Identification & Classification of Semantic Units Used in Formation of Patterns in Kundan Jewellery, a Methodical Approach.

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Abstract

India has a rich tradition of jewellery and there are a number of styles of jewellery making in practice, each with its uniqueness, special forms and style. Kundan is a type of traditional Indian jewellery that uses a framework of gold crafted in intricate details it utilizes chips of diamond, raw or minimally polished for the purpose of setting. Backside of kundan jewellery is embellished with hard enamel, typically red green and red blue colours that make back side of jewellery equally pleasurable to look at; an unusual but important feature that makes the jewellery wearable from both sides.

Kundan work has fine geometry and achieves amazing level of symmetry using rough shapes of gemstones that may or may not be a symmetrical or homogeneous assortment. It requires excellent craftsmanship and intelligent arrangement of stones in their place to achieve an aesthetically pleasing composition.

In recent times, kundan has made a comeback as a prominent style. Articles are very expensive both in fiscal and work demanding terms. The process of making jewellery starts by taking a strip of gold and bending it in a variety of shapes in multitude, those are subsequently assembled on a base plate. Kundan, Jewellery is handcrafted piece by piece to assume form clusters that in turn form a complete piece.

This study is focussed at identification of smallest semantic units that are used in kundan jewellery. For purpose of identification literature, artworks, works in progress were studied in depth. Jewellery showrooms, Shop floor surveys were conducted along with in depth interviews with experts in field. Findings were presented to group of experts and academics, their suggestions were incorporated in documentation.

A total of ninety one smallest semantic units that are used in design of kundan jewellery, were identified during path of research. These were classified into five categories based on geometry. These semantic units alone or in combination with other units in meticulous manner create kundan jewellery.

Introduction

India has a rich tradition of jewellery and there are number of styles of jewellery making in practice, each with its uniqueness, special forms and style. Kundan jewellery is a particular type (of jewellery) that utilizes chips of diamond, raw or minimally polished for the purpose of setting, thereby giving an article its classical look (Figure1). This type of jewellery is motivated by the old Indian concept of retaining maximum weight of diamonds and gemstones, used as they were naturally found or minimally faceted. This typical use of diamonds and gemstones is in contrast to western concept of polishing them for maximum brilliance or fire, in formal brilliant cuts (Pagel-Thiessen1993:174) (Snowman 1990:182-185). Properties of carat weight and quality of cut (that determines the fire inside the diamond) are diametrically opposite to each other. If a polisher tries to retain weight it compromises optical properties and vice versa.

Figure1- Kundan as a style of setting

Kundan jewellery has a structural framework of gold crafted in intricate details. The gemstone is set from the front using a foil of very high purity gold foil. For the purpose of setting a very thin foil is rolled in a mill, at such fineness and low thickness gold becomes very pliable. Parts and pieces of this foil are pressed in cavities left around the gemstone, partly set with setting paste. By pressing layer after layer of gold, space around gemstone is slowly filled with solid gold, this pressing is done by a pointed tool that gives good pressure and negotiates tight corners to get a flush stone close setting (Untracht 1985:614). Sometimes mild heat is applied to fuse gold together. Gold surface holding gemstone in place is evened out using an engraver that leaves behind a lustrous surface. This method is also used to make gold patterns over a variety of substrates like conch shell, ivory, precious and semi precious gemstones like agate and marble. To achieve a pattern as if gold is inlaid on surface, first pattern is traced on surface. Thereafter holes are drilled in key locations that act as nodes and anchor points. These points are filled with gold pins (or foils or both) that work as base and anchor for successive gold work. Gold in form of foils is worked on it and layers deposited to get desired shape. Excess gold is trimmed using engravers. Ultimately the surface appears as gold is inlaid into it (Sharma, Varadrajan 2008:111).

