing tension and intensifying trust between parties” (Dormann & Biddle, 2009, p. 802-824). Humor can serve to “relieve boredom, frustration, and guilt and instead provide enjoyment and fun;” the use of humor “to enhance the mood of players seems to be an important element of game-play, making it more enjoyable;” and is “especially the case for
players in teams; as a player explained, people who had a bad day were not fun to play with” (Dormann & Biddle, 2009, p. 802-824).

Studies also show that “the active processing of humor leads to enhanced awareness of the contextual events,” in that humor has been shown to enhance memory (Dormann & Biddle, 2009, p. 802-824). Humor also has a hand in divergent thinking; “perhaps the strongest effects we see for humor in game-play involve the player generating humor based on the game;” and in this player-generated humor, researchers “believe there is evidence of the relationship between humor and creativity” (Dormann & Biddle, 2009, p. 802-824). The players “are using their knowledge of the game-play and their problem-solving abilities” and are “experimenting and creatively distorting and breaking the game rules and mechanics for comic play and comic fun;” researchers, in summation, “believe that in games, humor has great potential for stimulating creativity and divergent thinking” (Dormann & Biddle, 2009, p. 802-824).

These three main qualities of childlike thinking (playfulness, recklessness, and humor), when logically linked to games, will be taken a step further within this study. (Before reaching the specific childlike thinking method to test within this study, the author anthologized a group of methods—some found in research, some original to this study—in order to gauge which one would be most relevant and viable to test.
5. Various Childlike Thinking Methods

5a. Overview

Research has concluded that there are six main categories of childlike thinking methods: priming, neuroscience mimicry, qualitative mimicry, behavior mimicry, context mimicry, and motive mimicry. Motive mimicry was chosen to be the main focus of this study, but for the sake of comprehensiveness the other methods are listed below.

5b. Priming

In the case of this study, priming is the act of attempting to think like a child by embarking on thought processes while thinking of oneself as a child. More scientifically, priming is “a non-conscious form of human memory concerned with perceptual identification of words and objects,” referring to “activating particular representations or associations in memory just before carrying out an action or task” (“What is Priming?”).

Some studies linking childlike thinking to creativity have utilized priming. One study “sought to manipulate a childlike mindset before assessing creative performance,” by presenting participants “with an open-ended prompt and asked them to write for 5–10 min in response to it,” introducing (priming) this activity with the statement “You are 7 years old” to the experimental group, concluding that “the manipulation appeared highly successful in encouraging spontaneous and playful thinking in the childlike mindset condition” (Zabelina & Robinson, 2010, p. 57-65). Their study concludes by asserting that “it is possible to facilitate this often-functional regressive process by encouraging adults to think of themselves as children for a short period of time” (Zabelina & Robinson, 2010, p. 57-65).
5c. Neuroscience Mimicry

Neuroscience mimicry is the act of attempting to think like a child by shutting off or activating certain areas of the brain in order to match one’s brain function to that of a child. The author of this study suggests several brain-structure-related reasons regarding why children are inherently more creative than adults.

**Theory 1: Working Memory in Children**

One important thing to keep in mind is that the frontal lobe develops post-childhood; the frontal lobe include the frontal cortex, which enable a viewer to understand the consequences of actions. Working memory, which relies on the existence of a frontal lobe, is one’s ability to remember in the short term. Working memory is difficult for a young child, because attention and distractibility impact working memory.

In an article called "Working Memory," Saul McLeod explains that the frontal lobe is what dictates working memory ability, so younger children (who have yet to fully develop that part of the brain) are lacking compared to older people. Thus, children, who lack a fully developed frontal lobe, don’t have freshly memorized items to inhibit them from thinking with novelty, so it makes sense why the aforementioned childlike thinking aspects exist. Children are so imaginative because they have no tether to immediately memorized items. They are open to possibilities because they don’t have working memory to bias or inhibit their thought decisions. They think with levity because they are uninhibited by the gravity of working memory. They think fearlessly because they are uninhibited by constantly remembered limits. They forgive so easily because of a lack of stored grudges. Lastly, they maintain ignorance and innocence because
remembering in the long term is more difficult for them, leading them to maintain a lasting, potently fresh perspective.

