

# Functional Instructions with Braille pictograms using Morphological Analysis for Sightless Children's Picture Books

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**Abstract:** - This paper discusses the use of typography and existing braille script both to tell a story. The research project is based on the teaching multisensory learning through the use of technology existing in the market and considered as and supplementary educational relief in the form of braille storybook. The play is a necessary element in children life, which is initiated by inbuilt inquisitiveness. Learning will be painless when it's executed through play. The cognitive development is very effective in natural learning. This varied cognitive development follows the cyclic pattern which is defined through Learn, Explore, Experiment and Contribute (LEEC). [7,2] Nature uses an unstructured methodology to address curiosity and initiates play. At the end of the play, children learn about themselves and others. Nature addresses this cyclic pattern through its Natural Resources. However, the recent concern from the researchers pinpoints the lack of interaction between children and Natural Resources. [3] Through the structured methodology these Natural Resources can be replicated in the form of a picture book to bridge the gap. In this paper, Morphological Analysis (MA) is used to map the available Natural Resources in the form of dimensions and its options. While traditional books are created with linear storytelling can allow us to explore the page spatially, leading to new connections between reader and the book.

**Index Terms**— Braille, Morphological Analysis, Natural learn and play, Ongoing exploration design.

## I. INTRODUCTION

Communication is a practice of transmission of data from one person to other through appropriate media. Although there are innovative procedural and unique aimed at the unsighted, availability of various mediums for communication for blind are negligible which is not in the case of sighted people. Braille is an arrangement of elevated points upon surface which symbolize an alphabet that can be sensed with the index and middle finger of the visionless individual to decode produced linguistic. [8]

When the Children play, infinite energy and imagination is shown. During the play children understand that the surrounding is a diversified place with unlimited possibilities. The Natural Resources provide inspiration, motivation, materials and the framework for play. [9] When designing children's book, the relationship between the visual along with the story line and the production of braille book has been the focus of this research project. 'Writing produces a visual image: the shapes, sizes and placement of letters on a page contribute to the message produced, creating statements which cannot always be rendered in spoken language'. [4]

In my practice as a designer, the connection between typography and symbolic interpretations play a vital role. I have aimed to push against the conventional use and meaning of story line to explore the visual dimensions of language to

make it creative. Children will be encouraged to become imaginative and innovative during the continuous Exploration and Experimentation. With the collective experience the child finally ends up in Contribution. Contribution results in newer invention which is for the betterment which is explained in further paper.

For sighted children story books have combination of visuals and story results in cognitive development, whereas lacuna can be observed with blind children story books which contain majorly text in braille script.

## II. EVALUATION

### A. Acquiring Tactics

The primeval techniques of training blind writing system are same as the recent means. But there is nothing achieved as a revolutionary in educational curriculum. Together sighted and sightless kids are able to sense acquainted substances effortlessly. Combining braille and pictograms which is an essential aspect thus delivering a way for the additional basic access by creating an educational relief to impart the unsighted kids from preschool to fifth standard kids. [8]

### B. Typography and Construction of Page

The purpose of traditional book typography is to communicate the author's message in a legible, readable

manner without drawing attention to itself. This means inviting the reader into the text and clarifying the structure and order of the text so the reader can navigate the book with ease, as well as linking the text harmoniously with other elements in the book (including illustrations, captions etc.). A well designed book shows a harmonious balance between the structural (direct) and associative (indirect) aspects of typography. [1]

**C. Morphological Analysis**

Morphological Analysis (MA) is used to analyze available dimensions and the options. MA is a method to study, represent structure and form of physical or conceptual entities, by deconstructing them into their basic dimensions and options. The method also enables identification of newer or innovative combinations as well as the impossible ones. Further major Natural Resource is mapped with its pictograms which will then contribute for the designed picture book.