Kundan work has a well-defined geometry and amazing level of symmetry are achieved using rough shapes that may not be uniform and symmetrical like round brilliant cuts. Work requires excellent craftsmanship and clever arrangement of stones in their place to achieve an aesthetically pleasing composition. "Janchana" (Hindi, Guajarati- to make look beautiful) is a process of looking at composition before actual setting takes place. A Photostat or tracing of design is taken and stone composition is checked over this acting as background. There may be several trial and errors before a stone finds its right place and orientation. Once the craftsman is satisfied with his scheme of things, actual setting takes place.

Backside of kundan jewellery is embellished with hard enamel typically red green and red blue colours. This makes back side of jewellery equally pleasurable to look at a feature that makes jewellery wearable from both sides, the backside may often be better than front(Sharma, Varadrajan 2008:21) Enamel also works as security feature for settings which gets disturbed if a stone is taken out and set again with a lower carat or inferior quality stone.

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Need for research

Kundan jewellery has made a comeback in recent years and re-established as a classical style. The work is intensive both in terms of efforts and material. There is a vacuum of methodical study in domain of kundan. Some material was available in the form of photographic documentation or in books on jewellery (Balakrishnan 2006:103-141). Other source for kundan was jewellers in possession of material either in form of designs or articles (ready and semi finished) they were initially reserved in sharing the

same. This style of jewellery has a visual language of its own but no cataloguing is available, to understand and describe, in a systematic manner.

Methodology

Research in domain of jewellery needed an approach demanding delicacy and subtlety. Information and resources are not easily available and rather protected for the fear of competition by other jewellers. This research was conducted by adopting proven research methodology, as suggested by researchers (Hair et al. 2005, Kothari 2002) from time to time for different cases. In present study, Jewellers and kundansaaz were approached for preliminary learning. Each and every approachable person was interviewed at length. These interviews were intended for following purpose

a) To understand the importance of kundan Jewellery in India

b) Understand their essential visual features, their usage in Kundan and application in design

It took time, efforts and confidence building measures to win their trust to have access to these resources. These interviews helped in better understanding of subject from professional's point of view.

For purpose of study, material from various sources was collected and studied (Shajahan2004:137). Primary sources were photographs in books, photographs of articles, sketches and renderings by those practicing kundan. Study material from various sources were compiled and studied in a methodical way by labelling individual semantic units and tabulate them. This whole exercise led to identification of a total of 99 basic semantic units along with their basic descriptions. These findings were validated by series of experts (four Jewellers, five kundansaaz and four designers) practicing kundan Jewellery. Finally 99 unites were retained, while those found to be replicating in terms of shape or not carrying unique design measures, were deleted. A chart of these semantic units was prepared as a foundation for further classification.

Smallest Semantic Units

Jewellery has an overall form for any given article like ring, pendent, bracelet, neck piece or ear pieces. This overall form is a collection of sub assemblies as form clusters (Figure2). A Form clusters in turn is made of units that are geometric or inspired by nature. These are "smallest semantic units" elemental building blocks of jewellery, they are used alone or in combination with other such units an aesthetically pleasing composition to make a "form cluster".

