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Research Paper

Exploring and judging structural variations in different holed cards

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■ **ABSTRACT :** Card weaving is a simple, easy weaving method, but designing patterns is typically laborious and requires knowledge, experience, and skill. The present investigation explored structural variations in 2,4 and 6 holed cards through various pattern drafts created using CAD technology. Card woven bands can range from simple and easy to elaborately patterned and very time consuming. One of the most common individual card manipulations is the twist. The patterns in the weaving were controlled by both technique of warping pattern and variation in movement of rotation, *i.e.* the way of turning the cards. The structural variations developed were evaluated by panel of expert to get their relative ranking in terms of suitability for various end use items. Findings revealed that a wide range of interesting effects can be obtained from every single pattern created for different holed cards.

■ **KEY WORDS:** Exploring, Structural, Variations, Holed, Card weaving

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Card or tablet weaving is a very ancient and widespread off-loom weaving method of weaving narrow bands of fabric using flat cards with holes punched in them (*http:// www.stavacademy.co.uk.*). Tablet woven bands are known to have been made in Europe from the Bronze Age up until medieval times, and they are still made in parts of the world such as Turkey and Pakistan. The development of the loom allowed the use of flexible fibres such as wool, cotton and linen etc. (Anonymous, 2001). From the times immemorial, the village and cottage crafts seemed to have played a pivotal role in the social and economic life of our society with introduction of appropriate technology, market orientation and encouraging a concept of "self help" among the primary producers. Hand weaving plays a very important role in generating productive employment in the rural areas (Panda, 1997). Tablet weaving is a method of weaving strong, narrow, decorative bands. The equipment required is very cheap and simple, yet the range of possible patterns is immense. Uses of tablet-woven bands included the decoration of clothing, and use as belts and straps (*http://www.shelaghlewins.com*).

The tablets used in weaving are typically shaped as regular polygons, with holes near each vertex and possibly at the center, as well. The number of holes in the tablets used is a limiting factor on the complexity of

the pattern woven. Patterns are made by placing different-colored yarns in different holes, then turning individual cards until the desired colours of the weft are on top. After that, a simple pattern, like a stripe, small diamond or check, can be repeated just by turning the deck of tablets. Tablet weaving is especially freeing, because any pattern can be created by turning individual tablets. This is in contrast to normal looms, in which the complexity of the pattern is limited by the number of shafts available to lift threads, and the threading of the heddles (*https://en.wikipedia.org*). Most card woven bands are very strong and sturdy. Card woven bands can range from simple and easy to elaborately patterned and very time consuming. One of the most common individual card manipulations is the twist. Simply rotate a card around its vertical axis. This changes the threading direction of the card as well as the colour position (*http://www.stringpage.com*). Card weaving is a fascinating little craft. The fascination lies, in the cleverness and ingenuity of the technique, and in the unique texture of the woven bands- strong, firm, thick and smooth-quite unlike the product of any other form of weaving. These decorative adornments are found in most cultures throughout history, which are expressed through clothes and other forms of accessories (Anonymous, 1989). Creativity triggers innovativeness which enable one to come out with new concepts and ideas which are relevant in the designing and implementation of fashion (Sproles and Burns, 1994).

Hence, keeping in view the importance of ancient craft of creativity and innovation in card weaving and its revival for rural economy, the researcher got the idea of conducting the present investigation on "Exploring Structural Variations in Different Holed Cards".

■ RESEARCH METHODS

The present investigation was based on exploring the possibility of structural variations through card *Weaving technique* using varied number of holes and involved experimental work.

Sample selection:

The researcher selected ten experts from the field of clothing and textiles to act as panel of experts for evaluation of structural variations in the developed designs in terms of its suitability for various end uses.

Development of tool:

A rating performa was developed by the researcher for evaluation of the developed structural variations in card weaving designs by panel of experts on various parameters. A five point rating scale was administered for the same, as follows: Excellent-5,Very good- 4, Good- 3, Fair -2 and Poor- 1.

Experimental work:

The researcher tried to develop structural variations in 2, 4 and 6 holed cards. The study was conducted in different phases :

Phase 1. Creation of pattern draft using CAD:

Before starting to weave pattern, drafts were made on graphs of Corel draw where each square represented one yarn. The vertical columns represent the holes in the cards and were lettered whereas the horizontal columns represent the number of cards used. Each of the squares was filled in so as to indicate the colour arrangement of the warp threads. The 'S' or 'Z' under each card indicated the threading direction. When cards turn forwards or backwards, they make a diagonal stitch to the left or the right depending on their threading (*http://www.eg.bucknell.edu*).

