

# A Study on the Relationship between Personality Type and Design Habits

by

Abdulaziz M. Albahar

Submitted to the Department of Mechanical Engineering  
in partial fulfillment of the requirements for the degree of  
Bachelor of Science in Mechanical Engineering

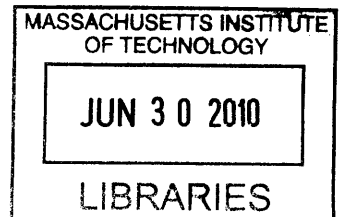
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## **Abstract**

There are a number of factors that influence an individual's ability to design. Designers vary by characteristics of their designs. Some product designers may be very practical, while others attempt to induce surprise and delight in their target user. Even when selecting what design to move forward with, designers' personalities and their classification as either satisficers or maximizers greatly impacts their final designs. We surveyed a number of students from MIT class 2.97, Designing for People, in order to gauge their design habits. The data we extracted provided us with information on their design experience and comfort, their attitudes towards surprising designs, and their characterization as satisficers or maximizers. Due to the relatively small sample size, we did not find any overarching trends, but the results do establish some correlations between self-reported confidence in personal designs and their potential to surprise the user.

Thesis Supervisor: Maria C. Yang

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## **Acknowledgments**

First and foremost, I would like to thank my thesis supervisor Professor Maria Yang. She took me on as a thesis student and never looked back. Her help and guidance with this study has been invaluable and her passion for the subject matter fueled much of the interesting analysis that was performed.

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And of course, a special thanks goes out to all the 2.97 students who were the subject matter of my thesis. Thanks to your diligence in filling out the survey.

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# I. Chapter 1

## A. Introduction

### 1. Opportunity

For a two-and-a-half-week period every January since 2008, students at the Massachusetts Institute of Technology (MIT) have been exposed to the process of design, often for the first time. ‘Designing for People’, course 2.97, had previously been offered as ‘Design-a-palooza’, focusing on a different aspect of design every year. From the course website,

“2.97 is a two-and-a-half-week introduction to product design that covers ideation, concept selection, prototyping, user experience, and many other concepts through various exercises and projects. The class is intended for all years and all majors, giving a chance to design for the first time, design again and again, and fostering the confidence to think creatively for any future endeavor.” (Yang, 2010)

Since the class is so open-ended, one would expect a wide variety of students to sign up. Due to its nature as a Mechanical Engineering Department-sponsored course, it tends to be more heavily populated by mechanical engineering majors or students who are considering pursuing the major. Needless to say, those students all have several things in common: they would like to be productive for a certain time during the Independent Activities Period (IAP), and they would especially like to use that time learning more about design. These students are intellectually curious, like most MIT students, but they are such at a time when they are not required to register for coursework.

Across the timeline of 2.97, students are taught to design and prototype, but most importantly to enjoy the process and learn to appreciate the thought that goes into designing everyday items for human use. Students who previously had no opinions on product design can suddenly advocate for one design over another

based on a variety of factors. The structure of the class and its membership made it an ideal testing bed for our study, and an interesting learning opportunity.

## **2. Objective**

With the existence of an intriguing set of subjects, it was now our duty to formulate the questions we wanted to ask. Our experimental objective was to extract a set of data from these students that we could then analyze and possibly infer some conclusions from. We were set on the idea of administering a multifaceted survey exploring the concept of design from various angles.

Our questionnaire aimed to look at, from a design perspective, why certain products were appealing to students. What attributes about those products made them particularly attractive? We also wanted to strongly emphasize the concept of ideation through brainstorming and embed that into the survey as a more interactive section. The goal wasn't just to have them fill in circles on a piece of paper, but to incorporate their newly acquired ideation and design skills into a challenging yet enjoyable experience.

Comfort levels, past experience and formality of previous design settings were something we discussed as well, in terms of their being several tiers of students in class who were at different comfort levels of ideation and design. We included that in the survey as well, as a variable to correlate with other aspects of design.

In summary, our overall objective was to administer a diverse questionnaire to the students, asking them to reflect on their learning through answering a series of intriguing, interactive questions. The focus was to examine the relationship between different personality types and design. We were looking specifically at possible correlations between variables on the questionnaire. We also planned for a control group to exist in one of the exercises, but to make sure they were not aware of the presence of different versions of the question. In the end, this study would hopefully prove to be a learning experience for us that we can build on in future years.

## II. Chapter 2

### A. Background

#### 1. Personality and Design

It is often said that artists' personalities are reflected in their work (Dinkelaker, 1998). It has been shown that this metaphor extends to design. Certain personality types work better in design groups and are more inclined to neutrally lead the group rather than attempt to convince the rest of the group that their viewpoint is best (Wilde, 1997). But personalities aren't just useful for gauging people's interactions with each other: they dictate how an individual approaches design and why he or she designed a product a certain way.

Studying successful product design teams often gives a good indication of individual member performance. Susan Kichuk and Willi Wiesner of U.S. International University found that successful teams were characterized by, "higher cognitive ability, higher extraversion, higher agreeableness and lower neuroticism than their unsuccessful counterparts," (Kichuk, 1997). Kichuk and her colleague summarized all personality traits into five factors: Conscientiousness, Extraversion, Agreeableness, Neuroticism and Openness to Experience<sup>1</sup>. They then matched up the teams based on these characteristics and on tendency for interpersonal conflict to occur.

Kichuk et. al. hypothesized that personality would be an important analysis tool because it provides, "incremental validity," over general measures of intellectual ability, making a unique contribution to metrics of design potential.

The concept of measuring personality traits to dictate design team formation has been explored by many academics. Douglass Wilde of Stanford University published an often-cited paper in 1997 discussing how, after he began to apply this technique at Stanford, their teams' performance improved greatly (Wilde, 1997). Wilde placed

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<sup>1</sup> It may help to clarify some of these terms. Conscientious in this context means dependable and hard-working. Extraversion is sociability and assertiveness. Agreeableness is courteousness and tolerance. Neuroticism is seen as lack of emotional stability, anxiety and anger. Openness to experience is not as well-defined but generally refers to curiosity and broad-mindedness.

constraints on how students chose their design team partners, namely by having them fill out a Myers-Briggs type of questionnaire beforehand. He observed how certain questions were answered and made sure that there was a minimum level of compatibility between team members. Table 1 below shows the breakdown of the US population into sixteen different persona types. This is of course only for a sample population and can be expanded to larger populations, at which point it should be further examined and revised to determine case-specific breakdowns.

