DESIGN APPROACH TO *KUNDAN* JEWELLERY-DEVELOPMENT OF A TOOL TO STUDY PREFERENTIAL LIKENESS OF ARTICLES USING MOTHER GRID AND FORM CLUSTERS IN A METHODICAL MANNER

Parag K. Vyas[a] and V. P. Bapat[b]

Industrial Design Centre, Indian Institute of Technology, Bombay, Powai, Mumbai, India.
[a]*paragvyas@iitb.ac.in,* [b]*bapat@iitb.ac.in*

Indian jewellery was seldom studied with a scientific point of view where precise measurements and mathematical interpretation of articles under observation were possible. Studies so, far were limited to documentation of existing pieces, family heirlooms and collection of royalty published in form of photographic documentation. This study was driven by the need of a tool to objectively study *Kundan* jewellery. A grid was proposed and developed for that purpose. The grid, for purpose of understanding, was a three dimensional visual array in form of plates. Test plates in actual size were made for presentation to subjects. This grid was designed to test effect of three variables namely cluster pitch, variety in proximity and number of semantic units in a form cluster. This three dimensional model was used as a virtual "test space" to see in which area of this space preferential likeness of subjects fell. Merits of this tool were more than one concurrent interview with subjects and portability.

Keywords: Kundan Jewellery, Testing Grid, User Preferences, Research Tool.

1. INTRODUCTION

A smallest semantic unit, often identifiable by a name, is fundamental building block of *kundan* jewellery. An assemblage of these put together in a certain manner constitutes a form cluster, which in turn by repetition, constitute an article, as in Figure 1. A theme created by a form cluster is carried to various pieces in a particular set, typically neck pieces (or necklaces), wrist pieces (*kangan*), ear pieces (*latkan*) and rings (*angoothi*). Technically the stones were flush stone close set, as compared to claw setting of western master jewellers using formal cut gemstones [1, 2].

Semantic units have their own symbolism and draw inspiration from nature, both flora and fauna [3]. As Boral observes, "Indian jewellery frequently turns to nature for inspiration. Many designs derive from flower, seeds and fruit which can be strung and worn as such or copied in metal" [4]. These smallest semantic units, by way of analogy of letters (and ligatures) of alphabet, are 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 namely a neck piece, two bangles, a Mangteeka and a pair ear rings constitute a basic set, contemporarily [5, 6]. A progression from basic curves that make smallest semantic units to a set of jewellery comprising of various articles could be seen, as depicted in Figure 2. This illustration defines length and breadth of present research, thereby curves creating semantic units are beyond scope of this research, and likewise

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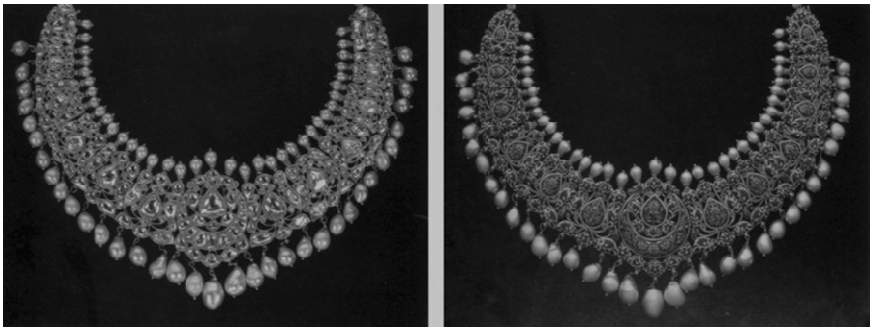

Figure 1. Kundan Necklace, smallest semantic units & form, front and back. *Source*: Balakrishnan R. U., 2004, Dance of the peacock.