Phase 2. Development of samples using pattern drafts:

The researcher used conventional card weaving technique to explore possibility of structural variations in all the 50 pattern drafts developed out of 2,4 and 6 holed cards. Each of this pattern draft was further elaborated to create possible variations in structure through clever use of forward and backward movement of the cards. The manipulation of card movement in different directions resulted in multiple structural variations based on the design of the pattern draft.

Phase 3. Evaluation of pattern samples with structural variation:

The researcher developed various pattern samples with structural variations based on number of holes in the cards. The final prototype of each of the possible structural design variation in different holed cards developed through card weaving in the form of waist belt was critically evaluated by panel of judges to select ten best designs and give relative rankings in terms of various end uses.

■ RESEARCH FINDINGS AND DISCUSSION

The researcher developed ten pattern drafts each for 2, 4 and 6 holed cards using CorelDraw software followed by preparation and threading of cards to explore possible structural variations by changing movement of rotation.

Preparation of cards:

The researcher prepared 2 ,4 and 6 holed cards using discarded X-ray sheets as demonstrated below for developing the structural variations in pattern through card weaving.

Developed patterns for structural variations:

Based on the feasibility for creating structural variation by changing number of holes in card weaving, following patterns were designed.

Technique of card weaving :

The total number of warp yarns needed depends on the number of cards and the number of holes in each card. Cards were threaded either from front to back known as 'S' threaded or from back to front known as 'Z' threaded as designated in the draft plan. The warps were stretched between the two poles. The shed was formed by turning the cards. The cards were turned either forward or backward as either a pack or an even divided into several packs or individually manipulated making many weave structures possible.

Plate 1 : Detail of possible structural variations by movement of rotation in 2 holed card

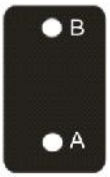
Movement of rotation	Structural variation	
	Change the turning sequence-	
Possibility of forward and backward turns	when hole A is at upper position	when hole B is at upper position
		

Plate 2 : Detail of possible structural variations by movement of rotation in 4 holed card

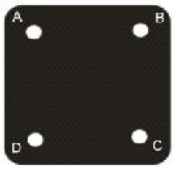
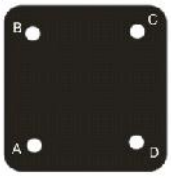
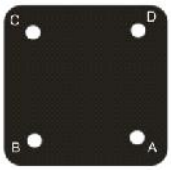
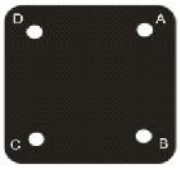
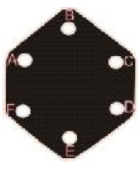
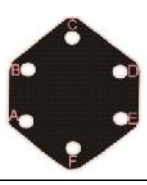
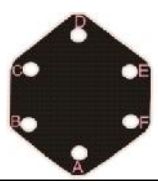
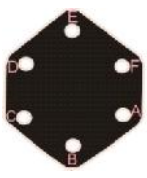
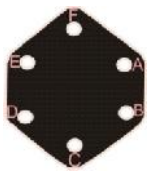
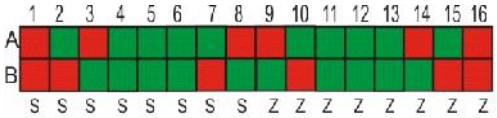
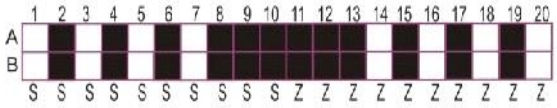
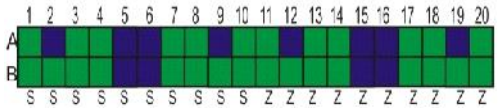
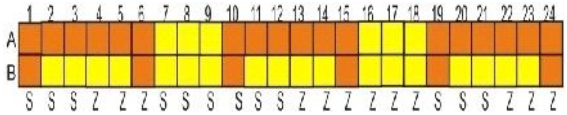
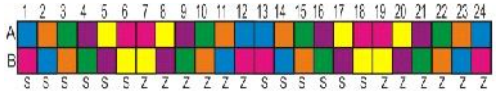
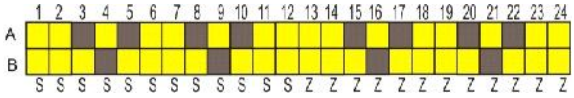
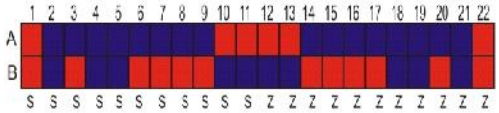
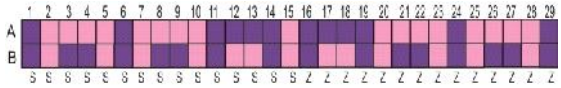
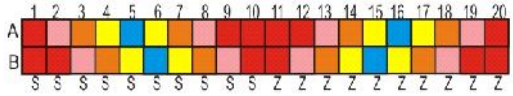
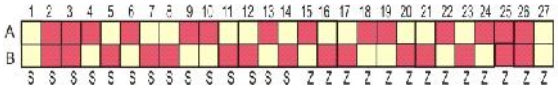
Movement of rotation	Structural variation			
	Change the turning sequence-			
Possibility of forward and backward turns	when hole A and B is at upper position	when hole B and C is at upper position	when hole C and D is at upper position	when hole D and A is at upper position
				

