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9th VC/1992-94 Batch

- ① Sachin Paliwal : Explorations in Bamboo toys
- ② Nilesh Kale : Bombay stresscapes : a photo documentation
- ③ Varsha Sathye : Tali (Screens) in the Architecture of India
- ④ Somesh Sharma : Shop signs -
- ⑤ Julie R. Leonard : Analysis of illustrations/diagrams for school textbooks
- ⑥ S. V. Neelkantan : Use of hypermedia in children's stories

EXPERIMENTALS

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SPECIAL PROJECT

EXPERIMENTAL

- submitted in partial fulfilment of the requirements for the Degree of Master of Design in Visual Communication.

By. SACHIN PALIWAL
92625004.

Guide. Prof. V.P. BAPAT

Industrial Design Centre
Indian Institute of Technology,
BOMBAY.

FEBRUARY - 1994

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APPROVAL SHEET

EXPLORATIONS
IN
BAMBOO TOYS

This special project entitled "Explorations in Bamboo toys" done by Sachin Paliwal (Roll no 92625004) is approved in partial fulfilment of the requirements for the degree of Master of Design in visual communication.

Guide: Prof V.P. Bapat.

Examiner: Prof M. Bhandari

Bapat 31
22/6/19

ACKNOWLEDGEMENT

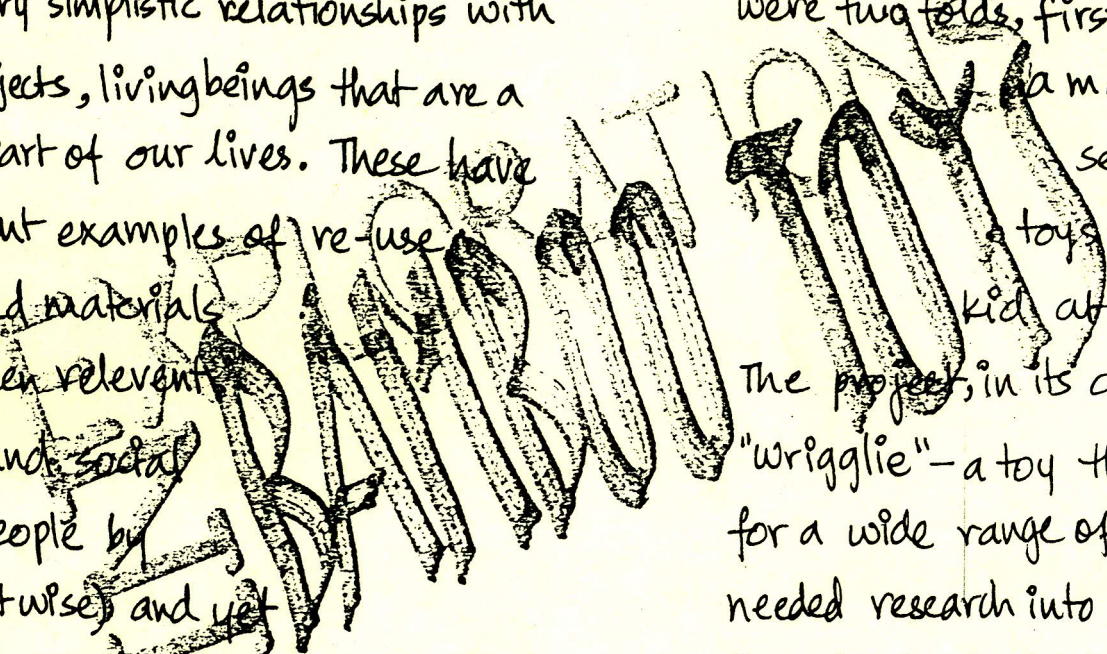
EXPERIMENT

My thanks are due to
Prof. V. P. Bapat who
gave me ample freedom
in working on this
project though me
being a V.C. student.

- Sachin Patilwal.

INTRODUCTION

Toys, in the Indian context, have been much more than mere playthings. Somehow, these have also had very simplistic relationships with the activities, objects, living beings that are a very important part of our lives. These have also been excellent examples of re-use of waste/recycled materials and have also been relevant to the economy and social status of the people by being cheap (costwise) and yet carrying with them the very human qualities and creativity of the toymaker. There probably was a deep understanding of the nature of kids and thus most of the toys were not "break proof". This temporariness and the low cost had always made these



toys affordable as well as "disposable" after their lives. And Bamboo - a versatile material it is - enjoyed a high place for its use in most of the economical toys.

The intentions of this project in the beginning were two folds, firstly to explore bamboo as a material for making toys and secondly - if possible - making toys that could be made by a kid at home with ordinary tools.

The project, in its course, took a turn when "wrigglie" - a toy that could also be a mechanism for a wide range of toys was realised. This too needed research into variables in its making so that it could be made successfully by anyone. The student started work and had to soon abandon it when he faced allergic reaction to bamboo fibre. The project, then, was turned into a mental exercise of analysing the available/completed pieces and generating concepts and ideas.

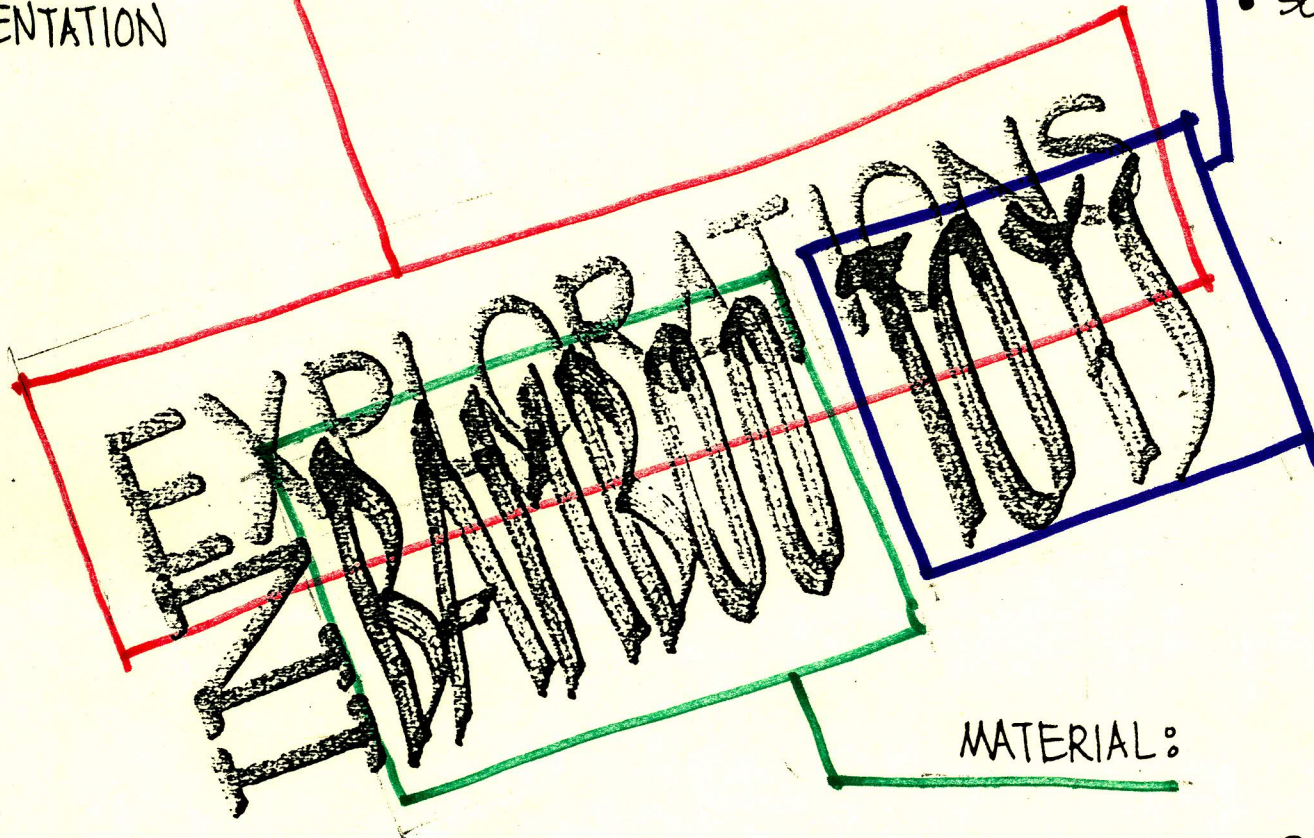
AIM :

EXPLORATION

EXPERIMENTATION

APPLICATION :

- Display toys - static
- Sound-emitting toys
- Play-toys
semidynamic
Dynamic.