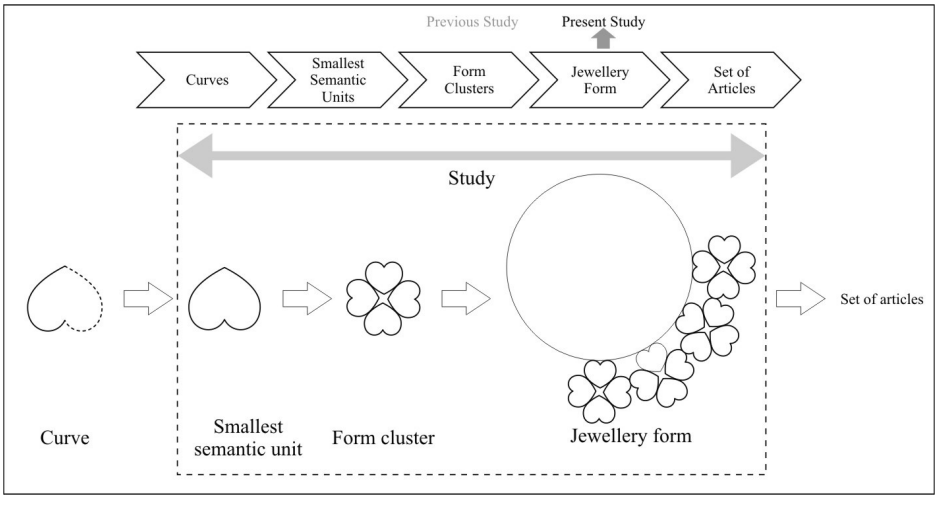

Figure 2. Progression from basic curves that make smallest semantic units to a set of jewellery.

combined effect of several articles assembled together in various combinations is a matter for future research.

2. NEED OF A TOOL

Indian jewellery is seldom studied with a scientific point of view where precise measurements and mathematical interpretation of articles under observation were possible. Studies so, far are limited to documentation of existing pieces, family heirlooms and collection of royalty published in form of photographic documentation [7]. Literature was silent on methodical research, in the domain of jewellery and no existing scientific methodologies to conduct such research were available. New research techniques had to be developed for this purpose. However, in a recent study by Vyas & Bapat, 99 smallest semantic units were identified and documented [8]. *Kundan* jewellery had become popular in recent times and client's awareness and expectations were higher. In practice it was observed Gold framework before setting was shown to clients for approval in semi finished stage, feedback though genuine often lack clarity. Jewellers had to struggle with this interpretation of 'a little bigger', 'a little smaller', 'a little closer' or 'a little loose' often, ironically, translating them into precise instructions for fabrication. These expressions though precise in articulating the need, did not define how much of 'little bigger' was big enough or how close 'a little closer' meant. There was a strongly felt need to have

a tool which made measurements possible, enabling mathematical interpretation of the expressions of these needs expressed by present and prospect clients.

The cost of reworking in case of disagreement is prohibitively expensive and counterproductive and at present there is no method available to articulate, let alone measure the various aspects of jewellery. The need was also highlighted during review of literatures and affirmed by professionals.

3. METHODOLOGY (DEVELOPMENT OF A TOOL)

The proposed tool and its design were driven by the need for measurements of Visual variety in proximity their numbers and cluster pitch. As a preliminary thought, encompassing these variables in a cube was proposed to makes orientation and location with reference to a point [9], as depicted in Figure 3. After deliberations it emerged into a testing grid in form of a conceptual parallelepiped. Proposed test grids conceptually had

1. Fineness/Coarseness on *x* axis.
2. Numbers of constituting semantic units on *y* axis.
3. Varieties in proximity on *z* axis.

Following the conceptual model grid they were placed on three axis of a parallelepiped, enabling a 'more-less' interpretation of two of the factors cluster pitch and numbers constituting a form cluster as depicted in Figure 4a and 4b abstractly [10]. Visual variety in proximity was nominal, yet providing

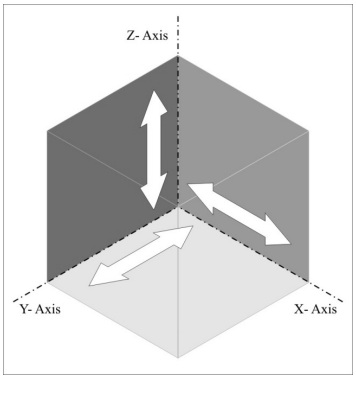

Figure 3. Variables Encompassed in a cube, with reference to a point.

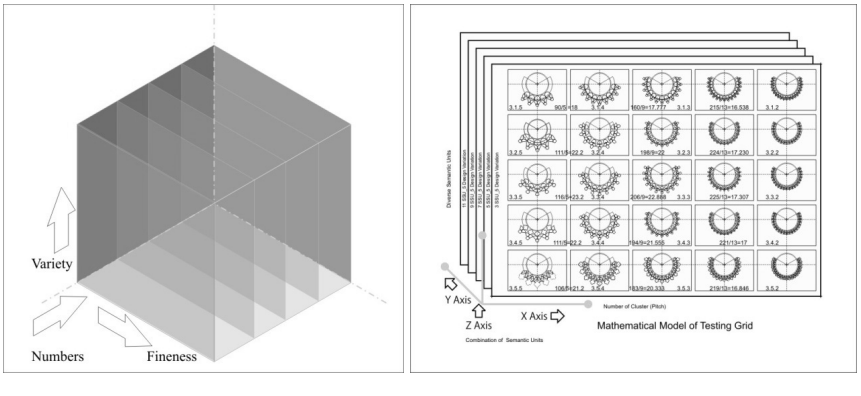

Figure 4a & b. Fineness/coarseness on *x* axis, Numbers of constituting semantic units on *y* axis & Varieties in proximity on *z* axis.