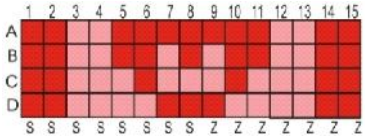
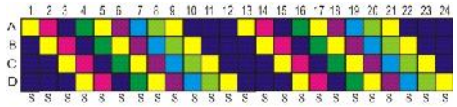
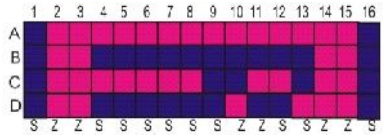
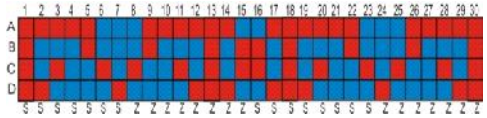
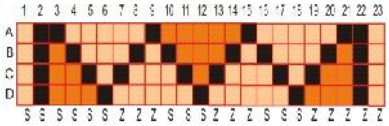
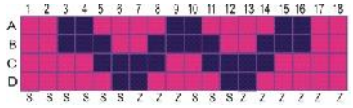
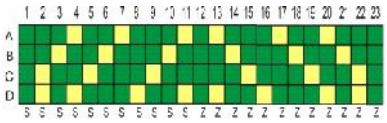
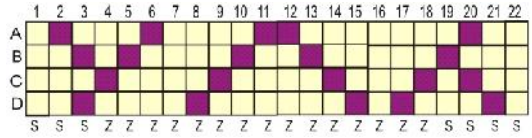
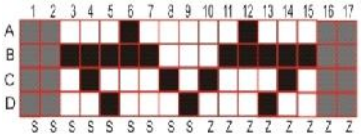
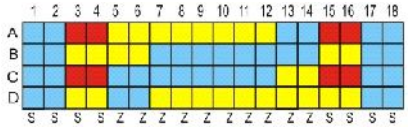
Plate 3 : Detail of possible structural variations by movement of rotation in 6 holed card

Movement of rotation	Structural variation					
	Change the turning sequence-					
Possibility of forward and backward turns	when hole A is at upper position	when hole B is at upper position	when hole C is at upper position	when hole D is at upper position	when hole E is at upper position	when hole F is at upper position
						

Pattern draft to explore structural variations in 2 holed cards

Pattern code	Pattern draft	Pattern code	Pattern draft
2.1		2.6	
2.2		2.7	
2.3		2.8	
2.4		2.9	
2.5		2.10	

Pattern draft to explore Structural variations in 4 holed cards

Pattern code	Pattern draft	Pattern code	Pattern draft
4.1		4.6	
4.2		4.7	
4.3		4.8	
4.4		4.9	
4.5		4.10	

