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"CODING OF ARCHITECTURAL FORMS", THE EASY AND EFFICIENT MEANS OF PEDAGOGICAL CONVERSATION

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ABSTRACT

Considerable portion of architectural conversations includes narrating forms. In professional or pedagogical conversations, the forms are identified by name, if any, expressed through sketches or by objects having resemblance in appearance. It happens so because even though numerous forms are used in Architecture, only a few of them have got 'geometrical names'. Even the sketches of Forms at times may be misleading, specially when those are complex. Naming all forms for identification is not only a laborious job, the same may be even more difficult to remember because of their innumerable number. In the above situation, these authors have proposed 'Coding of architectural forms on logical basis'. In preparing the Code, either the first letter or the short form of the related terms have been used. Such codes in fact 'can represent the forms in words'. Naturally it would help the teachers to readily express the various shapes or forms to their students. In addition, the Code may enrich the field of Architecture by importing thousands of new forms, which at present are not used because those could not be conceived. This paper explains the logic utilized for devising Codes for Architectural forms. Once such Codes are made known, the students would be able to 'visualize' any Form as soon as the teacher would mention its Code.

KEYWORDS: Architectural Forms, Geometric Forms, Coding of Forms, Architectural Design

INTRODUCTION

Most, if not all, of the professions have their own and distinctly different 'terms' and 'language' for exchanging ideas in pedagogical and professional conversations. "Graphics" is said to be the "language of Architecture". All architects, especially those engaged in profession and teaching need talk of 'Forms' to their students or juniors. Even though there are innumerable number of forms in Architecture, unfortunately only a few (i) with geometrical names (like, Sphere, Cone, Cylinder etc.), (ii) having resemblances with known objects (like, ball, cup, electric bulb, onion etc.) and (iii) easy to draw on board are used in practice. Architects create amazing, wonderful and novel things every day and they do all these based mostly on the forms known to them. Needless to mention that the introduction and use of new forms in profuse number would be able extend the present horizons beyond anything. One practical means of introduction of new forms in Architecture may be, to draw these and assign names. However, this endeavor may not give the expected outcome, because there is every possibility that the architects, teachers and the students would find 'remembering the huge names' tiresome. In such a situation, Coding forms on logical basis can be a better option.It is well-known that the Planes create Forms through a number of maneuvering processes like, Progression (or, Translation), Rotation and Spiral movements. In their endeavor for coding forms, these authors have first Coded the various Planes and then, the various maneuvering processes. So, any real or imagined form can now be expressed through Codes in the following way

Code of Form = Code for the basic Plane that creates the form + Code for the maneuvering process that creates the expected Form.

EXAMINING THE PRESENT SITUATION

At present the teachers of architecture convey various real or imagined forms to their students in any of the following ways:

- Taking the students to the site and showing the real object. (This process is highly effective, but least convenient due to involvement of time, expense and hazards).
- Showing miniature model of the object. (It is only possible when such models are available).
- Showing photographs (This one also depends upon availability and it consumes considerable time).
- Drawing sketches of the object (This process is applied only if the forms are simple to draw).
- By narrating the form through words (In this endeavor, only the simple forms are used and complex ones are avoided. In addition, there remains possibility of mistake in this process).

"Narrating any Form by its name" may be the "most convenient method" in Architectural teaching. However, this method can be used only in a few cases, because only a few Forms have proper names that came from geometry. The system of using objects having resemblances does not work universally, because such objects usually do not have any fixed or universal shapes all over the world. Even drawing of sketches on board at times may be misleading. It happens so because 'forms are three dimensional objects, and there exists practical problems and limitations when these are drawn on two dimensional paper or board'. Thus a round drawn by a marker pen may represent, a ring (hollow), a plane surface (two dimensional), top view of a cylinder (two dimensional) or a sphere (three dimensional). After we come to know of these limitations, it seems that in place of sketch their Codes may be a better option, in case these do not create such confusion. Fortunately, the codes do not. Coding forms in fact means giving 'logical symbolic names' to them. Such naming would help not only the teachers to convey their imagination to the students, but it would also introduce thousands of new and unheard of forms in their field of discussion and work. The outcome of the same is the enrichment of the visual field of Architecture far beyond the present horizon. It may be seen that the formulated Codes are so simple that, once the inner principle is known, the mention of the code itself would 'speak of the form' and the students will be able to 'visualize' those.

