

TOLERANCE FOR AMBIGUITY

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1. INTRODUCTION

The author had a couple of experiences with industrial design students and alumni early in his educational career. The first was a conversation with a graduate of a well-respected university's Industrial Design program. This individual had graduated ten years previous to the encounter with a degree in industrial design. In a conversation about the profession they indicated that they were not working as an industrial designer and explained that their education had not prepared them for the "real" world of industrial design. They said after graduation they were hired by General Electric and were given an entry-level project. They admitted they didn't know where to start. It was not presented like their school design program projects and it did not follow the process they had been taught and had practiced in school. They struggled with the project, and other group dynamics, and became more and more frustrated. After six months they quit the job and had not worked as an industrial designer since.

In another conversation with this same person a few weeks later, they told me they were interested in teaching industrial design. They said sarcastically, "I would give them "real world" experience, I would assign the students a project on Friday, and on Monday I would change it, cut the budget or cancel the project."

A professor of the industrial design program at the before mentioned university said that the student had very good skills and that they thought they were creative. They had a portfolio good enough to secure a good design job (Skaggs, 2002). What went wrong?

The other experience was with an industrial design student found crying at their desk. "I don't think I can do this," they proclaimed. The curriculum, like many schools, teaches fundamental skills in the sophomore year; and experience the design process in their junior year. This student had learned all the skills but now was finding it hard to apply those skills appropriately to a more complex design project. What went wrong?

It wasn't their training that had gone wrong. It was the ability to deal with the subtle complexities of the world of the industrial design. They had the skills, knowledge, and methodologies but lacked fundamental personality characteristics vital to practice design.

In his book *Conceptual Blockbusting*, James L. Adams says,

The fear of making a mistake is, of course, rooted in insecurity, which most people suffer from to some extent. Such insecurities are also responsible for the next emotional block, the "Inability to tolerate ambiguity... an overriding desire for order; and [having] no appetite for chaos." I am not suggesting that in order to be creative you should shun order and live in a totally chaotic situation. I am talking more of an excessive fondness for order in all things (1986, p 45).

These student's experiences with design highlighted a problem they were unaware of. Something beyond their skills, knowledge, and methodologies. Industrial designers work at the fuzzy end of product development, where many factors are undefined and can change rapidly, and where there is uncertainty and unfamiliar spaces. A designer must be able and willing to embrace ambiguity, paradox, and uncertainty (Gelb, 1998). Tolerance for ambiguity suggests a certain lack of rigidity in thought processes that would be important to an industrial designer.

2. TOLERANCE FOR AMBIGUITY

Tolerance for ambiguity is the ability to perceive uncertainties, contradictory issues which may be difficult to understand, as well as information with vague, contrary or multiple meanings in a neutral and open way (McClain, 2015).

Bochner (1965) categorized attributes of individuals who are intolerant of ambiguity. The nine primary characteristics describe intolerance of ambiguity and are as follows; (a) need for categorization, (b) need for certainty, (c) inability to allow good and bad traits to exist in the same person, (d) acceptance of attitude statements representing a white-black view of life, (e) a preference for familiar over unfamiliar, (f) rejection of the unusual or different, (g) resistance to a reversal of fluctuating stimuli, (h) early selection and maintenance of one solution, and (i) premature closure.

The author has edited these attributes that describe an intolerance for ambiguity to attributes that describe a tolerance for ambiguity because this is the attribute we are looking for in industrial designers. It is recognized that these are not perfect interpretations but close enough for our consideration. They are as follows:

1. Not bound by categorization
2. Comfortable with uncertainty
3. A low fear response to the unfamiliar or change
4. Acceptance of novelty
5. Tolerance for fluctuating stimuli
6. Delaying selection from multiple solutions

An in-depth discussion of these characteristics is beyond the scope or interest of this paper. Each attribute is defined and its connection to the practice of industrial design is discussed.