Pattern draft to explore Structural variations in 6 holed cards

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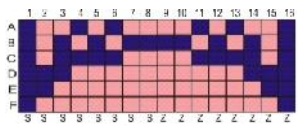
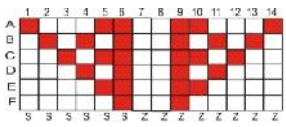
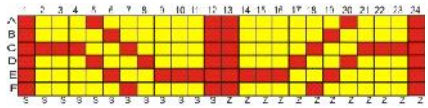
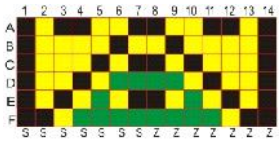
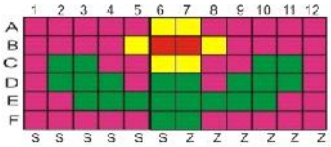
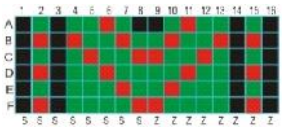
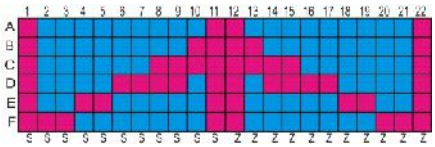
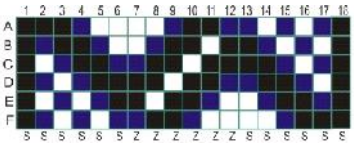
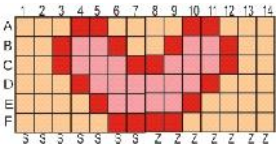
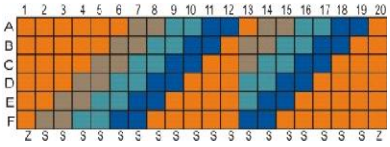
6.1		6.6	
6.2		6.7	
6.3		6.8	
6.4		6.9	
6.5		6.10	

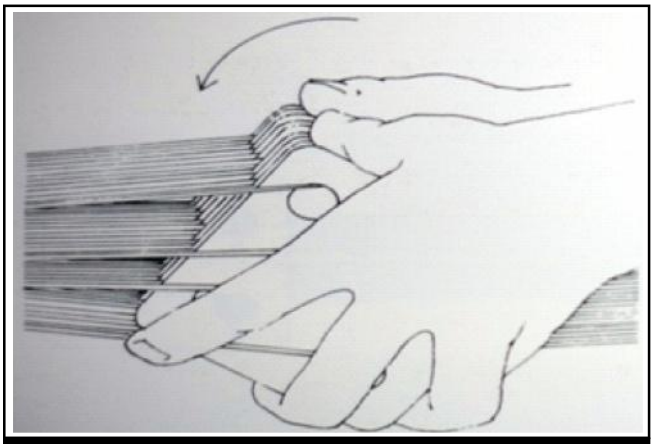


Fig. 1 : Forward turns of the cards

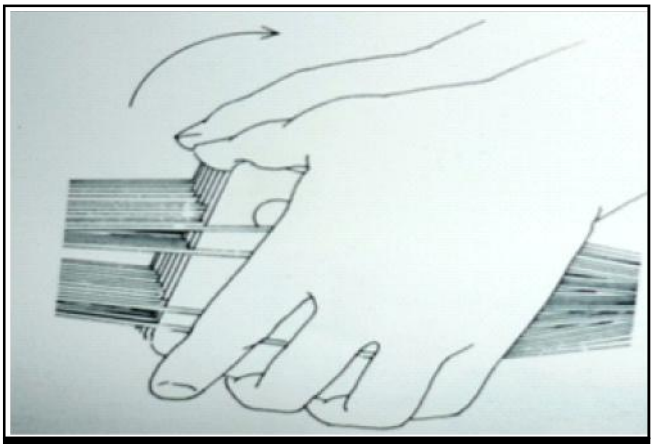


Fig. 2 : Backward turns of the cards

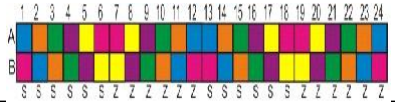
Developing structural variations :

A variety of pattern samples were developed with structural variations based on number of holes in the cards and by changing the movement of rotation in cards. These were evaluated by panel of judges to select best 15 designs to be developed into different textile products of personal accessories, household articles, outer wear and utility items.

In the present paper, following plates showed structural variations created in one of the pattern draft from each 2,4 and 6 holed cards.

