

Influence of Sketch Detail in Design Prompts on Design Exploration

by

Esteban McKenzie

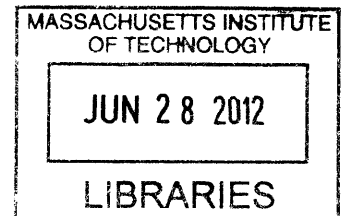
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Esteban McKenzie

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requirements for the degree of
Bachelor of Science in Mechanical Engineering

Abstract

This study sought to observe how the type of shape they are presented with influenced designers' early creative process. One of three shapes, with varying degrees of detail and concreteness, were shown to respondents at random. The respondents were asked to sketch designs for a lemon squeezer based on the inspirational shape they were shown. The concepts were then grouped by to the inspirational shape they were based on. The designs were rated on the categories of feasibility, similarity to existing products, number of perspectives drawn, the presence of annotations, and the ease of which the concept could be understood. When the results were analyzed, it was found that the number of perspectives drawn and the presence of annotations were the only categories that varied by the inspirational shape group. The more open-ended shape corresponded with respondents drawing more perspectives of their concept on average, and including annotations more often, while the most well defined shape had fewer perspectives drawn, and fewer concepts with annotations. The categories of feasibility, similarity and clarity had no variation between groups of people who received different inspirational shapes. These results suggest that the more open-ended inspirational shape gave respondents mental leeway to be more expansive in their descriptions, and less constrained to basic representations.

Thesis Supervisor: Maria C. Yang

Title: Assistant Professor of Mechanical Engineering and Engineering Systems

Acknowledgements

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I would also like to thank my parents and grandparents for instilling in me a love of learning, and always encouraging me to push to achieve more than I believed myself capable of.

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Contents

1. Introduction.....	6
2. Related Work.....	7
2.1 Design Through Sketches	7
2.2 Perception of Designs.....	7
2.3 Amazon’s Mechanical Turk.....	7
3. Design and Execution of Study	9
3.1 Construction of the Prompt.....	9
3.2 Quantification of the Responses.....	11
4. Analysis of Data.....	19
4.1 Feasibility and Originality.....	19
4.2 Representations of Concepts.....	20
4.3 Clarity of Concept and Drawing Ability.....	23
5. Conclusions.....	25
5.1 Limitations and Future Work.....	25
6. References.....	27
A. Design Prompt.....	28
B. Products used for Comparison.....	32

1. Introduction

In a world where innovation is the life-blood of the modern economy, and maximizing efficiency is the order of the day, the field of design is not immune from the call to streamline. In response to this, many researchers are looking to understand the process of design, and how a designer's capabilities are affected by outside influences. One area being actively explored is the earliest stage of design, which usually involves making concept sketches by hand. Sketches have long been seen as the medium most conducive to creative thinking and innovation. Because of this, the sketching process is being investigated to find what can influence a person to be more innovative in less time. Sketching itself is a very free flowing process, and it is because of this that designers are able to use it to go through many iterations rapidly of focusing on one idea, and then jumping to a whole new one just as easily.

This study aims to investigate how the sketch output would be influenced by the use of different inspirational shapes as a starting point. One of three figures was selected at random to be shown to respondents, and these three differ very much in how open-ended or well defined and concrete their shapes are. The respondents were then asked to sketch designs based on this inspirational shape. Would a more nebulous starting image incite a designer to be more creative and think more "out-of-the-box?" Or would a well defined CAD model limit a designer's imagination and cause fixation on the strict shape? This study looked to answer these questions, and find what other effects these varying shapes would have on a designer's creative process and design output.

2. Related Work

2.1 Design Through Sketches

A designer's time is always in high demand, and maximizing the efficient and effective use of their time and expertise is at the center of many research studies. Because of this, there is much interest in learning how the design process functions. It has been well documented that sketching is an invaluable tool of a designer. Sketching allows for constant feedback and self-evaluation of idea, allowing the designer to rapidly go through much iteration of ideas in the concept phase. Rodgers et al have been found that sketching allows for both vertical transformations of ideas (going into further detail on a certain vein of ideas), as well as lateral transformations (changing direction to divergent ideas) to happen throughout the iterations [1]. In the early stages of designing, sketching serves the purpose of short-term memory, and allows for visual analysis of ideas. As was found by Schütze et al, this allows a designer to come up with far higher quality solutions to design problems than if they would attempt to do so mentally [2]. These studies have both demonstrated that there is truth in the belief that sketching allows for the most creativity and innovation when approaching a problem.

2.2 Perception of Designs

When interpreting a design, there is a large amount of bias that can be attributed to the quality of the drawing. Macomber and Yang found that neatness in a drawing elicits a favorable response, while the opposite is true of roughness. Observers of a drawing also were found to favor hand drawn to CAD representations. [3]

2.3 Amazon's Mechanical Turk

Mechanical Turk (www.MTurk.com) is a crowd sourcing website by Amazon that allows people to post tasks to be completed for micro-payments. It can be used as a source for large, diverse, inexpensive, and readily available sample populations for research [4]. In order to compensate for less direct control over the experiment participants, the poster of a study must be very careful

to design it such that the participant is led through the study with no vagueness in the expectations. A form of control included in the website is the ability to deny compensation to submitters of low quality responses, as well as limit the availability of the task to certain demographics. Despite the studies being more difficult to control than a laboratory or one-on-one setting, it has been found that results delivered by Mechanical Turk studies have been found to be just as reliable, and sometimes more so [5].

3. Design and Execution of Study

This study was based on a design prompt posted as a HIT (Human Intelligence Task) on Amazon’s Mechanical Turk. It is said that a plurality of active Mechanical Turk users are from India, so in order to control the sample, the HIT was available only to users in the USA. The prompt, designed by Dr Catherine Elsen, was directly inspired by the ‘Design Synthesis and Shape Generation’ project conducted by Lim, Prats, Chase and Garner [6]. This project used their prompt, found in full in Appendix A, which asked the participants to design, at a minimum, three concepts for a lemon squeezer based on an inspirational shape they were provided with. The prompt directed the participants to use only a pen to freehand sketch their ideas, and to submit them via email.

3.1 Construction of the Prompt

The prompt asked the participants to take on a design task for a fictional manufacturer of kitchen appliances. The task was to come up with at least three designs for a new manual lemon squeezer incorporating a given inspirational shape. Since the focus of the study was to analyze sketching behavior, participants were instructed to use only pen and paper for free hand sketching. The inspirational shape shown to each participant was selected at random from one of three possibilities shown below in Figures 3-1, 3-2, and 3-3.

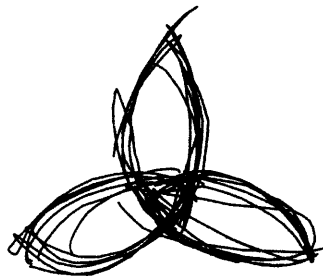


Figure 3-1: “Sketch-like” shape is roughly drawn with little precision or definition



Figure 3-2: “CAD-like” shape is well defined and precisely drawn

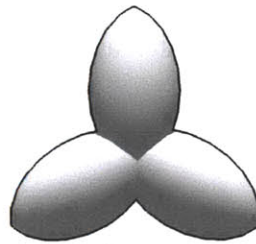


Figure 3-3: “3D-like” shape has depth and contours

The participants were instructed to use the shape shown to them as inspiration for their design and to work part or all of it into their concepts, and to then note on their sketches which shape they had been given. The participants were told to either scan their sketches, or take pictures of them, and email the files to a dedicated email address. They were also asked to fill out two questionnaires following the completion of the task. The first asked, among other things, whether the participant had background in designing and drawing, and asked them to rate their confidence in their drawing abilities on a five-point scale from Very Poor to Very Good. The second asked questions about the participant’s experience with the task. The submissions were assigned numbers to maintain anonymity, and then checked for completeness. The participants with complete submissions were compensated with two dollars.

