Constraints on changes in Representations during development

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ABSTRACT

A child builds representation of the objects through their exposure or related events a no of times. Children's drawing are used as tool to study constraints on internal representational changes that are encountered by a child during its development, these constraints are implicitly build during development, but during different phases of development different constraints are called with different intensities. 143 students between the age group of 4 to 12 years were asked to draw a tree and then to draw a tree that does not exist, similar procedure was called for human (boy/girl), animal and house. This method of experiment made children to re-operate on their mastered representation and bring about changes in the representation of a house, animal, tree and human being which will account for their non existence. Changes introduced by children of age group 4 to 7 were found to be greatly different from that of children from 8 to 12 yrs, these younger group tended to bring about more of those changes that did not interrupted there sequential process that is they brought about changes towards the end where as this was not generally the case found among the older group they brought about changes in the middle of their mastered processes. Younger children brought about changes in shape and size of elements and went with deleting where as older came up with insertion from cross category bringing about changes in position and orientation of elements.

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1. INTRODUCTION

Representation here refers to the characteristic image that is completely internal to a child's mind and not that child draws on paper. These representations implicitly embodies some constraints during the early procedures of representation and this ability of the child to flexibly bring about changes in these constraints changes along the course of development, e.g. when a child is asked to draw a human being it has some certain criteria which has to be necessarily brought about in their drawing which will qualify their drawing for a human like 2 legs , 2 hands trunk and many more but when they are asked to draw a human that does not exist then in that case they will bring about changes in these constraints some tend to change the shape of hands or bring about another hand in place of a leg. These representations on basic scale are implicitly learned by a child from its surrounding.

There has been lengthy considerable debate in this field on whether or not or to what extent children's drawing could be used as data's for internal representation, however these discussions debate over the ability of a child being able to replicate his internal representation on paper through drawing whereas the objective of this project is not to study the inadequate drawing skills of children rather it is to understand the changes that are incorporated by them owing to their development phase, in already successful drawing procedures when they are explicitly asked to change by setting newer goals. Main ideal here is to identify these constraints which comes to play when these representation undergo changes.

These representations are built as a result of knowledge about the objects. There are 3 ways in which knowledge could be gained and hence representation formulated.

1) To have knowledge innately, i.e. to have knowledge because of evolution, that one has right from the birth.
2) To gain knowledge by interacting with external social, cultural and physical surrounding.
3) And last and most important one is to gain new knowledge by making full use and deriving complete benefit from prior existing knowledge that is already represented. It is a model in which knowledge is presented sequentially in a procedural manner during one phase of development   then in next phase the knowledge that has been previously represented is called by other parts of cognitive system and serves as data for them. These then undergo a re-description of knowledge, this cycle of description and re-description continues and forms the basis of this dimension of knowledge gain procedure.

The presence of this ability to re-describe representation may be unique to human species and be the reason for representational flexibility and creativity.

2. SUBJECTS

Subjects were chosen in a manner that they posses behavioural mastery in order to depict internal representational through drawing, i.e. a subject who is possibly able to execute the task would be suitable for showing such changes.

143 students of age group 4 to 12 yrs (class 1 to 7) from Kendriya Vidyalaya, IIT Kanpur Campus were taken as subjects for study. Out of 143, 30 were of age group 4-7 and 113 were of age group 8-12. This grouping was done to analyse the difference that was brought by different age group children with ease.

Children of 4 yrs are well capable to draw familiar objects, so this became the rational of choosing children of 4ys and above as my subjects. This chosen age group is found to be successful in drawing and has some knowledge about the object they are asked to draw. These subjects have reached behavioural mastery for the following drawing. This made it easy to focus only on the analysis of representational changes.