**Table 1: US Population Breakdown for Sixteen Types**

ISTJ	ISFJ	INFJ	INTJ
11.6%	13.8%	1.5%	2.1%
ISTP	ISFP	INFP	INTP
5.4%	8.8%	4.3%	3.3%
ESTP	ESFP	ENFP	ENTP
4.3%	8.5%	8.1%	3.2%
ESTJ	ESFJ	ENFJ	ENTJ
8.7%	12.3%	2.4%	1.8%

What is particularly relevant to our experiment is the ENTP category, which stands for ‘Extraversion, iNtuition, Thinking and Perception’. This category typically encompasses inventors, engineers, explorers and visionaries. The character traits that belong to ENTP belong to a broad range of particular behaviors, and it does not make sense to generalize that broadly within the context of our project, especially since we are working with a small sample size, most of whom are engineers. It is worth noting that ENTP’s comprise a mere 2-5% of the population, and might very well include icons like Walt Disney and Benjamin Franklin (Kiersey, 2010).

We gave the example of Myers-Briggs to illustrate how far one can get with examining personalities of designers. Doug Wilde took the formation of design teams to a whole new empirical level, optimizing the individual team members within a team by extracting data from them, and then recalculating the group dynamic to ensure diverse perspectives and inter-member cooperation, or at least civility.

We are not, at the moment, interested in creating cohesive groups of designers. Rather, we are at an earlier stage where the question is more ‘how do these personality types influence design perspectives?’ Our aim is to take the concept of individual personalities and extrapolate how much, and what form, of those personalities is actually reflected in product design, if any.

## 2. Maximizing vs. Satisficing

An important personality trait we looked at was an individual’s tendency to be either a maximizer or a satisficer, and then how that was reflected in the survey responses. Satisficing and maximizing behaviors are decision-making behaviors. Satisficers are those who choose something because it meets the criteria of being satisfactory, or adequate, rather than attempting to look for what will derive them the most pleasure. Maximizers, on the other hand, will change their product preferences based on relative pleasure. If they find a product that they enjoy more than the one they thought they previously enjoyed the most, they will promptly switch to favoring the new product. They attempt to derive maximum pleasure from their interactions. Table 2 below gives a direct comparison for a sample process between satisficers and maximizers (Slote, 1984).

**Table 2: A Decision-Making Comparison of Satisficing vs. Maximizing Behavior**

<b>Satisficers</b>	<b>Maximizers</b>
(1) Set an aspiration level such that any option which reaches or surpasses it is good enough. (2) Begin to enumerate and evaluate the options on offer. (3) Choose the first option which, given the aspiration level, is good enough.	(1) Enumerate all the options on offer. (2) Evaluate each. (3) Choose the best.

In a paper whose primary author was Barry Schwartz of Swarthmore College, there were negative correlations reported between maximizing behavior and, “happiness, self-esteem and life-satisfaction” (Schwartz, 2002). Maximizers were reported to be more flustered by having more choice and to have more regrets overall, which goes against the

rational choice model of thinking. The implications for this research are very interesting, especially in the realm of product design.

One realm where satisficing comes into play is in decision-based design. F. Mistree of the University of Houston discussed a publication at a conference in 1990 that examined the design-build process of navy ships. After going through the mechanical details of the design itself, Mistree spoke about how, “the characteristics of decisions are governed by...the design of real-life engineering systems” (Mistree et. al., 1990). One issue with these decisions, according to him, was that they were being made concerning problems that were loosely defined. This led to the lack of a unique solution and several, less than optimal, satisficing solutions.

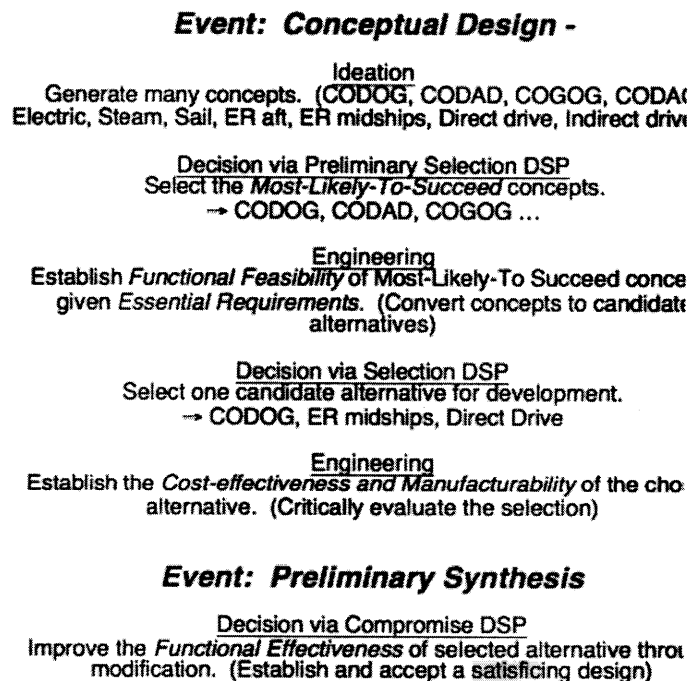


Figure 1: Part of typical engineering design process, satisficing aspect highlighted.

“Firms satisfice with respect to decision rules. That is, if existing rules are functioning well, the firm is unlikely to change them; if not, search for better rules will be stimulated,” (Winter, 1971). Although somewhat unrelated to product design, this quote serves to show the nature and behavior of many corporate firms. Maximizing is, in many cases, simply a lot more work. With a maximizing mentality, if an individual is deciding

between two designs that both have equal potential, the process of deciding between those two designs will be very involved and take ample time.

The tenets of rational choice theory assume that humans, given complete information and multiple choices, will make the choice that maximizes their utility. This has been shown to be unrealistic, as information is almost never complete and should be treated more like a commodity. Maximization may not actually be feasible due to limitations in the human thought process and the complexity of our environment. All humans supposedly have a ‘threshold of acceptability’, below which they will not choose a product. If a product exceeds the threshold, however, a satisficer will immediately choose that one. If the individual in question accidentally stumbles upon a superior product to the one he has chosen, then a reevaluation would be in order and the new good would likely be chosen over the old one. Put simply, maximizing is not a deliberate goal, but it is an attitude that may surface when choosing products due to necessity (Schwartz et. al., 2002). The following example is one that illustrates this point effectively,

“No matter how dissatisfied one is with one’s telephone service, if phone service is provided by a regulated monopoly, one cannot do better, and inadequate service is not one’s fault. However, when a choice of phone service becomes available, there is no longer any reason to tolerate inadequate service, and failure to obtain adequate service *is* one’s responsibility” (Schwartz et. al., 2002).

Potential for regret was also one primary finding from the Schwartz paper that raised doubts about the theory of maximization. As choices proliferate, the likelihood of maximizing decreases, and individuals are more likely to question whether they really did make the correct choice. This is especially true if it is not actually possible to examine all the alternatives. On the other hand, an increase in number of choices will not necessarily have a negative affect on the satisficer since the criterion is ‘good enough’ instead of ‘best’ (Schwartz et. al., 2002).