METHODOLOGY FOR DEVISING CODE

The methodology applied for coding form is constituted of two major items

- Coding the basic Planes which create Forms and
- Coding the various maneuvering processes required for creating forms from the plane.
- **Coding Basic Planes**

Basic planes are created by lines. Even though such lines represent only the edge or peripheries, as per convention we consider those as planes. Thus, a round shape drawn by a line is considered as a plane, and not a hollow ring. In our endeavor for coding of planes, these have divided into three groups:

- Planes created by Curve lines,
- Planes created by Straight lines and
- Planes created by Straight and Curve lines.

Brief descriptions of these are given hereunder.

- **Planes Created by Curve Lines:** Various Planes can be created by using 1, 2, 3, 4 or more number of curved lines. For saving space we have shown here under the "Shapes, How created, Examples and Codes" of various Planes created by 1, 2 and 3 nos. of curved lines. Whereas only one curve line can create a Round or Oval shape, two curve lines can create many shapes depending upon whether those are 'Bulged outside' or 'Depressed inside'. Similar are the cases with shapes created by 3 or more curve lines. In coding, 'C' stands for curve lines, Integer (1,2,3 etc.) for number of lines used, 'a' for abnormal shapes, 'b' for bulge and 'd' for depression. Some of the planes, however, have been further specified by using terms "Thin" and "Acute".

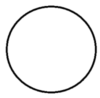
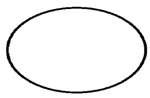
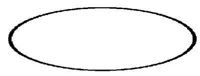
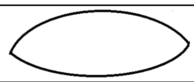
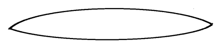
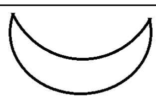
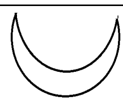
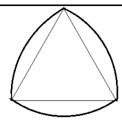
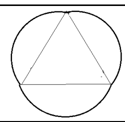
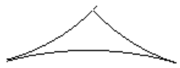
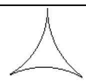
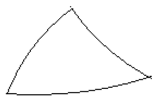
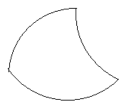
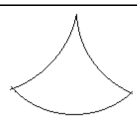
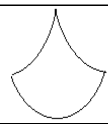
Shape	How Created	Example /Code (Normal)	Example / Code (Thin or Acute)
Round (Circular plane)	1 curve line, uniformly bent	 C1	n.a.
Oval	1 curve line, abnormally (abbreviated by 'a') or non-uniformly bent	 C1a	 C1a.Thin
Leaf	2 curve lines, bulged (abbreviated by 'b').	 C2b	 C2b. Thin
Crescent	2 curve line, bulged and depressed (abbreviated by 'b' and 'd' respectively)	 C2bd	 C2bd Thin
No name	3 curve lines, all bulged	 C3b	 C3b. Acute
No name	3 curve lines, all depressed	 C3d	 C3d. Acute
No name	3 curve lines, 2 bulged-1 depressed	 C3bbd	 C3bbd. Acute
No name	3 curve lines, 1 bulged- 2 depressed	 C3bdd	 C3bdd. Acute
No name	N nos. curve lines, b. bulged d. depressed etc.		

Figure 1: Simple Planes Created by Curve Lines

- **Planes Created By Straight Lines:** Various Planes used in Architecture are be created by straight lines also. In the following Figure the "Shape, How created, Examples, Codes and additional specifications to indicate Length : Breadth ratio, Acuteness of abnormality or bending etc." have been provided for some planes created by Straight lines. Here "S" stands for Straight.