2.1. NOT BOUND BY CATEGORIZATION

Categorization is the method of recognizing similarities and differences in ideas or objects and grouping these based on a criterion for a specific purpose (Cohen, H., & Lefebvre, 2005). The purpose of a category is to illustrate a relationship between the ideas or objects in whatever the purpose of the categories may be.

A problem arises once an idea or object has been set in a certain category and is hard to break out of that classification. This is called functional fixedness, (Duncker, 1945) which is the inability to see the possibilities and usefulness of ideas or objects beyond their accepted grouping.

As knowledge about the world is constructed, ideas and things are categorized and meaning is applied. To play with these categories and meanings means exploration, experimentation and the use of imagination. It is being able to move something from one domain into another. This is a part of what industrial designers do as they develop new ideas.

Designers need to be open to experience ideas and objects from a fresh perspective and not be fixed in terms of how things are categorized.

2.2. COMFORTABLE WITH UNCERTAINTY

Uncertainty refers to situations involving imperfect, incomplete or unknown information (Fields, 2011). Uncertainty impacts productivity because it makes decisions very difficult. Lacking decisions slows or stops progress. To move forward with uncertainty, decisions need to be made. These important decisions can be made using intuition. According to Agor, (1986 p 39-41) intuition is not a guess; good intuitive decisions are based in part on "input from facts and experiences, combined and integrated with a well-honed sensitivity and openness to other clues." Making decisions based on intuition requires a certain level of tolerance for ambiguity.

Designers are distinguished by “high tolerance for ambiguity and intuitive decision-making skill (Gelb, 1998 p 163).” Intuitive decision making is the ability to recognize, evaluate, and pursue interesting ideas and insights. This kind of intuition is a form of judgment, or the “evaluative component”, as Runco (1994) calls it.

Experience with an intuitive process allows the designer certain confidence in their intuitive judgments. Intuition allows a designer to make decisions when there is a high level of uncertainty or little precedent, when variables are not predictable, when facts and time are limited, when facts do not make the way clear, and when it is necessary to choose from several plausible ideas. Designers handle uncertainty by making intuitive decisions which allow for the ideas to move forward. All of these situations are part of an industrial designer’s daily routine. Designers “trust their feelings, their unconscious thoughts, in addition to their conscious, deliberate, step-by-step, systematic thinking. They can wait until a solution arrives which feels right and is logically right. They rely on their unconscious mind to help select the final solution to the problem (Olson, 1978 p 45).”

2.3. A LOW FEAR RESPONSE TO THE UNFAMILIAR OR CHANGE

A model for adapting to the unfamiliar defined as a process includes four stages: 1) status quo is the initial state of the system—comfort, familiarity, established patterns, relationships, and routines prevail. (2) an unfamiliar element enters or arises, and interferes with the status quo; 3) Chaos--once the unfamiliar element is recognized and accepted, the system enters chaos, a time of anxiety, vulnerability, and confusion and (4) Integration--a transforming idea emerges, and people figure out how to integrate the unfamiliar and change how to work with the new situation (Brenner & Darby, 2000).

If you are not a problem solver, then change is always frustrating. People don't like unfamiliar because it brings up problems, and people don't like dealing with problems. Peter Drucker (2002, p 73) says, "The talk you hear about adapting to change is not only stupid, but it's also dangerous. The only way you can manage change is to create it." Oliome (1981, p 84) describes this in his book *The Change Resisters*, he observes that,

"the innovative-minded person has a different set [of arguments] from the stability-minded one. For one thing, being innovation-minded starts one off with the presumption that as one presses ahead into new things, the unforeseen problem will occur, but can be solved. The innovative person will move into new areas without full knowledge of the problems or how they might be solved".

Designers are in the business of dealing with the unfamiliar. Not only do they not resist change, they are the instigators of change. Designers seem to have a natural desire to change things--to make things easier, better, or sometimes just different. They have visions of what things could be. They conjure up scenarios of the future. The designer is not resistant to change because he knows that change brings new problems and designers like to solve problems.