Figure2. Kundan Necklace, smallest semantic units & form

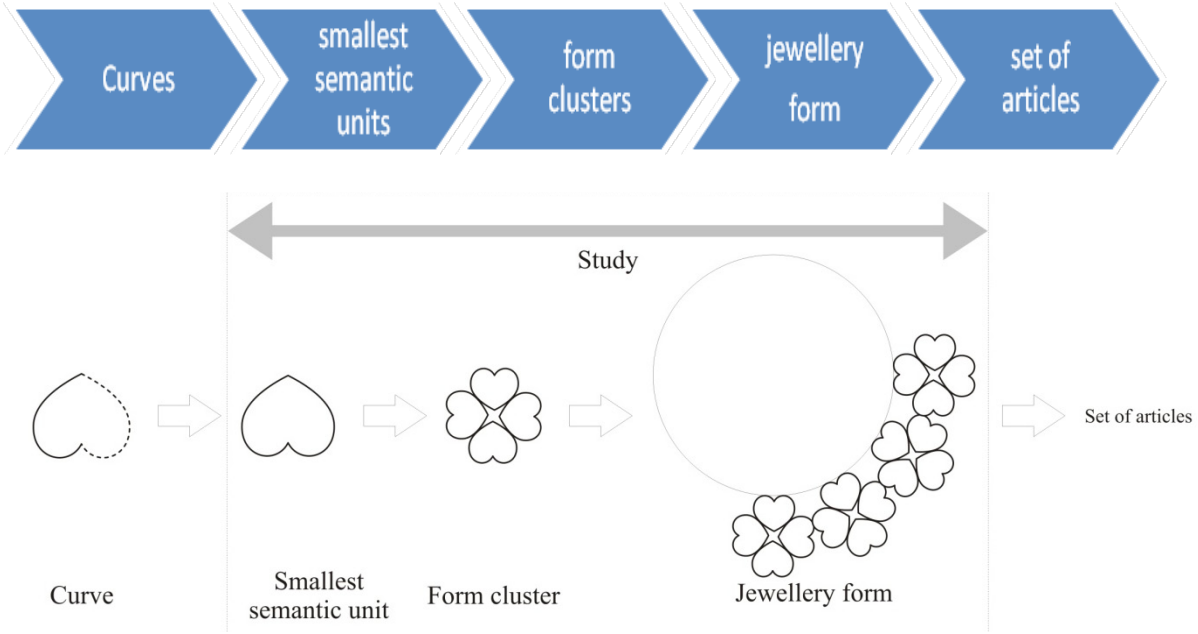


Figure3- Progression from basic curves that make smallest semantic units to a set of jewellery

A progression from basic curves that make smallest semantic units to a set of jewellery comprising of various articles could be seen as

- Curves
- Smallest semantic units
- Form clusters
- Jewellery (overall form)
- Set of articles (following a theme)

Illustration (Figure3) is to articulate length and breadth of research, which is from smallest semantic units to overall jewellery form. Accordingly, Semantic units identifiable by names are basic units of construction of jewellery, if further divided into curves, meaning is lost. Semantic units have their own symbolism and draw inspiration from nature, both plant and animal (Sharma, Varadrajan 2008:10). In this study 99 smallest semantic units are identified that were individually identifiable by their names like Koile, daudi paan and jau etc. These smallest semantic units, by way of analogy of letters (and ligatures) of alphabet, were used in combination with other semantic units to constitute form clusters (words), these in turn are used to form the article (sentences) and sets (paragraphs as, several coherent lines on a theme). (Jewellery articles, a neck piece, two bangles, a mangteeka and a pair ear rings constitute a basic set.

Analysis (Tabulation)

The semantic units were recognized by their names; it was derived by their particular geometric shapes and used in communication among kundanssaz community. The rational was based on resemblance to a known geometric

Figure4- Smallest Semantic Units identified by their names

shape like polygon, closed curve or forms from nature like birds, flowers and leaves.

This identification of a smallest semantic unit with a name makes description and articulation of a design more effective, illustrated as follows (Figure4).

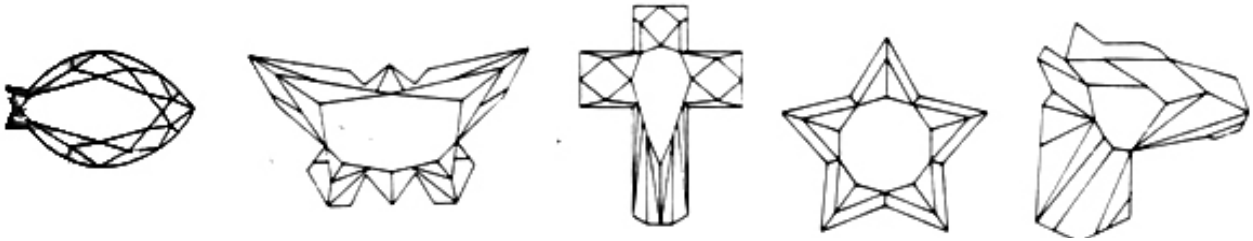
Classification of Smallest Semantic Units

A cataloguing provides a platform for further study that acts as reference. This tabulation is a register from which semantic units are further classified into five categories for ease of understanding.