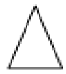
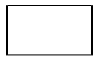
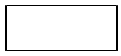
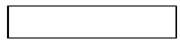
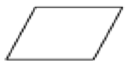
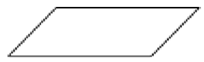
SHAPE	HOW CREATED	EXAMPLE / CODE	Length Width Proportion (Say 2, 3 4 Times etc.) Example /Code
Triangle	3 straight lines	 S3	 S3-2 times.
Square	4 equal straight lines	 S4	n.a.
Rectangle	2 one size + 2 another size straight lines	 S22	 S22-2 times
			Acuteness of Bend
Equal sided Parallelogram	4 straight lines, a. abnormal.	 Sa4	 Sa4.Acute
Parallelogram	2 one size + 2 another size straight lines, a. abnormal	 Sa22	 Sa22.Acute

Figure 2: Planes Drawn by Straight Lines

- **Planes Created by Curve and Straight Lines:** In the Planes created by both Curve and Straight lines, S has been used for indicating 'Straight' and C for 'Curve' lines. Also integers have been used to indicate the number of lines. In the following Figure the "No. of lines used, Nature of Curve lines, Examples and Codes" for planes created by Straight and Curve lines have been shown. As usual 'b' stands for bulge and 'd' for Depression. Additional specifications like, Mild and Acute has been used to indicate acuteness or abnormality of curvature.

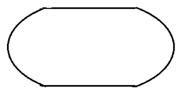
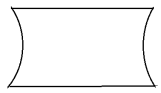
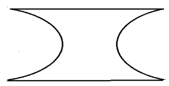
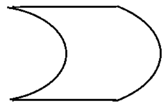
No. of Lines Used	Nature of Curve Line	Example / Code	Example / Code
S2 C2	All bulged	 S2C2 b -Mild	 S2C2b –Acute
S2 C2	All depressed	 S2C2d -Mild	 S2C2d-Acute
S2 C2	1 bulged, 1 depressed	 S2C2bd- Mild	 S2C2bd- Acute

Figure 3: Planes Drawn by Curve and Straight Lines

- **CODING THE MANEUVERING PROCESS**

The three major processes in which Forms can be created by maneuvering the Planes are:

- PROGRESSION (translational movement), abbreviated by 'PRO'.
- ROTATION (around horizontal axis only), abbreviated by 'ROT' and
- SPIRALING (i.e. both progression and Rotation), abbreviated by 'SPI'.

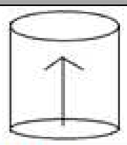
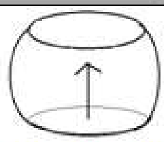
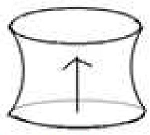
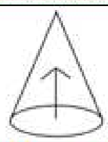
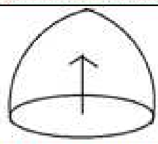
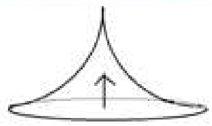
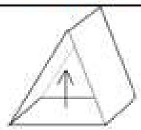
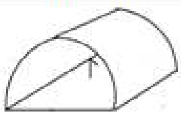
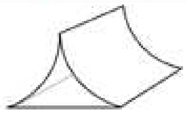
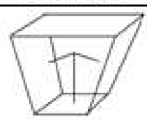
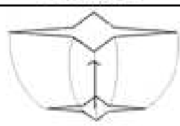
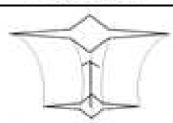
Each of the above processes may take place in a number of sub-processes. Various major and sub-processes of maneuvering and their Codes have been shown in the following Figure.