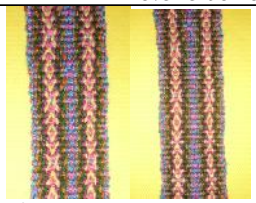
Here, we can see that there exists a wide arena of

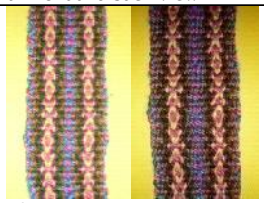
Plate 4 : Structural variations from sample of the pattern draft code-2.3

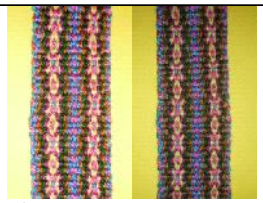


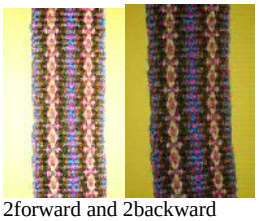
Movement of rotations with front and back view

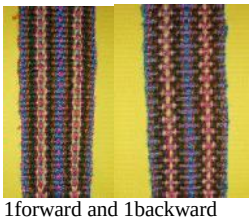

Forward and backward turns

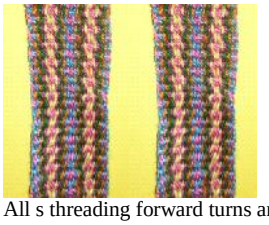

5forward and 5backward


4forward and 4backward

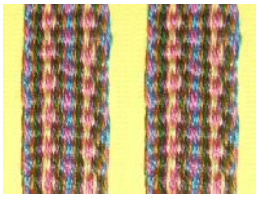

3forward and 3backward

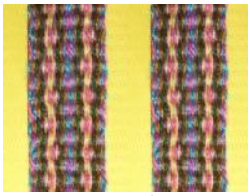

2forward and 2backward


1forward and 1backward


All s threading forward turns and backward turns


All s threading forward turns


All s threading 1forward and 1backward turns


All s threading 2forward and 2backward turns

the possibility of structural variations in the weaving pattern through manipulation of cards.

Evaluation of developed pattern draft:

Preferences of panel of the judges was taken for diferent holed cards pattern samples with structural variations. The data in Table 1 to 4 presents the WMS and ranking of the different pattern codes for different end uses.

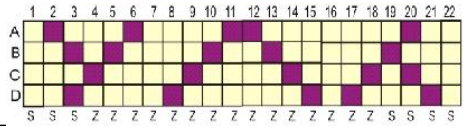
As perceived from Table 1, it is evident that mean scores range was found between 3.6 to 4.6 for personal accessories, 3.0 to 4.4 for household articles, 3.8 to 4.6 for outer wear and 3.2 to 4.0 for utility items.

For personal accessories, mean score of pattern code-2.5 (4.6) is maximum followed by pattern code 2.7 and 2.8 (4.4).In case of household articles, mean scores of pattern code 2.5 and 2.6 (4.4) is higher whereas in outerwear category, higher ranking and mean score is depicted by pattern code 2.8(4.6). For utility items, mean score of pattern code 2.6 (4.2) score and Istrank as shown in the Table 1.

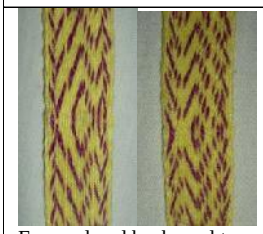
According to Table 2, it was found that mean scores range for personal accessories was between 3.4 to 4.2. on the other hand, mean scores range for household articles was 3.0 to 4.0, for outerwear items (3.4 to 4.6) and utility items (2.6 to 3.8). Mean scores for personal accessories for pattern code 4.3(4.2) is maximum.In case of household articles, mean scores of pattern code 4.3 and 4.8 (4.0) is higher whereas in outerwear category, higher ranking and mean score is depicted by pattern code 4.3 (4.6).For utility items, pattern code 4.3 (3.8) scored Istrank.

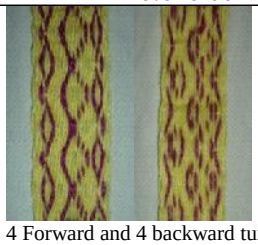
Perusal of data in Table 3 depicts that mean scores range was found between 4.2 to 5.0 for personal accessories, 3.8 to 4.8 for outerwear items, 3.2 to 5.0 for utility items and 3.0 to 5.0 for household articles. For personal accessories, mean score of pattern code 6.10 (5.0) is maximum followed by pattern code 6.2 and 6.5 (4.8).In case of household articles, mean scores of pattern code 6.3(4.8) and 6.4 (4.4) is higher whereas in outerwear category, higher ranking and mean score is depicted by pattern code 6.7 (5.0) followed by 6.4, 6.5 and 6.10 (4.8), respectively. For utility items, pattern code 6.3 scored Istrank as shown in the table.