In diamond polishing industry, a manner of naming based on appearance and resemblance to a known form (Figure5a&b) was followed in classification of fancy brilliant cut diamonds (Pagel-Thiessen1993:171-173). Drawing reference, this classification was based on basic geometric shape or resemblance. These categories provide a methodical way to look at them as a group following similar geometric ideology (ibid 255-258).

This method of classification was found suitable and adapted for classifying Semantic units used in kundan relatively large category hence, further divided in four sub categories.

Further fancy cuts of diamonds



Fish Butterfly Cross Star Horse's head

Figure5a- Naming based on appearance and resemblance

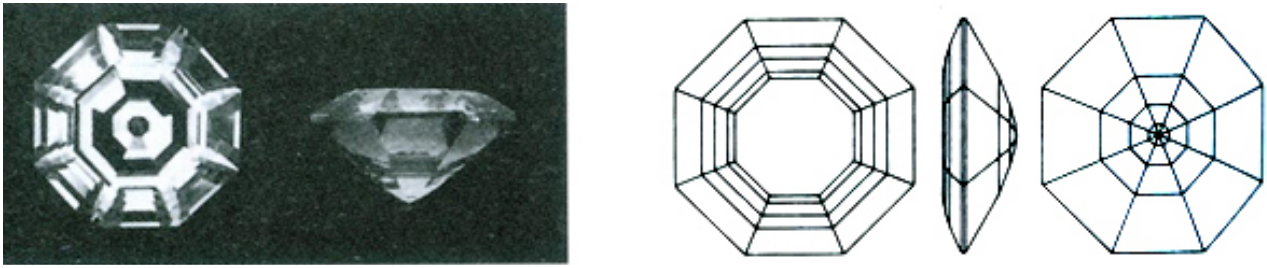


Figure 5b- Naming based on appearance and resemblance

jewellery. Identified 99 semantic units were classified into five broad categories. Category of sphenoid was a relatively large category hence, further divided in four sub categories.

1. Two axis of symmetry- These smallest semantic units had two axis of symmetry that is they were symmetric around two axes, vertical as well as horizontal. Conics (Circle& ellipses) and various uniform polygons fall in this category. Forms that were made by replacing sides of an even sided polygon by a modified curve also come under this category.

2. One axis of symmetry- These smallest semantic units had one axis of symmetry, either vertical or horizontal. Shapes like Heart, club, spade, cup, half moon and polygons with unequal opposing sides fell in this category.

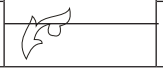
3. Rotational symmetry- these smallest semantic units were made up of floral motifs that were having rotational symmetry (inversion around a point is visible). Indian swastika is a classical example of such an inversion, in this study there was one such member kery chowfuliya.

4. Sphenoid- These smallest semantic units were made up of splines that follow shape of an alphabet (s,c &n) or a wing. Koilee, pankh, Phool and Phool kali constitute this category. This is a large group that was further divided into four sub categories as the name of alphabet suggests S-shape, N-shape, C-shape and Fan shape. This sub classification was driven by the semblance of the shape of alphabet and visual flow of smallest semantic unit.

5. Conjoined–these semantic units were an assemblage of more than one individual unit, which acquire a meaning of their own and are treated as a smallest semantic unit. They had a full thought encompassed within themselves, reflecting in their name. Kamal, chidi and machhli are such semantic units. These semantic units by analogy, for purpose of understanding could be compared to Sanyuktakshar or beej mantra (seed syllable) that is a syllable and a mantra within itself.