Process	Code	Sub-Process	Code	Final Code
Progression	PRO	Upward (Straight)	Straight	PRO.Straight
		Converging to a point	Con.Point	PRO.Con.Point
		Converging to a line	Con.Line	PRO.Con.Line
		Diverging	Dive.	PRO.Dive
Rotation	ROT	Around long axis	Long	ROT.Long
		Around short axis.	Short	ROT.Short
Spiraling	SPI	Straight-clockwise	Straight.Clock	SPI. Straight.Clock
		Straight-anticlockwise	Straight.Anti	SPI Straight.Anti
		Converging-clockwise	Con.Clock	SPI Con.Clock
		Converging-anticlockwise	Con.Anti	SPI Con.Anti
		Diverging-clockwise	Dive.Clock	SPI Dive.Clock
		Diverging-anticlockwise	Dive.Anti	SPI Dive.Anti

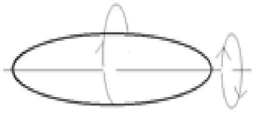
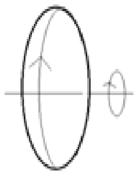
Figure 4: Major and Sub-Maneuvering Processes

The maneuvering processes mentioned above, examples and their codes have been shown in Figure No. 05 below.

- **Primary Maneuvering Process: Progression (PRO)**

Secondary Process	Example and Code (The Examples Show Processes, and Not Views)		
(01) Straight			
	PRO.Staight	PRO.Bulged	PRO.Depressed
(02) Converging to a point			
	PRO.Con.Point-Straight	PRO.Con.Point-Bulged	PRO.Con.Point-Depressed
(03) Converging to a line			
	PRO.Con.Line-Straight	PRO.Con.Line-Bulged	PRO.Con.Line-Depressed
(04) Diverging			
	PRO.Diverse-Straight	PRO.Dive-Bulged	PRO.Dive-Depressed

- **Primary Maneuvering Process : Rotation (ROT)**

Secondary Process	Code	Example (The Examples Show Process, And Not Views)
(01) Around Long axis	ROT.Long	
(02) Around Short axis	ROT.Short	

- **Primary Maneuvering Process: Spiraling (SPI)**

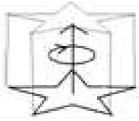
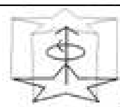
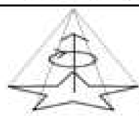
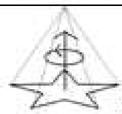
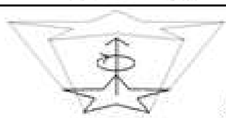
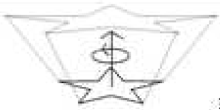
Process	Code	Example (The Examples Show Process, And Not Views)
(01) Straight Clockwise	SPI.Straight-Clock	
(02) Straight Anti-clockwise	SPI.Straight-Anti	
(03) Converging Clockwise	SPI.Con-Anti	
(04) Converging Anti-clockwise	SPI.Con-Clock	
(05) Diverging Clockwise	SPI.Diverse-Clock	
(06) Diverging Anti-clockwise	SPI.Diverse-Anti	

Figure 5: Maneuvering Processes for Making Forms from Planes

CODE FOR FORM

While narrating any form, the teacher would first mention the code of the plane that would constitute the form. Then he would mention the Code of the maneuvering process by using which that form will be created. It may be mentioned that same forms can be created through a number of processes. We have shown examples and codes of a number of forms in the following Figure.

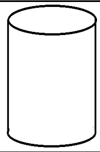
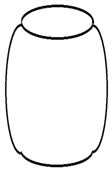
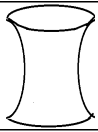
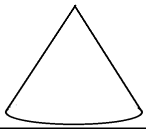
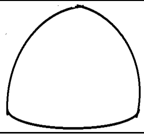
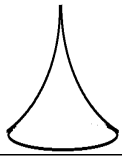
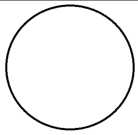
Code (1 + 2)		Full Description	Example
(1) Plane	**(2) Maneuvering Process**		
C1	PRO.Staight	Object. 2 times (means height is 2 times of base)- Code: **C1. PRO.Straight**. CYLINDER	
	PRO.Bulged	Object. 2 times – Code: **C1. PRO.Bulge** DRUM	
	PRO.Depressed	Object. 2 times - Code: **C1. PRO.Depressed**	
	PRO.Con.Point-Straight	Object. 1 time Code: **C1. PRO.Con.Straight** CONE	
	PRO.Con.Point-Bulged	Object. Nil. (means- base and height are equal) Code: **C1. PRO.Con.Point-Bulged** DOME	
	PRO.Con.Point-Depressed	Object. 2 times - Code: **C1. PRO.Con.Depressed** HORN	
	ROT.Long or ROT.Short	Object. Code: **C1. ROT.Long** SPHERE	