Several things should be considered before assuming these studies are the tell-all indicators of satisficing and maximizing behavior. First off, the authors

acknowledge that with maximizers, not everyone is a maximizer in every domain. They give the example of the federal tax return, where the type of postage stamp used on that envelope will probably not be something most people dwell on. Furthermore, the correlations between maximizers and unhappiness are based on fairly vague questions, and if more context were applied to those questions, reflective of the backgrounds of the candidates being tested, the results might not be identical.

Finally, maximizing behavior in general may differ from maximizing behavior with respect to design, and in the case of design it may be optimal to have more maximizing behavior instead of going with the first design that makes sense. This is what we will attempt to explore with our study.

### **3. Grouping and Surprise**

From the data we collect, we hope to be able to group subjects into various categories and use those categories to make inferences on design directionality. Some sample groupings we believe may exist are confident vs. non-confident people, experienced vs. inexperienced designers, and of course maximizers vs. satisficers. The way that subjects answer our survey questions will often determine how they are grouped. We have structured several tiers of questions to address certain categories and groupings, and are hoping we can extrapolate certain trends indirectly based on the answers we get.

The concept of ‘surprise’ in design is one that has been discussed in an abstract sense on many occasions. Professor David Wallace of the Mechanical Engineering Department at MIT has mentioned it several times in his lectures on product design and the user experience (Wallace, 2009-2010). MIT Mechanical Engineering graduate student Geoffrey Tsai is exploring, as part of his Master’s thesis, surprising designs and the possibility of being able to work in the element of surprise into the design of any product. The thought behind this is that surprising designs make people happy; they are delightful for the user and are almost like a hidden gem within the product itself. This paper will not go much further into the concept of surprise itself due to space constraints and the

difference in scope between the two topics. However, there is a question on our survey that deals with surprising designs and allows students to rank their favorite designs of a particular product. We also did some surprise density correlations of student sketches in response to another question on the survey.

### **III. Chapter 3**

#### **A. Methods**

##### **1. Design of Study**

We exhaustively debated what the format of the survey should be like. Should it be purely a multiple-choice type or survey? How many text boxes should there be for written input? How many different sections should the survey be? How long should it take the students to get through the whole thing? The next few subsections describe the various parts of the survey that we designed, in order of their appearance to the students.

It is worth noting that the students were aware they were going to participate in a study, they just weren't informed it was for a thesis till after they were finished.

##### **2. Ideation and Reflection**

No design survey can exist without collecting data on concrete product design ideas from its subjects. Since the students had been through most of the class at this point, they were familiar with the techniques and tools required of them to generate ideas. The quality of ideas was purely their own creativity and was something we were excited to examine. This part of the study was the only part with separate prompts for a control group and variable group.

The question we asked required students to generate new concepts for an office product, a fairly common one: the stapler. Both groups were given the same office product to design. The first group had a set of detailed instructions, explaining they had to write attributes the product is currently associated with,

and attempt to generate ideas that deliberately *oppose* the chosen attribute. The example of designing a new type of dog was given, and the attribute ‘furry’ was chosen. The opposite of furry would be something like ‘scaly’. The second group had no instructions besides that they had to design a new stapler. They were not restricted by listing down attributes first, they could go straight to sketching. Many pages were provided to the students so they could use one page per sketch, and so they were never constrained by number of drawing mediums. After 15 minutes, we told the students to stop sketching and put their designs and the prompt aside.

As part of the ideation experience, we wanted to gauge how students felt after this intense, creativity-stimulating exercise. We provided them with a set of questions on the back of the prompt page. They were asked if the experience was enjoyable or stressful overall. Focusing on their own performance, they were asked if they were generally creative people, and if they felt creative on that particular day. Finally, they were asked if they found the concepts they sketched that day surprising, and whether they were satisfied with them. Please see Appendix for a copy of this section.

### **3. Experience and Comfort**

The next section was not timed, and it was uniform for all survey-takers. The first few questions asked about the students’ design experience and how comfortable they felt designing. We felt this was important to separate those who had a lot of design experience from those who, before this class, did not have much exposure to designing.

There were four of these questions, all multiple choice. Three of them had five choices, while one had four choices. We decided a 5-point scale was appropriate, and normalized the four-choice question to a 5-point scale. In this case, we decided that the higher number meant a better choice overall, so we adapted our multiple choice answers to have a value each, as they weren’t all linearly valued from 1 to 5. When we say a 5 is a better choice we mean the

person answering is generally more experienced and comfortable with designing. Please see Appendix for a copy of this section.

#### **4. Surprise and Perception**

This section was not as organized theme-wise as the past couple of sections. We asked a question regarding product expectations as they compared to actually interacting with the product. This question had some maximizing/satisficing elements to it, particularly since it was an A or B answer about product expectations. The next question asked people to name and describe a delightful, surprising product. The last two questions in this section dealt with user curiosity when handling products and their packaging.

In this section we tried to set up some hypothetical scenarios for people to relate to when answering. Instead of asking a question about their opinion on packaging and having a 1 to 5 range on the answer, we opted for a more specific setup that targeted likely scenarios. Please see Appendix for a copy of this section.

#### **5. Toothbrush Selection**

The next page was one of the more interesting sections in this survey. Subjects were given pictures of four different toothbrushes, and asked to rank them all on a scale of least likely to purchase to most likely. Besides their (black-and-white) pictures, there was information placed next to each toothbrush displaying the cost, describing its features, and ranking ergonomics, wear indicators and novelty from low to high.

There is no real 'correct' answer to this exercise. There is one that is more surprising than the rest in a unique way, so that is the one we expected people to pick. But it would be interesting to see what facts would alter people's choices. Please see Appendix for a copy of this section.

## 6. Maximizing/Satisficing

The last section of the survey included a set of thirteen questions that measured, on a scale from 1 to 7, the approach people take to making decisions. This section was crafted to help sort people into maximizers and satisficers, but subtly asked very general everyday questions. For example, one questions dealt with how likely a person was to change the radio while in the car to listen to other stations even if he/she is already content with what they are listening to. Please see Appendix for a copy of this section.

## IV. Chapter 4

### A. Results and Discussion

The results and respective discussion will be presented in roughly the order of the questions in the survey. Prompt A was the one that required listing of attributes before drawing sketches, while Prompt B allowed students to begin sketching right away.