Sr. No.	Name	Semantic Units	Description	Classification
1	Choki		A square, used in both vertical and slant configuration	Two axis of symmetry
2	Tikhi Choki / Shakkar para		A square with concave curve forming sharp points	Two axis of symmetry
3	Austpel / Austpehal		An octagon with equal sides & chamfer	Two axis of symmetry
4	Gole Choky		A square with liberal fillets	Two axis of symmetry
5	Lamba Austpel		An octagon with adjoining unequal but equal opposing sides & chamfer	Two axis of symmetry
6	Tikha Austpel		A trapezoidal octagon with two equal opposing sides other two long and short	One axis of symmetry
7	Gole		A circle	Two axis of symmetry
8	Oval / Nim gole		An ellipse or a pillow shape with major axis used vertically	Two axis of symmetry
9	Tikha Chofuliya		A floral motif with four petals made of two concave curvatures meeting at a point	Two axis of symmetry
10	Gole Chofuliya		A floral motif with four petals	Two axis of symmetry
11	Gole chhakliya		A floral motif with five or more petals or cluster of petals	One axis of symmetry
12	Heart/ Daudi		A heart shape resembling a beetle leaf	One axis of symmetry
13	Teda daudi pan		A heart shape with point tilted to one side	Sphenoid - C Shape
14	Tikha Daudi Pan		A beetle leaf shape, skewed and compressed, also called teekha paan	Sphenoid - S Shape
15	Keri Daudi		A shape with two pointed ends and a bulge in between	Sphenoid - C Shape
16	Keri		A mango shape, a often used form in all major styles	Sphenoid - C Shape
17	Keri Dandi		A mango shape, a often used form in all major styles, one point slightly elongated to resemble stem of fruit	Sphenoid - S Shape

18	Kery Choful		A floral motif with four petals made of two concave curvatures meeting at a point and tilted in a direction	Rotational symmetry
19	Siru / bund		A Drop or Pear Shape shaped like a pendeloque	One axis of symmetry
20	Gole Trikon		A triangle or trilobite made by replacing sides of a triangle by an arc of a circle	One axis of symmetry
21	Tikha Pyala		A cup shape resembling a goblet or chalice top, one point made of two concave curves	One axis of symmetry
22	Daudi Pyala		A cup shape roughly resembling a goblet or chalice top, slight skew to one side	Sphenoid - C Shape
23	PyalaPatti		A shape resembling a combination of a chalice and a leaf	Sphenoid - C Shape
24	Pyalapatti1		A shape resembling a combination of a chalice and a leaf, slender and skewed to a side	Sphenoid - N Shape
25	Pyalapatti2		A shape resembling a combination of a chalice and a leaf, stylized	Sphenoid - S Shape
26	Pyala patti3		A shape resembling a combination of a chalice and a leaf, elongated and skewed to a side	Sphenoid - S Shape
27	Ful Pyala		A cup shape resembling a goblet or chalice top, one point made of two concave curves, asymmetric and skewed	Sphenoid - C Shape
28	Shankhala		A conch shape bulbous on top and pointed to bottom	One axis of symmetry
29	Shankh Ful		A conch like spiral shape growing outwards	Sphenoid - C Shape
30	Chhipla		A shape resembling a lobe of pearl oyster	Sphenoid - S Shape
31	Chhipla1		A shape resembling a skewed lobe of pearl oyster	Sphenoid - S Shape
32	Chhipla2		A shape resembling a lobe of pearl oyster with a depression on one side	Sphenoid - N Shape
33	Chand		A Half moon shape like a sickle blade	One axis of symmetry
34	Teda Chand		A skewed half moon shape	Sphenoid - C Shape
35	Chidi1		An abstract bird in flight shape	Sphenoid - S Shape
36	Chidi2		An abstract bird in flight shape, elongated	Sphenoid - S Shape