3.2 Quantification of the Responses

The Mechanical Turk posting led to 37 complete submissions being collected, yielding a total of 103 concepts, each concept expressed through several drawings, and the concepts were quantified using several categories. They were rated for feasibility on a scale from 1 to 5, with 1 being Very Unfeasible and 5 being Very Feasible. Similarity to existing products was also rated from 1 to 5, with 1 being Very Dissimilar and 5 being Very Similar. In order to get a good benchmark for rating similarity with existing products, lemon squeezers were searched for using the Google Shopping and Amazon search engines. It was found that there are only a few different styles of manual lemon squeezers on the market today, with slight design variations distinguishing different products. All of the products used for benchmarking can be found in Appendix B. I distinguished three main categories to divide them into: reamers, crushers and squeezers. The reamer category included those that had a stationary reamer over which the lemon would be pressed and twisted by hand (Figures B-3, B-5, B-6, B-7 and B-10). I grouped into the crusher category those that featured a lemon being crushed into a reamer using some sort of press (Figure B-1). The squeezer category all involved a hinged lever squeezing the lemon into a sieve-like bowl (Figures B-2, B-4, B-9 and B-11). Figures 3-6 and 3-7 demonstrate the comparison to similar products.

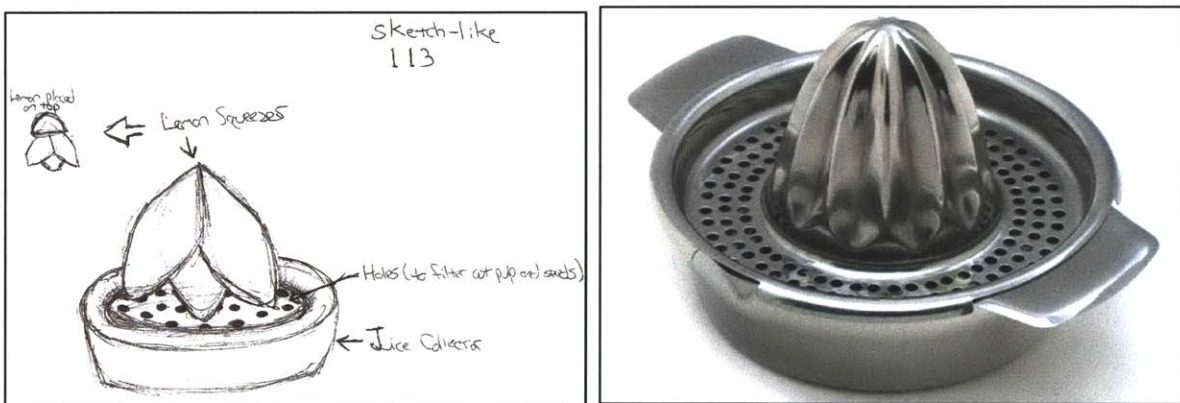


Figure 3-6: Concept shown was rated 5 for similarity to existing product. Product shown is Cuisinox 4.7" Citrus Squeezer found on wayfair.com. Both have upright stationary reamer with a strainer over a juice collection dish.

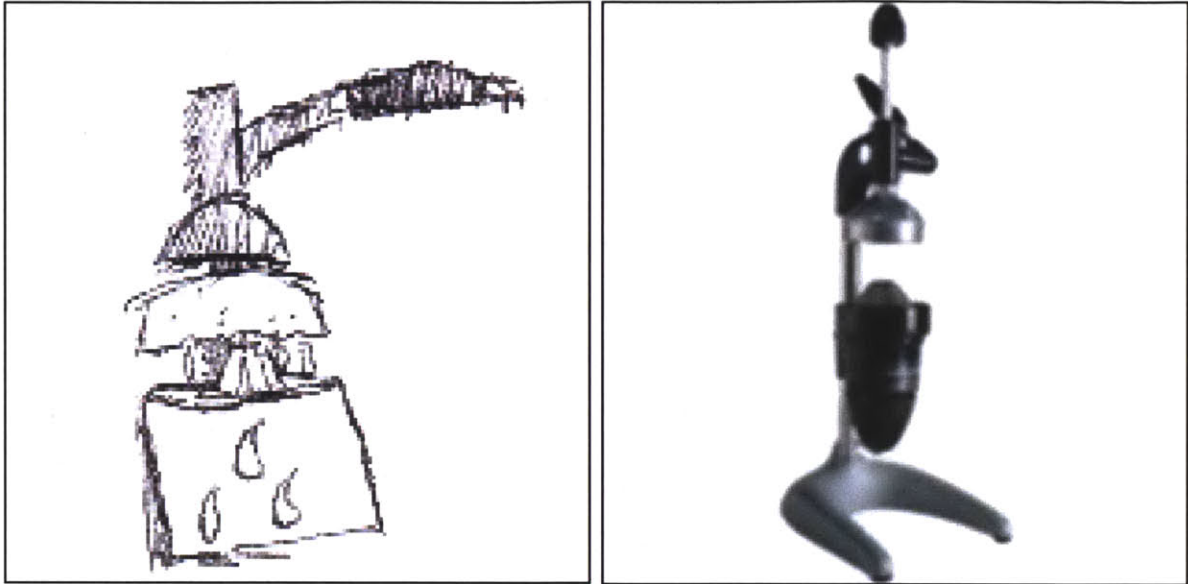


Figure 3-7: Concept shown was rated 5 for similarity to existing product. Product shown is Hamilton Beach 932 - Heavy Duty Manual Citrus Juicer found using Google Shopping search. Both have a lever that is pulled to crush the lemon onto a reamer with a cup, while allowing the juice to drain out the bottom. Product has capacity for lemons, limes, grapefruits and oranges.

The number of perspectives drawn of each concept was noted, as well as which concepts included annotations, and finally, the clarity of the concept (as a measure of ease in understanding the concept from the sketch) was rated on a three-point scale from Unclear being 1 to Clear being 3. The concepts were then grouped by which inspirational image they were based on for analysis. The breakdown of respondents and concepts by inspirational shape is shown below in Figures 3-4 and 3-5. The two distributions show that there was not a single group of respondents that produced a drastically disproportionate amount of concepts.

Following them, Figures 3-6, 3-7, 3-8, 3-9 and 3-10 show sample submissions with explanations of how their ratings were decided.

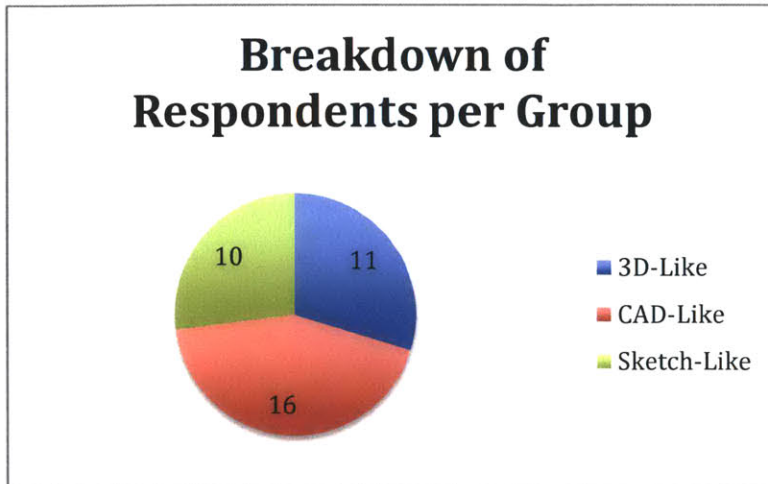


Figure 3-4: Breakdown of the 37 respondents by inspirational shape. There were 10 respondents who were shown the Sketch-Like shape, 16 were shown the CAD-like shape, and 11 were shown the 3D-like shape.