**D. References**

There is clearly a gap, which needs attention. The lack of available technology, lack of standardization or inadequate implementation of standardization has been long standing problems in the field of acquainting knowledge with respect to story reading. For endurance with surface of current research picture book, coated PVC sheet is used to make it consistent and ceaseless. [8]

**III. PROBLEM DEFINITION**

The process of a book is a constant conversation between author, designer, illustrator and producer. In mainstream children’s publishing, books often evolve in the conventional way – the text is written first, the illustration is done in relation to the text and the designer comes in at the end to put these together this may be the spatial page and active typography. This formed the germ for my research project where no such combination is observed for braille story books.

**IV. STATEMENT**

To provide a piece of a hardware for sightless children with parallel learning of story and picture book.

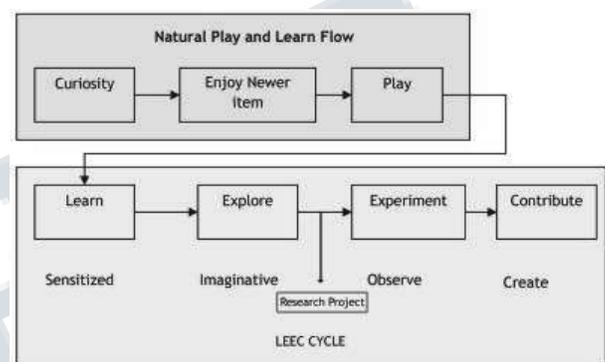
**V. METHODOLOGY**

**A. Learning Process**

When the child is playing, it’s very difficult to differentiate the “Play” component from “Learn” component. As Piaget defines the cognitive development every aspect of play ends

in cognitive learning of a child. [7] Multiple Intelligence theory defines varies forms of intelligent that can be developed within children with their effective learning and children will establish broader vision with the help of different learning methodologies. [5]

Below is the Learn-Explore-Experiment-Contribute chart is showcased which describe the natural learning process. Curiosity being the root and contribute at the tail. In this proposed chart the current research projects is between explore and experiment whereas the sightless child explores the book which aids to imagine with observation.



**Table 1 Natural Learning Process**

**B. Pictogram Derivation**

For the natural forms a story telling activity in collaboration with ‘Bookwallah Organization’ (NGO based in India and Chicago works for educational expansion from all age groups). Considering the requirement of this research project children from grade 1 to 5 are subject.

**C. Experiment**

Purpose: To derive pictograms from children for research project for sightless children story books.  
 Subject: Children from grade 1 to 5.  
 Investigation Material: Art papers, paints, sketching material.  
 Testing: Each group was narrated simple short stories and they were asked to illustrate any interesting part.  
 Purpose: The primary intension behind the activity was to derive common forms of different existing elements.  
 Data Analysis: Below are few painting collage and we will be further analysis a form to extract pictograms.  
 Below are few examples of house and further simplification towards braille pictogram.

**Observation**

1. Different grades drew different forms (fig 2.1) further linear drawings were drawn by the children (fig 2.2) but to

reduce the visual complexity, simplest forms were short listed.

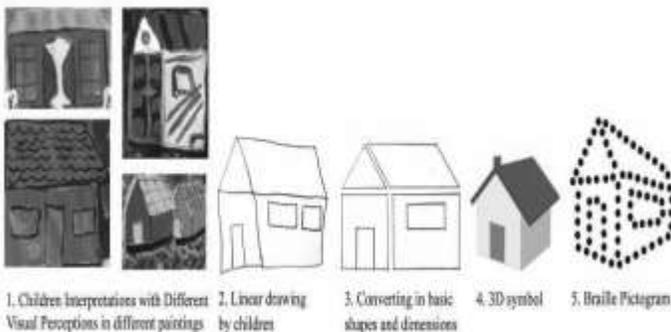
2. Children preferred graphic free forms than realistic approach.
3. Being children with vision could express more in their interpretation rather than adult invasion in their creative thought process.
4. The linear drawing forms were more refined and universal with grades and easy in identification.

Conclusion:

1. Many pictograms were derived using morphological method explained below.
2. The activity irrespective of the color since our area of research being for blind.
3. Symbols being universally common the two dimensional symbols are converted to three dimensional pictograms.