**Theory 2: Myelin in Children**

Another thing to keep in mind is that in early elementary years, more and more fibers grow between the myelin (white-matter) in the brain, leading to more interconnectedness of the brain, which allows for better formation of memories and connecting old learning to new learning. The author suggests that this time period is a sweet spot, before too many memories are stored (thus, less connection of new memories to old, or at least more intense, focused connection of new to old memories, leading to connecting of seemingly unconnectable ones [since the child is forced to connect old with new, no matter what they are]).

The spurt of myelin/white-matter growth and brain-interconnectedness, and lack of old memories to associate with new ones, lead to novel combinations. “During the early elementary years, fibers continue to grow between neurons and the white matter of the brain (also called myelin);” the “growing neural networks of connected neurons and fibers are essential to the transmission of information throughout the brain;” as the brain matures, “more and more fibers grow and the brain becomes increasingly interconnected” and “these interconnected networks of neurons are very important to the formation of memories and the connection of new learning to previous learning” (Semrud-Clikeman, 2016).
Theory 3: Rapid Efficiency Development in Children

Another thing to keep in mind is that, “in the first few years of life, 700 to 1,000 new neural connections form every second” and “after this period of rapid proliferation, connections are reduced through a process called pruning, which allows brain circuits to become more efficient” (Brain Architecture, 2016). The author’s supposition is that every time a child rethinks something, his/her brain is more efficient at thinking it; thus, immense creativity happens, resulting from a more and more interconnected brain.

Theory 4: Executive Functions in Children

Another thing to keep in mind is that executive functions also rely on the frontal lobe, so young children (who lack a fully formed frontal lobe, which will develop in later years) are less apt to manage working memory, reasoning, task flexibility, and problem solving/planning/execution. Thus, they are more free than adults to *not* censor their thoughts, and instead, to think with whimsy; “executive functions (also known as ‘cognitive control’ and ‘supervisory attentional system’) is an umbrella term for the management (regulation, control) of cognitive processes, including working memory, reasoning, task flexibility, and problem solving as well as planning and execution” (Pettinelli, 2014).

Theory 5: Self-Consciousness in Children

One more thing to keep in mind is that the frontal cortex is what allows attention, allowing viewers to understand action consequences. The ventromedial prefrontal cortex promotes self-awareness. The author’s theory is that children don’t yet truly have the area that centers on attention and self-awareness; thus, confidence is boosted, since
children don’t focus on potential consequences or the way they may be perceived. Simply put, children are completely in the moment, allowing for immense creativity.

**Thoughts Going Forward**

In summation, the lack of a frontal lobe (thus, a lack of self-consciousness) and the rapid development of myelin (thus, a profusion of interconnected [novel] thinking) seem to point toward the extreme creativity in children. Early on within the formation of this thesis, the author had chosen to test neuroscience mimicry as a creative thinking method. While this was later ditched in favor of another method, neuroscience mimicry was still considered as a viable implication in the formation of later methods to be tested.

5d. Qualitative Mimicry

Qualitative mimicry simply entails attempting to think like a child by mimicking childlike thought aspects. In other words, this method encompasses any attempts to directly think with the qualities and sub-qualities of playfulness, recklessness, and humorousness.

5e. Behavior Mimicry

Behavior mimicry is any attempt to think like a child by mimicking the habits of children. Some examples of behavior mimicry include the aforementioned Why Chain Method (i.e., asking “Why?” over and over, leading to deeper and deeper insights regarding the original question), thinking in malapropisms (e.g., mistaking 'flamenco' dance for 'flamingo' dance and dancing while squawking, leading to a novel perspective on dancing), and taking things literally (e.g.,
interpreting the idiom ‘spit it out’ literally and spitting on the ground when asked to reveal a secret, leading to a humorous rendition of the original command).

