EXPRESSION OF FORMS

DESIGN RESEARCH SEMINAR

PDSPL-154

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Approval

This Design Research project titled ‘Expression of forms’ by Sridhar Geddala is approved in partial fulfilment for Masters degree in Industrial design at IDC, IIT Bombay.

Prof. R. Sandesh (Project Guide)

Declaration

I declare that this written submission represents my idea in my own words and where other ideas or words have been included, I have adequately selected and referred the original source.I also declare that I have adhered to all principles of academic honesty and integrity and have not misinterpreted or fabricated or falsified any ideas / data / facts / sources in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources that have not been properly cited, or from whom proper permission has not been sought.

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Acknowledgement

I would firstly thank my guide, Sandesh for all the support and valuable inputs that he gave me during the course of this project. A lot of this project would not been possible without his guidance. I would also like to thank my parents and batchmates who supported me morally to make this happen.

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1. Introduction

Fig 1: Apple imac

Every product has its own expression, which comes from the visual details the designer include in the product. Most of them are intentional and some are functional. Though expression is subjective, we can clearly classify products under different expressions. One of those classification is done by *Prof. A G Rao(IDC, IIT Bombay)*. This project try to dissect these expressions using eye tracking as a tool. Though the project focussed on the primary analysis like fixation points and gaze time, a detailed analysis of the eyetracking data is give at the end for one expression(soft).

2.Expression of Forms

Fig 2: motorola phone

Expression of forms is a concept by Prof A G Rao(IDC, IIT Bombay) , which serves as a generative tool, to arrive at new product forms.

“Expression as related to product refers to the physiognomy of a product. “---A G Rao

Expression that relates to the manufacturer comes out of the designers depth of understanding of material and process. Expression that relates to the user comes out of the psychological relationship of the user to the product. How a person connects or aspires to connects himself/herself of the product when he or she comes into contact with the product as an individual, a professional, a family member, or a member belonging to particular sect, belief or society forms the basis of the expression.

Expression as basis of new form in industrial design---A G Rao

Expression of form

The product expression can be studied using the nine elements of design
viz., texture, material, surface, surface quality, line edge quality, color , orientation and proportion

Fig 3: casio watch

Elements of design:
Texture: smooth, highly polished
Material: metallic, plastic dial
Surface: flat surfaces
Surface quality: glossy (case and wristband), plastic and glossy dial
Line: Parting line: horizontal and vertical, subtle fillets at the corners
Graphic lines : horizontal and vertical, subtle fillets at the corners
Stroke lines:
Edge quality: slightly round off
Color: high chrome, black
Orientation : vertical
Proportions:

Expressions
Cold
Strong

3. Eye Tracking

Eye tracking is the process of measuring either the point of gaze (where one is looking) or the motion of an **eye** relative to the head. An **eye tracker** is a device for measuring **eye** positions and **eye** movement.

Eye tracking methods

1. Electro- oculography– it identifies eye movement by recording corneoretinal potential differences, which are detected from skin electrodes that are attached around the eyes.
2. Point of regard (pupil center/corneal reflection) method takes advantage of corneal reflections of incoming light. Infrared is commonly used light source.

Eye trackers

1. Monitor based eye tracker
2. Snap-on eye tracker
3. Stand-alone eye tracker
4. Eye tracking glasses

Fig 4: Monitor based eye tracker

Eye trackers from different producers vary in their technical specifications. Some major specifications include the sampling rate, tracking accuracy, allowed operating distance, adaptation to head movements, use of monocular , binocular tracking. And adoption of bright and dark pupil tracking or both. Higher sampling rate captures saccades and miniature eye movements better and is especially desired in research in reading.

Overview of eye tracking data

1. Fixations
2. Saccades
3. Smooth pursuits
4. Miniature eye movements like drift, tremor, and microsaccades

Fig 5: Fixation and saccades

3.1 Use of eye tracking in product design

Gaze data can statistically predict self reported feature importance in product preference decisions.

This suggests that gaze data could be used to supplement or replace attribute ranking and choice based product surveys, with further investigation.

Gaze data were also found to predict when size change in product features is noticeable to consumers. This can be useful in design, for example when a company wants to decrease the size of a feature to save money on materials, but does not want the consumer to notice the change .

3.2 Why eye tracking

Where you look at depends on the properties of what you are looking at, as well as your goals, experiences and expectations

Eye tracking captures foveal vision(what we are fixating/focussing directly) it provides useful information about visual attention, because in most cases in most case fixation coincides with attention.

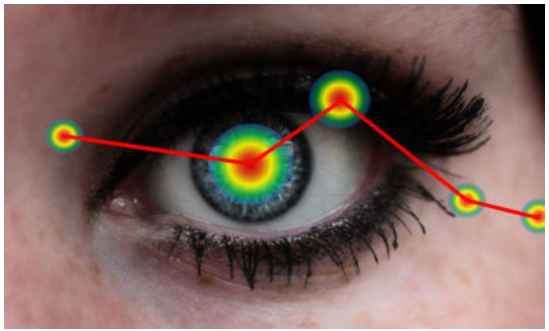


Fig 6: Fixation and saccades

4. Project brief

Understanding the expression of forms using Eye tracking

Brief: The objective of the experiment is to validate the *Qualitative study* of *Expressions of the form* (10 expressions and the *Details,* elements of design) using *Eye tracking*. The experiment may reveal new observations about the relation between (product) details and expression.