Figure 6: Examples and Codes of Forms Created from Planes

USE OF CODES IN IDENTIFYING AND NARRATING FORMS

In Architecture the above mentioned Codes can be used for several purposes like,

- **Identification of Novel Objects:** It is possible to identity various non-existing or imagined forms through the above mentioned Codes.
- **Correct Identity of known Objects:** While the name and sketches of some known objects may create misunderstanding or confusion, quoting those by their codes can eliminate that possibility.
- **Detail Description:** After identifying any object through the Code, it is possible to present detailed description of the object through this code.

Examples of the above are given hereunder.

- **Identification of Non-Identifiable Objects:** Sketch no. (a) of Figure No. 07 below is a plane which is capable of making numerous three dimensional forms. But the architects do not get that opportunity, because it itself does not have any identifying name. This plane can however, can easily be expressed by code "S2C2d-Acute", which means it is composed of 2 nos. Straight and 2 nos. Curve lines, the curve lines are depressed inside (indicated by ‘d’) and these are acutely depressed. After this identification, there are 12 or more maneuvering processes each of which is capable of making of new forms from it.

- **Correct Identity of known Objects:** Coding is capable of identifying any form correctly. It has already been mentioned that simple sketches of planes and forms quite often may be misleading. For example, sketch (d) in Figure no. 07 looks like a circle. In reality it can be either a hollow ring, a circular plane or a sphere. It can be expressed by two codes, viz. C1 or ‘C1.ROT.’. The Code C1 indicates a circular Plane created by 1 no. curve line and Code ‘C1.ROT.’ indicates a SPHERE that has been created by rotating (ROT) the plane around its axis. If the code ‘C1.PRO.Straight’ (sketch ‘f’) is used, it means the above circular plane has gained thickness or height by straight Progression, and so, it is a cylinder.

- **Detail Description:** Codes can not only identify known and unknown forms, it can also give correct description of a given form. Thus the code ‘C1.PRO.Con.Point-Bulge’ (sketch ‘b’) indicates, it is a form created by the plane made of 1 no. curve line, the plane progressed up to Converge in a Point and is Bulged outward. So, it is a DOME. Even though “Dome” is the rough form, it is possible to explain it in more details through codes. For example, it can be further explained as, “2 times (i.e. height is double of base). Lower 1/4th S4. PRO. Straight, then ½ C1. PRO. Straight. Bulge, then 1/4th C1.PRO.Con.Point.Depressed, on top a small C1.ROT.”. The details of the dome, if drawn, will be something like the one shown in sketch (c). Examples and Codes for a few other forms like, Tetrahedron, Pyramid and unexplainable have been shown in Sketch f, g and h respectively.