Table 3: Summary of Data from Ideation Section

Prompt (A/B)	Total Sketches	Surprising Sketches	Surprise Density	Confidence Score
B	15	2.000	0.133	8
B	8	1.250	0.156	8
A	15	1.750	0.117	7
B	16	1.500	0.094	6
A	5	1.750	0.350	6
B	12	1.250	0.104	6
A	12	1.500	0.125	6
B	7	1.750	0.250	5
A	13	2.000	0.154	3
A	7	1.500	0.214	2
A	10	2.500	0.250	2
A	8	1.250	0.156	2
B	6	0.500	0.083	0
B	8	1.750	0.219	-1
A	9	0.000	0.000	-2
A	4	0.500	0.125	-3
B	6	1.750	0.292	-5
B	8	1.750	0.219	-9

We had some very interesting data sets to experiment with and extrapolate conclusions from. The figure for number of surprising sketches was an averaged number after four separate people (2 graduate students, 1 undergraduate and a professor) each wrote down how many surprising sketches they believed were drawn. Surprise density is an important number, because it tells something very different from pure number of surprising sketches. The number of sketches a person drew correlated mainly to censorship during ideation. The people with higher numbers of total sketches were able to not censor themselves during that process. The people with higher numbers of surprising sketches showed more creativity per time spent sketching. Of course the most impressive combination would be to have a high number of sketches and a high surprise density. The highest surprise density with this group was 0.350, or 35%, which is not a high average. This shows that it is not trivial to design a surprising product. The other explanation for this is that this group is fairly inexperienced overall so the surprise density may be lower than in a senior design class. Unfortunately we did not have enough data points with regards to class years in this course to compare the seniors with the freshmen.

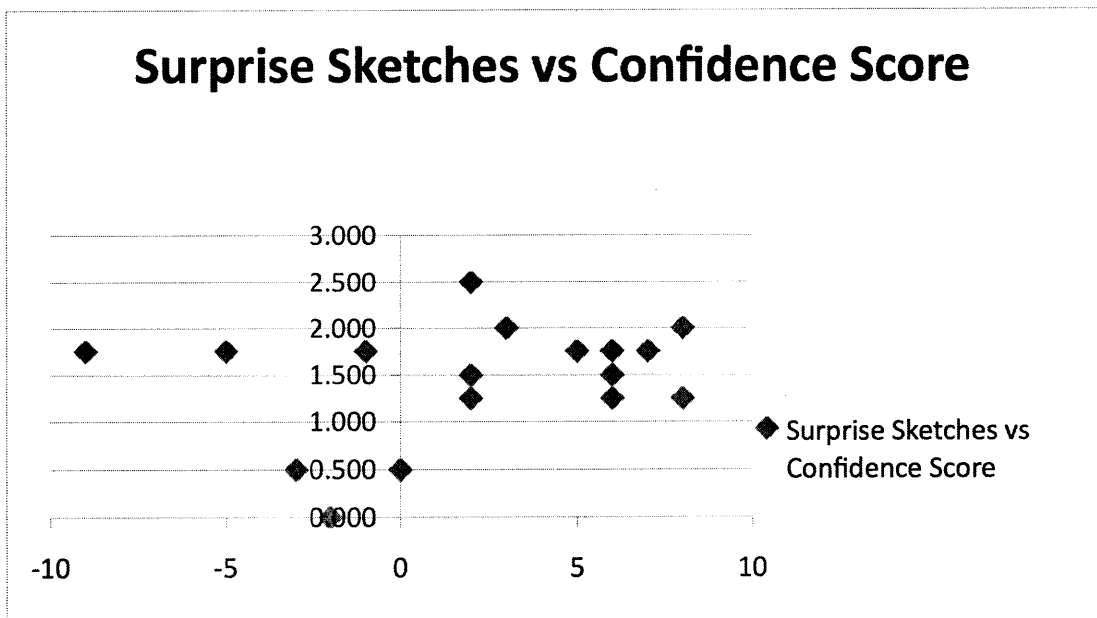
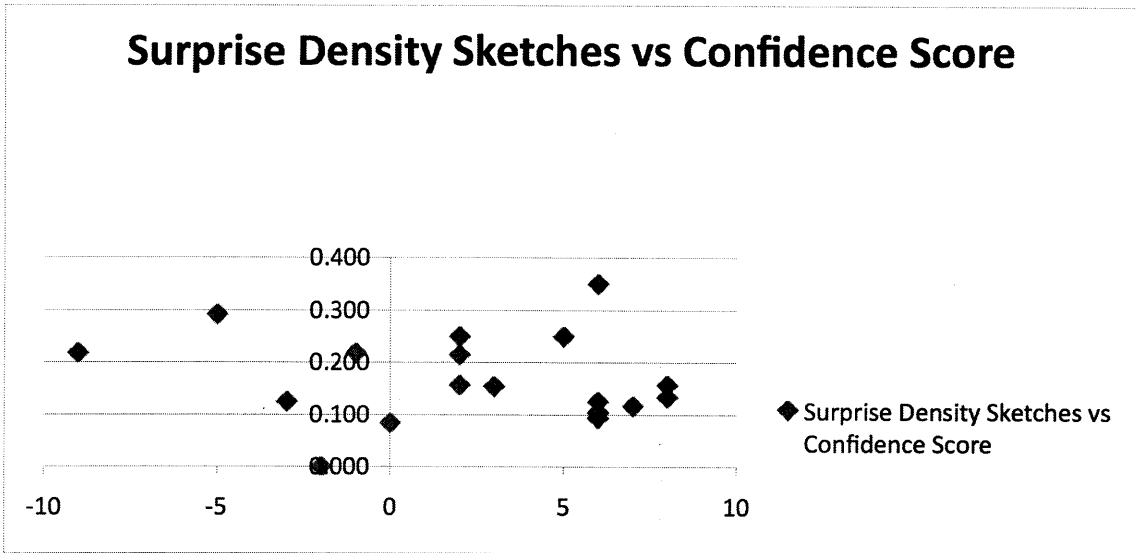
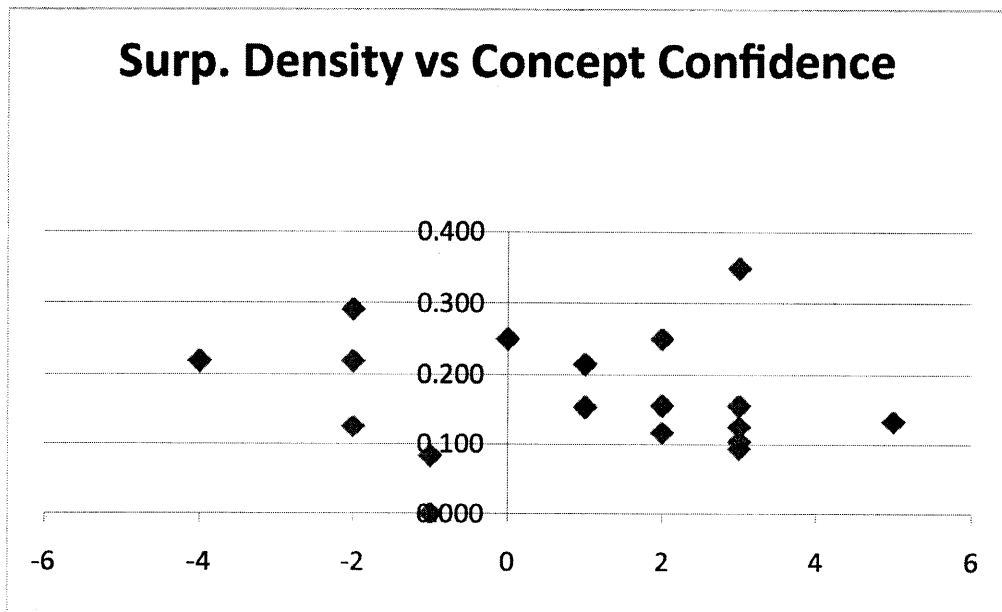