Experiment is is done in two parts

1. **Qualitative study**: In qualitative study a series of pictures(of products) are selected for each expression and the elements of design for every expression are studied in detail by visual examination. This table will serve as a basis for the further experiment .
2. **Quantitative study**:in this step the quantitative research will be done using the data generated by eye tracking. The eye tracking experiment is designed to validity the qualitative data. Which may lead to some other new observations about the expression and product details. .

5 . Qualitative research

The qualitative research is a visual observation of the expression of the product using nine basic elements of design. The qualitative data used here is from an class assignment from *Forms 2* course*(IDC IIT Bombay, batch 2014-16)*. Each one of 12 design students were given one different expression and asked to articulate the visual attributes by collecting images of products or any natural form that have the similar expression.

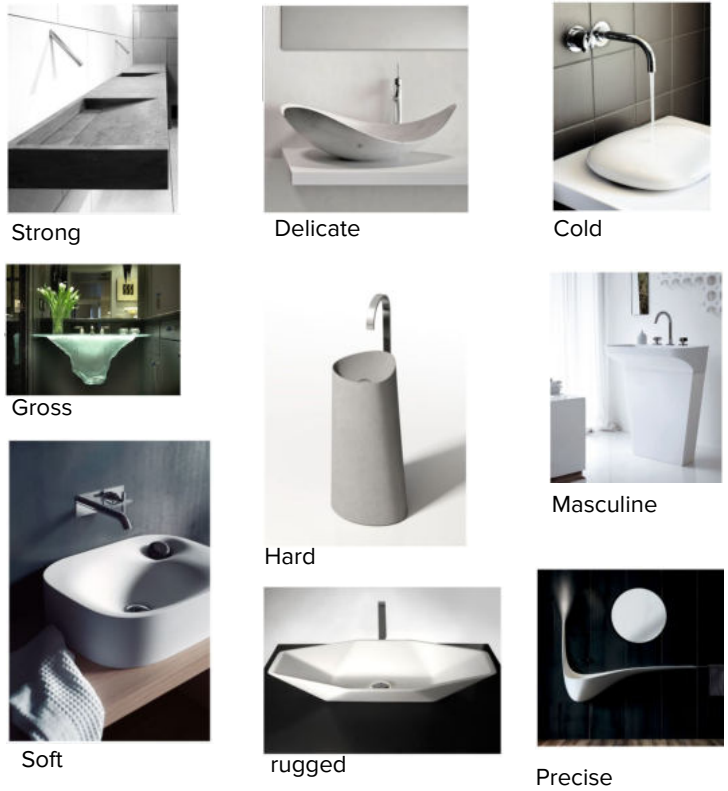


Fig 7: Wash basins with different expressions
(Image source: Shreelekha, IDC 2014-16)

Qualitative study of expressions

Expression	Form: Curvature, Symmetry etc	EDge Quality: RAdius, Fillet etc	Line Quality	Color
Soft	Free flowing Continous Organic Symmetry	No sharp edge Free flowing Minimum interruption in edge Broad Fillet	There are 2 types of softness created by line quality Smooth free flowing curves Fuzzy outline	White Cool colours tints light Pastel shades of all Gradial change in color in the form
Hard	Assymetric or Symmetric Not curvilinear Rigid	Sharp Defined	jagged lines Interrupted Broken Lines	Grey, Blackish Different Color Patches
Delicate	Fine Soft smooth	Single flow Surface transition - High radii	Continuous Dynamic Smooth Fine	Mild , Subtle Pastels, Soft Pleasing Transparent
Rugged	uneven Multi Planar Fragmented crude geometry dissimilar	jagged irregular barbed rough ridge uneven	Short broken uneven sharp angles	earthy palette camouflage outdoor
Warm	Asymmetric, Smooth curvature	Round and smooth edges	continous curved lines	Soft,pastels,warm colors
Cold	Symmetric, Geometrical	Clear and sharp edges	Straight & continuous lines	Dull color (gray shades)

Expression	Surface:Matte, glossy, transparent etc	Texture: Surface quality, Texture etc	Proportion:Width, Breadth, height	Scale	Orientation
Soft	Matte surface Can be glossy	smaller scale becomes soft Soft texture should be smooth to touch	1 : 1 to 1 : 2.5	–	–
Hard	Matte or Glossy Translucent(acceptable) Opaque(preferable)	Smooth or Grainy Coarse	1:1 to 1:4	–	–
Delicate	Matte - importance to form Transparent but not fragile	Smooth Subtle Soft	Lean Extended Elongated 1:1:2 to 1:2:5 with varying orientations and mass distribution		
Rugged	Matte and metallic Intersection of multiple materials	Worn out and Precipitous multiple abrasions rusted or scarred cracked	1:1:1 to 1:5:7 Sturdy and Robust		
Warm	Matte,fine granular	soft,smooth	1:1:1 to 1:2:4	medium to large	
Cold	Metallic/Matt, regular surface	even surface	2.1:0.5	medium	