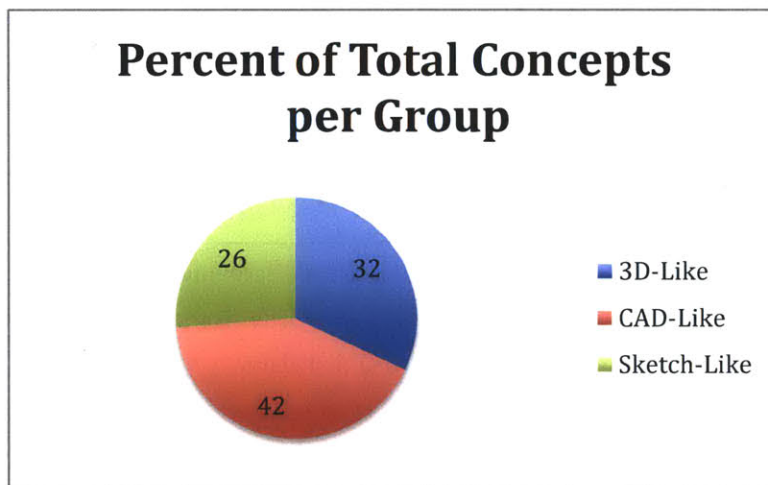


Figure 3-5: Breakdown of the 103 analyzed concepts by inspirational shape. The Sketch-Like shape inspired 26% of the concepts, the CAD-Like shape inspired 42%, and the 3D-Like shape inspired 32%.

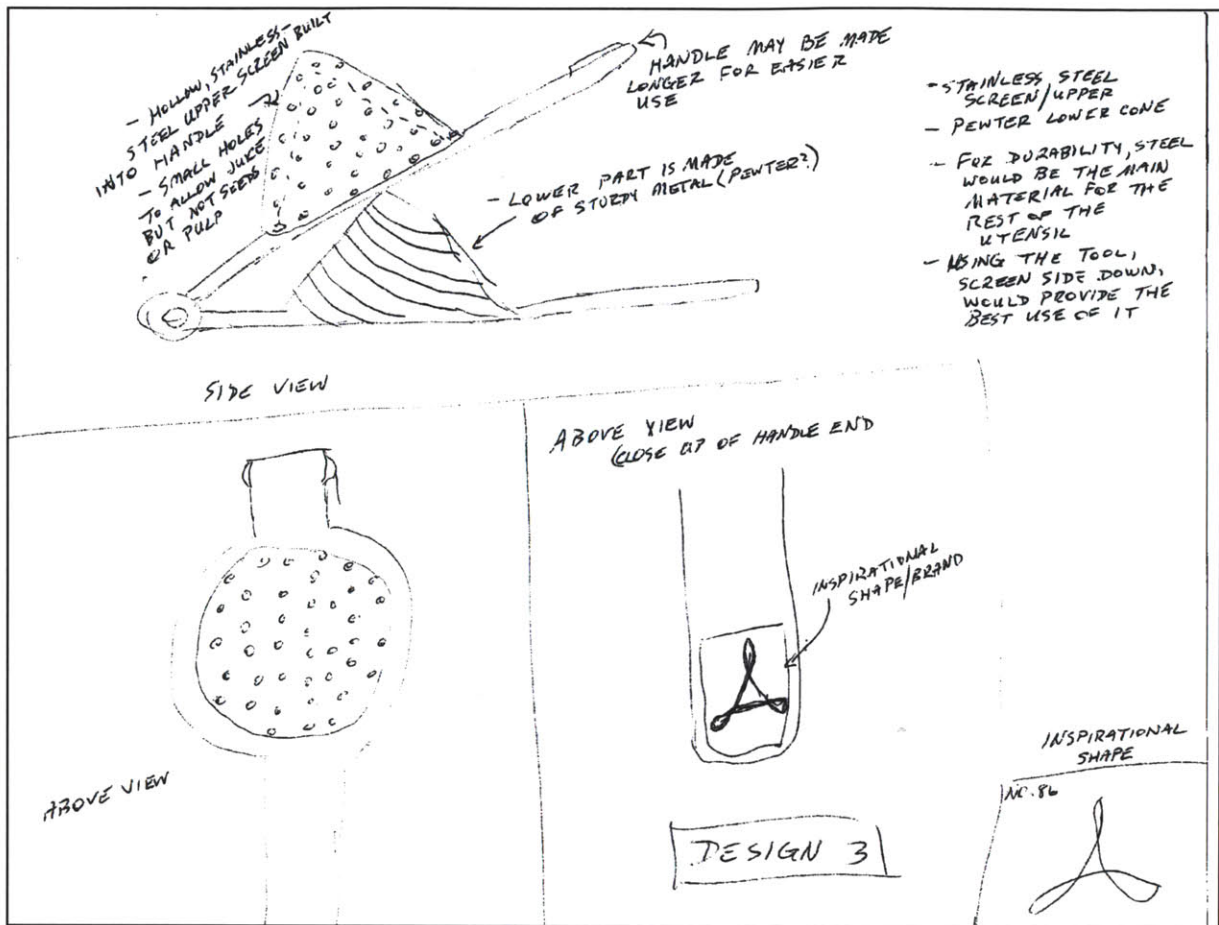


Figure 3-6: Concept based on “Sketch-like” shape. Rated 5 for Feasibility due to its simple and proven design. Rated 5 for Similarity with Existing Products, as it is almost exactly like a typical product of the squeezer type. Rated 3 for Clarity because the function can be understood at first glance.

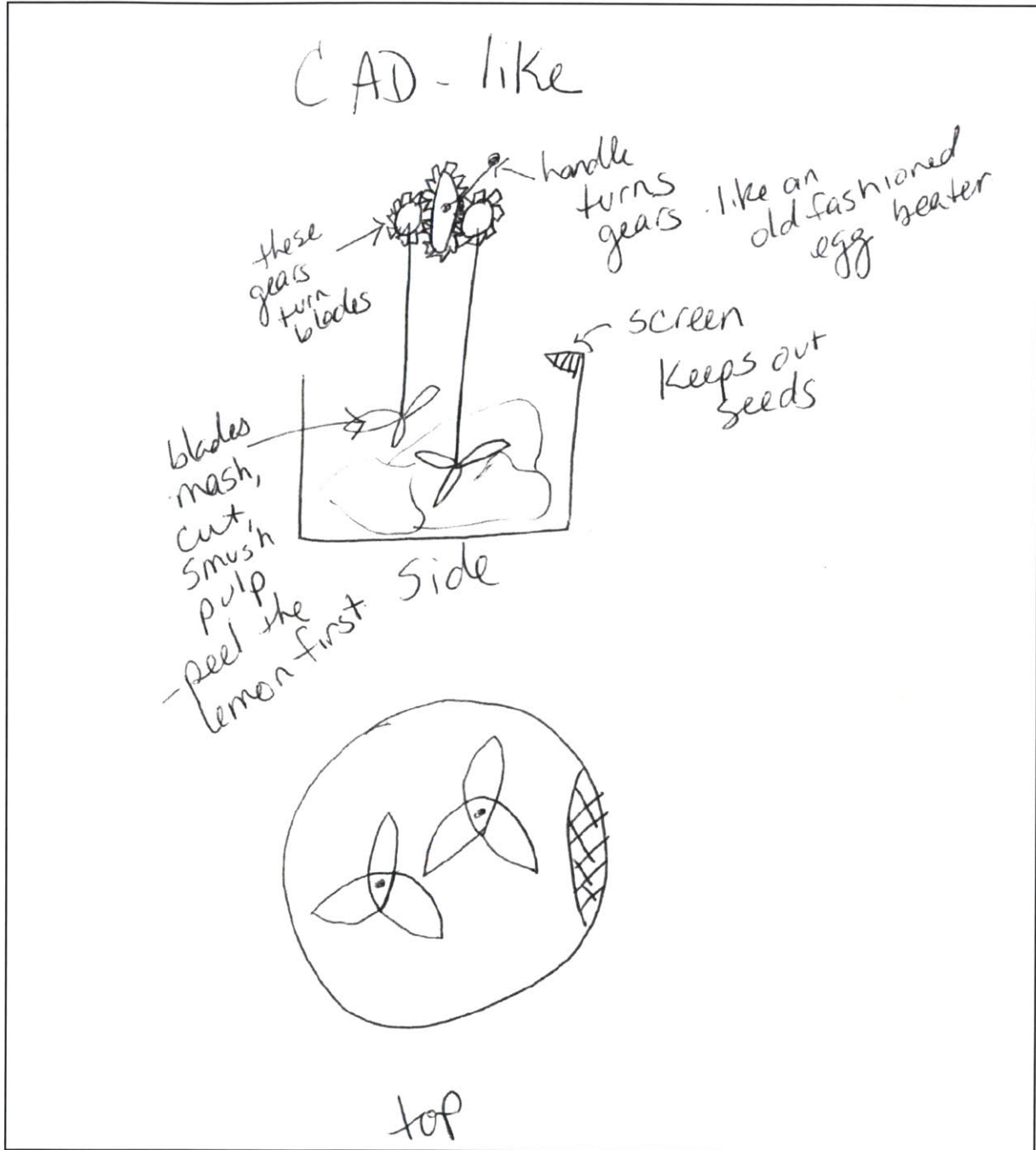


Figure 3-7: Concept based on “CAD-like” shape. Rated 3 for Feasibility, because though it is more complicated than many of the concepts, it could still be reasonably done. Rated 1 for Similarity with Existing Products, because there is nothing on the lemon juicer market like it. Rated a 3 for Clarity because it is well explained through annotations and leaves no question as to its function.