MATERIAL :

- As "yet another" material

- Form
Tubular/cylindrical
knotted/colour, texture

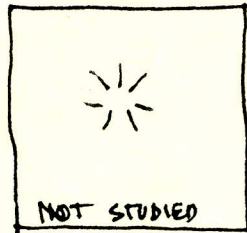
- Properties.
Elastic/springlike
Fibre strength

TYPES OF TOYS POSSIBLE

BAMBOO...

As "yet-another"
material →

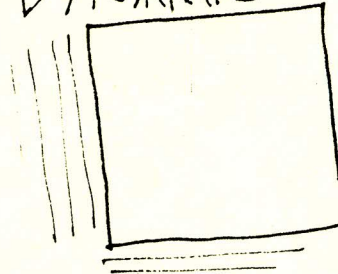
STATIC TOYS



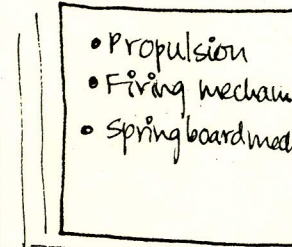
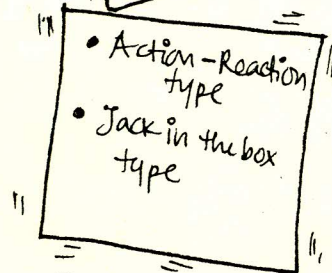
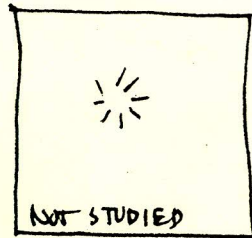
SEMI-DYNAMIC



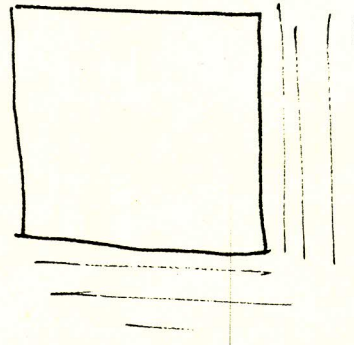
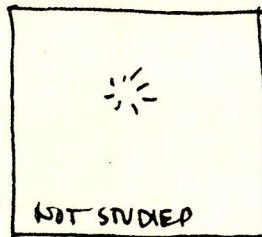
DYNAMIC



As an
ELASTIC material →



As a material
with FORM
(FORMAL PROPERTIES)



EXPERIMENT

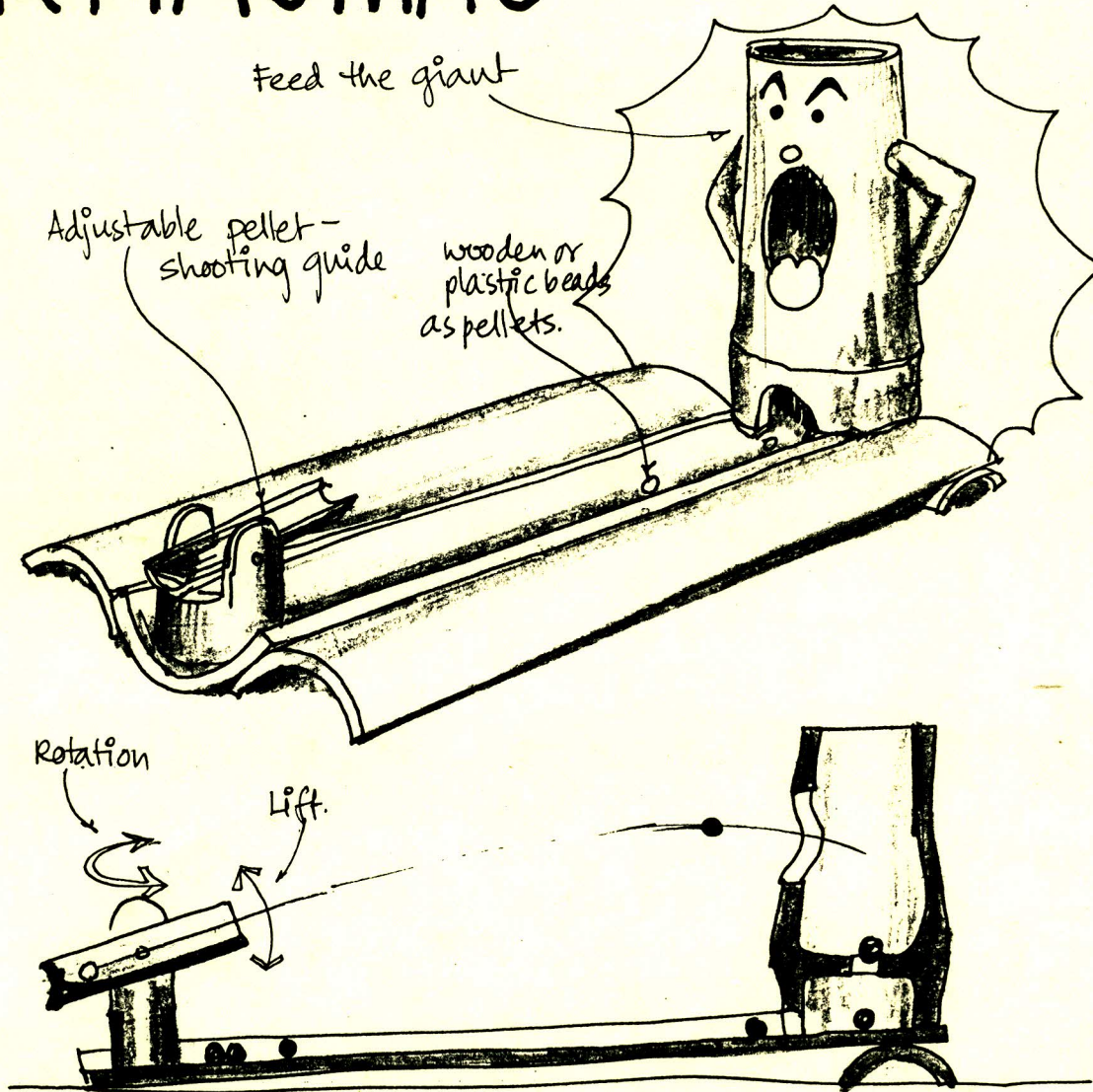
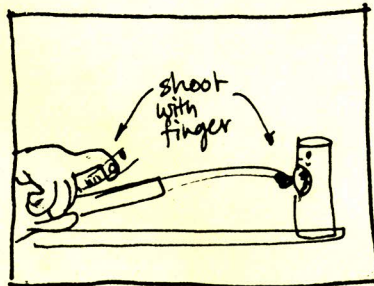
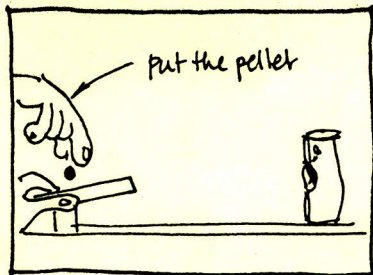
IDEA - 1
Semidynamic
Form Property.

"KHAUMAU"