Age	No of children
4	1
5	5
6	12
7	14
8	27
9	17
10	22
11	30
12	15
total	143

3. EXPERIMENT

a. To confirm behavioural mastery of the chosen subjects

Subjects were asked to draw 4 basic drawings to ensure that they didn't suffer from any motor execution or planning problem and that there drawing skill were compatible within their age group.

b. To observe different changes incorporated

Once the subject was confirmed to gained behavioural mastery he/she was asked to produce a drawing of a tree. Then after successfully completing the task of drawing a tree, children were asked to draw a tree that does not exist. Drawing of house and a house that does not exist, an animal and an animal that does not exists, and a human being and a human that does not exist were obtained one by one. For clear understanding of what is meant by say "Y" that does not exists, different phrases were tried in order to make it clear what was expected of them like a "Y" that you have never seen before, a "Y" that can nowhere be possibly present, a "Y" that you have never seen anywhere in books, in reality, etc.

4. RATIONALE BEHIND THE METHOD OF EXPERIMENT:

Children have an ability to spontaneously design procedures for drawing a house, tree, animal and human in early childhood, these procedures are be efficiently and successfully run implicitly by the children of the age of 4-5 yrs when they are asked to produce the drawing, and then when a child is asked to produce same drawing that does not exists he is demanded to operate on their internal representation so that they can incorporate facet which will make the house no more applicable for being a house. Then this will help us study the type of modification that are brought by children of different age and categorize different constraints of representational changes.

5. RESULTS

All the 143 students chosen were successful in drawing the basic four geometric figures indicating that none of them faced problem regarding planning of the task and its subsequent motor execution.

Success in the field of whether the children were able to produce a "Y" that does not exists were analysed and mostly most of the older group children were able to bring about these changes successfully.

Now since we have seen almost most of the students were able to introduce about changes successfully to the non existing categories, the different changes those were incorporated were as follows:

1) Size and or shape of some or many elements of "Y" changed
2) Size and or shape of complete object changed
3) Certain elements were deleted
4) Certain elements were added
5) Orientation of elements or whole changed/positions of elements swapped
6) Cross category addition of elements

Children many a times or rather mostly all the times introduced more than one type of change in the one drawing, e.g. changed the shape of elements as well as added elements from different category. These changes brought about needed to bring changes in the animal hood, house hood etc of the drawing e.g. a man that does not exist should not be different from one that exist in a manner that latter on is wearing a cap so out of 572 drawing of non existing category 34 were rejected.

It is evident from results and overall histogram drawn that children from all age group brought about changes up to the category of deletion i.e. younger and older both group children changed shape of elements and whole objects and brought about changes by deleting where as a smaller no of insertions, change in orientation and position of elements and cross category insertion was observed in younger age group children with respect to older one.

These results are similar to that found by Karmiloff-Smith in his experiments.

Not Animal – 4 yrs

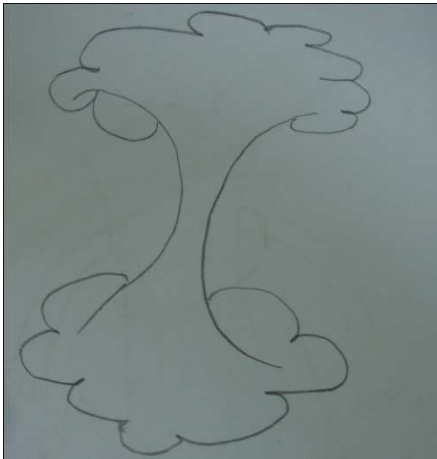Not Animal – 5 yrs

Not house – 5 yrs

Not house – 6 yrs

Not human – 6 yrs

Not human – 7 yrs

a. __A house that does not exists:__

1) Change in shape and size of elements (windows and gate)