5f. Context Mimicry

Context mimicry is exactly how it sounds: it is the act of surrounding oneself with an environment similar to a child’s environment in order to think like a child. For example, one might attempt to think like a child by sitting in a baby-blue room, a color similar to the walls of many baby rooms. Interestingly, blue has been linked to creativity; in one study, “for creative tasks such as brainstorming, blue environmental cues prompted participants to produce twice as many creative outputs as when under the red color condition” (University of British Columbia, 2009). Preschools, kindergartens, and elementary schools (not to mention crib rooms at home) are commonly packed with blues; perhaps this contextual aspect is one reason why children are so often found to be more creative than adults.

5g. Motive Mimicry (Original Method)

Motive mimicry entails finding a childlike game and replacing its motive with whatever new motive the participant deems necessary. Below is an example of motive mimicry, involving the revised rules of the childhood game known as “Musical Chairs” (Williams, 2009).

**Step 1:** Determine what is rewarded in the game. (In the case of Musical Chairs, *nimbleness* is rewarded, in that the player slowest to find a chair is eliminated.)

**Step 2:** Take this rewarded quality and imagine its relevance to design brainstorming. (In early design phases, *nimble generation of ideas* is encouraged.)
Step 3: Rework the mechanics of the game, replacing the original motive (in this case, nimbleness) with the new motive (in this case, ideation nimbleness).

Result: Musical Chairs, Modified

1) Pick one person to be Moderator. This person will be playing music for the game and choosing when to stop the music.

2) As the music plays, the other players must sketch ideas regarding a given design prompt.

3) When the Moderator stops the music (any time he or she wants), the other players must quickly show their ideas.

4) If two players present the same idea, that idea is eliminated. The player with the fewest ideas is out of the game.

5) Continue until one player is left. The winner then becomes the Moderator. Repeat gameplay until time is up.

This method was chosen to test for numerous reasons. As mentioned earlier, studies link games and gamification to creativity. The author also hypothesized that games from the preconventional development phase of childhood (ages 6 to 8) might be the most conducive to creativity, in that within this age range, "children’s creative productions are often spontaneous and novel, in part due to a lack of self-censure" (Cropley, 2001).

Other studies mention the freeness of thought associated with childlike mindsets and relevant games; "very short-term interventions designed to focus individuals on spontaneous thinking and play are likely to be effective in fostering creative originality" (Zabelina & Robinson, 2010,
The same study asserts that “in experience-sampling studies, it would be important to determine whether flow and creativity co-occur with tendencies to view the self as more childlike versus adultlike in nature” (Zabelina & Robinson, 2010, p. 57-65). (This idea of self-labeling [as childlike and/or creative] when it comes to creativity exercises will be incorporated later on in the experiment of this study.)

The same study asserts that interventions “facilitating a focus on fun and spontaneity are likely to be effective,” and that potential interventions along such lines might include “exercises designed to facilitate a childlike mindset, games, and/or interventions designed to focus individuals on what they want to do rather than what they feel that they have to do” (Zabelina & Robinson, 2010, p. 57-65). This logic—that a focus on fun and lack of impulse may be quite effective in inducing childlike creativity—caused the author to go forward with the decision to test childhood games, tailored into design brainstorming games, as a means toward more creative ideation output.

6. Experimental Study

6a. Overview
An experimental study—regarding the facilitation of creative output through childhood games tailored into design games—was conducted in January of 2016.

6b. Participants
Participants within this study are two groups of enrolled students (about 20 people each) in Professor Emily Verba Fischer’s Communication Design Overview class, all male and female
students between the ages of 18 and 25. Both groups meet at 8AM in the College of Design, Architecture, Art, and Planning. The students are sophomores in the Graphic Communication Design Program and were chosen due to their lack of any experience-garnered creativity bias.