Feed the giant

Adjustable pellet-
shooting guide

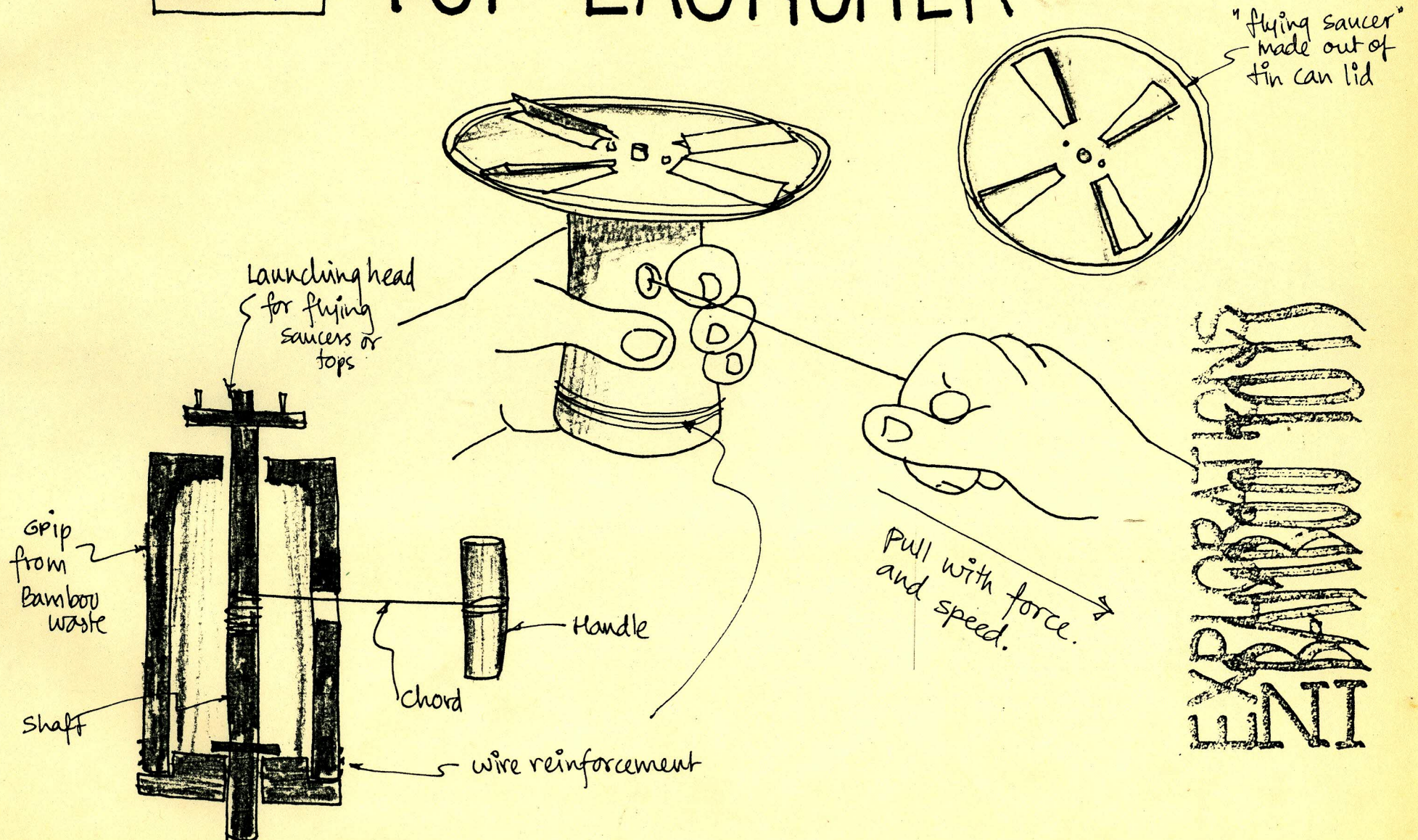
wooden or
plastic beads
as pellets.