2) Change in complete shape and size of house

6) Cross category insertion

b. <u>Tree that does not exists:</u>

1) Change in shape and size of certain elements

2) Change in shape and size of complete tree

6) Cross category insertion

2) Change in shape of whole tree

6) Cross category insertion
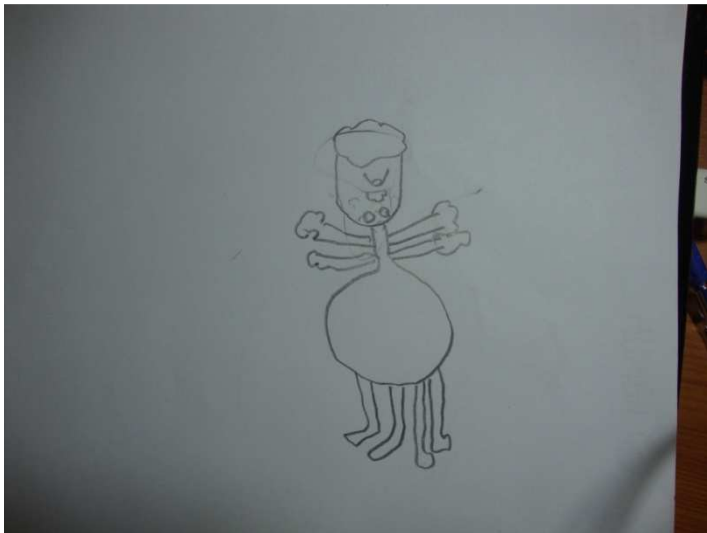
c. Animal that does not exists:

4) Change in position of elements (legs)

6) Cross category insertion

d. Human Being that does not exists:
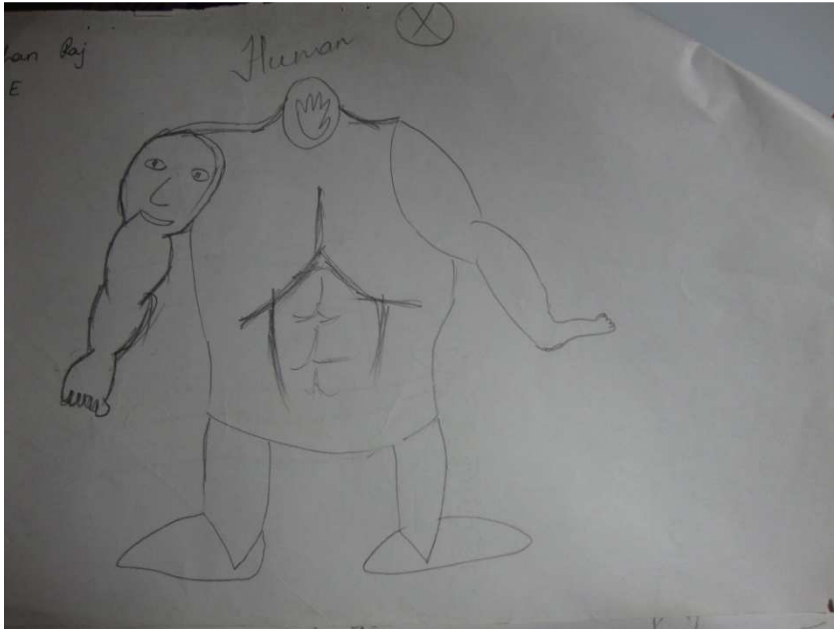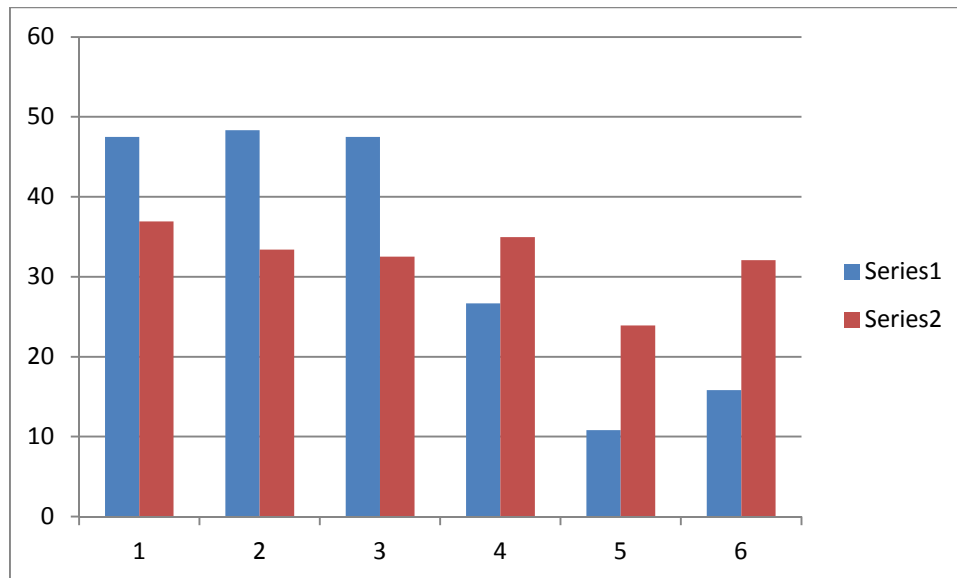