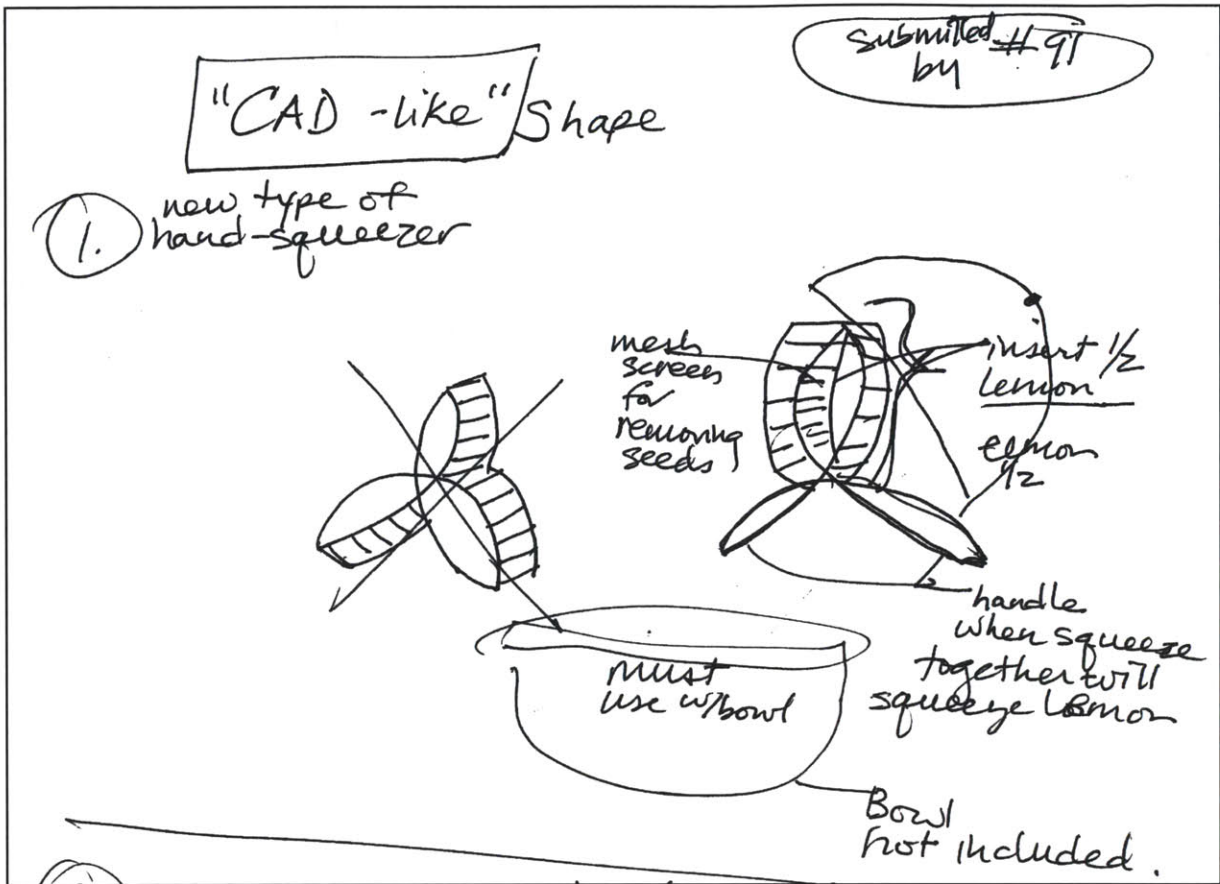


Figure 3-8: Concept based on "CAD-like" shape. Rated 3 for Feasibility because it is hard to see how it would do what the annotations say it is supposed to, 5 for Similarity with Existing Products, because it is similar to Figures B-9 and B-11. Rated 1 for Clarity because the drawing is vague, and the annotations do not well explain well how the parts work.

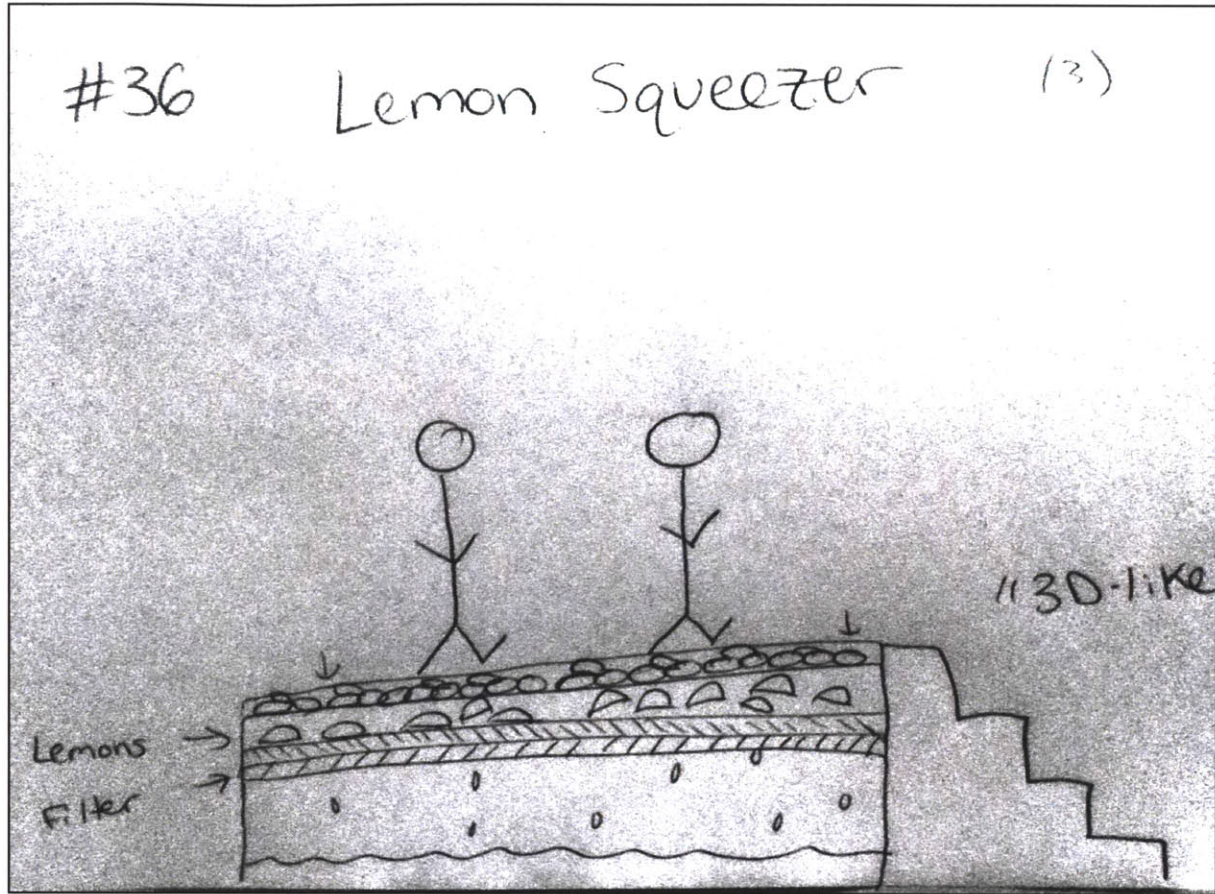


Figure 3-9: Concept based on “3D-like” shape. Rated 1 for Feasibility, because it is not a kitchen appliance. Rated 1 for Similarity with Existing Products, because there are no products like it on the market. Rated 3 for Clarity because the design and functionality are obvious.