NOTHING TO
DO WITH
THE
ENI

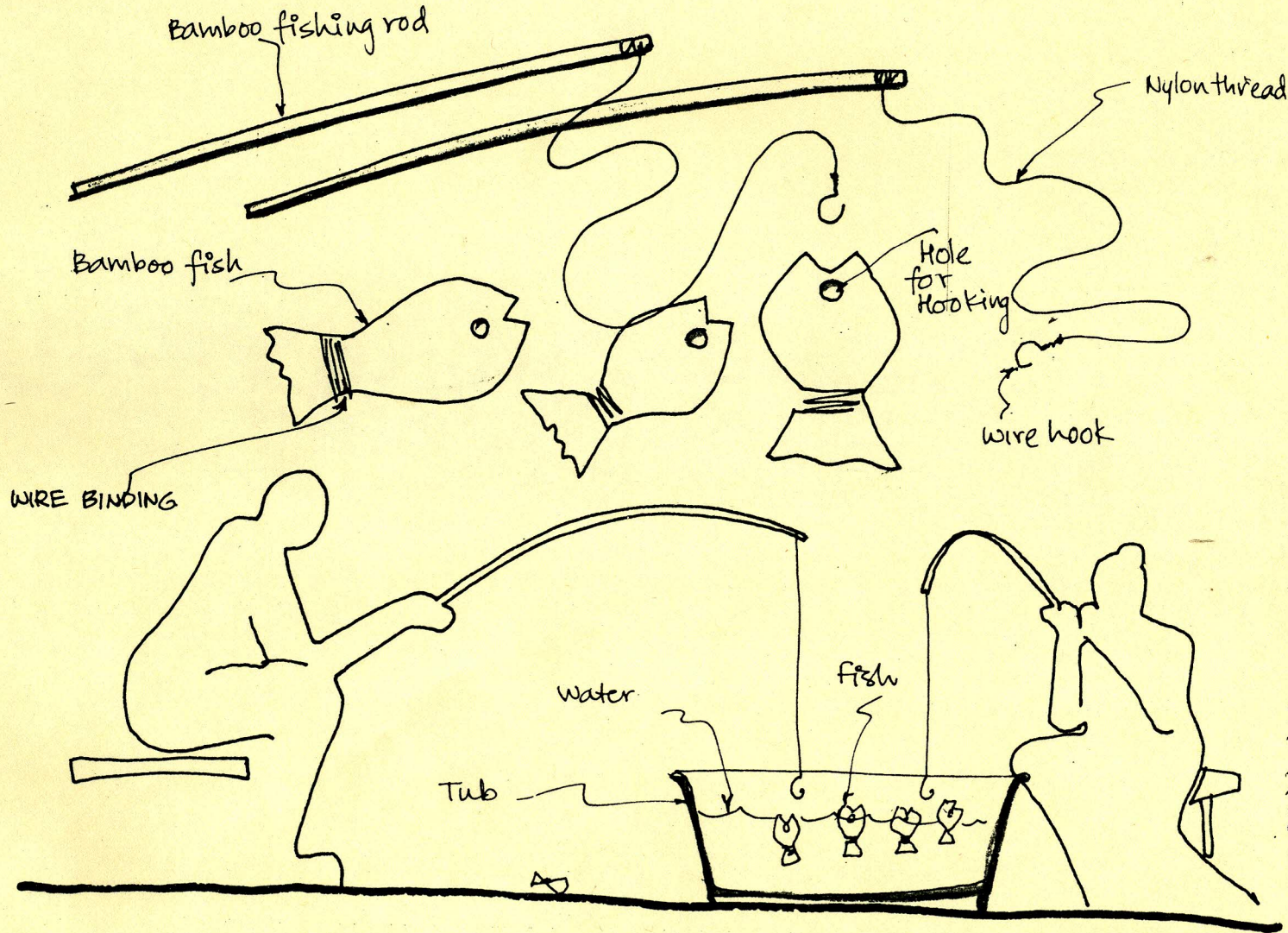
IDEA-2
semidynamic
Formal

TOP LAUNCHER



IDEA-3
Semidynamic
as a material

TUB-FISHING

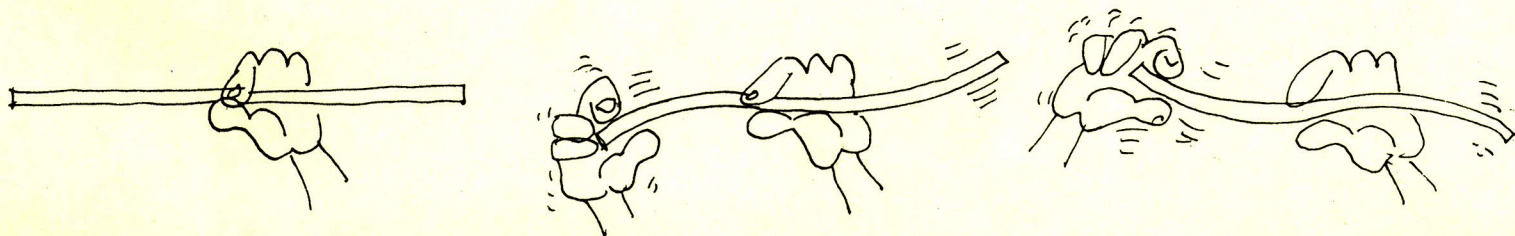
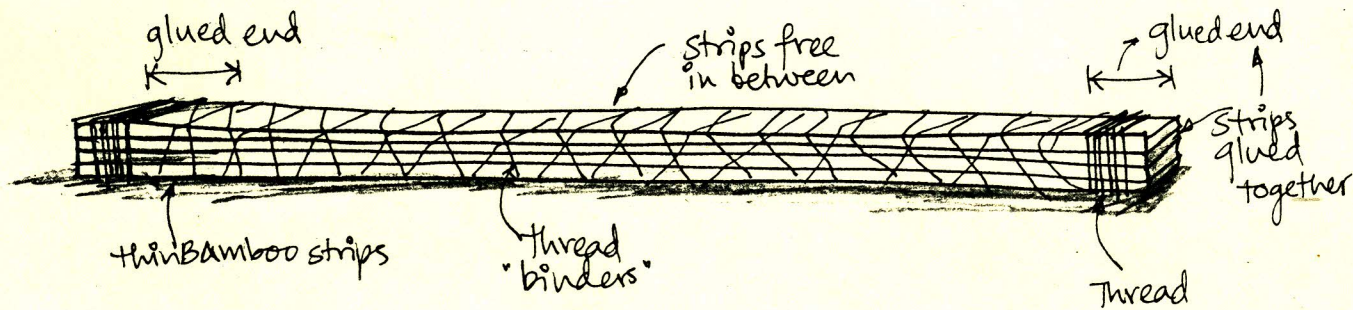
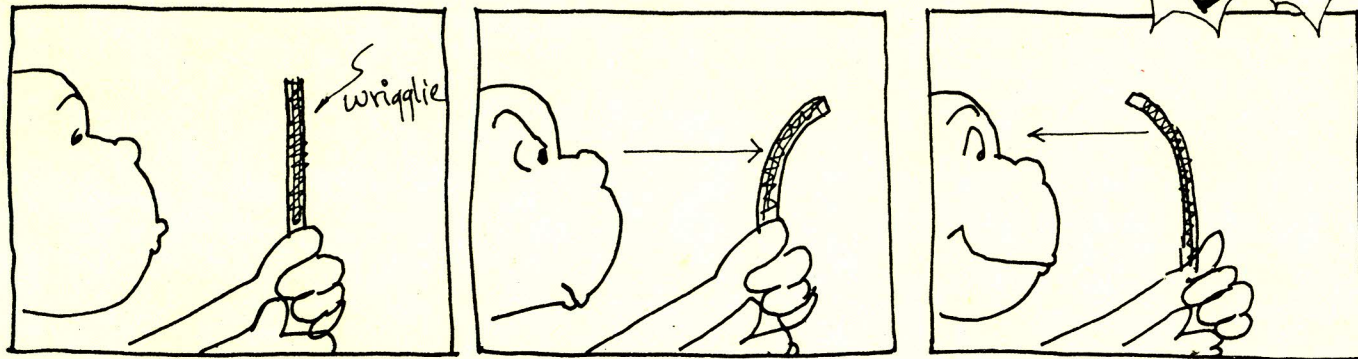


EXPERIMENT
ENI

IDEA-4
Semidynamic
Elastic, Fibre.

"WRIGGLIE"

SELECTED
FOR
EXPLORATION.



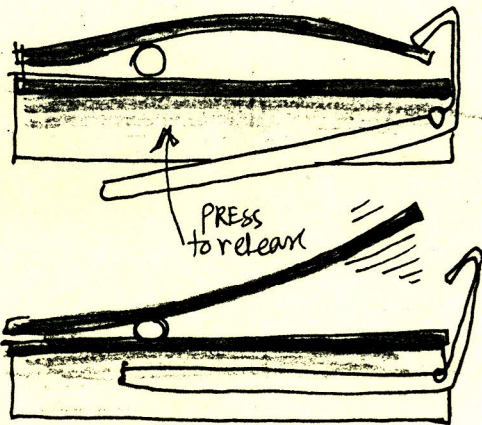
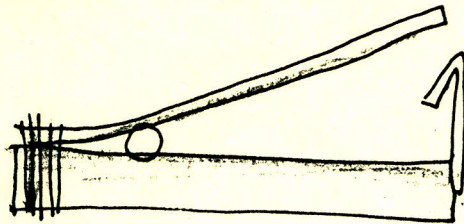
EXPLORATION

IDEA-5

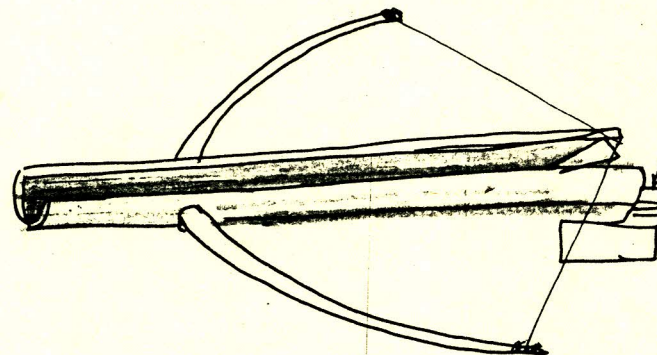
Semidynamic
Elasticity

MECHANISMS FOR TOYS

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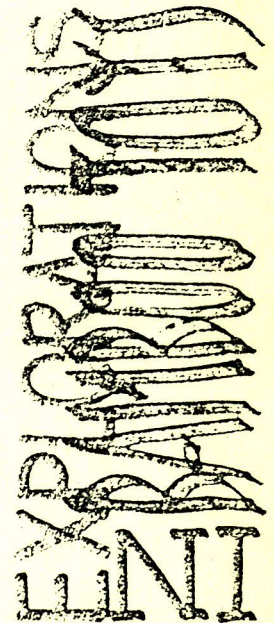


springboard.