1) Change in shape of the element (Palms)

5) Change in position of elements (face)

4) Insertion of new elements (hands and legs)

5) Change in orientation of element (face)

Overall combine result of tree, animal, house and human
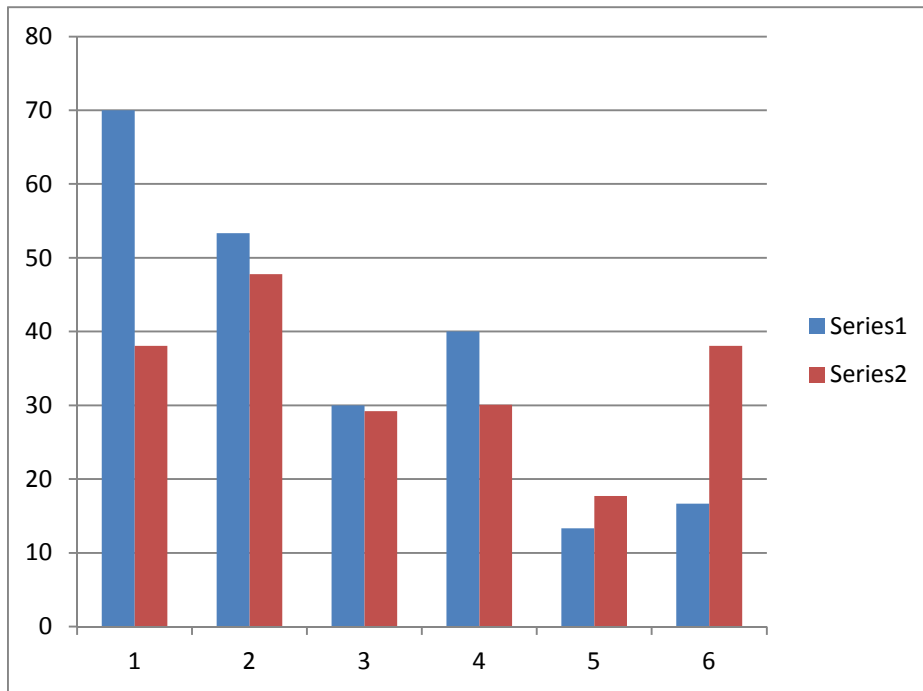

X axis: different types of changes

Y axis: % of children showing a type of changes

1) Size and or shape of some or many elements of "Y" changed
2) Size and or shape of complete object changed
3) Certain elements were deleted
4) Certain elements were added
5) Orientation of elements or whole changed/positions of elements swapped
6) Cross category addition of elements

1 2 and 3 are extensively used by younger age group children with respect to 4 5 and 6. And older group children uses 4 5 and 6 together with 1 2 and 3.

In order to call forth 4 5 and 6 one should have better flexibility in terms of bringing about representational changes, which is found to be less in younger children.
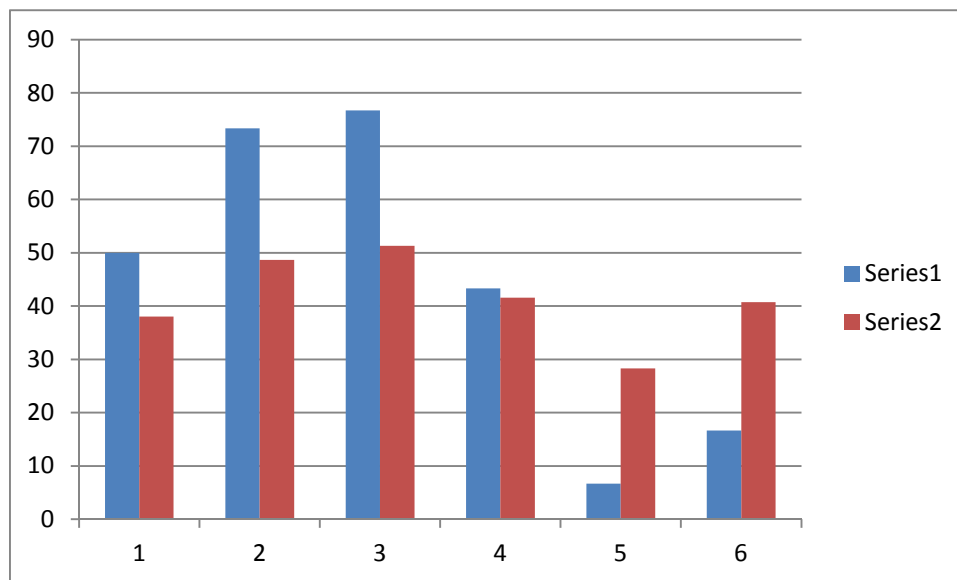
a) Tree