insights into combinations and their interplay. This was further developed for precise articulation of constituting factors, in form of array of five by five presentation plates on DIN A4 papers.

3.1. Cluster Pitch, as Levels of fineness/heaviness measured on *X*-axis

With use of a principal circle as a basic grid, different levels of fineness were made by making size of the cluster larger or smaller [11]. A larger size of form cluster required lesser number to cover the arc while a smaller size called for more numbers. On the x axis the form clusters became coarse to fine progressively from left to right, as depicted in Figure 5.

Heaviest appearing neckpiece was made up of five form clusters that were gradually increased, two on each side, to create five levels of fineness. The finest was made up of twenty one form clusters. The cluster pitch thus became measurable in millimetres, enabling mathematical interpretation possible, Figure 6a, 6b and 6c. Cluster pitch represents how finely form clusters are packed per unit length. A higher pitch number depicts a rarer packing of form clusters as compared to a lower pitch number.

3.2. Numbers of Constituting smallest semantic units in a Form clusters measured on *Y*-axis

For testing the effect of number of constituting semantic units in a form cluster, test clusters were created using three smallest semantic units. A set of five form clusters was created progressively by increment of two semantic units at a time, thus creating a scale to gauge preferences amongst form clusters made of three semantic units to eleven semantic units Figure 7.

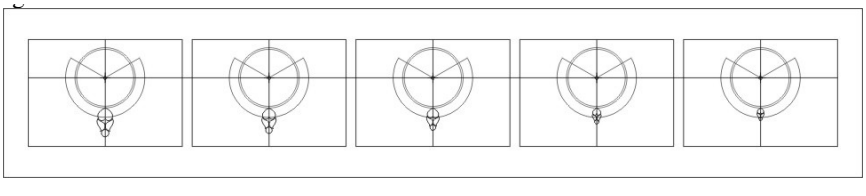

Figure 5. Form clusters becoming progressively finer, left to right.

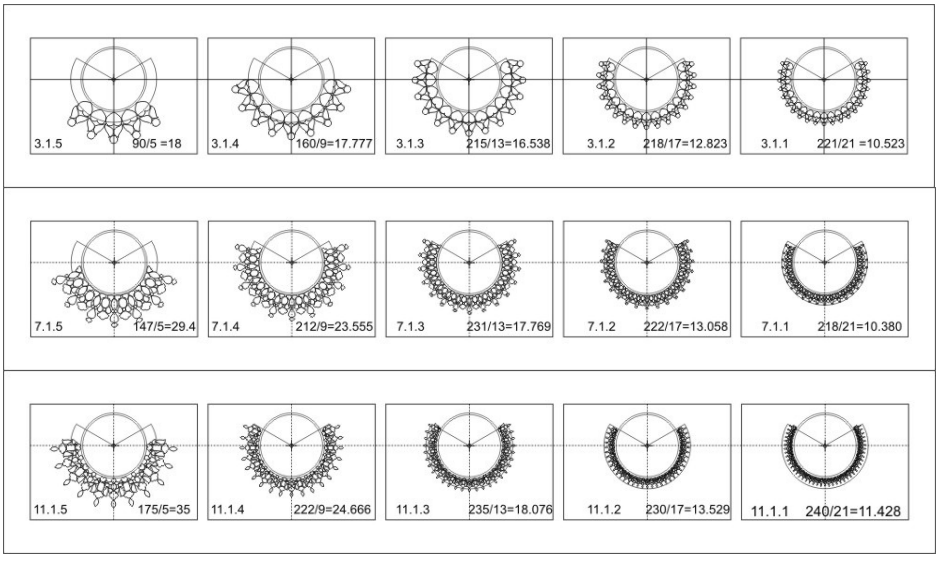

Figure 6a, b & c. Cluster pitch and its mathematical interpretation, form clusters packed per unit length.