may be used for propelling ^{toy} cars etc

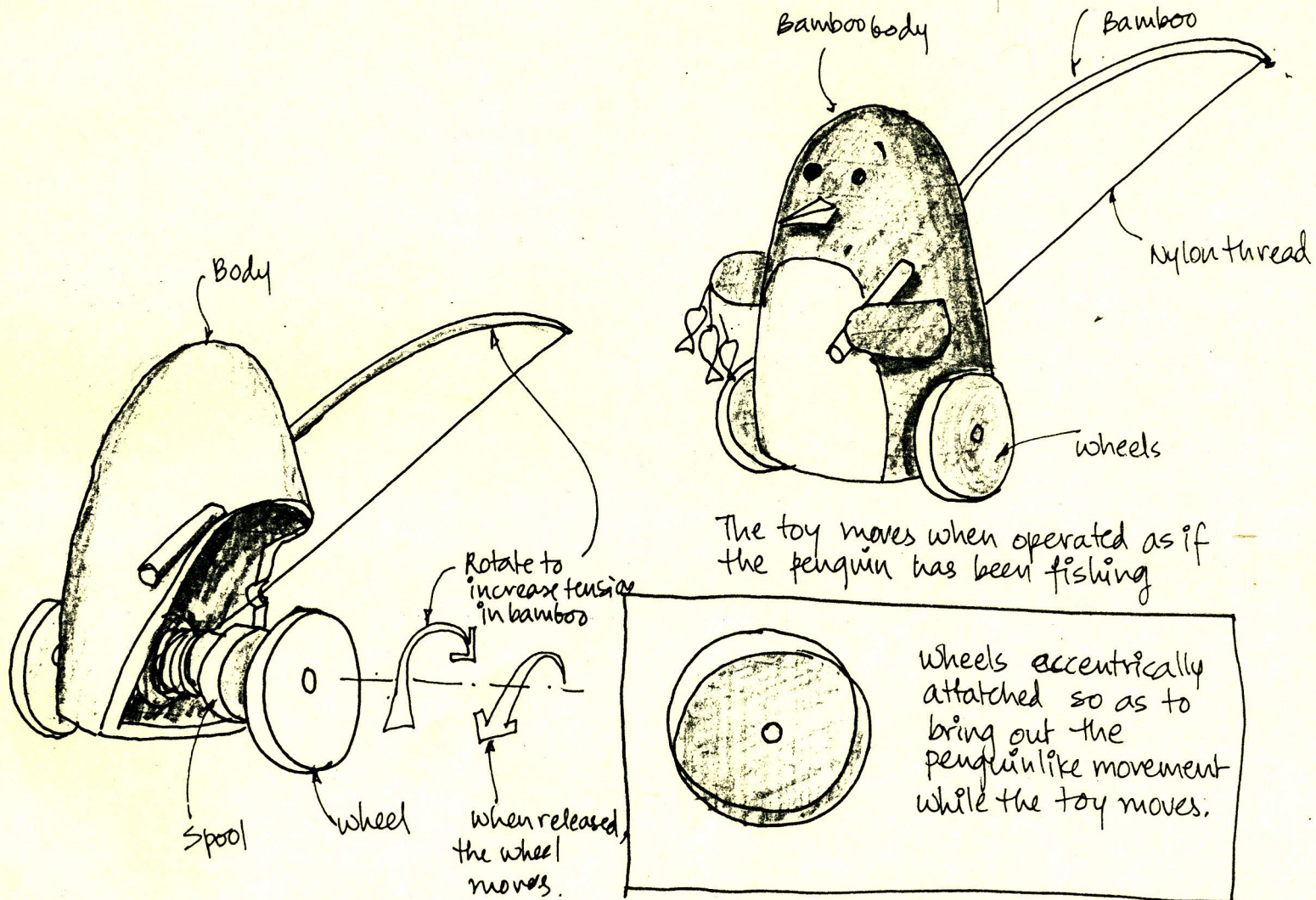
Press to
release
chord



IDEA-6

Dynamic
Form & Elasticity

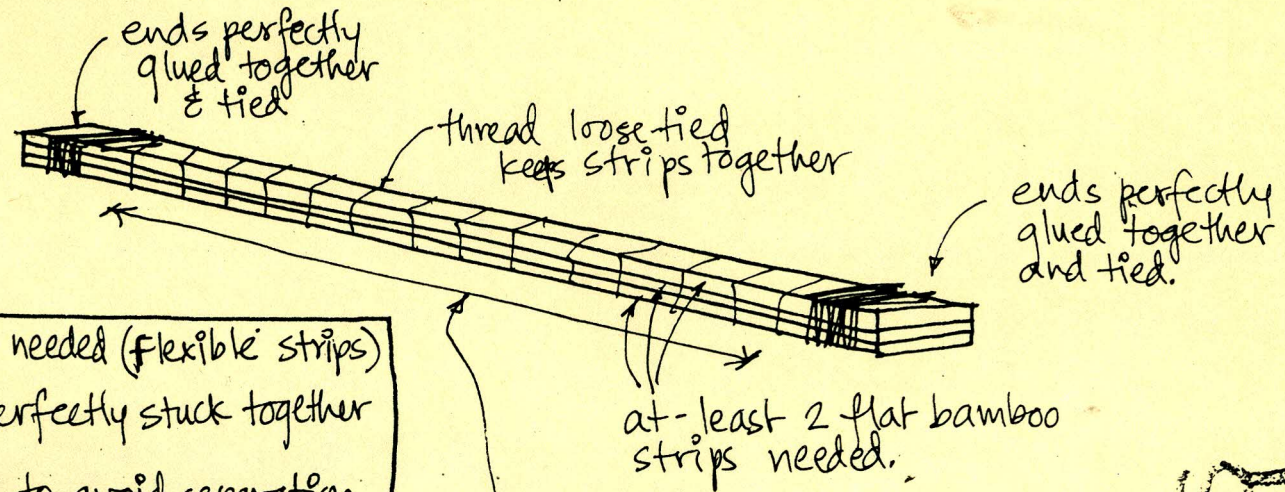
"MACHHIMAR"



WHEELS

THE WRIGGLIE

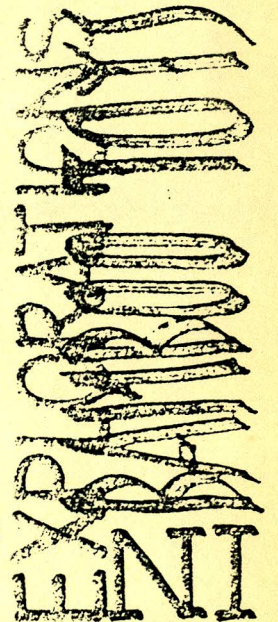
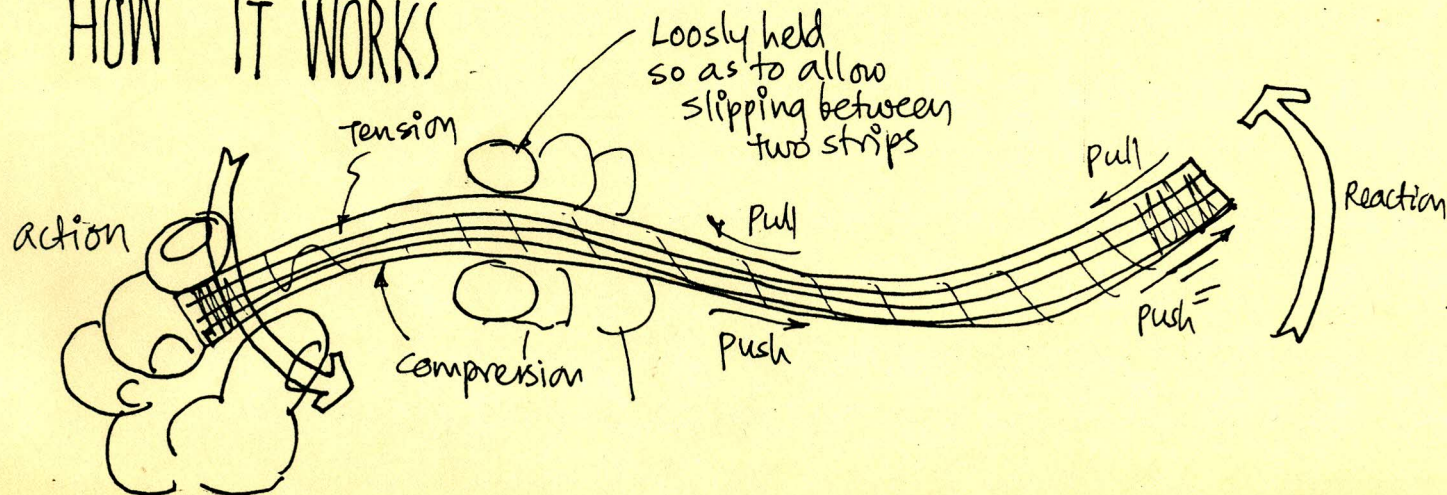
GENERAL INFORMATION



- at least 2 strips needed (flexible strips)
- ends must be perfectly stuck together
- strips loose-tied to avoid separation yet permit slipping between them
- Use of inner wood of bamboo preferred

no adhesive between strips in this area.

HOW IT WORKS



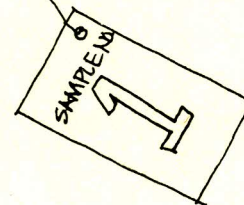
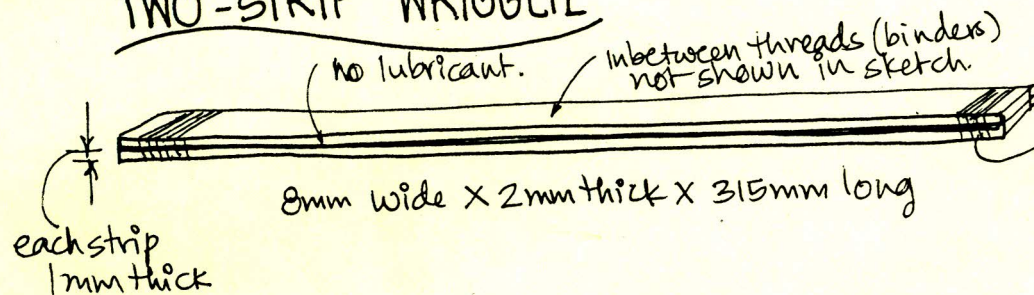
SINGLE-STRIP WRIGGLE



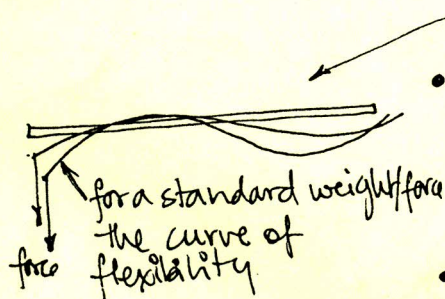
THE WRIGGLE STUDIES & OBSERVATIONS.

* Does not exist as the principle requires atleast 2 strips for it to work.

TWO-STRIP WRIGGLE

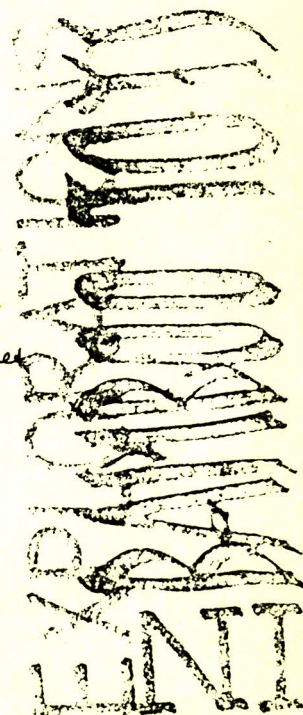
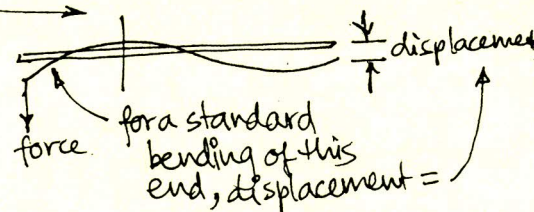


- Works properly when each strip has a minimum thickness of 1mm.