Expression	Form: Curvature, Symmetry etc	EDge Quality: RAdius, Fillet etc	Line Quality	Color
Precise	geometrical, symmetrical clear curvatures	sharp edges	straight continuous lines, or very clearly defin	metallic colours
Gross	Lumpy, bulky, bulbous, irregular	Fuzzy, uneven, inconsistent	Uneven	Preferably earthy, dark tones
Fragile	symmetrical weak and sharp connections breaks with a sound, hard but slendor, less visual weight	uneven more rigid and brittle fine more detailed	fine lines not continuous	acromatic transparent colour
Strong	symmetrical more grounded more stable well built sophisticated optimum	subtle fillet less protrusions	less number of lines less broken lines line is well defined	dark colours colour with a visual mass
Masculine	A mix of strong, hard, cold and rugged expressions But not too prominent that it should not incline towards to any one of expressions. It can also be a little bit warm and soft. But it all depends on what kind of "masculine" you are taking/ talking about.	see Hard, Rugged, Precise, Cold & Strong. Just take minimum elements from all of these or few or one of these	see Hard, Rugged, Precise, Cold & Strong. Just take minimum elements from all of these or few or one of these	see Hard, Rugged, Precise, Cold & Strong. Just take minimum elements from all of these or few or one of these
Feminine	Soft Delicate Clean Organic Shapes Light-weight	Round Smooth Free from angular corners	Thin Continuous Curvy	Bright and warm Colour Fresh Colour Pale Colour

Expression	Surface:Matte, glossy, transparent etc	Texture: Surface quality, Texture etc	Proportion:Width, Breadth, height	Scale	Orientation
Precise	glossy/ matte / transperent	smooth, mirror finish	1:1.6:<5	medium	
Gross	Matte and glossy	Coarse, uneven	1:1:1 to 1:1:0.5	medium to large	
Fragile	glossy transparent	hard glossy	1:1:>10	less the scale more fragile	
Strong	matte glossy	brushed knitted metallic smooth	1:01:01	Not dependent on scale	
Masculine	see Hard, Rugged, Precise, Cold & Strong. Just take minimum elements from all of these or few or one of these	see Hard, Rugged, Precise, Cold & Strong. Just take minimum elements from all of these or few or one of these	see Hard, Rugged, Precise, Cold & Strong. Just take minimum elements from all of these or few or one of these		
Feminine	Sleek Glossy Flimsy Glamorous	Soft texture Decorative Flower patterns	Smooth and pointed to one end Shrink in the middle (like Hourglass)	Small to Medium	

6. Quantitative study

Fig 8

Experiment and analysis

1. A set of eight images of appliances were selected for each expression

2. Subjects were asked to rate the products relatively, while eye tracking is done during this process

3. Subjects were shown the images again and asked to analyze the details of the products that contributed to their expression

4. An analysis of verbal vocabulary and eye tracking is done for each expression

6.1 Equipment used and protocols

- **Brand** : SensoMotoric Instruments
- Remote eye tracker
- **Setup**: placed in a fixed location in front of the participant
- Participants are positioned in front of the eye tracker and only limited head movement is acceptable.
- Think aloud protocol is followed

Fig 9

6.2 Test subjects

20 people participated in the eye tracking test and all the participants are designers

6.3 Soft

Users were asked to rate the images relatively on the scale of one to ten, where ten is the most soft and one is the least soft. The scores of the images is shown below each image.

Fig 10

7

Fig 11

6.8

Fig 12

6.3

Fig 13

6

Fig 14

6

Fig 15

5.5

Fig 16

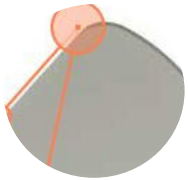
5

Fig 17

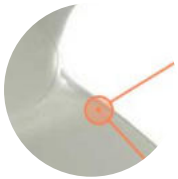
3.8

Analysing fixation points

Flushed surface near joining part making it look like one single form transition ,smooth finish, rounded surface, glossy surface white tint



Filleted corners, continuous flow of edge line



Free flowing form, partitions lines are barely visible, white tints , flushed surface near the joining of parts, organic flow of form

Matt finish surface, rounded edges, plastic, also feel like silicon or rubber, undulated surface, soft pastel shades, matte finish, curved lines, soft pastel colors

Matte finish, soft plastic feel, curved line, no visible protrusions, all surfaces are flushed to same surface level, pastel colors and silver is slightly glossy

Matte finish, light pastel colour and bold font is used for logo, logo is printed on the surface.

6.4 Hard

Fig 18

8.1


Fig 19

7.5


Fig 20

6.4


Fig 21

5.7


Fig 22

4.8

Fig 23

4.6

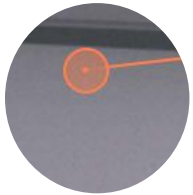

Fig 24

3.7


Fig 25

3.5

Analysing fixation points



Matte surface, glossy, translucent, opaque, smooth surface, geometric , rigid shape, sharp defined lines, tapered edges, shades of grey and blackish color

Matte surface, opaque surface, smooth surface, straight lines, slight filleted edges and shades of grey, 90 degree angular edges

Matte and slightly reflective surface, stepy surface, broad fillet

Glossy finish, chrome or metallic surface, sharp edges, boxy form, chrome details , straight surface bends , broken lines

Smooth and reflective surface, hard plastic, geometric form, jagged lines and straight lines, dark colours

Metallic surface, steel or hard plastic, straight lines, slightly filleted edges and metallic or shades of grey