The design process leads to uncharted territory. To pursue what we do not already know, it is necessary to have a sense of wonder, the patience to suspend judgment, and a tolerance for ambiguity. In accepting ambiguity, unfortunately, we lose the comfort of familiarity. Dealing only with the clearly defined and the familiar, however, precludes the plasticity and adaptability of thought necessary in any creative endeavor. Tolerating ambiguity allows one to accept uncertainty, disorder, and the paradoxical in the process of ordering one's thoughts.

2.4. ACCEPTANCE OF NOVELTY

The very essence of creativity in ideas, products or services is its originality, it's different, and hence there is not a standard by which to judge it (Rogers, 1961). Einstein (2010) said, "if at first, the idea is not absurd, then there is no hope for it". If ideas that are absurd, unusual or different are neglected, potential prompts to great ideas will be missed. Creative thinking and safe thinking are opposites, dealing with the risks of the unusual and different is an integral part of coming up with new ideas. This is something that Einstein is famous for understanding.

If we define creativity as the generation of novel and useful ideas, both aspects of the definition are constraints that must be considered, balanced, and satisfied. The narrow target of creative ideas will be missed if one is overly practical or overly imaginative.

Industrial designers are tasked with developing original and useful ideas for the clients they work for. Raymond Loewy used a principle to define this balance called "MAYA": most advanced yet acceptable (1951). New ideas are always received with skepticism and reluctance because they have nothing to relate to.

2.5. TOLERANCE FOR FLUCTUATING STIMULI

Stimuli in this case can include; multiple priorities, changing schedules and budgets, and changing product requirements. Tolerance for ambiguity refers to the capacity to withstand the fluctuations and chaos brought on by a problem that cannot be clearly defined or when it is unclear how the pieces of the solution are going to come together because the criteria is changing.

A designer's work requires working along with unclear and changing requirements. These fluctuating stimuli are often out of the designers control and change based on the corporation or clients changing understanding of the needs of the new product of service the designer is asked to work on. A Microsoft Corporation job posting for an industrial design intern lists under desired skills lists, the ability to work through ambiguity and multiple priorities.

Zack Bennett (2019) a designer a Fahrenheit Design in Austin Texas is said, "in the work world of industrial design schedules are shifting, budgets expand and contract, and product requirements change. Designers have to work with changing parameters. At Fahrenheit studio they have a traffic light in the conference room with all three lights lite as a reminder of the importance of embracing ambiguity.

2.6. DELAYING SELECTION FROM MULTIPLE SOLUTIONS

"Some people believe that there is only one right answer and that ambiguity must be avoided whenever possible (Sternberg, 1999)." To optimize creative potential you need to be able to tolerate the discomfort of an ambiguous situation long enough so that what you produce is the best, or close to the best, of which you are capable. Linus Pauling (Crick, 1996) stated that, "the best way to have a good idea is to have lots to choose from". Fluency is an important aspect of creativity (Torrance, 1974) because the number of ideas increases the opportunities for originality and usefulness. In idea generation obvious ideas are generated first, and when these are exhausted, more remote connections, more creative ideas, are found (Mendelsohn 1976). There is a strong correlation between the quality of ideas and the quantity of ideas (Johansson, 2004, Bayles, 1993).

Designers like to explore lots of ideas and so have a willingness to defer judgment and seek alternative ideas, solutions, or conclusions. This is called resistance to closure and requires a tolerance for ambiguity.

3. ORGANIZATIONS AND TOLERANCE FOR AMBIGUITY

It is human nature for people to become comfortable with certain ways of doing things over time and to resist change from their familiar patterns. Organizations also develop systems, processes and procedures causing them to become less flexible as their processes become more defined and refined (Hannan & Freeman, 1977). This organization intolerance for ambiguity increases with age and experiences (Levinthal, 1991). These refined and defined processes are for building safety and efficiency but are not conducive to allowing flexibility and change.