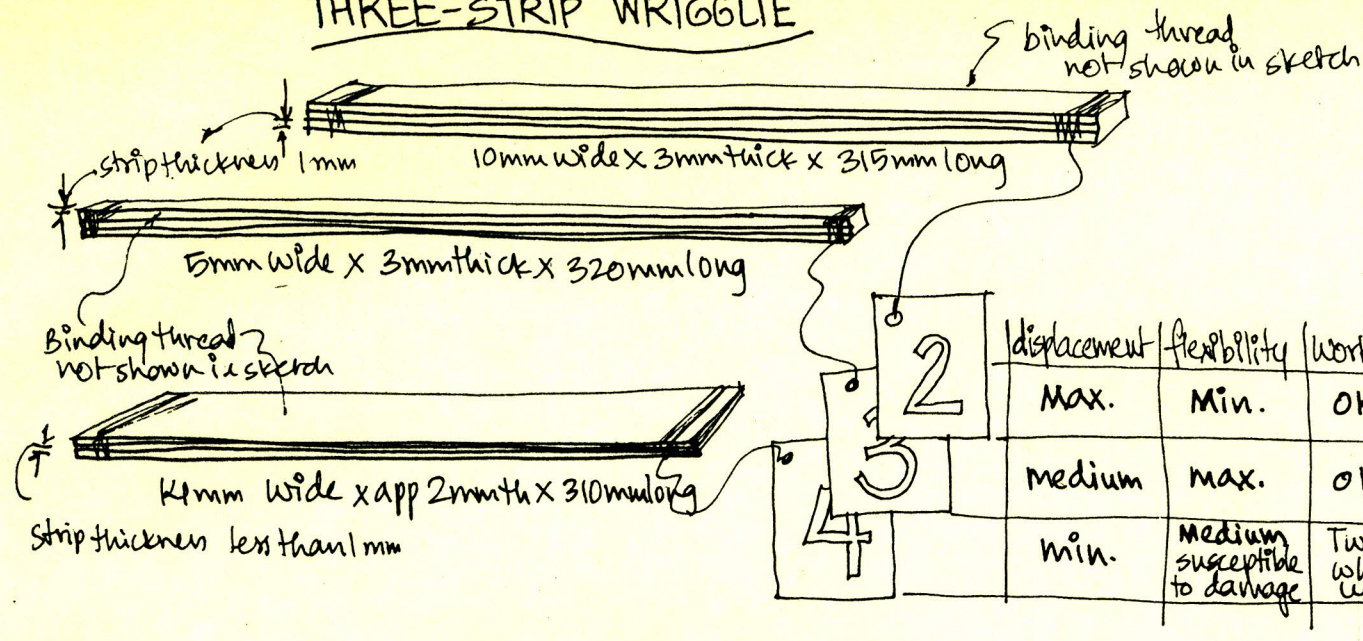


- More flexible, less displacement when compared to 3, 4-strip wriggles of equally thick strips, width and length.

- strips less than 1mm thick and wider than 10mm tend to twist when used.



THREE-STRIP WRIGGLIE

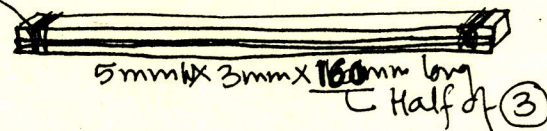


	displacement	flexibility	working
2	Max.	Min.	OK.
3	medium	max.	OK.
4	min.	medium susceptible to damage	Twists when used

OTHER OBSERVATIONS (3-strip Wrigglie)

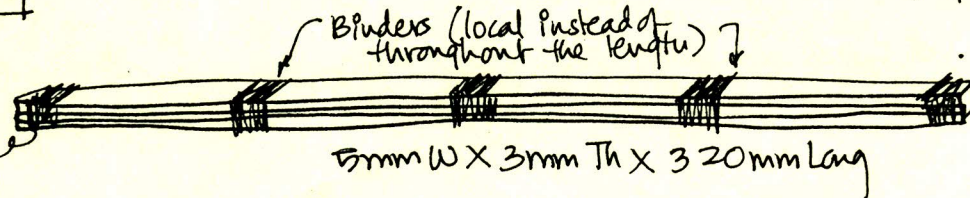
- Flexibility and displacement reduce dramatically (more than half)

3a



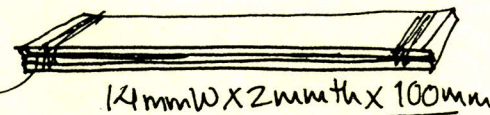
- displacement increase slightly.
- Flexibility same

3b



- Displacement and flexibility reduce dramatically.
- Broke while experimentation.

4a

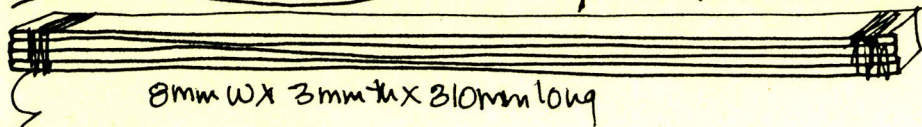


THE WRIGGLIE

STUDIES & OBSERVATIONS



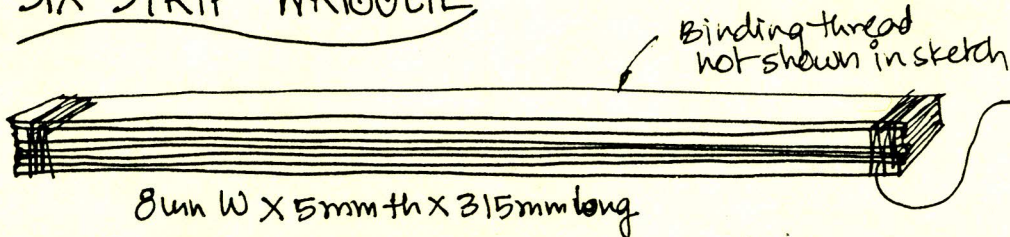
FOUR-STRIP WRIGGLIE



5

- Flexibility good. Increases with use
- Displacement good
- Optimum performance

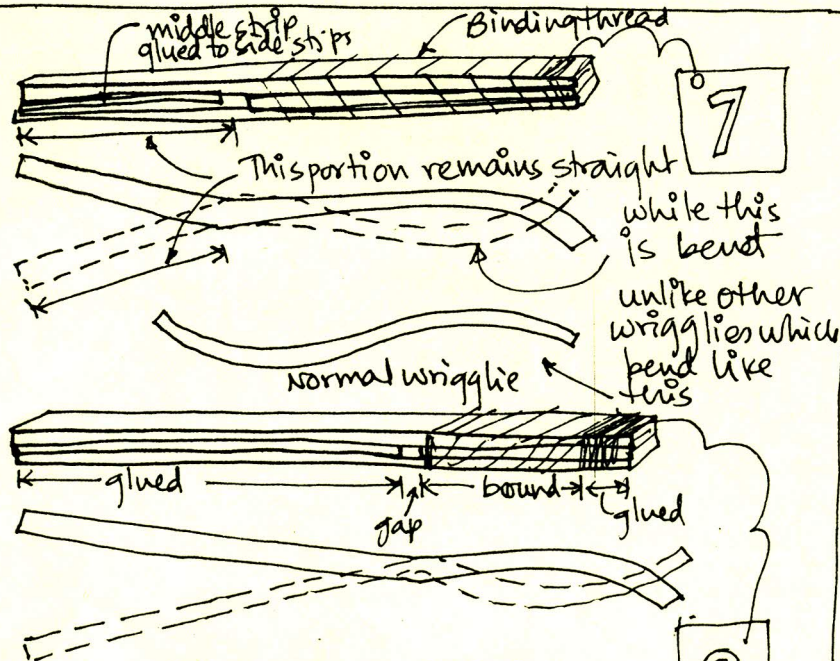
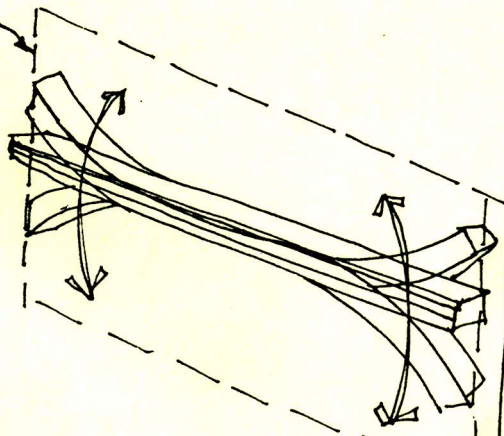
SIX-STRIP WRIGGLIE