6.5 Delicate


Fig 26

7.5

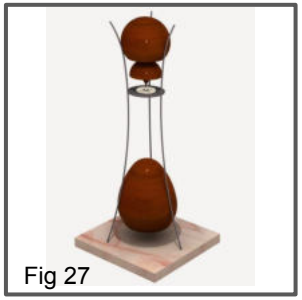


Fig 27

7.5


Fig 28

7.5

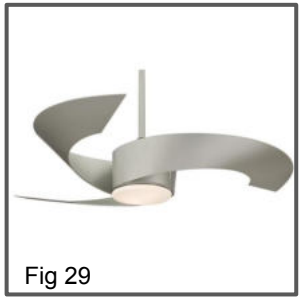


Fig 29

7.25


Fig 30

7


Fig 31

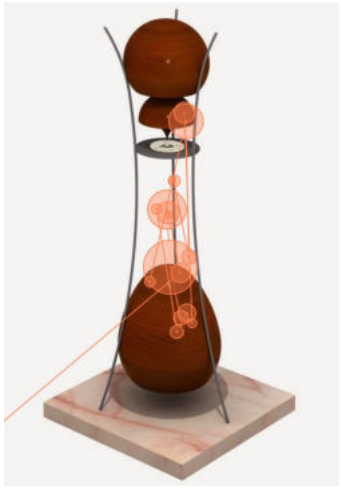
6.5

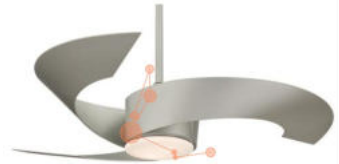

Fig 32

6.5

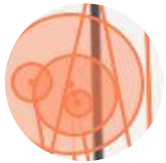

Fig 33

6





Smooth, subtle, steel , matte , single flow, high radii, chrome color, minimum surface contact between parts,



Smooth surface, steel soft, fine , single flow lines , high radii, achromatic color

Glossy, matte, steel , round surface, smooth , soft surface, continuous and linear line

Glossy surface, hard plastic or, curved line, less filleted edges, tints of white, silverish

Translucent, tint of white, convex curve, free flowing surface , curved parting line, whitish

6.6 Rugged


Fig 34

8


Fig 35

8

Fig 36

8


Fig 37

7.5

Fig 38

7.5

Fig 39

7

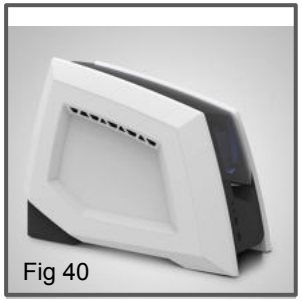


Fig 40

7

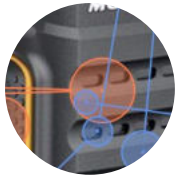

Fig 41

6.5

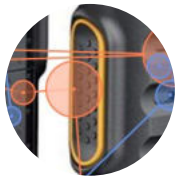
Matte, multiple layers, hard rubber, hard plastic, short, broken , blackish , dark grey, logo is protruding

Uneven, multilayered, metal or hard plastic, jagged , short broken and uneven lines, sharp edges, dark grey , blackish colors, worn out, multiple abrasions, cracked

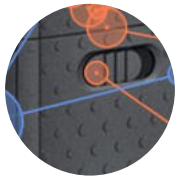
Engraved details on surface, logo is engraved on the surface , strong parting lines, dark grey and blackish colours



Multi layered, hard plastic, matte, metallic , short , broken , filleted edges, dark grey



Grill patterns, protruding elements,strong partition lines , smooth surface , rigid , uneven filleted, chamfered edges, dark grey colors



Barbed surface, filleted edges, geometrical shaped details

6.7 Warm


Fig 42

8


Fig 43

7


Fig 44

7


Fig 45

6

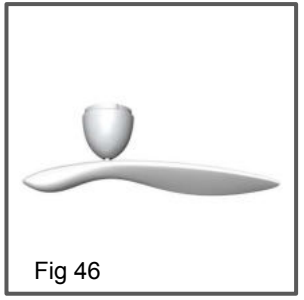


Fig 46

6


Fig 47

6


Fig 48

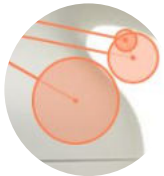
6


Fig 49

5

Asymmetric , smooth curvature, ceramic ,plastic, matte , soft , smooth, filleted edges, continuous curved lines, tints of white or soft pastel colours

Smooth Form transition from bigger radius to smaller radius, smooth curvatures



Thin partition lines, organic form transition, undulated surfaces

soft , glossy , curved surfaces , round profile details, shades of white,plastic , ceramic material

Smooth curvature , continuous curved lines, rounded and smooth surface

6.8 Cold

Fig 50

7


Fig 51

7


Fig 52

6


Fig 53

6


Fig 54

5


Fig 55

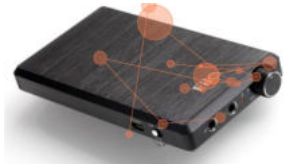
6

Fig 56

6

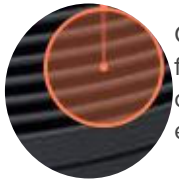
Fig 57

5

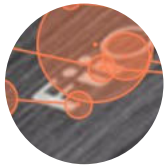


Even surfaces, flat surface, matte, metallic , symmetrical , geometrical , clear and sharp edges, straight and continuous lines, grey shades

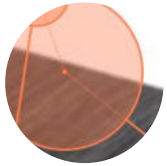
Even surface,clear sharp edges, brushed surface finish, grey shades