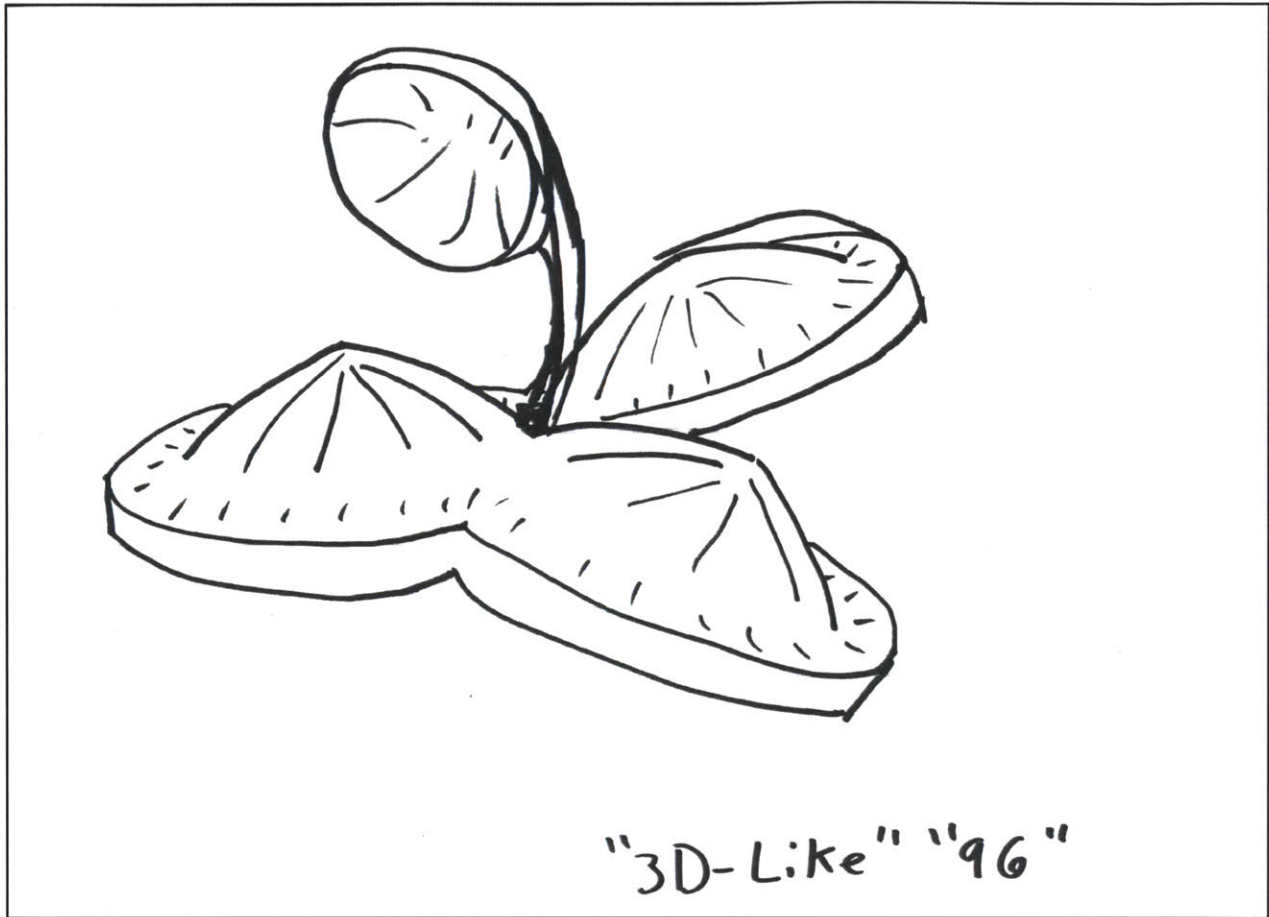


Figure 3-10: Concept based on “3D-like” shape. Rated 5 for Feasibility, because it is a mechanically simple crusher style juicer. Rated 3 for Similarity with Existing Products, because it incorporates aspects of Figure B-1. Rated 2 for Clarity because though it is easy to see the function of the arm crushing a lemon onto one of the reamers, the purpose of the other two reamers is not clear.

4. Analysis of Data

4.1 Feasibility and Originality

Analysis of the rated concepts was done by shape group for the qualities of feasibility and similarity to existing products by finding the average, standard deviation and the 95% confidence interval, shown below in Figures 4-1 and 4-2.

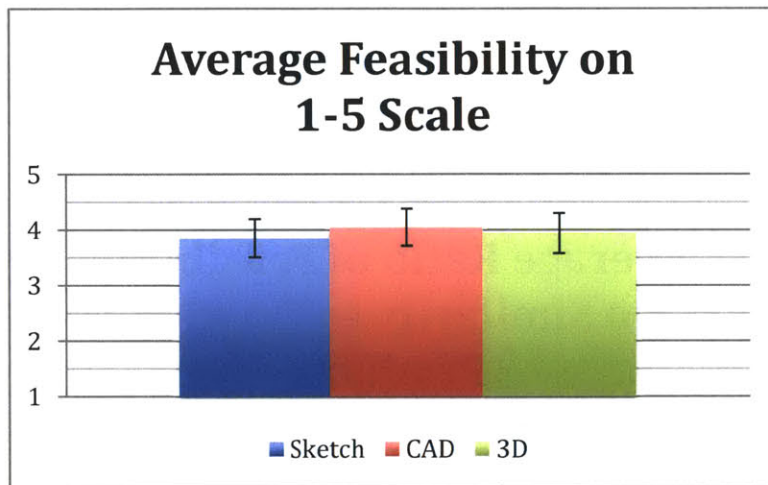


Figure 4-1: Average Feasibility by group with 95% confidence interval shown. No significant variation

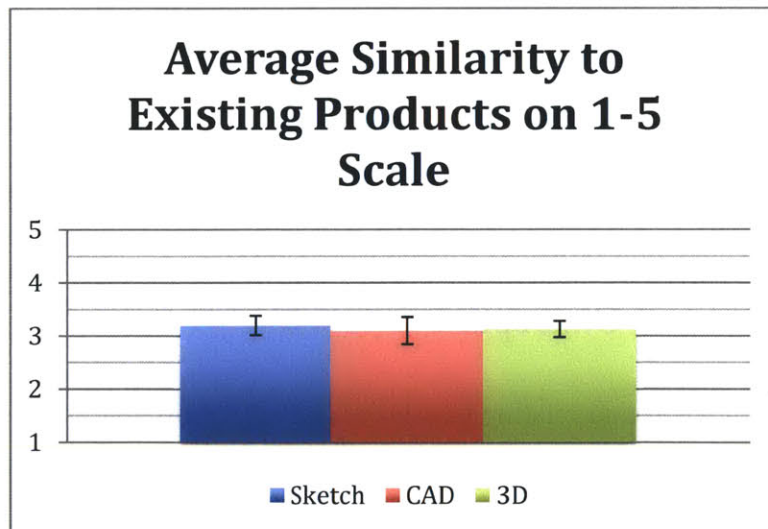


Figure 4-2: Average Similarity to Existing Products by group with 95% confidence interval shown. No significant variation

The data seems to suggest that the different inspirational shapes had no effect on either the feasibility or originality of the concepts at all, with the averages for the different groups falling within each other's confidence intervals.