6

- Flexibility reduces dramatically
- Displacement reduces "
- Working improper
- Tendency towards deformation

Note: All these wigglyes work in two directions on one plane parallel to the length and perpendicular to the width of the strips



EXPERIMENTATIONS

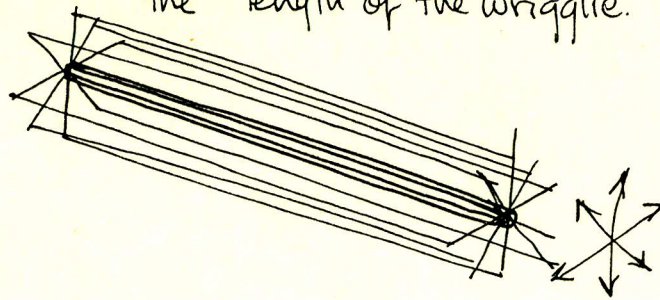
THE WRIGGLIE

STUDIES & OBSERVATIONS



THE CURIOUS WRIGGLIE.

This wrigglye works in all planes along the length of the wrigglye.

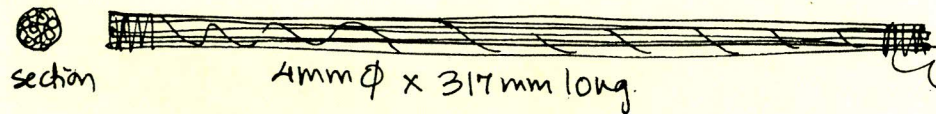


THE WRIGGLIE

STUDIES

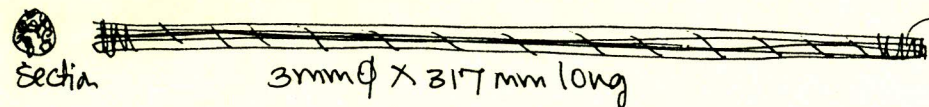
&

OBSERVATIONS.



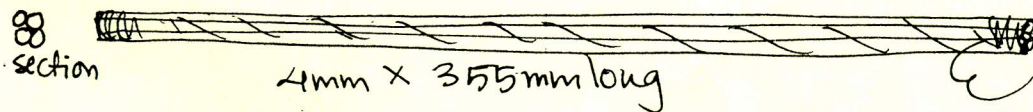
9

- made out of 1mm x 1mm strips of outer skin of bamboo
- parts break after use due to nature of the skin of bamboo.



10

- made out of 1mm x 1mm x 317 strips of inner bamboo wood
- excellent flexibility, softness and displacement



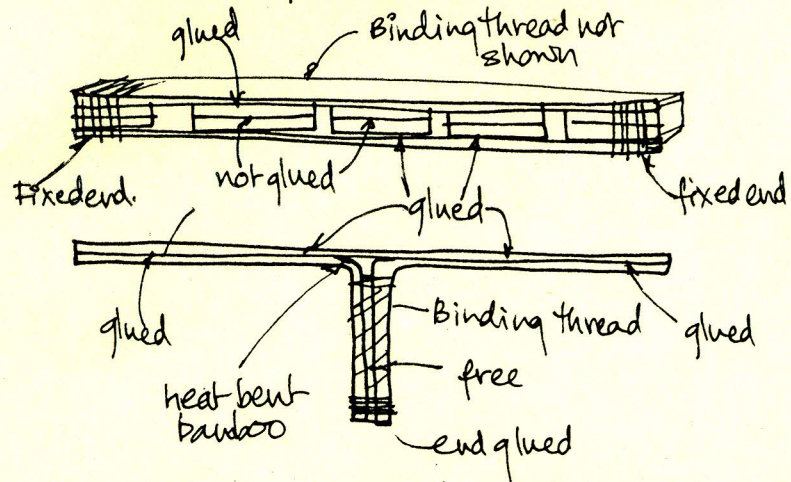
11

- made out of 4 circular 2mm φ strips of inner wood
- inefficient working
- Tendency to break.

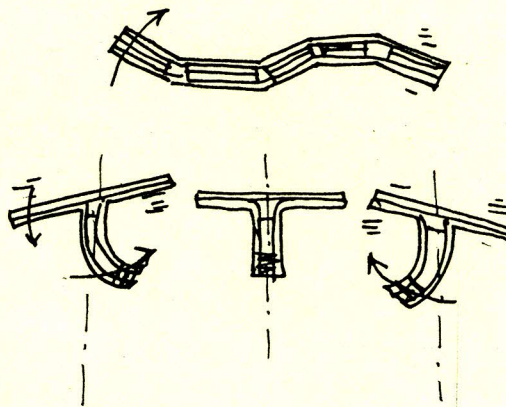


WRIGGLIE POSSIBILITIES

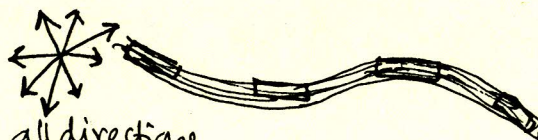
possible formation.



Expected results



all directions
on this plane

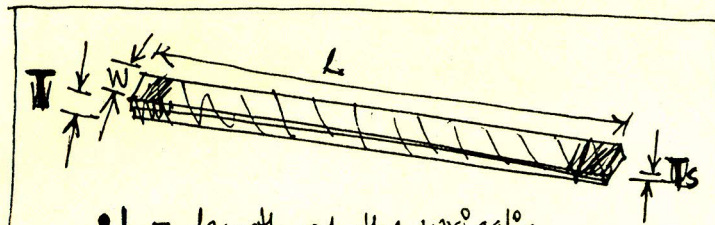


EXPERIMENT

...

...

THE WRIGGLIE VARIABLES



- L - length of the wrigglie
- W - width of the wrigglie
- T - Thickness of wrigglie
- T_s - Thickness of individual strips.

Number of strips used
in the wrigglie.

Material of strips

- bamboo or other
- skin of bamboo
- inner wood



Lubrication between strips

- wax • talcum • Varnish •

BINDING (TIES)

- Intermittant / throughout
- Material
- Tightness of binding

EXPERIMENT

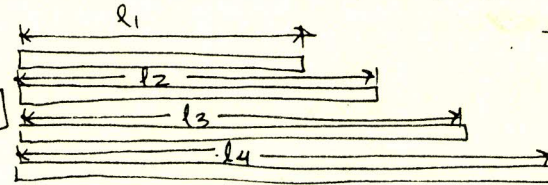
WRIGGLIE STUDIES: GUIDELINES FOR ANALYSIS

PROCEDURE.

STANDARDISE

- all wriggle variables except the variable which is to be studied. Use of wriggles made out of one bamboo must be preferred.
- all applied load/force. weights hung at the end can be used as a standardisation.
- distances of clamping the wriggle and tying weight.

Example: analysis of effect of length

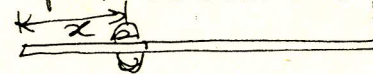


all these must have same width, same thickness, same strip thickness & number of strips, same lubricant and same binding material.

Use 1 kg of weight for all to assess the comparative flexibility.

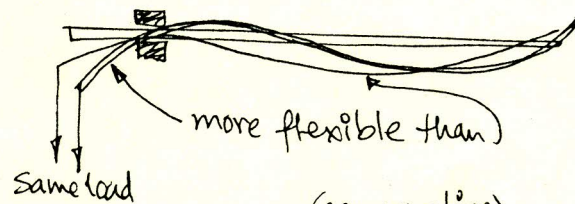
Use weight for equal bending to assess the comparative displacement

clamp at x distance from ends



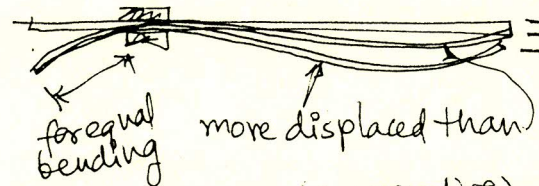
WHAT TO STUDY

check Flexibility.