Grill pattern curved surface, filleted edges , mono chromatic with less expression and details



Brushed surface, metallic , even surface, engraved logo details, dark grey color



Clear sharp edges, symmetrical and geometrical shapes, even surface

Knurling surface,metallic details, sharp edges , broken and discontinuous edges

6.9 Precise


Fig 58

3


Fig 59

6

Fig 60

5.5


Fig 61

8

Fig 62

5.5


Fig 63

5.5

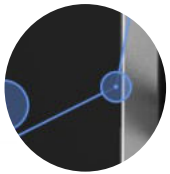

Fig 64

6.5

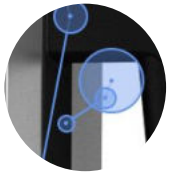

Fig 65

7

Logo positioned geometrically center of the surface, highly polished surface, details are positioned along the median



Sharp linear edge, hdp , mirror finish ,



Straight lines, sharp edges, minimalistic geometric shapes,

Crown is positioned in geometrically in the center, geometric shape,

Chamfered edge, clean flushed transition from glass to metal, highly polished glass surface, matt finish metal

Uniform thickness,

6.10 Gross


Fig 66

8


Fig 67

7.5


Fig 68

7


Fig 69

7


Fig 70

6.5


Fig 71

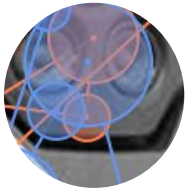
6.5


Fig 72

6.5

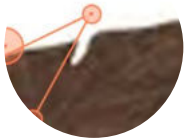

Fig 73

5.5



coarse , uneven surfaces , matte finish , irregular, broken or discontinuous lines, dark tones

Matte surface, mix of curved and straight lines, varying edge radii at different elements of the product. No definite pattern



jagged edges, matte surface , coarse and uneven surface,

Irregular form, earthly dark tones

complicated , irregular form transitions, matt, uneven , coarse texture

6.11 Fragile

Fig 74

7.5

Fig 75

7

Fig 76

7

Fig 77

4.5

Fig 78

6.5

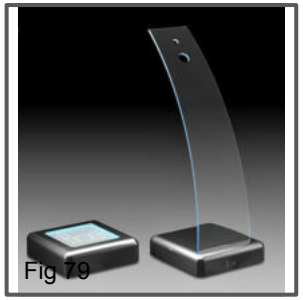


Fig 79

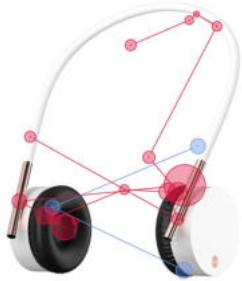
6.5

Fig 80

6.5

Fig 81

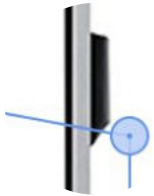
4.5



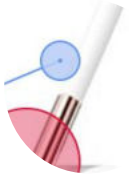
Week connections, hard but slender, fine lines, rigid and brittle, glossy

Fine and more detailed, straight or linear lines , achromatic colours , flat surfaces, matte finish, straight continuous lines

Less visual weight, fine lines , transparent or light colours, continuous curved lines with big radii, shades of white



Less visual weight, hard but slender, achromatic colors,



Smooth form transition, minimum partition lines, glossy finish, round profile, continuous flow of edge lines

Weak visual connections, thin cross sections , visual unbalance in weight

6.12 Strong


Fig 82

8


Fig 83

6.5


Fig 84

9


Fig 85

7.5


Fig 86

7.5


Fig 87

7.5

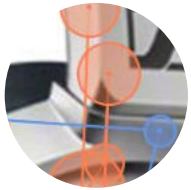

Fig 88

6


Fig 89

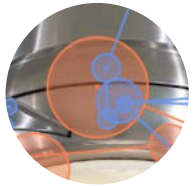
8

Well built, more stable form, subtle fillets,

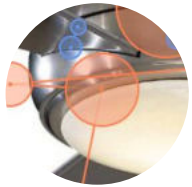


Strong joineries, lines are well defined, shades of grey , black colour, symmetrical form,

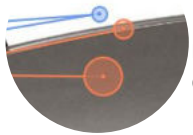
Sophisticated details,



Well built, stable, more grounded and symmetrical, dark colors, colors with visual mass, less protrusions



Lines are well defined , less broken line, glossy finish, subtle fillets,less protrusions



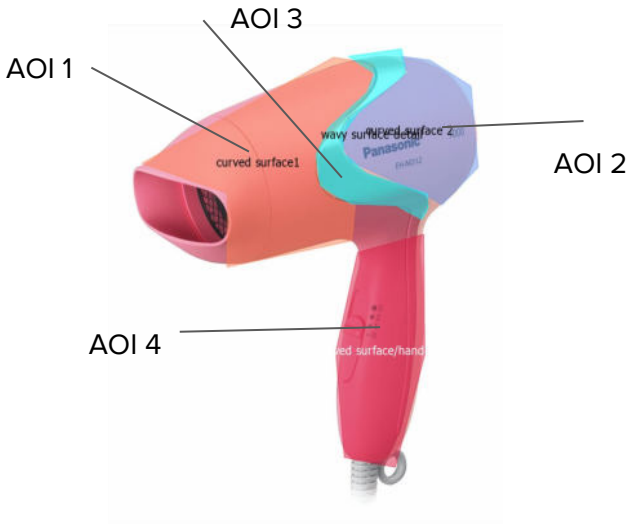
Matt surface, brushed metallic surface, clean sharp edges