In order to look for underlying trends, I defined another quality to attempt to give a rudimentary measure to the innovativeness of a concept. This was defined as the ratio of Feasibility to Similarity to Existing Products. Hence, a concept that has a high feasibility rating, but also a high rating for similarity to an existing product would have a small ratio, and not be considered very innovative. Neither would a very original idea that was not at all feasible. An innovative idea is one that is original, and could be functional. This would mean a high feasibility rating and a low rating for similarity to existing products. As shown below in Figure 4-3, even using this measure, the variation between the groups is very small, and reveals no trends.

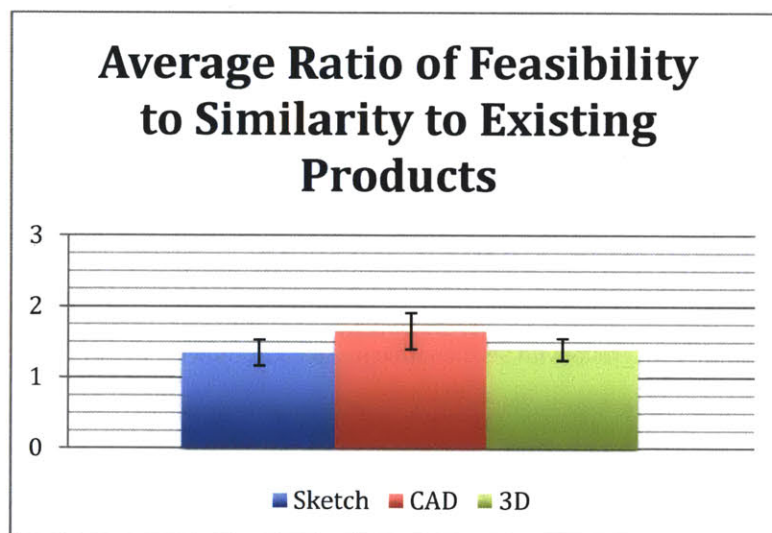


Figure 4-3: Average ratio of Feasibility to Similarity to Existing Products by group with 95% confidence interval shown. No significant variation across groups

4.2 Representations of Concepts

While there were no trends found relating feasibility and originality to type of inspirational shape, there were some trends found when analyzing the number of perspectives drawn per concept, and the percent of concepts that were annotated per group, shown below in Figures 4-4 and 4-5.

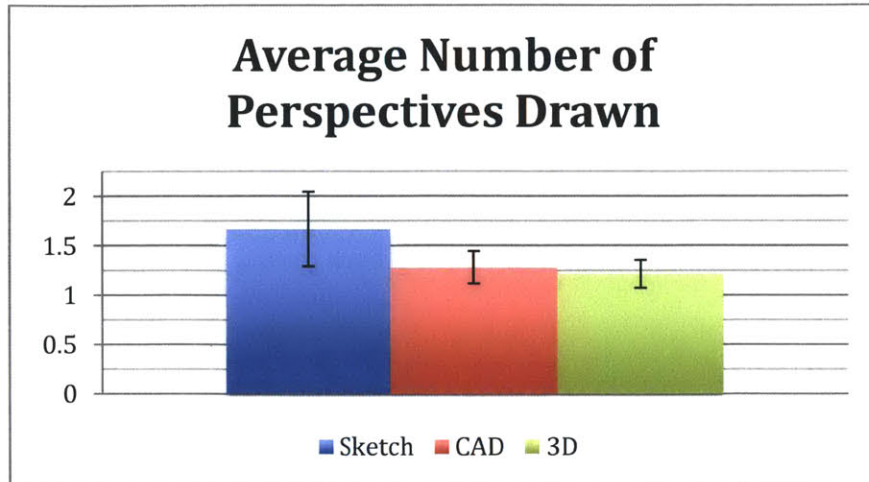


Figure 4-4: Average Number of Perspectives Drawn by group with 95% confidence interval shown. Sketch-like group appears to stand out as having more perspectives on average than the other two groups, with a possible slight downward trend from left to right across the groups i.e. from a very blurry inspirational shape to more detailed and precise ones.

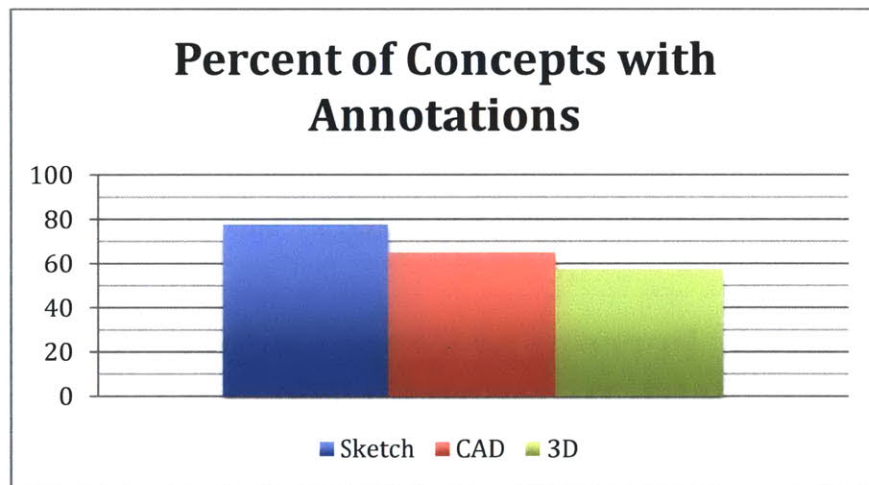


Figure 4-5: Percent of concepts per group that were annotated. There is a noticeable downward trend across the groups from left to right.

The data suggests that the sketch-like group tended to provide more thorough representations of their concepts through drawing multiple perspectives, and making annotations on their sketches. There seems to be a downward trend in these two categories that correlates with the more defined and concrete version of the image participants were shown, the less perspectives they were likely to draw and the less likely they were to make annotations. One possible explanation of this trend could be that the more open-ended an image a designer is given to work with, the

more engaged their creativity is, and the more their mind is engaged with attempting to thoroughly describe their concept.

To check for other possible underlying causes for the trend, demographic information about the participants in each group was analyzed. It was found that there was a very uneven distribution of participants with design background and drawing background as shown below in Figures 4-6 and 4-7.

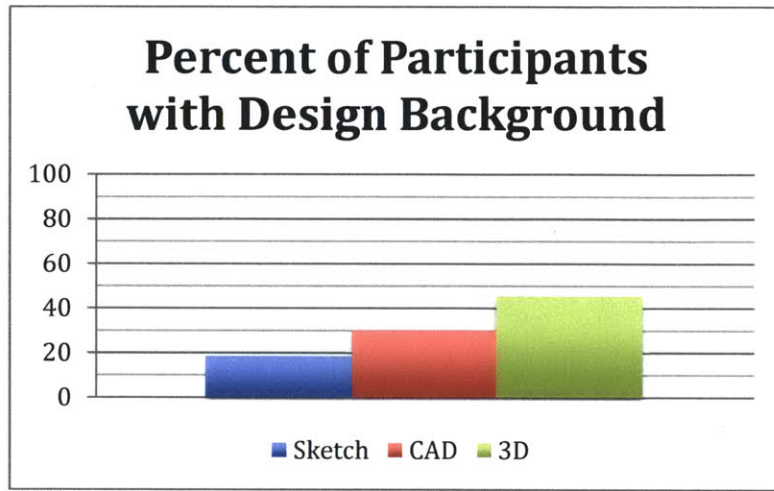


Figure 4-6: Percentage of people with design background making up each image group. There is a very uneven distribution increasing from the Sketch-like to 3D-like image group.