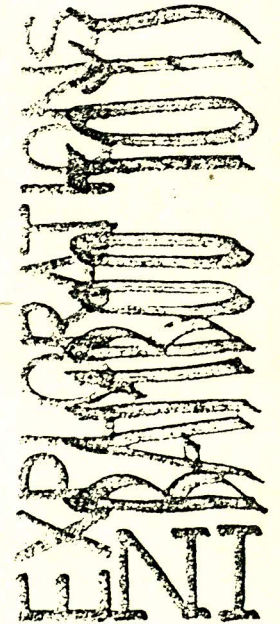


(comparative)
The amount of bending for equal load applied.

check Displacement



(comparative)
The amount of displacement from original point for equal bending on one side.



	Number of strips			Length			width			Th. of strips			Th. of Wriggle		
	2	3	4	150mm	300mm	450mm	2mm	5mm	10mm	0.5mm	1mm	2mm	2mm	5mm	10mm
Flexibility	S	D*	D**	S	I*	I*	S	D*	D**	S	D*	D**	S	D*	D**
Displacement	S	I**	I*	S	I**	I*	S	I*	D	S	I**	I*	S	I**	D*
Working	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

EXPECTED RESULTS

S - Standard

I - Increase

D - Decrease

* slightly

** medium

*** Dramatic

EXPERIMENT

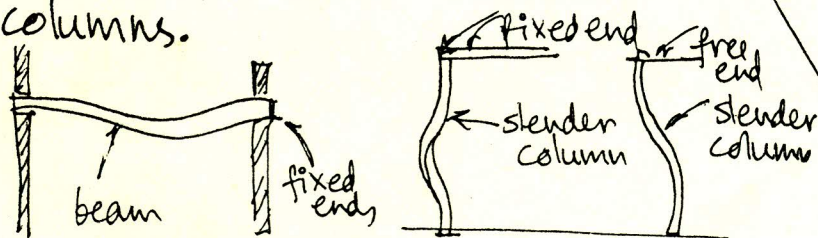
	Material			Lubrication			Binding		
	Bamboo skin	Bamboo inner wood	other	wax	Talcum	Varnish	Through	intermediate	other
Flexibility	D** (less)	S					S	I*	
Displacement	D*	S					S	I*	
Working	BREAKS EASILY	✓					✓	✓	

WRIGGLIE APPLICATIONS

Understanding/education

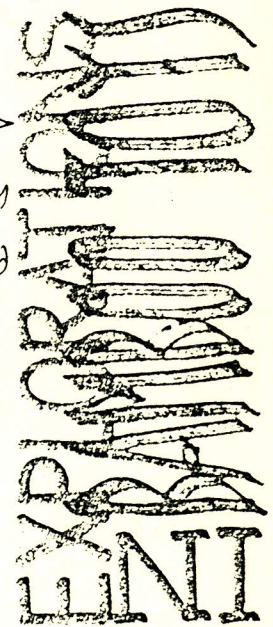
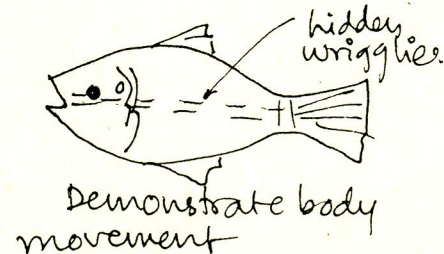
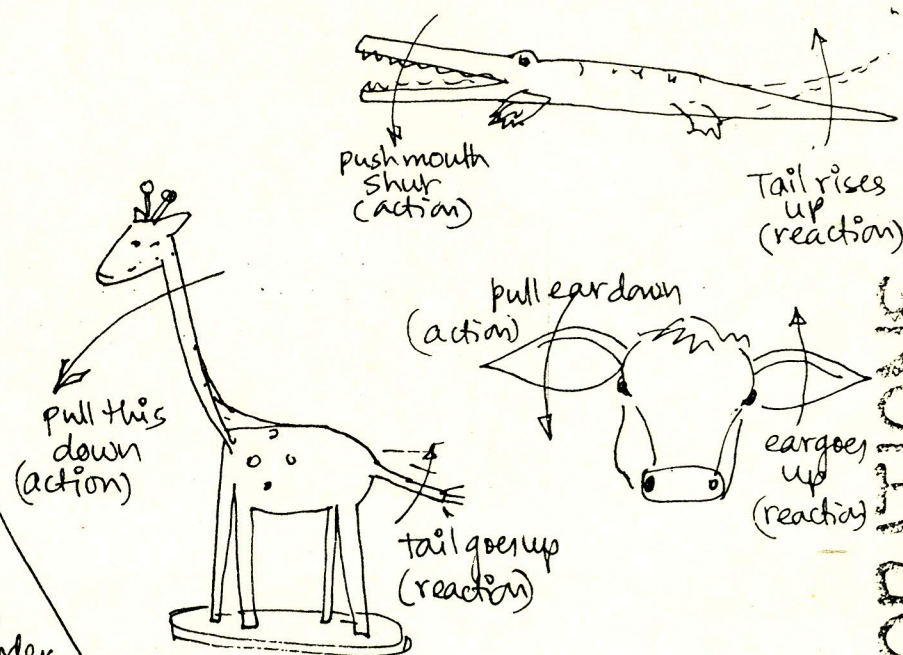
- Body movements of fishes snakes and other reptiles while they swim/walk/crawl.

- Behavior of certain structural members (RCC) on loading, especially beams, slabs with clamped/fixed ends, and slender columns.

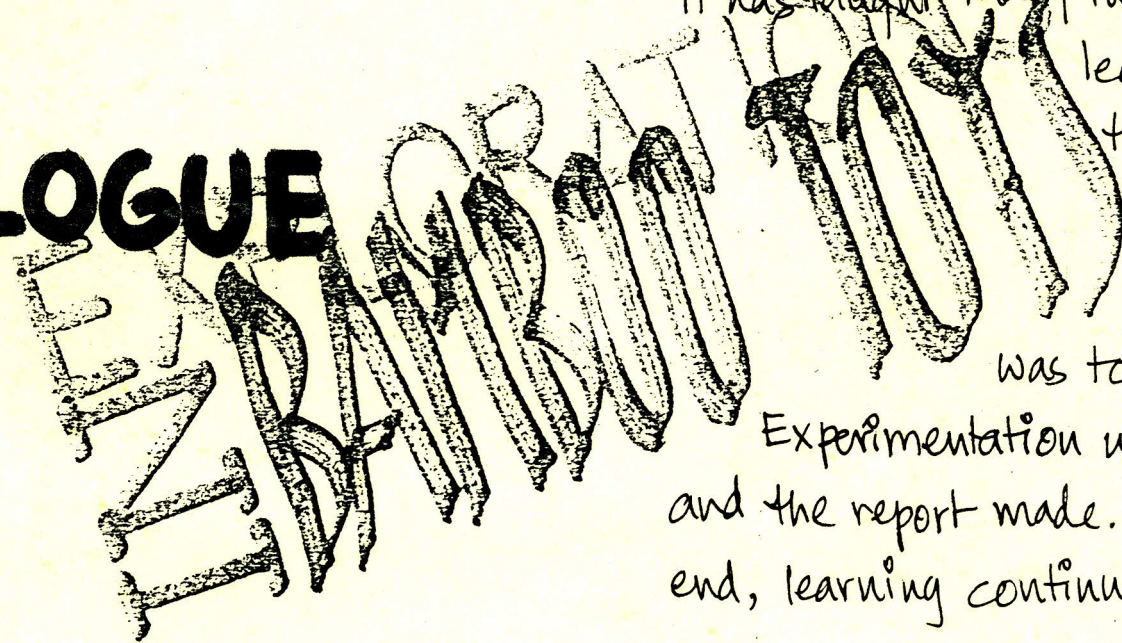


Toys :

- mostly action-reaction toys



EPILOGUE



Every experience teaches something, be it academic, be it practical knowledge - something is always added.

Though this project doesnot end in a happy, satisfying note, and the fact remains that much is still to be explored, it has taught many things to this student. This learning is not-academic - and that is why it was interesting - it was a practical, hands on training where one material was touched, and worked with.

Experimentation was done, results analysed and the report made. From the beginning till the end, learning continued.

And this process still continues - and may it continue further... into the folds of the time to come.

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