6.13 Summary

	Form	Surface	Surface quality	colour	Line	Edge quality
Soft	Free flowing, continuous, organic symmetric	Matte Glossy	Soft and smooth surface	Cool or light pastel colors, tints of white	Smooth free flowing curves, fuzzy outlines	No sharp edges Filleted corners Continuous edges , broad fillets
Hard	Symmetric, non curvilinear, regid	Matte , glossy Translucent opaque	Smooth Grainy coarse	Earthly colours Shades of grey Blackish	Jagged lines Broken lines	Sharp Defined
Delicate	Fine soft smooth	Matte Transparent but not fragile	Smooth Subtle soft	Mild Subtle Pastel transparent	Continuous Smooth Fine High radii	Single flow surface transition-high radii
Rugged	Uneven Multiplanar Crude geometry, fragmented	Matte Metallic Intersection of multiple materials	Worn out and perceptions, Multiple abrasions, protrusions and depressions	Earthly colors Shades of grey blackish	Short broken Uneven Sharp angles	Jagged irregular Uneven Barbed rough

	Form	Surface	Surface quality	color	Line	Edge quality
Warm	Asymmetric, smooth curvature	Matte , Fine granular	Soft smooth	Soft Pastel Warm colors	Continuous curved lines	Round and smooth edges
cold	Symmetric , geometrical	Matte metallic	Even surface	Grey shades	Straight lines	Clear and sharp edges
Precise	Geometrical Symmetrical	Glossy , matte transparent	Smooth Mirror finish	Metallic colors Dark shades	Straight continuous lines , clear lines	Sharp edges
Gross	lumpy , bulky , irregular ,	Matte glossy	Coarse uneven	Earthly colours Dark tones	uneven	Fuzzy uneven inconsistent
Fragile	Week and sharp connections, hard but slender, less visual weight	Glossy transparent	Hard glossy	Achromatic Transparent colors	Fine lines Not continuous	More rigid and brittle, fine, uneven, more detailed
Strong	Symmetrical More grounded More stable Well built sophisticated	Matte glossy	Brushed Knitted Metallic Smooth	Dark colors Colors with visual mass	Line is well defined, less broken lines	Subtle fillets, less protrusions

7. Advanced analysis future scope



Creating area of interest in the product

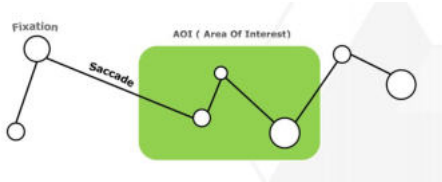
A precise analysis can be done using the data generated through eye tracking. By creating Area of interest in the product and studying different analysis like dwell time, glance duration, diversion duration , glance duration and hit ration one can understand the precise eye movements during the test.

7.1 Definitions

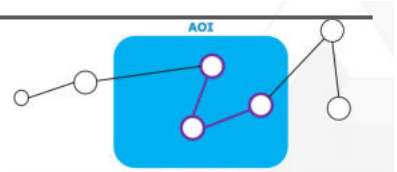
Fixation: the state when the eye remain still over a period of time

Saccade: the rapid motion of the eye from one fixation to another

Area of interest : is used to include or exclude certain areas for analysis

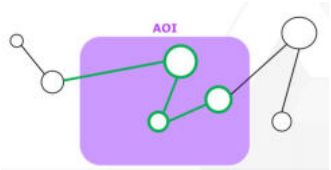


Dwell time: a dwell is defined as one visit in an AOI, from entry to exit (Measure: sum of duration from all fixations and saccades that hit the aoi)



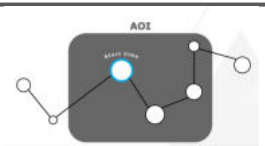
Net dwell time: the time at which the particular subjects eye enters the aoi until it leaves the AOI(sum of sample durations for all gaze data samples that hit the AOI

Glance duration: saccade duration for entering the object + sum of all fixation durations and saccade durations before the eyes began to leave the AOI(dwell time+ duration of saccade entering AOI)

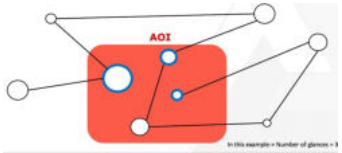


Diversion duration: sum of saccade durations for entering and leaving the the object+ sum of all fixation durations and saccade durations before the eyes begin to leave the AOI(glance duration+duration of saccade leaving AOI)

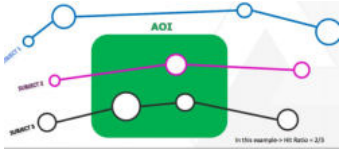
Duration before: start time of first fixation to enter the AOI



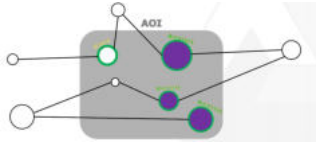
Glances : number of glances to a target(saccades coming from outside) within a certain period(increment the counter each time a fixation hits the AOI, if not hit before)



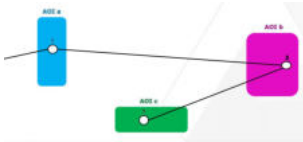
Hit ratio: how many subjects out of the selected subjects looked at least one time into AOI