37	Chidi3		An abstract bird in flight shape, steep skew vertically	Sphenoid - S Shape
38	Shiru pan		A leaf shape sans vein, made of skewed drop	Sphenoid - C Shape
39	Pankh		A wing shape with detail cuts depicting individual feathers	Sphenoid - Fan Shape
40	Jau		A shape resembling wheat or barley seed made of two arcs of a circle	Two axis of symmetry
41	Koyali		A shape resembling leaf made of two sinewy curves	Sphenoid - S Shape
42	Koyali1		A shape resembling leaf made of two sinewy curves, with a slight bulge on one side	Sphenoid - N Shape
43	Lamb Koyali		A shape resembling leaf made of two sinewy curves, with a lean appearance	Sphenoid - N Shape
44	Koyali dandi		A stylized koyali with a taper towards top, heavy bottom	Sphenoid - N Shape
45	Dand Koyali		A stylized koyali with a taper towards top, heavy bottom, one point slightly elongated to resemble stem	Sphenoid - N Shape
46	Koyali Mindi		A stylized koyali with point slightly elongated to resemble stem terminating in one circle called mindi	Sphenoid - N Shape
47	Gole Koyali		A stylized koyali with a prominent bulge to accommodate large stones	Sphenoid - N Shape
48	Daudi Koyali		A stylized koyali with partial features of daudi paan	Sphenoid - N Shape
49	Koyali Khach gole		A stylized koyali with a prominent bulge to accommodate large stones and a notch to one side	Sphenoid - N Shape
50	Khanch Koyali1		A stylized koyali with a notch to one side	Sphenoid - N Shape
51	Khach koyali2		A stylized koyali with slender appearance and a notch to one side	Sphenoid - S Shape
52	Khach koyali3		A stylized koyali with partial features of daudi paan with a prominent s shape	Sphenoid - S Shape
53	gole koyali dandi		A stylized koyali with a mindi fused in body	Sphenoid - S Shape
54	Ti-Koyali mindi		A stylized koyali with three prominent apex showing in one with a mindi fused in body shape	Sphenoid - C Shape

55	Ti-koyali		A stylized koyali with three prominent apex showing in one shape	Sphenoid - C Shape
56	Koyali Pankh		A stylized koyali with three prominent apex showing in one with a mindi fused in end, fan like appearence	Sphenoid - S Shape
57	Koyali pankh2		A stylized koyali with two prominent apex showing in one shape with fan like appearence	Sphenoid - Fan Shape
58	Koyali Patti pyala		A chalice shape with three prominent apex, sharing partial features of a koyali and and a patti	Sphenoid - C Shape
59	Koyali ful		A flower shape composed from a combination of koyalies	Conjoined
60	Mirchi		A shape resembling a chilli pod stylized like a	Sphenoid - C Shape
61	Kalli		A shape resembling a flower bud just opening	Sphenoid - S Shape
62	kaliipatti		A shape resembling a flower bud with partial features of a leaf	Sphenoid - S Shape
63	Dandi Kalli		A shape resembling a flower bud with end stylized and elongated to resemble stem	Sphenoid - C Shape
64	patti dandi		A leaf shape with end stylized and elongated to resemble stem	Sphenoid - S Shape
65	fulpatti		A shape resembling a flower petal with partial features of a leaf	Sphenoid - S Shape
66	Fulpatti1		A shape resembling a skewed flower petal with partial features of a leaf	Sphenoid - S Shape
67	Ful Dandi		A floral motif with two petals and one stylized point elongated to resemble a bud	Sphenoid - S Shape
68	Mindi Jo		A shape resembling wheat or barley seed with partial features of koyli and mindi	Sphenoid - N Shape
69	bel patti		A leaf shape with a long and stylized stem	Sphenoid - N Shape
70	Pandadi		A leaf shape with a prominent bulge to accommodate large stones	Sphenoid - N Shape
71	Jasud patti		A shape like petal of a hibiscus flower	Sphenoid - C Shape
72	golepatti		A leaf shape with an apex and two lobes	Sphenoid - N Shape
73	Patti		A shape resembling a broad leaf with a vein	One axis of symmetry