6c. Task

Each student in the experimental group was asked to sign a consent form. The author pinned up three different design prompts (each with its own brainstorming game) throughout the room. (To read the games and prompts, see Figure 2.) The author asked students to move to a prompt, resulting in three groups of six people. The author went on to explain each prompt.

The groups then moved to different parts of the room, and the author set a 10-minute timer and told them to begin. Each group brainstormed using their specific game/prompt for 10 minutes. When time stopped, the author handed out worksheets to each participant. The worksheets asked participants to list five words or phrases that best describe the way they were thinking throughout the activity. (To read the worksheet contents, see Figure 3.) Participants then wrote on the back of their ideations which game/prompt they had used, along with ‘Round 1,’ and—if they had used more than one piece of paper—paper clipped their papers together. They handed in their sheets and worksheets, and the author prompted each group to rotate to the next game/prompt. The author started the 10-minute timer again, and the participants repeated what they had done previously, only in this new game/prompt.

After 10 minutes, they again filled out worksheets, labeled the back of their stacks with their game/prompt and ‘Round 2,’ and handed in their stacks. The groups rotated again, and
brainstormed a final time for 10 minutes, and filled out a third round of worksheets, labeling their ideations with their game/prompt and ‘Round 3.’

A few days later, the control group of participants did the exact same thing, excluding the games (i.e., each group of six students merely ideated using the prompts, using whatever methods—individual or group ideation, whatever their preference—that they chose to employ).

6d. Analysis

After gathering all of the ideations and worksheets, the author devised a system in which he analyzed the ideations without knowing which ones belonged to the experiment or control groups. The author analyzed each instance of brainstorming—each student’s stacks from Round 1, Round 2, and Round 3, culminating in three stacks of ideations per student—in terms of five creativity criteria garnered from previous research. The following criteria were used:

**Fluency** was scored in terms of the **number of sketches** generated per stack.

**Flexibility** was scored in terms of the **number of sketch categories** (text only, image only, or text/image hybrid) generated per stack.

**Elaboration** was scored in terms of the **numbers of instances of elaboration** (how many groups of ideations building off of one another) generated per stack.

**Originality** was scored in terms of the **ideations’ newness according to past sketches** (how far-reaching the overall group of ideations is) using a Likert (1-5) Scale.
Utility was scored in terms of the overall usefulness of each sketch (how plausibly each sketch could be read on something as small a business card and as large a billboard) using a Likert (1-5) Scale.

(For an example of a page of sketches, see Figure 4.)

The author then looked to the worksheets and tallied the most commonly cited words/phrases attributed to each game/prompt within the experimental group and each prompt within the control group.

6e. Results

Analysis of both the experimental and control groups proved that the childlike design games did, in fact, result in more creative responses to the design prompts. While no particular game stood out as the most beneficial to creativity (due to scattered results across all games and rounds), the games overall proved worthy in increasing two of the creativity criteria; the experimental games resulted in 167.42% as many iterative instances (elaboration), and 163.67% as many sketches (fluency).

Elaboration and fluency may have been so successful due to the fact that the nature of the games dictated speedy ideation; elaboration is conducive to speed in that quicker ideation tends to lead to more incremental thinking (since focus on improving upon an idea is quicker than thinking up an entirely different idea), and fluency is conducive to speed in that quicker ideation tends to lead to more ideation results.
Musical Chairs - 6 people

Gameplay
1) Pick one person to be Moderator. This person will be playing music for the game and choosing when to stop the music.
2) As music plays, other players must sketch ideas for the logo.
3) When Moderator stops music (any time he or she wants), players must quickly show their ideas.
4) If two players present the same idea, that idea is eliminated. The player with the fewest ideas is out of the game.
5) Continue until one player is left. The winner then becomes the Moderator. Repeat gameplay until time is up.

Prompt
Design a logo for a fitness app called EatFit. (Play the game for 10 minutes. Draw as many ideas per sheet of paper as you'd like. When the time is up, write 'Musical Chairs,' and whatever round of game you are on, on the back of each of your sheets, paperclip your stack of sheets, and put all players' paper-clipped stacks in a pile in the back of the room.)