Figure 2: Scatter Plot of Surprise Sketches vs. Confidence Score for Participants.



**Figure 3: Scatter Plot of Surprise Density of Sketches vs. Confidence Score for Participants.**



**Figure 4: Scatter Plot of Surprise Density of Sketches vs. Confidence of Participants in Designs.**

There did not seem to be much of a correlation between surprise density, surprising sketches and confidence score. This could mean that people were misrepresenting themselves on the answer sheet or that perceptions of what a ‘good’ or ‘surprising’ design is are different between the reviewers and the students judging their own work.

Table 4: Data from Experience and Surprise Questions

Experience and Comfort				Surprise		
q1	q2	q3	q4	q5	q7	q8
3.75	3	5	5	2	3	3
3.75	2	4	3	2	2	2
2.5	3	3	4	2	3	3
2.5	4	5	5	2	3	2
1.25	4	4	3	1	2	2
2.5	5	3	5	1.5	2	2
2.5	3	4	5	2	3	2
2.5	5	4	4	2	3	2
2.5	2	4	4	2	3	2
2.5	3	4	4	2	3	2
2.5	4	5	4	2	3	2
1.25	5	4	5	1	2	2
3.75	4	4	3	2	3	2
2.5	3	4	2	2	1	1
1.25	5	4	5	1	3	2
2.5	3	4	3	2	3	2
2.5	3	5	5	2	3	2
2.5	2	4	2	2	2	2

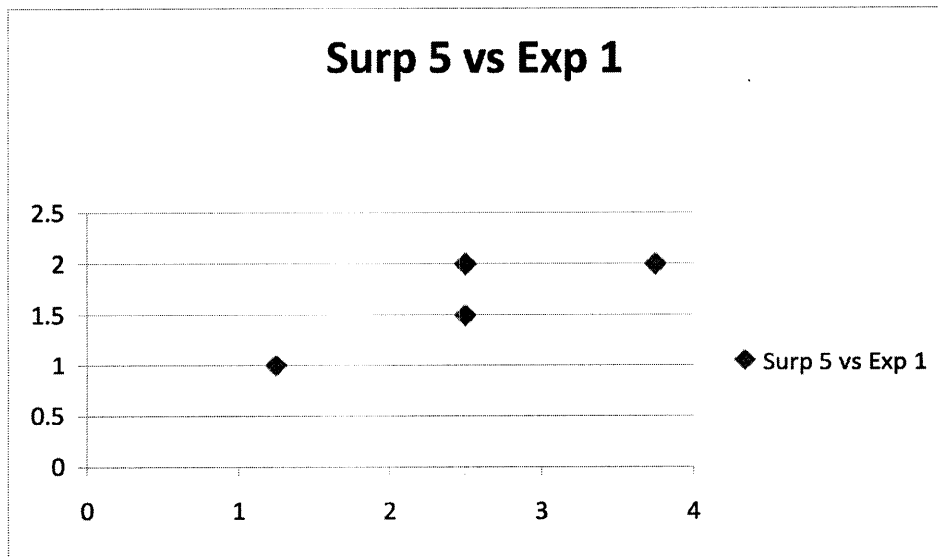


Figure 5: Plot of Correlation between Question5 and Quesiton1, Data is Overlaid.

There seemed to be a rough correlation between experience and wanting to be surprised by a product. Looking at figure 5, it seems like individuals with more experience are almost always pleasantly surprised if a product goes above and beyond their expectations.

**Table 5: Toothbrush Exercise Results with Average**

<b>Toothbrush</b>			
<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
1	4	2	3
1	3	2	4
1	3	2	4
2	3	1	4
3	2	4	1
1	2	3	4
1	4	3	2
2	4	1	3
1	2	4	3
1	2	4	3
1	2	4	3
1	2	3	4
3	1	2	4
3	2	1	4
1	2	3	4
1	3	2	4
1	4	2	3
3	2	4	1
1.555555556	2.611111111	2.611111111	3.222222222

The toothbrush exercise had somewhat of an unexpected result. Of the four choices shown, the most ‘surprising’ was the third toothbrush, which was designed such that the bristles never touched the surface it was placed on. We found that participants unexpectedly chose a different toothbrush as their first choice. However, what this does go to show is that surprise isn’t everything, and that some people really just want something very practical for their money, and they would not mind spending a little bit more on a feature that is more practical than surprising. This is referring to the choice of number 1 as the top selection instead of number 3.

Table 6: Data for Maximizing/Satisficing Questions

Maximizing/Satisficing													
a	b	c	d	e	f	g	h	I	j	k	l	m	max/sat total
5	6	5	6	6	4	1	3	N/A	5	7	7	6	61
2	2	3	4	3	7	6	6	1	4	6	6	6	56
7	6	7	4	7	5	7	7	7	7	5	1	7	77
6	6	6	7	7	2	6	7	7	1	7	7	7	76
7	7	4	6	6	6	4	2	5	4	6	6	6	69
6	6	4	2	5	6	2	3	3	2	6	5	6	56
2	2	7	7	2	1	2	5	6	6	6	6	6	58
5	5	1	5	5	3	2	5	2	2	7	3	5	50
7	5	3	3	6	4	6	5	2	4	5	5	5	60
6	3	3	5	2	6	6	5	3	2	7	6	4	58
7	3	3	5	4	5	6	3	5	1	7	5	3	57
2	2	6	4	6	4	6	6	2	5	5	6	6	60
6	3	3	3	7	7	4	5	5	1	6	5	6	61
5	2	7	6	6	1	5	6	4	4	7	3	6	62
5	5	2	4	3	6	5	5	3	6	6	6	6	62
4	6	7	7	4	4	6	2	6	5	6	7	7	71
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7	7	1	5	5	6	1	6	6	4	3	1	3	55