**Fig 1** Painting done by visual children from narrated stories.



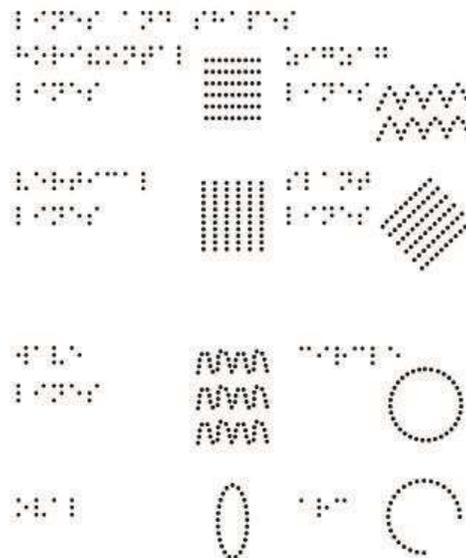
**Fig 2** Conversion of forms from painting and linear drawing to easiest shapes keeping essential features to blind in braille to pictograms.

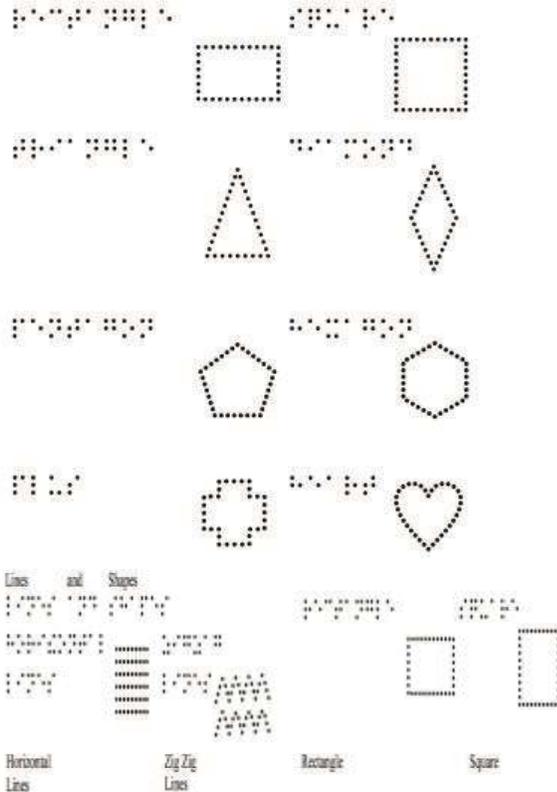
**D. Morphological Analysis**

Morphological Analysis is a powerful method to study and represent, structure and form of physical or conceptual entities. Various combinations of the dimensions and options in the specific context of any entity represent its corresponding manifestations in the real world. The method also enables identification of newer or innovative combinations as well as the impossible ones, and hence serves as a powerful visual tool for systematic creativity and innovation. [10] These necessities aid the designers to imitate the resources in the form of picture book to meet the children development. Every child development is different; however through this structured exploration the designed picture book acts as a learning material to acquire. Morphological analysis further provides systematic way to map the requirements for sightless. However with the systematic process most of the possible options and combinations are done mentioned below. Rather than exposing with designed pictograms blind children were first taught the basic shapes to help them to identify combined shapes for the research picture book.

**E. Mapping of Natural forms for sightless children**

Once the initial stage of learning of shapes is done (fig 3) analysis is done keeping blind children mapping process of learning. The learning depends on the moment of hands and for proper absorption of the form initially guidance is necessary later making the children individual learner. The sightless children can identify these new designed pictograms. [8]





**Fig 3 Braille book page with initial stage learning of shapes for further picture book analysis.**

**Natural forms Mapped to Dimensions**

Dimensions	Options		
Linear	Moving Ants	Snail	
Zig Zag	Snake	Worm	Caterpillar
Haphazard	Clouds		
Circular	Peacock Dance		
Rolling	Rolling Rocks		
Wave	Sea Waves	Tree Leaves	
Vertical	Rain Drops	Water Falls	Falling Leaves
Flying	Bee	Birds	
Oscillation	Monkey Tail	Dog Tail	
Rhythmic	Fish Movement	Elephant Walk	Cow
Spiral	Spider		
Jump	Frog	Monkey	Rabbit

**Table II Natural Resources- Mapped to Dimensions [1]**

**VI. OUTCOME**

Below is one of the stories from picture book which caters the entire story in major four frames. The picture book acts as a visual comic book appearance where each happening is represented in the form of story board.