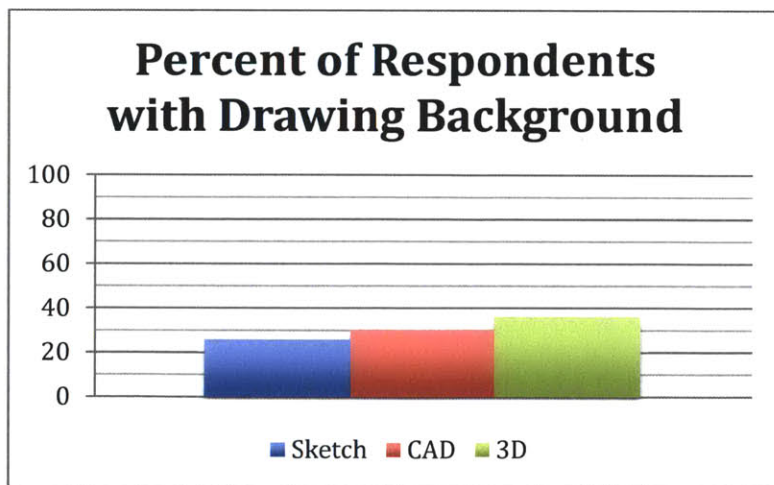


Figure 4-7: Percentage of people with drawing background making up each image group. There is a very uneven distribution increasing from the Sketch-like to 3D-like image group.

The distribution of participants with design and drawing background seems to inversely correlate with the trends in average number of perspectives drawn and percentage of concepts with annotations. At first, this seemed to suggest that there could be an inverse relation between more thorough representation and drawing and design background, but the Pearson Correlation showed that there was no significant correlation between the two as shown in Table 4-1. It seems then that respondents with drawing or design background. were no more likely to include more perspectives or annotations as those without the background.

Table 4-1: Shows the Pearson Correlation Coefficients relating the qualities of Design and Drawing Background to the presence of annotations in a concept sketch, and the number of perspectives drawn for n=37.

	Presence of Annotations	Number of Perspectives Drawn
Drawing Background	-0.050	0.139
Design Background	0.229	-0.026

4.3 Clarity of Concept and Drawing Ability

Despite the non-uniform distribution of respondents with drawing background, there was very little variation, by group, of average confidence in drawing ability, as can be seen in Figure 4-8.

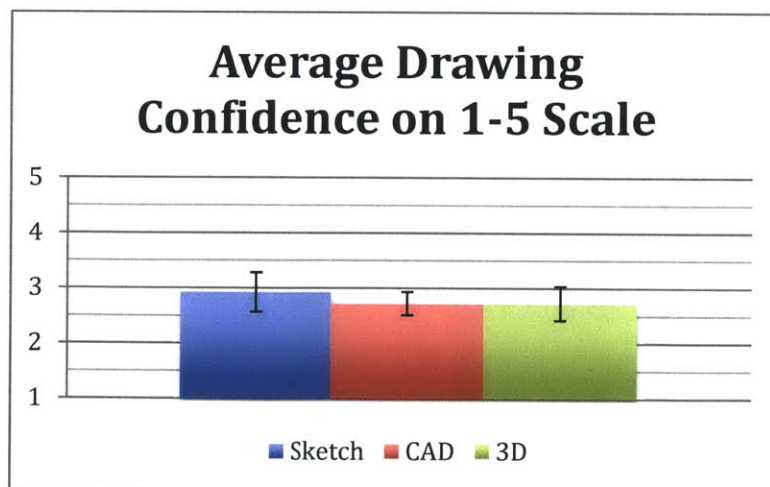


Figure 4-8: Average confidence in drawing ability by group with 95% confidence interval shown. No significant variation across groups

While there was no one group that had more average confidence than another, for individual participants, there was a strong correlation found between drawing confidence and whether the person reported having background in drawing. The Pearson Correlation Coefficient relating the two was found to be 0.598.

In the process of rating the concepts for feasibility, it was noticed that the rater's perception of feasibility was heavily dependent on the clarity of the concept. Concepts that were presented unclearly were far more likely to be rated lower on the feasibility scale, with a Pearson Correlation Coefficient relating the two of 0.668. This strong correlation of preference to clearly drawn concepts was demonstrated to be true for large samples of raters by Macomber and Yang [3], and thus should not be interpreted as a bias specific to this particular rater. Clarity was also found to have a moderate correlation with drawing confidence and drawing background with correlation coefficients of 0.358 and 0.331 respectively. Following that relation, feasibility then was found to correlate to both drawing confidence and background with coefficients of 0.349 and 0.330 respectively.

These correlations of drawing ability to the feasibility rating did not produce any trends in the data however, because there was negligible variation in average clarity across groups as shown in Figure 4-9. Since the correlation of clarity to drawing ability was not even half as strong as it was to feasibility, trends in drawing ability did not carry through to cause trends in feasibility.

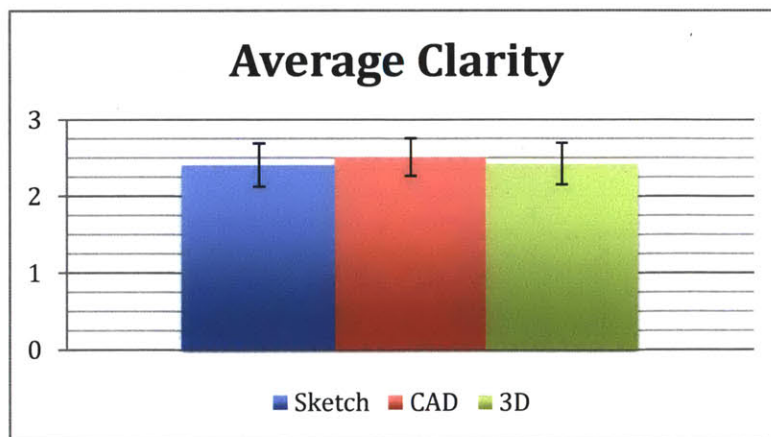


Figure 4-9: Average clarity by group with 95% confidence interval shown. No significant variation across groups

5. Conclusions

Though intended to be a study of the effect of the inspirational shape on design, the results demonstrated some unexpected trends. While there was no demonstrated effect of the inspirational shape on the feasibility or originality, or the ratio of the two, there is some evidence to suggest that there was an effect on the representation of the concept. Respondents from the sketch-like group were more likely to have multiple perspectives of their concept, and more likely to have annotations than those in the other groups. This could be evidence that more vague and open-ended inspirational shapes lead to more breadth and detail in thought, and in expression of a concept.

5.1 Limitations and Future Work

There were some noted abnormalities and limitations in the experiment that leave much room for improvement and future work. The use of Mechanical Turk for gathering participants was intended to produce a random sample of the general population. While it was expected that there would be many people with at least some manner of background with drawing, there were far more respondents with some background in design. This could have been caused by the title of the HIT, “Be a Designer” attracting more people who already had some background in design. For a future study, a more neutral title would be advised as an attempt to counter that effect.

Since there were so many designers in the sample, further analysis could be done to compare the trends among designers compared to non-designers. Separating out the trends created in the data by the designers could also reveal more subtle trends that could be attributed to the inspirational shapes themselves. The designers could be analyzed even further, separating them by what kind of background the self proclaimed designers actually have, and how this affects the data.

While quantifying the submissions, it was noticed that submissions with multiple perspectives often did not provide different angle views, but rather showed the device in motion (open and closed for example). It might therefore be interesting to find what characteristics, if any, correspond to higher probability of presenting certain perspectives.

Finally, a single rater did the quantification of the sketches for this study. For further investigation, it would be advisable to test for rater reliability by having multiple people rate the same concepts for the same qualities. In this way, the researcher could compensate for any rater bias discovered. A larger sample size would also be advisable, as a sample size of 37 submissions does limit the study somewhat.

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Appendix A

Design Prompt

Be a designer ! You'll need pen, paper, and a scanner or a camera.

****Quick Note:** If you already took our Be a Designer Experiment, DO NOT accept this HIT! We will have to reject your work, and we don't want to do that.

Guidelines: Please follow these steps consecutively

1. Cautiously read the Consent Form and hit the "I accept" button if you agree with the terms of this consent. You will not be able to proceed with the HIT without accepting it.
2. Make sure you have a scanner or a photo-camera available to you before starting the design task.
3. Read the design task and begin to sketch as many ideas as you want (minimum 3) on white sheets of paper.
4. Add, on each sheet of paper, the name of your inspirational shape and the number you have been assigned (see below).
5. Answer the short survey.
6. Send the scans and/or good quality pictures of your sketches to sketchexperiment2011@gmail.com and add, in your email, the number you have been assigned (see below, next to the inspirational shape). Your email address will never be used again later.
7. Wait for your HIT to be reviewed to be paid.