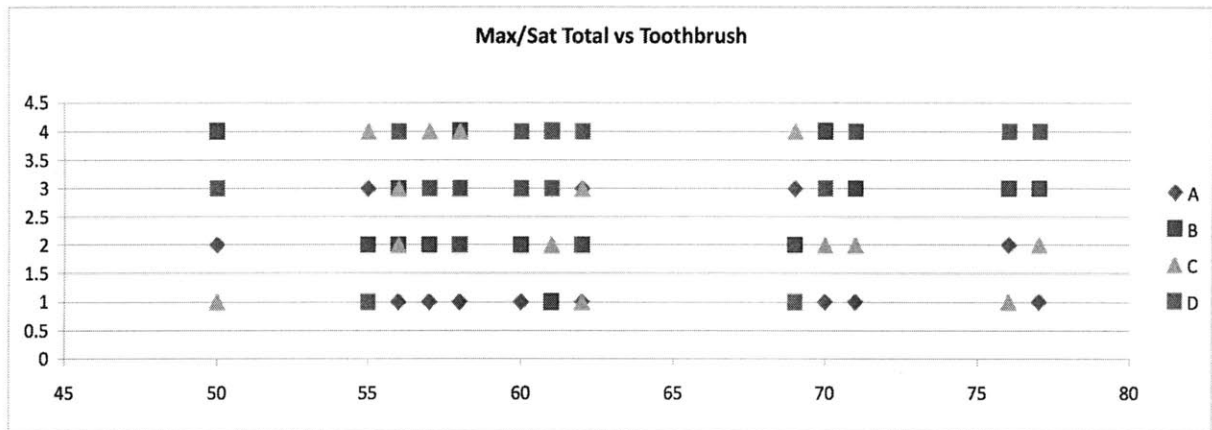
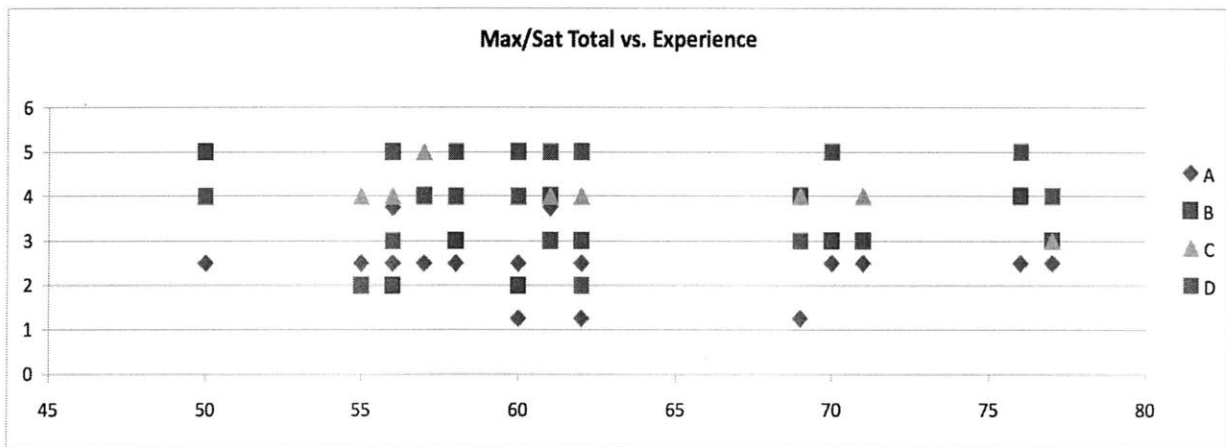
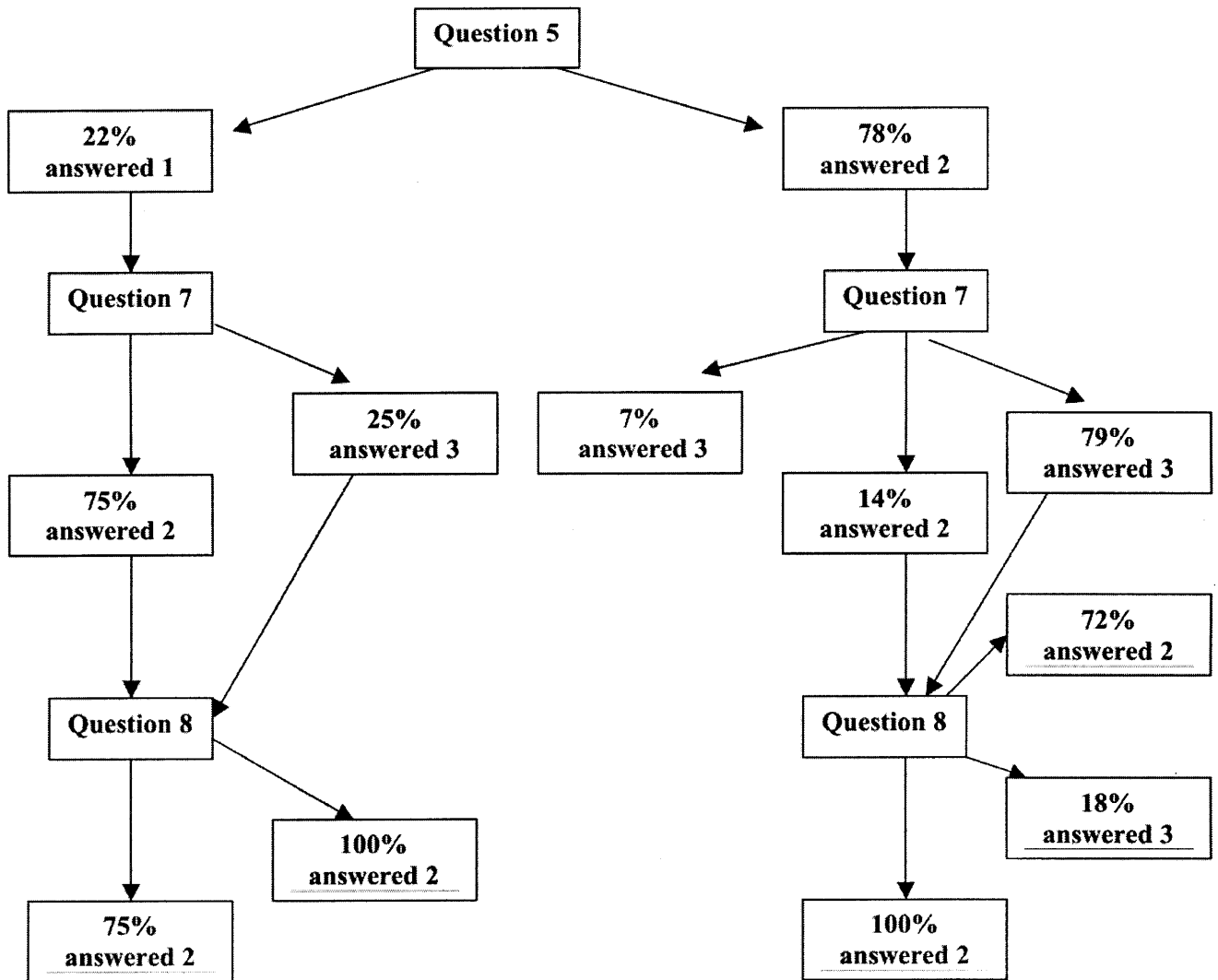


Figure 6: Plot of the Maximizing/Satisficing Participant Totals and their Toothbrush Selections.