X axis: different types of changes brought about when asked to draw a tree that does not exist

Y axis: % of children showing different types of changes

1) Size and or shape of some or many elements of tree changed
2) Size and or shape of complete tree changed
3) Certain elements were deleted
4) Certain elements were added
5) Orientation of elements or whole changed/positions of elements swapped
6) Cross category addition of elements
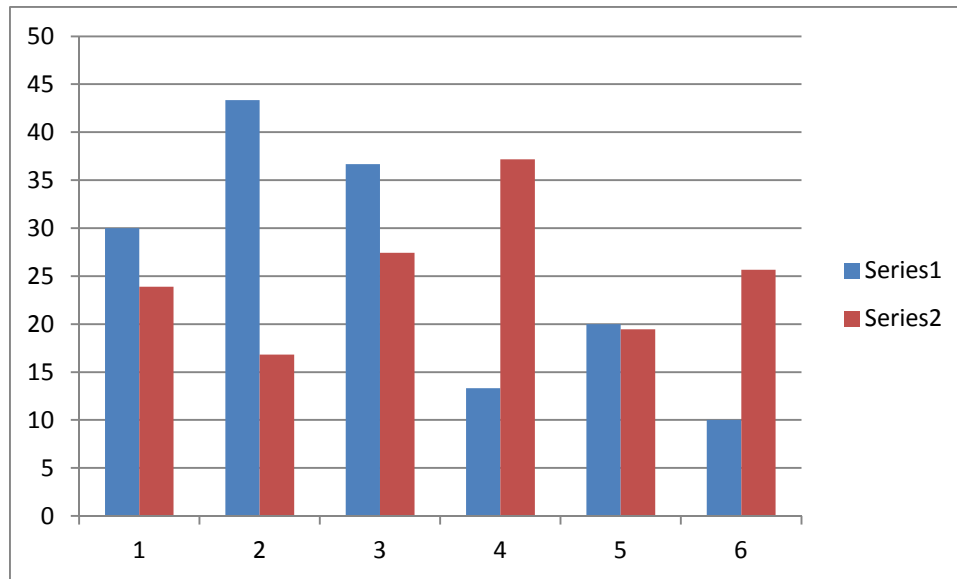
b) House

X axis: different types of changes brought about when asked to draw a house that does not exist.