Duck Duck Goose - 6 people

Gameplay
1) Six people sit in a circle, each with a pile of paper. One person (the Chooser) stands up.
2) The Chooser says "Go" and the five people sitting down must sketch logo ideas as quickly as possible.
3) The Chooser says "Stop" whenever he or she wants, then walks around the group, looking at the sketches.
4) The Chooser starts saying "Duck...duck...duck..." while passing each person.
5) The Chooser chooses a sketch that he or she finds interesting, and points at the idea and says, "Goose."
6) The Goose and the Chooser switch roles.
7) All players (except the new Chooser) must look at the idea, and sketch more ideas based on the Goose's sketch.
8) The new Chooser says "Stop" whenever he or she wants, and the game continues. Continue until time is up.

Prompt
Design a logo for an extreme sports TV station called XtremeTV. (Play the game for 10 minutes. Draw as many ideas per sheet of paper as you'd like. When the time is up, write 'Duck Duck Goose,' and whatever round of game you are on, on the back of each of your sheets, paperclip your stack of sheets, and put all players' paper-clipped stacks in a pile in the back of the room.)

Tag, You’re It - 6 people

Gameplay
1) Five people stand in one line, five feet apart. One person stands facing the others, ten feet from them without any paper.
2) This person is It, and must keep time during this game.
3) The five people begin to sketch. As soon as a person completes a sketch, he or she may move two feet in any direction.
4) Every thirty seconds, the person labeled It may move two feet in any direction.
5) Any person tagged becomes It and the game starts over.

Prompt
Design a logo for a movie critic web series called FilmFlaws. (Play the game for 10 minutes. Draw as many ideas per sheet of paper as you'd like. When time is up, write 'Tag, You’re It,' and whatever round of game you are on, on the back of each of your sheets, paperclip your stack of sheets, and put all players' paper-clipped stacks in a pile in the back of the room.)

Figure 2, Games and Prompts
Collaborative Ideation Techniques: Post-Activity Survey
Bennett Nestok and Emily Verba

1. Please list five words or phrases that best describe the way you were thinking throughout this activity. (See example words below.)

Example Words

<table>
<thead>
<tr>
<th>Playfully</th>
<th>Silly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normally</td>
<td>Sadly</td>
</tr>
<tr>
<td>Humorously</td>
<td>Happily</td>
</tr>
<tr>
<td>Inhibited</td>
<td>Frightened</td>
</tr>
<tr>
<td>Uninhibited</td>
<td>Confused</td>
</tr>
<tr>
<td>Weirdly</td>
<td>Angrily</td>
</tr>
<tr>
<td>Recklessly</td>
<td>Creatively</td>
</tr>
<tr>
<td>Open-minded</td>
<td>Logically</td>
</tr>
<tr>
<td>Stressed</td>
<td>Forced</td>
</tr>
<tr>
<td>Goofy</td>
<td>Childishly</td>
</tr>
</tbody>
</table>

2. Please check which game/technique your group used.

☐ Musical Chairs
☐ Duck Duck Goose
☐ Tag, You’re It

3. Is this the first, second, or third game you’ve played today? ☐ ☐ ☐

Figure 3a, Post-Activity Worksheet (Experiment Group)
Collaborative Ideation Techniques: Post-Activity Survey
Bennett Nestok and Emily Verba

1. Please list five words or phrases that best describe the way you were thinking throughout this activity. (See example words below.)