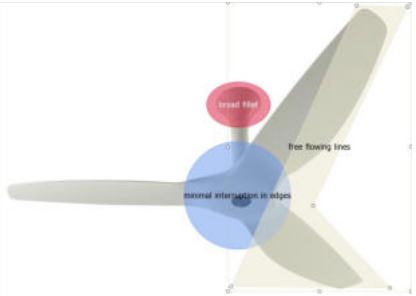
Visits and revisits: glances are also called visits

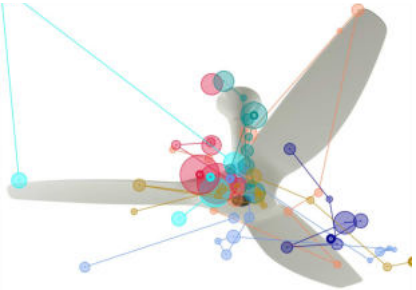


Sequence: order of gaze hits into the AOIs based on the entry time(lowest entry time=first in sequence)



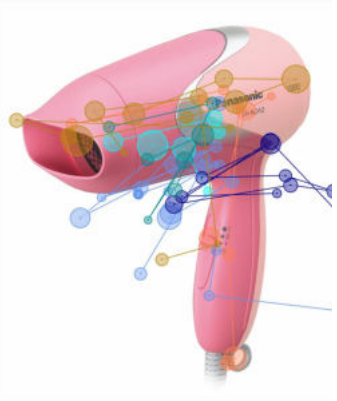
7.2 AOI statistics for soft





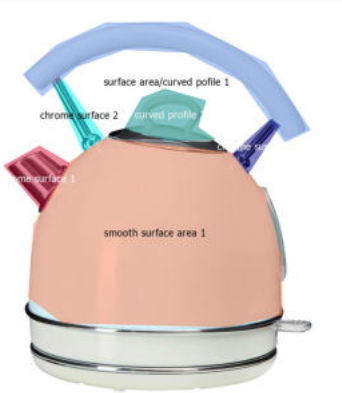
Area of Interest	AOI Order	AOI Size [px]	AOI Coverage [%]	Start Time [ms]	End Time [ms]	Entry Time Average [ms]	Sequence	Net Dwell Time Average [ms]	Dwell Time Average [ms]	Glance Duration Average [ms]	Diversion Duration Average [ms]	First Fixation Duration Average [ms]	Glances Count Average
free flowing lines	1	174314	13.3	0	12973	3043.1	3	636.6	491.7	528.6	659.4	122.2	1.1
broad fillet	2	21927	1.7	0	12973	4661.2	4	471.8	420.6	443.4	503.1	125.1	1.3
minimal interruption in edges	3	86829	6.6	0	12973	716.5	2	2774.1	2549.6	2720	2910.6	213.2	3.3
White Space	4	1040603	79.4	0	12973	40.5	1	1549.2	1307.4	1594.6	1731	253	3.4

Area of Interest	Revisits Average	Fixation Count Average	Appearance Count Average	Visible Time Average [ms]	Visible Time Average [%]	Net Dwell Time Average [%]	Dwell Time Average [%]	Fixation Time Average [ms]	Fixation Time Average [%]	Subject Hit Count	Subject Hit Count [%]	Revisitors Count
free flowing lines	0.1	2	1	7722.4	100	11	8.7	437.6	7.7	5	71.4	3
broad fillet	0.3	1.4	1	7722.4	100	4.8	4.1	420.6	4.1	4	57.1	3
minimal interruption in edges	2.3	7.9	1	7722.4	100	34.2	31.2	2327.9	28.5	6	85.7	6
White Space	2.4	5.1	1	7722.4	100	23.1	19.4	1142.6	16.3	7	100	7



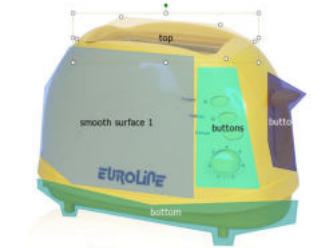
Area of Interest	AOI Order	AOI Size [px]	AOI Coverage [%]	Start Time [ms]	End Time [ms]	Entry Time Average [ms]	Sequence	Net Dwell Time Average [ms]	Dwell Time Average [ms]	Glance Duration Average [ms]	Diversion Duration Average [ms]	First Fixation Duration Average [ms]	Glances Count Average
wavy surface detail	1	25404	1.9	0	6503	3141.1	5	227.4	159.2	221.7	230.3	110.9	0.6
curved surface/handle 3	2	69605	5.3	0	6503	1185.3	4	326.8	167.7	264.3	434.8	65.4	0.7
curved surface 2	3	55933	4.3	0	6503	1054.9	3	454.7	409.3	494.5	593.9	119.4	1
curved surface1	4	100612	7.7	0	6503	730.8	1	669.2	562.8	650.9	710.6	173.3	1.3
White Space	5	1061422	81	0	6503	849.4	2	1317.7	1043.3	1236.6	1370.2	179	2.4