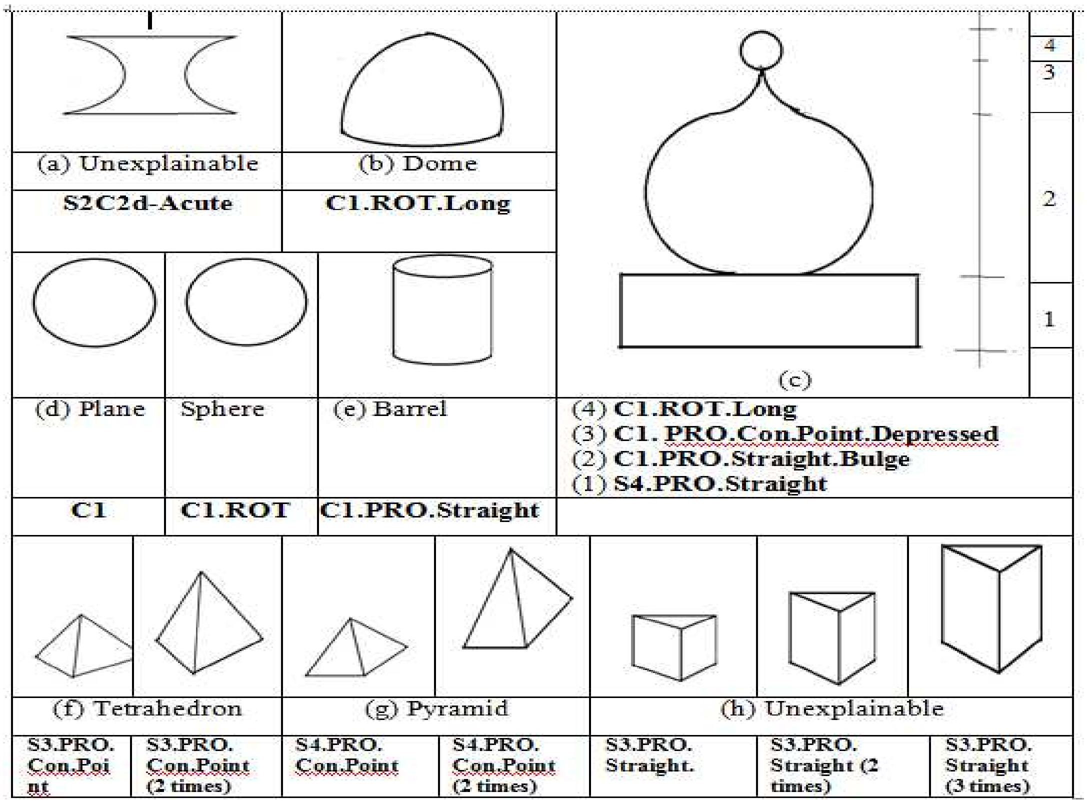


Figure 7: Examples of Some Forms

Some of our known forms can be narrated through Codes in the following ways:

- Cone: C1. PRO. Con. Straight. (Length specification: n-times etc.)
- Horn shape: C1. PRO. Con. Depressed. (Length specification)
- Sail of Sydney Opera house: Lower half - C2bd. PRO. Straight Upper half: C2bd-PRO.Con.Point. (Bent aside).
- Petal of Baha'I temple: (1) Lower half: C2bd-PRO.Div.
- Upper half: C2bd-Point-Converge.

CONCLUSIONS

Every day the professional architects are creating wonderful objects for people's use and enjoyment and for enriching the civilization of their respective countries. The item they mostly use for this purpose is "FORM". The concept of various forms are given to them by their teachers in the universities. At present the teachers mention or discuss only those forms which are convenient to identify, present or explain. Naturally numerous forms the teachers cannot express or convey are not used. And it happens so because these do not have names, or it is difficult to express those through sketches or photographs.

In such a situation, the introduction of Codes for identifying and explaining forms may be found as an added advantage in architecture. The Codes proposed above have been done in the simplest way. Thus the first letter of the concerned terms have been used in the Code for Planes, and the first part of the concerned maneuvering terms have been used in the Code for Maneuvering. Since these terms are known to all, there should not be any problem for the teachers and students to imagine any form from its code.

In addition to adding vast number of new codes to Architecture, the coding can serve another important purpose. It may increase the imaginative capability of the students. After the codes are known, the students may in fact go on imagining forms through codes. Discussions on forms may now take place only with words and by that way, time consuming drawings or sketches can be avoided. It may be expected that after the huge quantity of new Architectural forms would enter the arena of discussion of the architects and experts through such Codes, those would soon be materialized physical appearances in the world of Architecture and would enrich the civilization with altogether new looks.

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