The picture book analysis below according to frames digital and braille picture book: (Tortoise and Rabbit)

- a. Frame I shows the starting point of the race between rabbit and tortoise with many trees pictograms as jungle and sun above.(Here the frames are divided with linear dots which is used in academics to separate a page by blinds)
- b. Frame II As the story progress the rabbit moves forward to tortoise as he is fast.
- c. Frame III Rabbit being fast assumes for victory hence takes rest under the tree.
- d. Frame IV Last frame concludes with tortoise winning the race with moral message- ‘slow and steady wins the race’.



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**SMT. KAMLA MEHTA DADAR SCHOOL FOR THE BLIND**  
 (Founded 1900)

160, Dadasaheb Phalke Road, Dadar (East), Mumbai-400 014.  
 (REGISTERED UNDER BOMBAY PUBLIC TRUST ACT XXIX OF 1950 - F/232 (B)  
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To, Date: 08<sup>th</sup> January 2015

Siddhesh sushil shirsekhar  
 Sir J.J institute of applied art,  
 Fort, Mumbai.

Subject: Covering letter for project for blind students  
 And project approval.

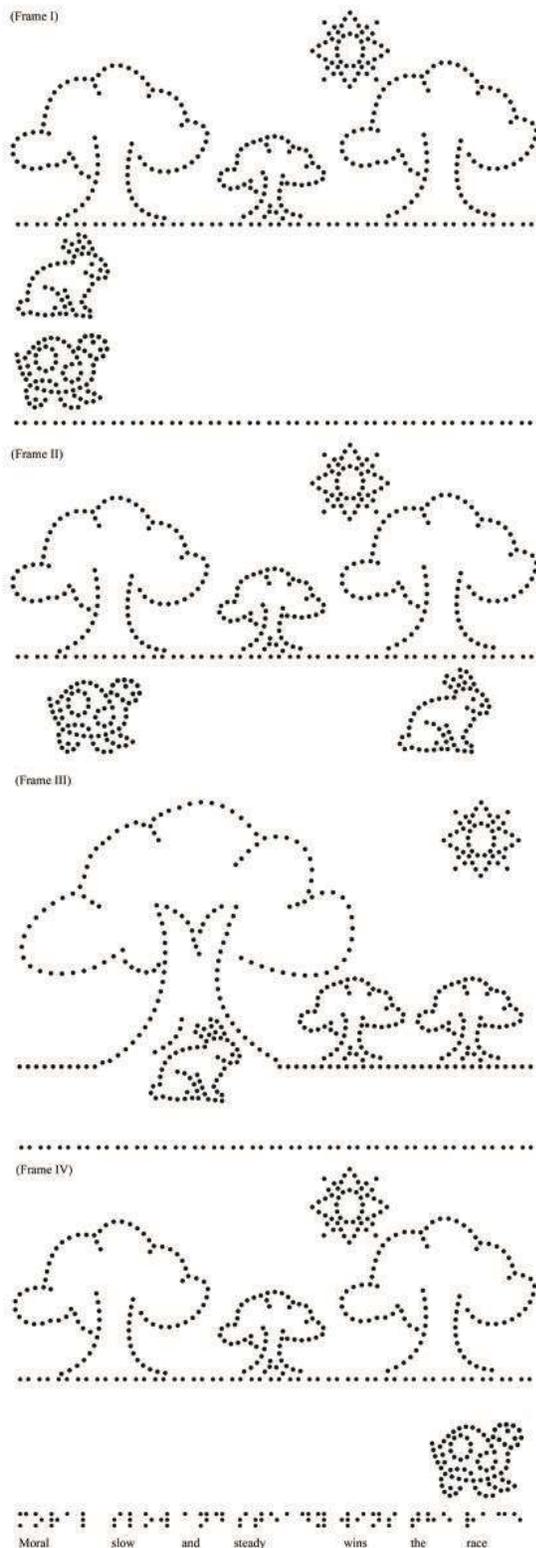
This covering letter mentions that Mr. Siddhesh Sushil Shirsekhar, final year B.F.A from Sir J.J institute of applied art 2014-15, Fort, Mumbai. He is launching a new project in Braille script which is very useful to basic concepts of the subjects of the subject for blind children.