Area of Interest	Revisits Average	Fixation Count Average	Appearance Count Average	Visible Time Average [ms]	Visible Time Average [%]	Net Dwell Time Average [%]	Dwell Time Average [%]	Fixation Time Average [ms]	Fixation Time Average [%]	Subject Hit Count	Subject Hit Count [%]	Revisitors Count
wavy surface detail	-	0.7	1	4695.6	100	4.9	3.8	156.4	3.7	3	42.9	1
curved surface/handle 3	-	0.9	1	4695.6	100	5.7	2.7	164.8	2.6	3	42.9	2
curved surface 2	0	1.7	1	4695.6	100	8	7.3	389.4	6.9	4	57.1	2
curved surface1	0.3	1.9	1	4695.6	100	14.1	12.3	500.3	10.8	5	71.4	3
White Space	1.4	4.3	1	4695.6	100	23.2	18.5	989.3	17.5	6	85.7	4



Area of Interest	AOI Order	AOI Size [px]	AOI Coverage [%]	Start Time [ms]	End Time [ms]	Entry Time Average [ms]	Sequence	Net Dwell Time Average [ms]	Dwell Time Average [ms]	Glance Duration Average [ms]	Diversion Duration Average [ms]	First Fixation Duration Average [ms]	Glances Count Average
curved profile 2	1	18715	1.4	0	9327	4538.4	6	244.5	176.3	219	236	79.6	0.6
chrome surface 3	2	5879	0.4	0	9327	1311.3	2	34.1	31.3	36.9	42.6	31.3	0.1
chrome surface 2	3	7708	0.6	0	9327	-	-	11.4	0	8.5	8.5	0	0
chrome surface 1	4	13309	1	0	9327	2331.9	4	108	93.8	99.5	122.2	93.8	0.3
surface area/curved pofile 1	5	56710	4.3	0	9327	2616.4	5	62.5	54	62.5	62.5	34.1	0.1
smooth surface area 1	6	247361	18.9	0	9327	504	1	1918.9	1705.7	1901.9	2007.1	144.9	3.6
White Space	7	962025	73.4	0	9327	1618.9	3	1128.6	918.2	1049	1248	125.1	2.9

Area of Interest	Revisits Average	Fixation Count Average	Appearance Count Average	Visible Time Average [ms]	Visible Time Average [%]	Net Dwell Time Average [%]	Dwell Time Average [%]	Fixation Time Average [ms]	Fixation Time Average [%]	Subject Hit Count	Subject Hit Count [%]	Revisitors Count
curved profile 2	-	0.6	1	5954	100	2.7	1.9	176.3	1.9	2	28.6	1
chrome surface 3	-	0.1	1	5954	100	0.5	0.4	31.3	0.4	1	14.3	0
chrome surface 2	-	0	1	5954	100	0.1	0	0	0	0	0	0
chrome surface 1	-	0.3	1	5954	100	1.3	1.1	93.8	1.1	2	28.6	0
surface area/curved pofile 1	-	0.3	1	5954	100	0.7	0.6	48.3	0.5	1	14.3	0
smooth surface area 1	2.6	6.9	1	5954	100	28.8	25.8	1461.3	22.3	6	85.7	5
White Space	1.9	4.3	1	5954	100	15	11.7	869.8	11	5	71.4	4



Area of Interest	AOI Order	AOI Size [px]	AOI Coverage [%]	Start Time [ms]	End Time [ms]	Entry Time Average [ms]	Sequence	Net Dwell Time Average [ms]	Dwell Time Average [ms]	Glance Duration Average [ms]	Diversion Duration Average [ms]	First Fixation Duration Average [ms]	Glances Count Average
top	1	30790	2.3	0	8819	4724.5	5	14.2	28.4	28.4	34.1	28.4	0.1
bottom	2	44254	3.4	0	8819	3438.4	4	65.4	45.5	59.7	62.5	45.5	0.3
button 2	3	16495	1.3	0	8819	4963.2	6	105.1	96.6	102.3	110.8	48.3	0.1
buttons	4	43433	3.3	0	8819	1638.8	3	915.4	864.2	938.2	995	196.1	1.4
smooth surface 1	5	143390	10.9	0	8819	622.7	1	1276.5	1160	1278	1437.2	170.6	2.6
White Space	6	1032199	78.8	0	8819	771.3	2	852.8	621	723.3	773.1	174.8	1.9

Area of Interest	Revisits Average	Fixation Count Average	Appearance Count Average	Visible Time Average [ms]	Visible Time Average [%]	Net Dwell Time Average [%]	Dwell Time Average [%]	Fixation Time Average [ms]	Fixation Time Average [%]	Subject Hit Count	Subject Hit Count [%]	Revisitors Count
top	-	0.1	1	6111.9	100	0.4	0.3	28.4	0.3	1	14.3	0
bottom	-	0.3	1	6111.9	100	1	0.7	45.5	0.7	2	28.6	0
button 2	-	0.3	1	6111.9	100	1.2	1.1	93.8	1.1	1	14.3	0
buttons	0.4	3.1	1	6111.9	100	13.6	13	793.2	12	6	85.7	3
smooth surface 1	1.6	4.4	1	6111.9	100	22.4	18.5	1094.6	17.4	7	100	4
White Space	0.9	2.7	1	6111.9	100	14	11.7	592.7	11.3	6	85.7	4

7.3 OBSERVATIONS

- Sequence -- The soft curved surfaces is the first one noticed in most of the soft products among all AOI’s
- Revisits count-- the soft curved surface has more revisit count in all the soft products among all AOI’s
- Fixation count---the soft curved surface has the highest fixation count among all AOI’s
- The subject hit count, diversion duration average glance count average all show the soft surface area in the product has more impact than other details

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