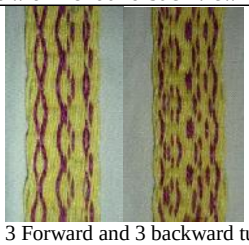
Plate 5. Structural variations from sample of the pattern draft code 4.9

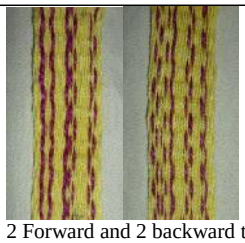


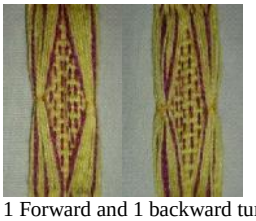
Movement of rotations with front and back view

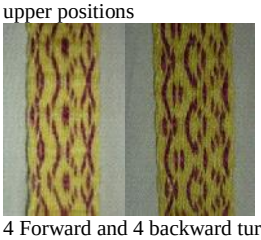

Forward and backward turns

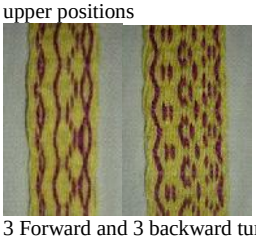

4 Forward and 4 backward turns when hole d and hole c are at upper positions

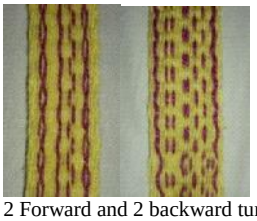

3 Forward and 3 backward turns when hole d and hole c are at upper positions

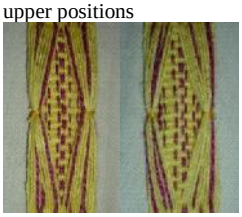

2 Forward and 2 backward turns when hole d and hole c are at upper positions

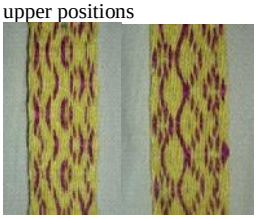

1 Forward and 1 backward turns when hole d and hole c are at upper positions


4 Forward and 4 backward turns when hole a and hole d are at upper positions

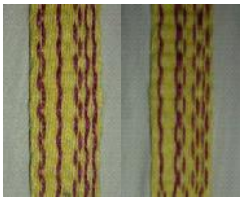

3 Forward and 3 backward turns when hole a and hole d are at upper positions

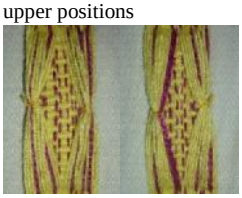

2 Forward and 2 backward turns when hole a and hole d are at upper positions


1 Forward and 1 backward turns when hole a and hole d are at upper positions

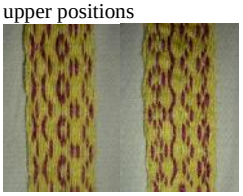

4 Forward and 4 backward turns when hole a and hole b are at upper positions

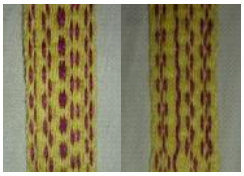

3 Forward and 3 backward turns when hole a and hole b are at upper positions

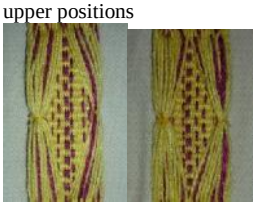

2 Forward and 2 backward turns when hole a and hole b are at upper positions

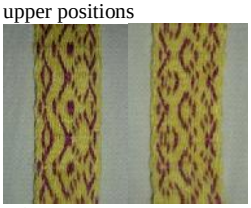

1 Forward and 1 backward turns when hole a and hole b are at upper positions


4 Forward and 4 backward turns when hole b and hole c are at upper positions


3 Forward and 3 backward turns when hole b and hole c are at upper positions


2 Forward and 2 backward turns when hole b and hole c are at upper positions


1 Forward and 1 backward turns when hole b and hole c are at upper positions

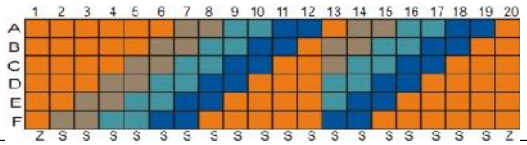

5 forward and 5 backward turns


6 forward and 6 backward turns

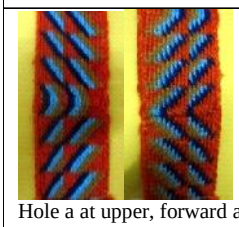

7 forward and 7 backward turns


2 forward and 3 backward turns, 3 forward and 2 backward turns

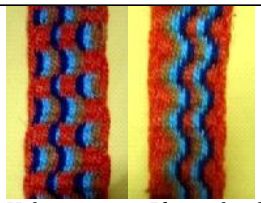
Plate 6 : Structural variations from sample of the pattern draft code 6.10



Movement of rotations with front and back view

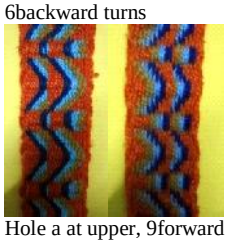

Hole a at upper, forward and backward turns