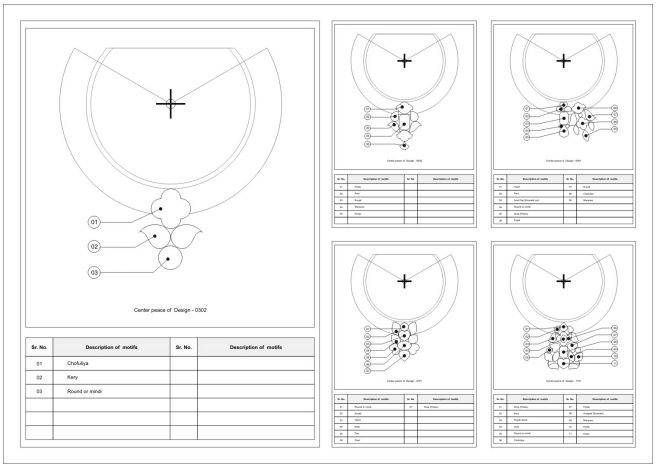

Figure 7. A scale to gauge preferences amongst form clusters comprising of three to eleven Smallest semantic units.

This point, where the apex touched the principle circle was called the point of contact and for calculation of cluster pitch the angular distance between two points of contact was converted to linear measurement.

3.3. Varieties in proximity, diverse constituting smallest semantic units in a Form clusters compared, Z-axis

The variety in proximity pertains to form clusters made of same number but different semantic units. The simplest cluster starts with three semantic units, five different clusters are made with a different combination of semantic units, keeping the number limited to three within each cluster.

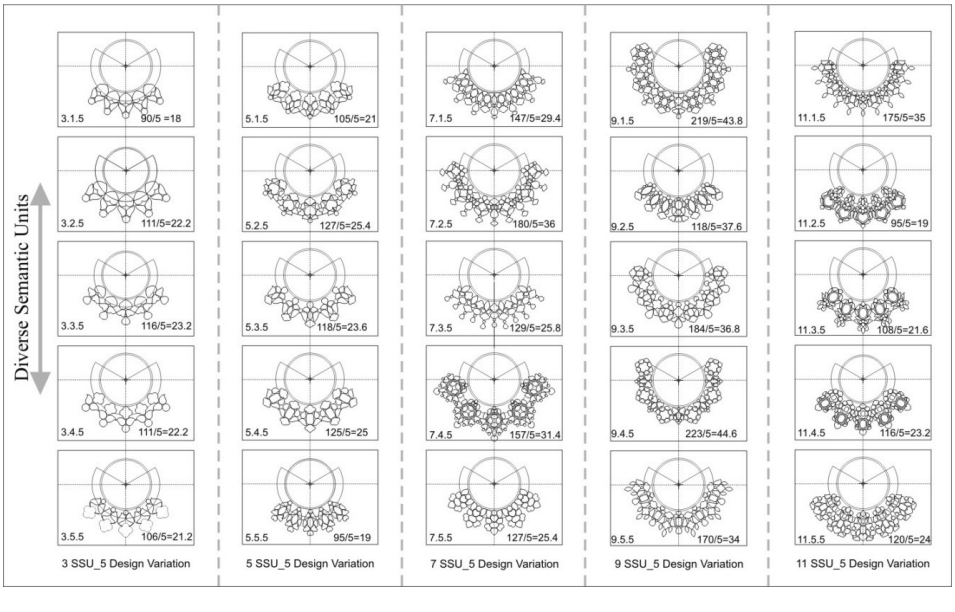

Figure 8. Diverse semantic units, a section showing gradually increasing visual variety.

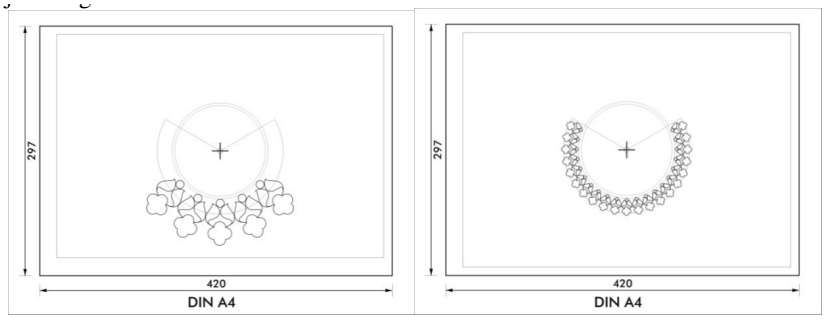

Figure 9a & b. *Kundan* artworks as presentation plates.