Y axis: % of children showing different types of changes

1) Size and or shape of some or many elements of house changed
2) Size and or shape of complete house changed
3) Certain elements were deleted
4) Certain elements were added
5) Orientation of elements or whole changed/positions of elements swapped
6) Cross category addition of elements
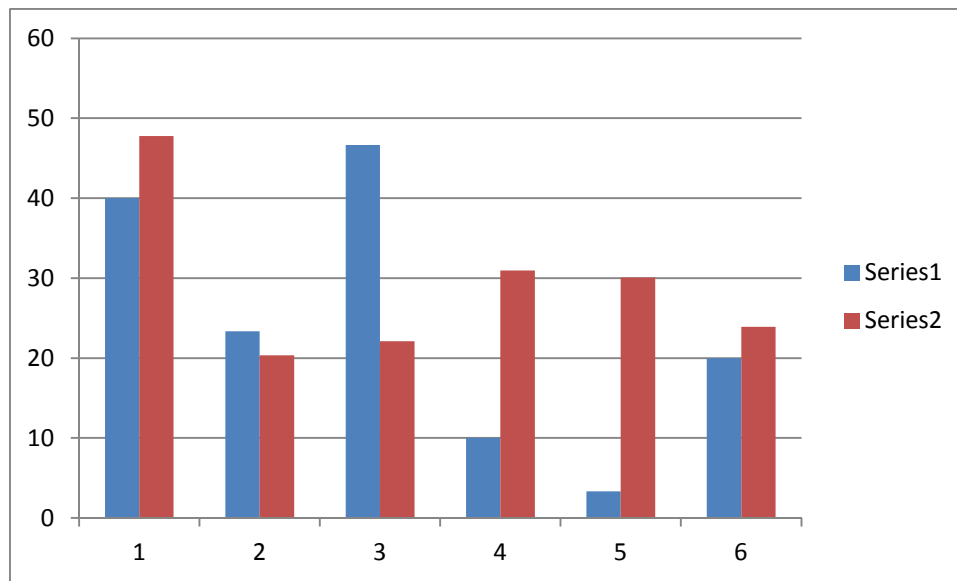
c) Animal

X axis: different types of changes brought about when asked to draw an animal that does not exist

Y axis: % of children showing different types of changes

1) Size and or shape of some or many elements of animal changed
2) Size and or shape of complete animal changed
3) Certain elements were deleted
4) Certain elements were added
5) Orientation of elements or whole changed/positions of elements swapped
6) Cross category addition of elements

d) Human

X axis: different types of changes brought about when asked to draw a tree that does not exist

Y axis: % of children showing different types of changes.

1) Size and or shape of some or many elements of human changed
2) Size and or shape of complete human changed
3) Certain elements were deleted
4) Certain elements were added
5) Orientation of elements or whole changed/positions of elements swapped
6) Cross category addition of elements

6. DIFFICUTIES FACED AND DEALT DOWN THE LINE:

1. It was difficult to make it clear to many students the concept of "a Y that does not exist", without examples, so I tried using different phrases like a "Y that you have never seen before anywhere in books, reality, Television.
2. Many used multiple constraints together as seen in above example which called for changes in the scoring system a no of times. Once I started with just single constraints but slowly since there was no sharp boundary to select or deselect one constraint created a trouble, which was settled by considering different people view and going with majority.
3. Variation with drawing again called for changes in drawing analysis, like to judge not a animal of say "ABC" ABC's not animal was compared with his animal but sometimes they became simply incomparable, so in this case either those drawings were judged independently by having a rough idea of the other member of the age group or stated invalid.

7. DISCUSSION

1) Older children deleted in the middle of their drawing procedure where as younger one tended to delete at the end

2) Similar trend was noted in the manner of insertion shown by younger children who added elements at the end of the drawing procedure like addition of smiley face to the house instead of adding in the midway of their drawing procedure as done by older children e.g. by making two faces on one human body.

3) There are a few different patterns observed in every section when viewed individually, this could be a result of a particular object being more familiar to younger group than other objects, e.g. for younger children tree is a object they come across very easily in their course curriculum so they can easily with less problem bring about changes in them which could be similar to that of older children.

4) In my results cross category insertion were also seen in more no than expected, but this could also be explain by looking at a few videos which says that type of cross category insertion that they incorporated did not interrupted their normal drawing procedure i.e. they incorporated cross category insertion once their normal drawing procedure was completed e.g. addition of face to a tree which is usually done at last in order to make the tree non existing.

8. INFERENCES

Younger children are less flexible in terms of bringing about changes in their already mastered procedure so they don't disturb these processes till it is possible even when they are explicitly asked to do by setting newer goals, so they generally tend to bring about changes in the end of their procedure and keeps their procedures minimally infiltrated by new ideas.

9. ACKNOWLEDGEMENT

10.REFERENCES:

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   -ANNETTE KARMILOFF-SMITH, MRC *Cognitive Development Unit, London*, Revised
   November 27, 1987, final revision accepted May 15, 1989