In higher education as principles and processes are passed on from one generation to another, they become an integral part of the institution (Lane, 2007). This is evident in educational approaches, for the most part, education works to eliminate ambiguity. Most of our testing or other rubric's for evaluation are defined in such a way that there is a right answer. It's A, B, C, or D, True or False. They are looking to have the student repeat back what was determined to be important to learn (Evans, 2004). We have

learning outcomes that define exactly what will be taught, and what is expected to be learned and retained from a course. The ability to handle ambiguity is a critical skill that many students lack, and our traditional methods neglect (Budner, 1962).

In a course structure questionnaire given to students they rated these eight items as critical components (DeRoma, Martin, & Kessler, 2003):

(1) presence of course syllabus; (2) presence of clear schedule of assigned readings; (3) dates for testing scheduled in advance; (4) clear outline for lecture topics; (5) adherence to lecture topic for a particular lecture; (6) specific grading criteria outlined in advance; (7) exams emphasizing mastery of knowledge; and (8) exams/exercises involving objective versus subjective reporting. Johnson, Court. Roersma & Kinnaman (1995) have recommended that undergraduate teachers examine their course for tolerance for ambiguity as an important criterion for development of flexible, integrative, and independent thinking.

The American Council on Education (Greenhaus, & Callanan, 1996) states that the ability to function effectively in an ambiguous, complex, and rapidly changing environment is a critical skill in industry. Morgan (1997, p.92) argued that organizational intelligence requires, "uses, embraces, and at times creates uncertainty as a resource for new patterns of development." Therefore, behaviors critical for survival in organizations such as innovation, creativity, adaptability, entrepreneurship, flexibility in negotiation and other change-oriented goals are best achieved by people who have a tolerance for ambiguity and uncertainty (Dollinger, Saxton, & Golden, 1995; Ghosh, 1994).

A significant and positive relationship has been found between creativity and tolerance for ambiguity (Tegano, 1990).

4. INDUSTRIAL DESIGNERS AND TOLERANCE FOR AMBIGUITY

What does this all mean? (1) Educators should be aware of the importance of tolerance for ambiguity and its influence on the success of students in the study of industrial design. (2) Students need to recognize their own tolerance for ambiguity or the lack thereof. (3) Faculty can work to develop curriculum that provides opportunities to experience and practice ambiguous situations.

Evidence of an Industrial design student who may lack a tolerance for ambiguity:

- need to know exactly what is expected in an assignment
- want to know what the end result should look like, examples of quality work
- ask multiple clarifying questions
- do not like vague or general guidelines
- can't accept the subjectivity in grading
- uncomfortable with variety of means, methods or processes to achieve a desired result
- an over-concern with finding the right answer
- uncomfortable with multiple solutions
- not accepting of failure
- uncomfortable with experimentation and playful approaches to problems
- want to select solutions early and defend them actively
- finding a balance with novelty and usefulness
- won't finish an assignment because it is not defined enough
- create their own boundaries, definitions, or parameters to work within
- focus quickly on working with details that they can understand

In IBM's Experience Design Center in Austin, Texas they have a poster on the wall to remind designers about ambiguity, it reads; Learn to anticipate, embrace, and leverage ambiguity.

5. CONCLUSION

Tolerance for ambiguity can be defined as the degree to which an individual is comfortable with uncertainty, unpredictability, conflicting directions, and multiple demands. Tolerance for ambiguity is manifest in a person's ability to operate effectively in an uncertain environment. Some people may have a more natural predilection toward tolerance for ambiguity, while for others it develops over time through education and experience. Some strive daily to simply eliminate ambiguity in their lives. However, ambiguity exists in different degrees and for varying periods of time within individuals and organizations everywhere. How one deals with uncertainty and the stress of an ambiguous situation is an important consideration in the life, education, and professional practice of industrial designers.

Oreg and Nevo (2009) found a correlation between careers individuals choose and the tolerance for ambiguity associated with that professional opportunity. A student possessing intolerance for ambiguity seeking opportunities in industrial design is bound to feel stress, anxiety, and frustration.

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