Gradually the numbers of constituting semantic units is increased to eleven in five stages, with an increment of two at every stage. This number is a measure of visual variety present for observation. A higher number is an indicator of more variety present for observation as compared to a lower number.

4. MERITS OF TESTING GRID

As a research tool testing grid comprises of set of total 125 designs to choose from. As depicted in model they were in five levels of fineness, five different designs with five stages (increasing number) of semantic units in a form cluster, conceptually an array of $5 \times 5 \times 5$ for selection.

DIN A4 printouts of *Kundan* artworks full size were taken on white paper of adequate thickness. This was used as presentation plates for visual appreciation by subjects Figures 9a and 9b.

In initial stages of research it was found that to cover a number of subjects, an effective research methodology and a tool that could be taken to subjects, preferably, at their place was essential. Familiar

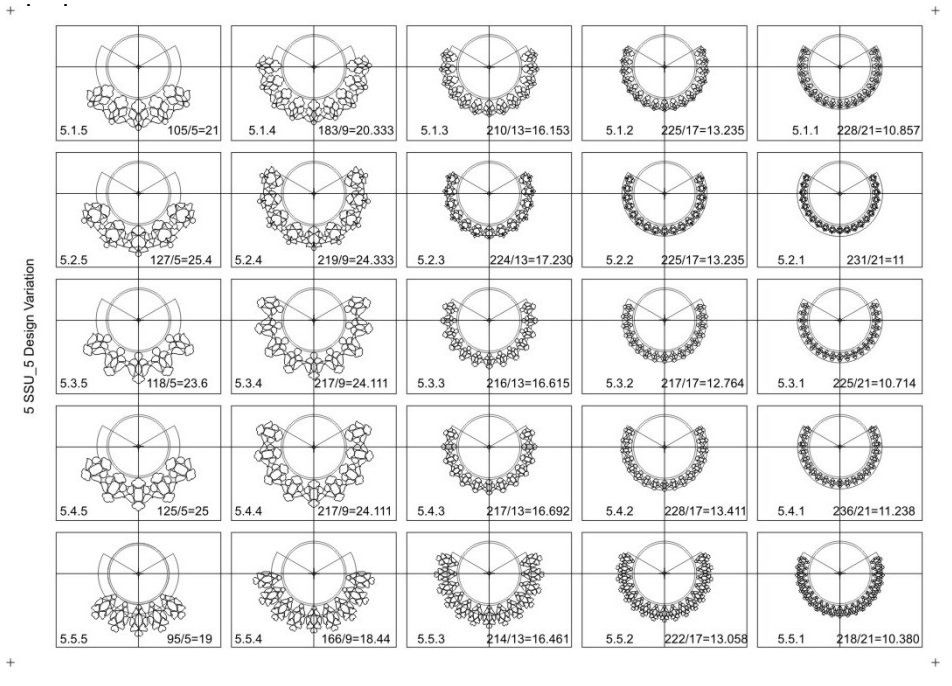

Figure 10. Section of complete grid as an array.

surroundings of their home were ideally suited for conducting interviews. This grid as a tool besides being precise was portable and it was possible to take it to subjects for the purpose of research. Presentation to the subjects was practicable in form of folios containing presentation plates. Use of paper separators was proposed to mark liking of a particular design. Using this grid real process could be emulated where early agreements on design of an article are sought on sketches for purpose of estimation.

A typical section of the complete grid appears like an array of five by five, containing five different combinations of a predetermined number of semantic units, each in five levels of fineness Figure 10. A test grid is a way to understand, scientifically, features that affect likeness in a positive way. Feedback of a client though genuine but may be difficult to interpret this test grid, facilitates an interpretation of abstract feedback like 'a little more' in measurable terms.

In a pilot study with the testing grid a stage wise selection was tested. In first stage twelve articles were selected from the complete set of designs. Amongst first selection of twelve designs, subjects were asked to narrow down preferential liking to six designs. This was followed by narrowing selection down to two and finally one.

5. LIMITATIONS OF TESTING GRID

The testing grid although an effective tool to study formal aspects, was slightly bulky in handling. It was due to use of heavy paper to counter effect of wearing. However, a full size replication had its merits in being closest to reality. They also illustrated minute details of smallest semantic units as there was no loss of details due to scaling.

The effects of colour of metallic gold and gemstones were not part of present study. It presents again a huge potential to be explored in form of colour, transparency, glaze levels and their combinations. Future research can be focussed on these aspects identified during present studies. These aspects present a vast uncharted research area with potential of professional applications in domain of jewellery design.