Hole a at upper, 6forward and 6backward turns

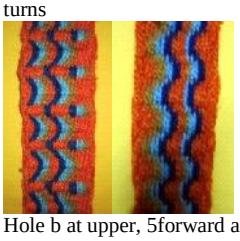

Hole a at upper, 5forward and 5backward turns

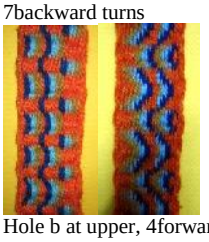

Hole a at upper, 4forward and 4backward turns

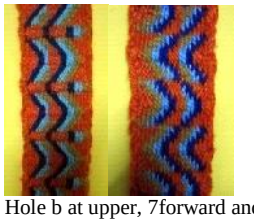

Hole a at upper, 7forward and 7backward turns

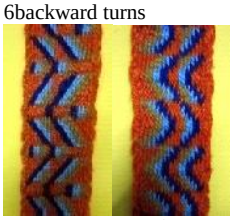

Hole a at upper, 9forward and 9backward turns


Hole b at upper, 6forward and 6backward turns


Hole b at upper, 5forward and 5backward turns


Hole b at upper, 4forward and 4backward turns


Hole b at upper, 7forward and 7backward turns


Hole b at upper, 9forward and 9backward turns


Change s threading cards to z threading, then forward and backward turns


s threading cards to z threading 6forward and 6backward turns

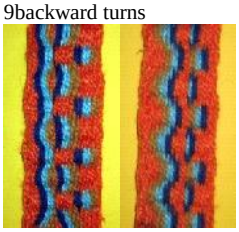

s threading cards to z threading 4 forward and 4backward turns

Table 1 : Mean score and ranking of the developed designs of 2 holed card by suitability of patterns

Parameters / Pattern code	Mean scores and ranking							
	PA*	Rank	HA	Rank	OW	Rank	UI	Rank
2.1	4.4	II	2.8		2.8		2.8	
2.2	3.6	V	3.0	V	2.4		2.8	
2.3	4.0	III	3.4	IV	4.0	IV	3.4	IV
2.4	3.8	IV	3.0	V	3.4		3.2	V
2.5	4.6	I	4.4	I	3.8	V	4.0	II
2.6	3.6	V	4.4	I	3.8	V	4.2	I
2.7	4.4	II	3.4	IV	4.4	II	3.8	III
2.8	4.4	II	3.8	III	4.6	I	3.4	IV
2.9	3.4		3.0	V	3.4		3.4	IV
2.10	4.4	II	4.2	II	4.2	III	4.0	II

*PA: Personal Accessories, HA: Household Articles, OW: Outer Wear , UI: Utility Items

Findings suggests that the developed structures have interesting effects and can be used to develop variety of products based on their suitability ranking as shown in the Table 3.

The overall ranking of the first five selected patterns of different holed cards has been depicted below :

The results pertaining to the overall preference of the judges regarding patterns made with card weaving technique have been furnished in Table 4. The data revealed that pattern code 2.5 was the most preferred pattern and hence was given the first rank out of ten patterns developed using 2 holed card. Pattern codes 2.10, 2.6, 2.7 and 2.8 were given second, third, fourth and fifth rank, respectively. Among, 4 holed card patterns; the most preferred pattern was 4.3 followed by 4.5, 4.6, 4.1 and 4.9, hence ranked accordingly. Similarly, among all 6 holed card patterns, pattern code 6.10 was rated highest and hence given the first rank. Pattern codes 6.3, 6.4, 6.5 and 6.9 were ranked second, third, fourth and fifth, respectively.