74	Nim patti		A shape resembling a neem leaf with a vein and cuts	Sphenoid - C Shape
75	Kamal		A stylized lotus shape with five apex	One axis of symmetry
76	Adha Ful		Flower with three petals and one mindi	One axis of symmetry
77	Khach Nakhiya		A shape like an animal nail with a depression to one side	Sphenoid - C Shape
78	Nakhiya		A shape like an animal nail with a depression to one side stylized like tiger claw	Sphenoid - C Shape
79	Parag raj		A shape like stamen of a flower	Sphenoid - C Shape
80	Bati		A shape resembling a flame of a clay lamp	Sphenoid - C Shape
81	Batak		A bird shape resembling a duck or swan	Sphenoid - C Shape
82	More		A stylized peacock motif made of paan, koeli mindi and kali	Conjoined
83	Chidi patti		A shape like a club in cards, with one lobe having an apex	Conjoined
84	Patti		A highly stylized leaf, opening like fern shoots	Conjoined
85	Panch patti ful		A symmetrical flower with five pointed petals top petal centrally placed with or without a hollow centre	Conjoined
86	Tikha che fulliya		A symmetrical flower with six pointed petals top petal centrally placed with or without a hollow centre	Conjoined
87	Pattiya		Cluster of leaves usually three or more	Conjoined
88	Ful		A highly stylized flower blossoming	Conjoined
89	Kamal patti		A lotus motif with or without stem and leaves	Conjoined
90	Ful pyala		A floral motif with two petals and lamba pyala	Conjoined
91	Machhli		A highly stylized fish motif	Sphenoid - N Shape

92	Cut Patti		A leaf cut from the sides	Sphenoid - C Shape
93	Gole Pyala		A cup shape resembling a goblet or chalice with a round top	Sphenoid - C Shape
94	Mindi Dandi		A shape resembling a comma made of a mindi and a dandi	Sphenoid - C Shape
95	Patang		A kite shape made of two convex and two concave arches	One axis of symmetry
96	Tikha Pan		A beetle leaf shape, skewed and compressed, with three apex	Sphenoid - N Shape
97	Mindi style		A stylized s mirrored and terminating into two mindi shaped	Sphenoid - N Shape
98	Ful Kalli		A flower and a bud shape stylized termination	Conjoined
99	Gole Trikone1		A triangle or trilobite with rounded corners	One axis of symmetry

Table1- smallest semantic units, description and classification

Implication of Research & Conclusion

This research provided besides a cataloguing, an understanding of semantic units that can be applied to design as tabulated in (Table 1). There was no definite way available to understand and articulate Semantic units. This cataloguing provides a basis for communication by making known, a part of, visual language of kundan. Used in form of a visual aid this can make communication easier and effective between a jeweller and his clients.

Future Research

Study further continues into domain to understand form clusters created by these semantic units. Their uniqueness and their interplay with each other create overall form of jewellery. The form clusters, using a mother circle are developed as a research tool to gauge user preference. This study is expected to provide a way to mathematically interpret design aspects, which have a positive influence on liking/ disliking of that article.

Definitions

Form cluster - Kundan work is made of smallest semantic units used alone or in combination with others. A compilation of semantic units in a certain manner constitute a cluster.

Piece (or Article) - An article, like necklace, is made of form clusters (of semantic units) following a pattern and largely same visual language. Pattern is formed by repetition or scaling or a variety of other devices. These elements make the articles like the alphabet makes the words that in turn make sentences and paragraphs.

Set- A set is a compilation of various articles like ring, bangles, necklace etc. following same visual language.

Glossary of terms

Carat- used in context of diamonds, refers to the measure of weight 200 milligrams. Used in context of gold refers to alloy composition in parts of 24. (Example, 22 carat gold is an alloy that has 22 parts gold and two parts of any other alloy metal, usually silver or copper, per 24 parts of metal mixed weight by weight. They are abbreviated and referred to as 'C' and 'k' respectively in their individual contexts.
Fire- used in context of diamonds, refers to the optical property of total internal refraction.

Stone- used in context of gemstones, usually diamond or a precious/semi precious stone.

Brilliant cuts- used in context of diamonds, refers to polishing (cuts) with high (to very high) optical properties of total internal reflection in various shapes. (Round, oval, pillow, heart, teardrop etc)

Kundan- The word kundan in Hindi means "Pure gold," and is applied to a flush stone closed setting type commonly practiced in India in the ancient past and still in use today for both cabochon and faceted stones.

Kundansaaz- A Jeweler who makes kundan articles, especially setting stones flush. Also call ed Karighar.

Photograph & Source

Diamond Grading ABC, Handbook For Diamond Grading
Dance of the Peacock: Jewellery Traditions of India
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