________________________________________________________

________________________________________________________

________________________________________________________

________________________________________________________

________________________________________________________

Example Words

- Playfully
- Silly
- Normally
- Sadly
- Humorously
- Happily
- Inhibited
- Frightened
- Uninhibited
- Confused
- Weirdly
- Angrily
- Recklessly
- Creatively
- Open-minded
- Logically
- Stressed
- Forced
- Goofy
- Childishly

3. Is this the first, second, or third round of sketching today?  

1  2  3

Figure 3b, Post-Activity Worksheet (Control Group)
Figure 4, Example Sketch (Fluency 18, Flexibility 2, Elaboration 4, Originality 5, Utility 5)
Although less successful, the other three criteria did still prove to be increased in the experimental groups. The childlike games resulted in **114.81% as much utility, 109.74% as much originality, and 108.91% as much flexibility.**

Over the course of all three rounds of ideation, the control group resulted in **44 total instances** of words matching the three main words associated with childlike thinking: playfulness, recklessness, and humorousness. Playfulness was referenced **25** times, recklessness was referenced **nine** times, and humorousness was mentioned **10** times. Also, childishness was referenced **one** time and creativity was referenced **12** times.

Conversely, the experiment group resulted in **71 total instances** of words matching those three main words. Playfulness was referenced **23** times, recklessness was referenced **20** times, and humorousness was mentioned **28** times. Childishness was referenced **six** times and creativity was referenced **11** times.

Thus, between both groups, the experimental group resulted in **27 more instances** of words matching playfulness, recklessness, and humorousness. Although creativity was referenced **one fewer** time, recklessness was mentioned **11 more** times, humorousness was mentioned **18 more** times, and childishness was referenced **five more** times. In other words, not only were the game-playing students’ ideas more creative (across all five criteria); they also described their own brainstorming as more childlike.
Of the three design games utilized in the experimental group—Musical Chairs, Duck Duck Goose, and Tag You’re It—none proved to be more successful than any others, since results varied across all five creativity criteria.

The only drawback was that playfulness—one ingredient of childlike thinking—was referenced three fewer times in the experimental group, perhaps due to the nature of games; after all, in a way, the game group had rules to consider. I like to think that future applications of this concept—turning childhood games into design methods—could address this shortcoming by somehow conveying to participants that breaking the rules—a key component of outside-of-the-box thinking—is perfectly okay.

7. Conclusion

7a. Overview
Future studies on potential creativity-inducing childlike thinking methods could refine this paper’s proposed and tested design method, and could also test various other variables (e.g., students of varying majors could be tested to see which types of student backgrounds impact creativity, and in what ways). The other five methods discussed in this paper also offer a great deal of potential for future studies.

7b. Potential Future Childlike Thinking Design Method Studies
Priming could be expounded upon with tests regarding how mentioning different age ranges (to participants) impacts the creativity of ideation responses.
Neuro mimicry could be studied more, as well; an MRI could be used to test how activation and deactivation of various brain areas impact creativity and to what extend per area, and it may also be of interest to test the notion that people with abnormal brain structure (e.g., people with brain damage or brain disorders) are more creative than people with normal brain structure (again, the author posits that the more developed the frontal lobe, the less creative the person).

Future qualitative mimicry studies could test the relative impacts of playful, reckless, and humorous types of thinking exercises, as well as the inherent ratios of each kind of thinking within children and adults. Studies could even go so far as to test which type(s) of thinking impact creativity the most.

Behavior mimicry could expound upon the potential creative impacts of the earlier-mentioned ideas of the Why Chain Method, the I Know You Are But What Am I Method, the Stop Repeating Me Method, and the I’m Going To Tell Method, and ethnographic studies on children could help elicit other promising ways to attempt to experience the bountiful creativity of children through mimicry of childlike behavior.

Context mimicry studies could examine how the color psychology of a childlike life (e.g., a baby blue bedroom, or brightly colored clothes) may potentially impact the creative thinking of children or children-mimicking adults. Places associated with waiting might be of particular interest, in that times of waiting are said to be some of the most creatively productive times of thinking in a person’s life. (For example: do waiting rooms in a childcare physician’s office differ visually from waiting rooms in a non-child-specialist’s office?)
Motive mimicry studies could involve outdoor games like the ones tested within this paper, as well as other types of games, e.g., board games, card games, and video games.