He is working on this project since months with proper approvals from the school faculties and authorizes. His project is now approved by our school and will be implemented in 'Kamla Mehta school for the Blind's first time and will be launched shortly.

We ask for word of appreciation and request to co-operate and grace the project to make it a grand success.

Thank you,

Yours truly,  
  
 (Smt. Uma Mumbaikar)  
 Principal  
 PRINCIPAL  
**SMT. KAMLA MEHTA DADAR  
 SCHOOL FOR THE BLIND**  
 160, DADASAHEB PHALKE ROAD,  
 DADAR (EAST), MUMBAI-400 014.



The entire story book is finalized and approved under the guidance of Smt. Kamla Mehta Dadar School For The Blind. Below is the approval letter for the current research project.



**Fig 4 Actual Braille picture book for sightless children.**

**VII. ADVANTAGES**

1. Picture book uses the universal measurements of braille dot to keep smooth learning process to bring out the expressive nature of the words in the form of pictogram.
2. Reduces the bulk quantity of pages required to produce a story which makes this picture book cost effective.
3. Recreation of pasts and imaging their future, while grounding themselves in the reality and fantasy in the picture book.
4. Acts as a link between braille script and verbal illustrative talks and helps the sightless to unfold their imaginations.
5. The child can understand the product beyond the designer’s design intentions.
6. Cognitive development where learning should enable the possibilities of thinking beyond linguistic and logical intelligence.

**VIII. LIMITATIONS**

1. This project gives a methodology to replicate the natural forms for a child to develop through picture book.
2. There is no replacement to nature to the child development. [6]
3. The table (Table II) provided here is to mention the way to explore the methodology and it can be updated.

**CONCLUSION**

1. Children development is very crucial since it lays the foundation for future contribution with the help of picture book the child becomes an individual learner to reciprocate.

2. It strengthens the education process. For the game is an important tool to the development of the analysis criticizes of the reality and to see theirs with subject, and that they need other subject to can intervene and transform, so they will become a 'product' of this society.

3. The book like the rest of graphic design, never resides in isolation. It is a product of a literary but also social, cultural, economic and political context and finally, that when you work in collaboration to communicate in an indirect rather than direct way; this can lead to unique and memorable reader experiences.

#### **FORTHCOMING LATITUDE**

Book varieties with terminologies, numerous approaches possibly applied through devices and methods.

#### **ACKNOWLEDGEMENT**

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#### **REFERENCES**

[1] Ananthavalli, R., & Medha, S. K. (n.d.). Natural Play and Learn - A Morphological Analysis. Designing for Children, (p. 7).

[2] Bruner, J. (1996). Studies in cognitive growth: A collaboration at the Center for Cognitive. New York: Wiley & Sons.

[3] Bunting, T., & Cousins, L. (1985). Environmental dispositions among school-age children.

[4] [Drucker, J. (1984). Letterpress Language: Typography as a Medium for the Visual Representation of Language.

[5] Gardner, H. (1983). Multiple Intelligences. Retrieved from American Institute for Learning and Human Development: <http://www.institute4learning.com>

[6] Hughes, F. P., Allyn, & Bacon. (1991). Children Play and Development.

[7] Piaget, J. (1990). The child's conception of the world. New York: Littlefield Adams.

[8] Shirsekar, S. (2017). Education with Braille and Typography. International Conference on Intelligent Systems and Information Management (pp. 50-53). Aurangabad: IEEE.

[9] Sinker, M. (2009, November 10). Retrieved from [www.marysinker.com](http://www.marysinker.com) : <http://www.marysinker.com>

[10] Zwicky, F. (1962). Morphology of Propulsive Power Society for Morphological Research. Pasadena, California.