**Figure 8: Answers Flowchart for Maximizing/Satisficing and Surprise Section (Q's 5, 7 and 8).**

Figure 8 is a flowchart that shows the decision-making events that occurred between questions 5, 7 and 8. The objective was to have those three questions roughly correlate with each other. We hypothesized that people who answered 2 for question 5 would be more likely to answer 2 or 3 for question 7 and 1 or 2 for question 8. This was generally true. The biggest pattern we saw was that 78% of people answered 2 for question 5, of whom 79% answered 3 on question 7, of whom 72% answered 2 on question 8. Those people like being surprised, are very curious and explorative, and do enjoy packaging if it is unique and adds to the feel of the product.

## **V. Chapter 5**

### ***A. Conclusions and Moving Forward***

#### **1. Conclusion**

Our main takeaway here is that we need a bigger sample size for this survey if it is given in the future. 18 responses was not nearly enough for us to establish some concrete correlations, and not close enough for us to be able to actually group people into separate circles for confidence, class year, etc. We may want to consider expanding it to other product design classes or just other mechanical engineers or engineers in general, just to get more responses.

In terms of key findings, we found that most of these questions did not match up well with each other, but there is more exhaustive data analysis that could take place to find some very specific correlations. We did not notice any overarching themes or trends while graphing and analyzing the data. The surprise density results especially were not representative at all when comparing them to the self-reported responses.

Another trend to note with this experiment is the tendency of people to be guided into answering a certain way. This is a recurring issue with surveys in general. We tried our best to make the questions not seem leading, but there are several questions where that is questionable and that may have significantly impacted the data.

#### **2. Suggested Changes and Improvements**

Having done this once already and after analyzing the data, we came up with an exhaustive list of suggested changes and improvements to this study.

- People will be sorted into several groups dictated by:
  - Class year (age), even though we have small sample sizes for this
  - Surprising sketches (censorship vs. non-censorship)
  - Surprise density (shows creativity potential in sketches which is a really nice indicator)

- Confidence score (self-reported how confident they felt on that particular day, only 1 question asked them how creative they were in general)
- In our opinion, the toothbrush example was very useful. It would help to have a few pages just of that kind of question in future surveys because it could serve as an interesting indicator on how they – the subjects – view things and thus affects their answers on other questions. Also we could then average out surveys instead of having just one example where we are worried about its content and effectiveness
- Experience and comfort questions were good because most people answered them pretty clearly and distinctly except. Normalization was a good idea because that way you can see who answers what on a uniform basis and you have a definitive 'greater number is generally better' principle
- The surprise question, question 5, with two choices could use some tweaking. "Sense of surprise" concept is difficult to phrase but more thought needs to be put into that question. Also the number of choices should be 3 instead of 2 if we are correlating it with questions 7 and 8 because that way it's easier and makes a little more sense.
- A question like "how do expectations factor into your judgment of a product?" and then the answers could be "I always expect something of a product, either in terms of a certain level of function or design innovation", "I sometimes expect something of a product, particularly if it is heavily advertised to have certain features or if those features are emphasized a lot", and finally "I generally go in without a set of expectations I prefer to find out when I see the product and/or try it what its distinguishing features are"
  - The above question could actually be split into two parts, one asking about expectations and the next asking about how these expectations actually

factor into the 'surprise' aspect of things such as "if you answered A or B to number 7, are you: a) pleasantly surprised when it meets/exceeds expectations?", if you answered C, answer this paragraph form question about interaction/reaction to products in general with that attitude in mind.

- Also questions 7 and 8 should be worked on and changed to seem less leading, we could rewrite the whole question
- For maximizing, satisficing, we had 13 questions, do we want to consider cutting them down to 10? Or adding the regrets scale, we decided last time that didn't really fit our purpose/goal for this. Maybe we want to slip in some of our own generalized questions with hints towards design/creativity?
- Address creativity in general in future studies, how creative do they generally feel versus today could be another confidence correlation we could do.

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## VII. Appendix

### Idea Generation Exercise

Name \_\_\_\_\_

#### Introduction

You are participating in a planned idea generation exercise. The goal of this exercise is to gain a better understanding of different approaches to the brainstorming process.

You will be generating concepts for new office products. You will be given more information about the specific office product on the other side of this page. Do not start until you have completely read and understood this page.

#### Instructions

Before you begin generating ideas, you will first write down on a separate sheet of paper a list of attributes commonly associated with the specific product. Choose one of those attributes and spend a few minutes generating ideas that deliberately oppose that chosen attribute. For example, if your task were to design a new type of *dog*, you might have a list of common dog attributes:

- four legs
- furry
- chews on things
- chases small animals

You would then pick an attribute like "furry" and try to imagine ideas for dogs that would *not* be "furry", such as "scaly". You can choose to focus on any number of the attributes.

Sketch every idea you have on a separate sheet of paper; include a title for the sketch, label any necessary details, and write your name. You will have approximately 15 minutes to brainstorm and sketch.

#### Stop

Once you have completely read and understood the instructions, you may turn over this sheet and begin brainstorming.

# Idea Generation Exercise

## Prompt

You will be brainstorming ideas for something that accomplishes a task similar to a stapler. Remember your instructions for brainstorming.

## Reflections

Once you are finished with this exercise, please answer the following questions about your experiences.

1. I thought this experience was enjoyable

strongly disagree    disagree    neutral    agree    agree strongly

2. I thought this experience was stressful

strongly disagree    disagree    neutral    agree    agree strongly

3. I am generally a creative person

strongly disagree    disagree    neutral    agree    agree strongly

4. I feel creative today

strongly disagree    disagree    neutral    agree    agree strongly

5. I think the concepts I sketched are useful

strongly disagree    disagree    neutral    agree    agree strongly

6. I think the concepts I sketched are surprising

strongly disagree    disagree    neutral    agree    agree strongly

7. Overall I am satisfied with the concepts I sketched

strongly disagree    disagree    neutral    agree    agree strongly

Feel free to use the remaining space for any additional comments you have.