Lastly, in the spirit of childlike thinking, perhaps testing of multiple merged methods could yield more specific results, in terms of how to elicit more creative ideation in design thinking. Priming could be paired well with MRI scanning in order to see which priming methods affect which parts of the brain. Priming involving purposefully playful or reckless or humorous vernacular could be used to study which types of childlike thinking impact the success of priming most efficiently, and vice versa. Studies could also examine how—within priming—using phrases involving various childlike behaviors, contexts, and games, each impact creative ideation. MRI’s could be used to test brain activation and deactivation as a potential result of playful/reckless/humorous childlike thinking patterns, childlike behaviors, childlike contexts, and childlike games. Playful/reckless/humorous thinking patterns could also be tested for within childlike behavior mimicry, contexts, and games, and behavior mimicry could be paired with contextual studies as well as childlike game play.

7c. Furthering Childlike Games as Design Methods
In future studies involving childhood games as design methods, rule breaking should be encouraged and numerous variable should be investigated. Could both experimental and control groups be told the five creativity criteria that will be tested, prior to ideation? Would doing so impact creativity positively or negatively, and in what ways? Could both experimental and control groups consist of the same people? How could various types of games (e.g., video games, card games, board games, and outdoor games) be tested as to each of their impacts on
creative thinking? Also, how do solitary games compare to collaborative games, in terms of creative influence?

Numerous other considerations exist. Perhaps other phases within the design process—aside from ideation—could benefit from childlike thinking as well. Perhaps this entire concept could be flipped; maybe children could be taught to think like adults in non-creative endeavors using game motive replacement involving games more commonly used by adults.

These variables and ideas, along with countless others, should be considered in future studies. Lastly, more research into the daily lives of children of all ages should also be considered in congruence with these other variables. Conclusions from these studies could be used in the formation of more childlike-thinking-based creativity-inducing design methods, and—in an ideal world—these methods could be utilized while brainstorming (the third phase of the seven-phases design process) by academic and real-world professionals alike, resulting in a world involving less cliché and more childlike minds. Perhaps, then, Buckminster Fuller’s famous sentiment would be nullified, and growing up in society would not involve—as he famously stated—any form of “degeniusing.”
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9. Appendix: Various Childhood Games as Design Methods

**Blind Man’s Buff (Selfless Ideation)**

*Unexpected, selfless thinking is rewarded, in that any idea easily attributed to its creator is punished.*

1) Choose one person to be It, and blindfold this person.

2) Everyone types out an idea and holds out their piece of paper.

3) The blindfolded person walks toward the papers, grabs one, turns around, reads aloud the idea, and then tries to identify who typed it.

4) If the ideator is correctly identified, restart the game with the identified ideator as the new blindfolded person.

**Dodgeball (Ideaball)**

*Empathy is rewarded.*

1) Players must write any idea for a design attribute that they come up with onto a piece of paper and crumple it up. The dodgeballs—or, ideaballs—can be thrown to other players, if any player wants to exchange ideas with another player.

2) If a person wants to show an idea, he or she throws an ideaball at another.

3) The hit person must explain whether he or she identifies with the idea; if the hit person does not, the thrower is out of the game. If the hit person does, the thrower and the hit person become their own team. The game ends when all players are on the same team, illuminating the most empathic idea of the group.
**Duck Duck Goose (Brainstorming Duck Duck Goose)**

*Originality is rewarded.*

1) Six people sit in a circle, each with a pile of paper. One person (the Chooser) stands up.
2) The Chooser says “Go” and the five people sitting down must sketch logo ideas (under a given design prompt) as quickly as possible.
3) The Chooser says “Stop” whenever he or she wants, then walks around the group, looking at the sketches.
4) The Chooser starts saying, “Duck...duck...duck...” while passing each person.
5) The Chooser chooses a sketch that he or she finds interesting, and points at the idea and says, “Goose.”
6) The Goose and the Chooser switch roles.
7) All players (except the new Chooser) must look at the idea, and sketch more ideas based on the Goose’s sketch.
8) The new Chooser says, “Stop” whenever he or she wants, and the game continues. Continue until time is up.