6. DISCUSSION AND IMPLICATIONS OF RESEARCH

There are a number of potential applications of this module of research in *Kundan* the most promising one is an effective communication tool between a client and jewellers. It is especially effective in initial stages of design where the adjustments and modifications that were done at the stage before setting, when the gold framework was ready, could be done in presence of a client. Once a cluster is made and agreed upon, a right size can be achieved using illustration software such as Corel draw and the form cluster can be rotated around the centre of principle circle to observe the overall effect, Figure 11 shows adaptation by a designer based in Ahmadabad. In case of "a little bigger" or "a bit smaller" appropriate

Figure 11. Mother Grid in use by designer. *Source*: Author.

Figure 12. Projection to see details enlarged. *Source*: M. K. Panchal & Vinay S., Ahmedabad.

action can be taken immediately. Prior to this tool such corrections needed elaborate reworking on form clusters already fabricated in gold.

It also presents a good potential as a projection on a larger screen to discuss minute details as shown in Figure 12. A discussion on minute details of jewellery is often with the help of a magnification device called jewellers loupe. A designer, client and *Kundansaaz* while discussing an article often miss a point as only one is observing the article at a time. Enlarged projection of this mother grid on the screen can facilitate concurrent viewing of details in an enlarged form and many of sensitive fitting details can be resolved. It is also expected to help making decisions about details like hinge points and joining details, these can be discussed on screen eliminating need of real framework to be ready.

This tool gives a way to measure and articulate cluster pitch and individual size of semantic units, thereby making communication between client and jeweller effective and efficient. It is expected to reduce disagreements and conflicts considerably by facilitating mathematically precise measurements. The tool will also make feedback and corrections easier as a qualitative feedback like 'a little smaller' can now be made quantitative in prevailing units of measurement e.g. so many millimeters.

As multiple printouts of this testing grid can be taken, parallel interviews by more than one interviewer is possible for the research, which otherwise was not possible. For pilot study data was collected by snowball technique where one reference led to others. Data analysis was by frequency distribution, the preferential likeness based on various client profiles based on Age, Marital status, Social status and working- non working status of women leads to a series of full length papers reflecting analysis of likeness and their inter group comparisons.

The study further continues in a full scale interview with subjects using the testing grid. The subjects from age group 20 to 59 years (divided into four age groups of 10 years each) representing girls to be married or recently married, women in early years of marriage to those planning marriage of a daughter or relative are to be interviewed with the help of this tool.

7. FUTURE RESEARCH

Kundan articles being prohibitively expensive jewellers and owners alike are reluctant about them being carried or display them freely. Portability of several articles at a time for presentation to subjects was a big hindrance the proposed tool is expected to overcome problem and facilitate further research.

This tool is expected to reveal the areas of this grid in which their individual preferences are centred. The outcome of future research is expected to be of use to jewellers and designers alike.

REFERENCES & ESSENTIAL BIBLIOGRAPHY

1. Pagal-Theisen, V., "Diamond Grading ABC-Handbook for Diamond Grading", Rubin & Son bvba, Antwerp, p. 169, 1993.
2. Snowman Kenneth, A., "The Master Jewelers", Thames and Hudson Ltd., London, pp. 174–188, 1990.
3. Sharma, R. D. and Varadrajan M., "Handcrafted in India", Lustre Press, p. 21, 2008.
4. Boral, F. and Taylor, J.B., "The Splendour of Ethnic Jewelry", Thmes and Hudson Ltd., London, p. 106, 1997.
5. Balakrishnan, R. U. and Kumar Meera, S., "Dance of the Peacock: Jewellery Traditions of India", India Book House Pvt. Ltd, 2004.
6. Untracht, O., "Traditional Jewellery of India", Thames and Hudson Ltd., London, 1997.
7. Balakrishnan, Usha R. and Kumar, Meera S., "Jewels of the Nizam", India Book House Pvt. Ltd, 2006.
8. Vyas, P. and Bapat, V.P., "Identification and classification of semantic units Used in Formation of patterns in Kundan jewellery, a Methodical Approach, in press, 2010.
9. Untracht, O., "Jewelry Concepts and Technology", Doubleday & Company, Inc., Garden City New York, p. 759, 1985.
10. Shajahan, S., "Research Methods for Management", Jaico publishing House 2004.
11. Chakrabarti, D., "Indian Anthropometric Dimensions, for ergonomic design practice", National Institute of Design, Ahmadabad, p. 68, 1997.