NAME: \_\_\_\_\_

---

*The following survey is geared towards understanding how you think about design and what your experiences have been like so far. When answering questions about your design experience, consider that design does not have to be something you've done professionally. It could include doodles on a napkin or tinkering in a workshop.*

---

1. Before this class, how much design experience did you have?

- No experience       Some experience       Lots of experience       Practically run my own design firm

2. How formal have your design experiences been in the past? Have you had to design mainly through class experiences, or through less-structured formats like freelance design work you've done on your own time?

- Informal on my own       Mostly on my own       Bit of both       Mostly classwork       Formal classwork

3. I feel comfortable designing:

- Strongly Disagree       Disagree       Neutral       Agree       Strongly Agree

4. How often do you find yourself thinking that a product around you is poorly designed? This could be anything from thinking "this should be designed better" to actually going through a thorough redesigning process yourself.

- Once a day       Once a week       Twice a month       Once a month       Almost never

Feel free to use the space below to elaborate with examples:

5. Which of the following attitudes do you most identify with?

- If I have a set of expectations for a product's look and function, and it behaves exactly as I expect it to, I am pleasantly surprised.
- If I expect something from a product and the product turns out to be better than I expected, that creates a sense of surprise for me.

Please elaborate on your answer, and whether or not your opinion is accurately represented by the answer choice you selected:

6. Name and describe a product you know that delights you because it is surprising.

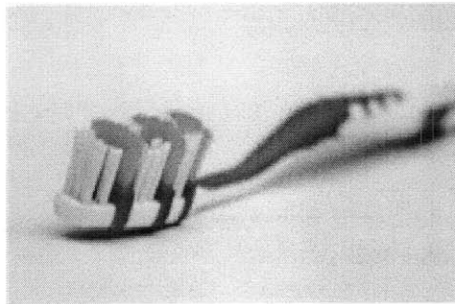
7. If you are given a pen with two detachable end-caps, one on each end, that both seem to blend in well with the design of the pen (they are not too conspicuous). One of the end caps is already detached, revealing a pen tip, and you are told to write with this pen. How likely would you be to detach the second end cap just to see what was under it before you started writing?

- I would do as instructed and start using the pen, and think about removing the other end-cap later
- I would first think about opening the other end-cap but probably still start writing
- I would definitely take off the second end-cap first

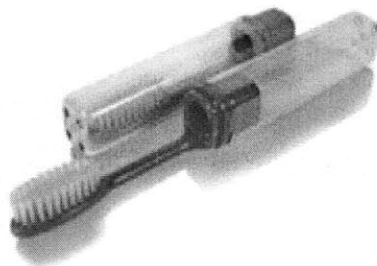
8. When you look at a product, do you notice if something is nicely packaged? Are you pleasantly surprised by innovative or unique packaging?

- I am very intrigued by packaging: it is essential to how I view the product and definitely affects my purchasing decisions
- I am only intrigued by packaging if it is very unique, but I care mainly about the product itself
- Packaging has no bearing on my opinion of a product. What's on the outside doesn't matter as long as it works the way it is supposed to

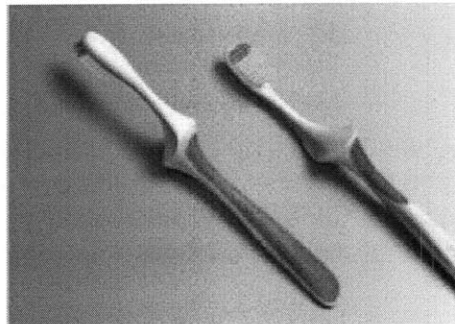
Please rank these toothbrushes in the order of which you would most likely (=1) to least likely (=4) buy.



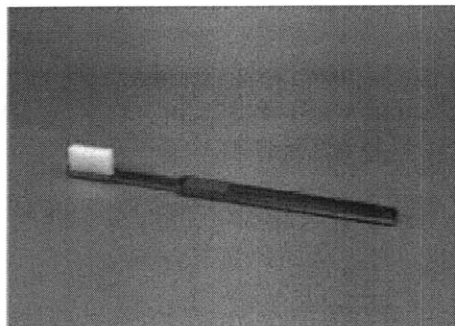
**Cost:** \$3.64  
**Description:** flexible head makes it easier to reach back molars  
**Ergonomics:** high  
**Wear Indicators:** yes  
**Novelty:** medium



**Cost:** \$2.65  
**Description:** integrated case and compact size make it suitable for traveling  
**Ergonomics:** low  
**Wear Indicators:** no  
**Novelty:** low



**Cost:** \$3.25  
**Description:** large diameter handle ensures the bristles never touch the counter surface  
**Ergonomics:** high  
**Wear Indicators:** yes  
**Novelty:** high



**Cost:** \$1.85  
**Description:** basic design with flat handle and rectangular head  
**Ergonomics:** low  
**Wear Indicators:** no  
**Novelty:** low

Name: \_\_\_\_\_

This survey examines the approach you generally take to making decisions, and how you feel after making decisions. Please rate your agreement with each of the following statements on a scale of 1 to 7. Try to be candid in your responses, and remember that there is no right or wrong answer.

### 1. Decision-making scale

a. When I watch TV, I channel surf, often scanning through the available options even while attempting to watch one program.

1	2	3	4	5	6	7
Completely Disagree						Completely Agree

b. When I am in the car listening to the radio, I often check other stations to see if something better is playing, even if I'm relatively satisfied with what I'm listening to.

1	2	3	4	5	6	7
Completely Disagree						Completely Agree

c. I treat relationships like clothing: I expect to try a lot on before I get the perfect fit.

1	2	3	4	5	6	7
Completely Disagree						Completely Agree

d. No matter how satisfied I am with my job, it's only right for me to be on the lookout for better opportunities.

1	2	3	4	5	6	7
Completely Disagree						Completely Agree

e. I often fantasize about living in ways that are quite different from my actual life.

1	2	3	4	5	6	7
Completely Disagree						Completely Agree

f. I'm a big fan of lists that attempt to rank things (the best movies, the best singers, the best athletes, the best novels, etc.).

1	2	3	4	5	6	7
Completely Disagree						Completely Agree

g. I often find it difficult to shop for a gift for a friend.

1	2	3	4	5	6	7
Completely Disagree						Completely Agree

h. When shopping, I have a hard time finding clothing that I really love.

1	2	3	4	5	6	7
Completely Disagree						Completely Agree

j. I find that writing is very difficult, even if it's just writing a letter to a friend, because it's so hard to word things just right. I often do several drafts of even simple things.

1	2	3	4	5	6	7
Completely Disagree						Completely Agree

m. Whenever I'm faced with a choice, I try to imagine what all the other possibilities are, even ones that aren't present at the moment.

1	2	3	4	5	6	7
Completely Disagree						Completely Agree