Consent Form

"Everybody is creative: a fun sketching task for Mechanical Turk users".

Our research group is conducting an experiment to analyze how designers and non-designers can express their creativity through the use of free-hand sketching. A design task will be followed by a short survey. This survey will be helpful to get feedback about the design task as well as basic, anonymous information in order to categorize our sample of participants. Your participation will be very valuable in helping us with this work and we appreciate your time and effort.

You should read the information below and ask questions about anything you do not understand before deciding whether or not to participate (see contact information below).

- To take part in this survey and experiment, you should be an adult living in United States of America. You are also required to scan or take pictures of your sketches, therefore make sure to have the appropriate and available equipment before completing this HIT (scanner connected to your computer and/or good quality camera with connecting device).
- This survey and experiment are voluntary. You have the right not to answer any question and to stop the interview/experiment at any time or for any reason; however, only a complete and approved HIT will render compensation. We expect that the whole process (sketching, answering the survey, and sending the sketches) will take about 40 minutes.
- You won't be judged on your capacity to draw. We are not interested in your sketching skills but rather in the different concepts you'll design. You should submit at least three different concepts to complete a HIT that will render compensation.
- The designs you create, including sketches and annotations, will not be used for any commercial or advertisement purposes but could appear in scientific publications with your identifying information removed. Your email address will never be used again.
- Unless you give us explicit (written) permission to use your name, title or other personal information in any publications that may result from this research, the information you tell us will be confidential.

IMPORTANT - sending your sketches :

- You should draw your sketches on white plain copy paper, with blue or black ink only (pens or markers, NO PENCILS).
- You will then have to send us your sketches. You can either
 - scan them (JPEG or PDF only, make sure to have a « photo » resolution).
 - or take detailed photos (make them JPEG or PDF only, minimum 1000 wide by 1000 pixels high or around 1 megapixel minimum – most cell phones won't reach these requirements). Make sure to lay the sheets of paper flat on a table and to take a top-down vertical shot under good artificial light.

You can send your scans and/or pictures at sketchexperiment2011@gmail.com and add, in your email, the number you have been assigned (see below, next to the inspirational shape).

Only clearly readable pictures/scans will render compensation, so make sure to check your images before sending. You are also required to write, on each sheet, the name of your inspirational shape (see below for further explanations).

If you have any questions or concerns, please send an email to sketchexperiment2011@gmail.com, specifying "QUESTION" in the subject line. Your contact is Catherine E., at Massachusetts Institute of Technology, Ideation Lab, Department of Mechanical Engineering.

To proceed with the HIT, please accept the following statement:

" I understand the procedures described above. My questions have been answered to my satisfaction, and I agree to participate in this study"

Task

You are asked to design a new lemon squeezer (for extracting juice from lemons). Your client is a fictional kitchen appliances manufacturer who wants to introduce a new lemon squeezer into its range of products. The company has a reputation for manufacturing simple and effective designs. The outcome from the first meeting between the design and management departments was the inspirational shape shown below. As this is only an abstract, conceptual shape, it needs to be completed. This inspirational shape can be distorted, deformed, modified. You can exploit it as a whole, or only use part of it, at any scale. You are just required to use it, somehow.

You are asked to use this inspirational shape as a starting point and make it into a real product design proposal using only free-hand sketching (no ruler or any drafting instrument allowed). Since the lemon squeezer only works manually you should not consider using any electrical motors in the design. In order to make an effective design, the new gadget should separate seeds and pulps from the juice.

You are asked to draw at least 3 different concepts. At the end of your process, indicate on each sheet the name of the inspirational shape you got.

You have been assigned the number `{AssignedNumber}`. Send your sketches by email and indicate this number in your email, as well as the name of the inspirational shape you got (see above the picture).

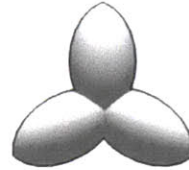
Name of inspirational shape: "sketch-like"



Name of inspirational shape: "CAD-like"



Name of inspirational shape: "3D-like"



Send your sketch to sketchexperiment2011@gmail.com

Short Survey

Please provide information about yourself below.

These questions aim at defining your user profile and your eventual design background. No personal information will be revealed.

1. What is your gender

- Female
 Male

2. What is your age range ?

- 18 to 22
 22 to 34
 35 to 44
 45 to 54
 55 to 64
 65 and over

3. What is your current occupation, or in what industry do you work ? If you attend(ed) a college, what is your major ?

4. Do you have any background in design, engineering, manufacturing, architecture, or any other activities related to designing ?

- Yes
 No

If yes, please explain:

5. How would you rate your confidence in drawing by hand ?

- Very poor
 Poor
 Average
 Good
 Very Good

6. Do you have any specific background in drawing ? (for instance artistic or technical classes, internships, any kind of training, professional or for leisure, ...)

- Yes
- No

If yes, please explain:

Please answer a few questions concerning the design task.

1. How would you rate the design task ?

- Very easy
- Easy
- Normal
- Difficult
- Very difficult

Please feel free to add any comments:

2. How would you rate the ease of use of sketching ?

- Very easy
- Easy
- Normal
- Difficult
- Very difficult

3. Where you somehow frustrated by the fact of using pen and paper ?

- Totally frustrated
- A little frustrated
- Not frustrated at all
- Rather happy with it
- Totally happy with it

Please feel free to add any comments:

4. Please choose below what was, for you personally, the main asset in using sketching:

- It's fast
- It's easy to use
- It's the best way to express my ideas
- Other

If you chose "other", please explain:

5. Please choose below what was, for you personally, the main drawback in using sketching:

- It's slow
- It's difficult for me to draw
- I feel sketching it's not the best way to express my ideas
- Other

If you chose "I feel sketching it's not the best way to express my ideas" please explain which would be the best medium to express your ideas:

If you chose "other", please explain:

6. How would you rate the use of the inspirational shape ?

- Very easy
- Easy
- Normal
- Difficult
- Very difficult

Please feel free to add any comments:

7. The inspirational shape was, for you:

- Totally helpful
- Helpful
- I don't know
- Rather constraining
- Totally constraining

Please explain why:

8. How satisfied are you with your ideas ?

- Very dissatisfied
- Dissatisfied
- Middle
- Satisfied
- very satisfied

Please feel free to add any comments:

9. How faithful are your drawings, considering what idea you had in mind ?

- Very unfaithful
- Unfaithful
- It's OK
- Faithful
- very faithful

Please feel free to add any comments:

Please make sure to upload clear and detailed scans or pictures of all of your sketches. Send us your scans and pictures of your sketches at sketchexperiment2011@gmail.com. Add, in your email, the number you have been assigned (see above, next to the inspirational shape). Make sure to add, on each sheet, the name of the inspirational shape you got.

"By submitting the HIT, I indicate I understand the consent form above. My questions have been answered to my satisfaction, and I agree to participate in this study"

We thank you very much for your participation.

Appendix B

Products used for Comparison



Figure B-1: Hamilton Beach 932 - Heavy Duty Manual Citrus Juicer found using Google Shopping search



Figure B-2: Focus Products Group 8607 Lemon Squeezer found using Google Shopping search



Figure B-3: CitriStar Citrus Juicer by Tribest found using Google Shopping search



Figure B-4: EcoTeak Wood Kitchen Press Collection by Enrico Products found on StacksandStacks.com



Figure B-5: Cuisinox 4.7" Citrus Squeezer found on Wayfair.com



Figure B-6: Alessi Juicy Salif Lemon Squeezer found using Google Shopping search



Figure B-7: Progressive International Citrus Juicer found on Amazon.com



Figure B-8: Blomus Lemon Squeezer found on Amazon.com



Figure B-9: Vintage Sunkist Lemon Squeezer found on ecrater.com



Figure B-10: Vintage Foley Aluminum Lemon Squeezer found on ebay.com



Figure B-11: Green Hand Hold ABS Lemon Squeezer Juicer found on au.suntekstore.com