Findings of the study conducted by Sahni and Phadke (1995) on card weaving also revealed that there

Tables 2 : Mean score and ranking of the developed designs of 4 holed card by suitability of patterns

Parameters	Mean scores and ranking							
Pattern code	PA*	Rank	HA	Rank	OW	Rank	UI	Rank
4.1	4.0	II	3.0	IV	3.6	IV	3.4	II
4.2	3.8	III	3.0	IV	3.4	V	3.4	II
4.3	4.2	I	4.0	I	4.6	I	3.8	I
4.4	3.6	IV	3.2	III	3.0		2.4	
4.5	4.0	II	3.2	III	4.0	III	3.2	III
4.6	4.0	II	3.0	IV	3.6	IV	3.4	II
4.7	4.0	II	3.8	II	3.2		3.4	II
4.8	3.0		4.0	I	3.0		2.8	IV
4.9	3.8	III	3.8	II	4.2	II	2.6	V
4.10	3.4	V	3.8	II	2.6		2.6	V

*PA: Personal Accessories, HA: Household Articles, OW: Outer Wear , UI: Utility Items

Tables 3 : Mean score and ranking of the developed designs of 6 holed card by suitability of patterns

Parameter	Mean scores and ranking							
Pattern code	PA*	Rank	HA	Rank	OW	Rank	UI	Rank
6.1	4.6	III	3.8	V	3.8	III	3.2	VI
6.2	4.8	II	4.0	IV	3.2	IV	4.2	IV
6.3	4.2	V	4.8	I	3.8	III	5.0	I
6.4	4.2	V	4.4	II	4.8	II	4.6	II
6.5	4.8	II	4.2	III	4.8	II	4.4	III
6.6	4.6	III	3.8	V	3.0	V	3.6	V
6.7	4.0	VI	3.2	VII	5.0	I	4.2	IV
6.8	4.4	IV	4.0	IV	3.8	III	3.6	V
6.9	4.6	III	3.6	VI	3.8	III	4.2	IV
6.10	5.0	I	4.2	III	4.8	II	4.4	III

*PA: Personal Accessories, HA: Household Articles, OW: Outer Wear , UI: Utility Items

Table 4 : Overall ranking of pattern developed

Cards	2-holed		4-holed		6-holed	
Sr. No.	Pattern code	Ranking	Pattern code	Ranking	Pattern code	Ranking
1.	2.5	I	4.1	IV	6.3	II
2.	2.6	III	4.3	I	6.4	III
3.	2.7	IV	4.5	II	6.5	IV
4.	2.8	V	4.6	III	6.9	V
5.	2.10	II	4.9	V	6.10	I

exist possibilities of so many variations by card weaving. The respondents liked the overall textural effects created by the use of various types of yarns. Also it had a great income generating potential besides helping to satisfy ones creative urge.

Conclusion :

The present study explored the possibility of structural variations in selected three types of holed card patterns. In each of the 2,4 and 6 holed cards, ten pattern drafts each were prepared and multiple variations were visualized through variations in movement of card rotation. Interesting effects were created through card weaving by the researcher which were highly appreciated by the judges also. The developed patterns can be effectively used in a wide variety of articles as revealed by the mean scores and ranking of the data analyzed.

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■ REFERENCES

Anonymous (2001). *Encyclopedia Americana*.pp. 553-54. Encyclopedia Americana Corporation, New York.

Panda, S.K. (1997). Handloom weaving. *Indian Tex. J.*, **107**: 4-6.

Sahni, S. and Phadke, S. (1995). A study on card weaving. *Ind Tex J* **105**: 14-22.

■ WEBLIOGRAPHY

Anonymous (Wolfe, 1989). *http://www.ijird.com/index.php/ijird/article/viewFile/46564/37794*

http://www.stavacademy.co.uk/mimir/cardweave.htm

http://www.shelaghlewins.com/tablet_weaving/TW01/TW01.htm

https://en.wikipedia.org/wiki/Tablet_weaving

http://www.stringpage.com/tw/basictw.html

http://www.eg.bucknell.edu/~lwittie/sca/artsci/DraftingThreadedIn.pdf.

Sproles and Burns (1994:70). (*http://www.ijird.com/index.php/ijird/article/viewFile/46564/37794.*

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