**Four Square (Design Principles Four Square)**

*Mindfulness of proper design thinking and creative elaboration are rewarded.*

1) Each player/square is a different rule, from the aforementioned (Christoph Meinel and Larry Leifer's) four principles of design thinking.
2) A design task is announced.
3) Ball bounces are accompanied by square- and person-in-square-dictated design idea contribution.
H.O.R.S.E. (D.E.S.I.G.N.)

*Creative elaboration is rewarded.*

1) Each area of shooting corresponds to a design feature idea.
2) Players must take turns shooting the ball into the hoop. Players mimicking a shot must come up with and explain a contribution/elaboration regarding the area’s coinciding design feature idea. Each feature matched poorly is given a letter; the first player to D.E.S.I.G.N. loses.

King of the Hill (Idea King)

*Ideation fluency is rewarded.*

1) Students each sketch an idea for a design (under a given design prompt), in a speed session.
2) Whoever has the most fleshed out idea is the winner, as chosen by a Timekeeper.
3) The winner becomes the Timekeeper and vice versa, and the game continues.

Musical Chairs (Brainstorming Musical Chairs)

*Ideation fluency is rewarded.*

1) Pick one person to be Moderator. This person will be playing music for the game and choosing when to stop the music.
2) As music plays, other players must sketch ideas under a given logo prompt.
3) When the Moderator stops the music (any time he or she wants), players must quickly show their ideas.
4) If two players present the same idea, that idea is eliminated. The player with the fewest ideas is out of the game.
5) Continue until one player is left. The winner then becomes the Moderator. Repeat gameplay until the time is up.
Punchbuggy (Inspiration Punchbuggy)

_Impiration vigilance is rewarded._

1) Whenever you notice something, or an idea, that’s unique, lightly tap someone nearby.
2) Assimilate these tallied ideas across multiple experiences into an inspiration board for the design problem in question.

Red Rover (Aesthetic vs. Function Red Rover)

_Creative criticism is rewarded._

1) Form two teams.
2) Regarding a design prompt, one team comes up with an aesthetic idea and one team comes up with a function idea.
3) Team A announces their function, and Team B announces their aesthetic.
4) Players from either team can each decide whether or not the opposing team’s idea can coexist with their own. If not, they run at the other team. The aesthetic idea either penetrates the function idea (breaking it) or does not, depending on the resolve of the opposing team (not breaking through the other team conveys that both aesthetic and function ideas can coexist peacefully). Throughout all of this, all players must explain why they are running at the other team, or why they are choosing to stay still and support their own.
Slaps (Ideation Slaps)

*Calm mental agility is rewarded.*

1) Player One posits an idea for a design feature under a given design prompt, palms facing down.
2) Player Two must come up with a reason to like that feature, and says it when trying to slap the hands of Player One.
3) Player One must posit a reason to dislike the feature as he/she reacts to (dodges) the opponent’s reason for liking it.
4) Players switch opinions (for/against) and start again.

Tag You’re It (Brainstorming Tag)

*Ideation fluency is rewarded.*

1) Five people stand in one line, five feet apart. One person stands facing the others, ten feet from them without any paper.
2) This person is It, and must keep time during the game.
3) The five people begin to sketch. As soon as a person completes a sketch, he or she may move two feet in any direction.
4) Every thirty seconds, the person labeled It may move two feet in any direction.
5) Any person tagged becomes It and the game starts over.
Tetherball (Design Mock Trial)

*Creative criticism agility is rewarded.*

1) Person 1 begins with a point (a design idea).
2) Person 2 begins with a counterpoint.
3) They duke it out tetherball style; in the end, the person with more points than counterpoints wins.

Telephone (Idea Warping)

*Creative elaboration is rewarded.*

1) Each player sits in a line.
2) Player One whispers a design idea in Player Two's ear.
3) Continue until the end of the line; each player warps the heard idea, until the final player speaks the end idea.