# Design Education Research Note 8

Understanding Children's Perceptions - a classroom experiment.

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## Introduction

This paper is concerned with how a group of 14 year old's perceive everyday objects. It describes an experiment designed to encourage pupils to speak fluently and without inhibitions about some designed objects. In the experiment the teachers role was to guide the childrens' thinking toward relationships between the objects.

The experiment aimed:

1) To investigate how children construe designed objects;
2) to see if children construe objects in a similar way;
3) to compare a group of children with two years design education with a group new to the subject;
4) to compare the childrens' perception of the designed objects with that of their teachers, and to test the childrens' assessment of their teachers' perception of "good design".

It was hoped the practical results of this classroom experiment would be:

a) to help the teachers direct a spontaneous but structured discussion among their pupils;
b) to raise the level of awareness of the children regarding how they perceive objects;
c) to help the children understand that other people perceive objects in ways sometimes different to their own;
d) to promote discussions amongst the children to encourage more flexibility in and alternatives to their usual viewpoint;
e) to help teachers and pupils become aware of the criteria used in assessment, in order to help them evaluate objects created by themselves and others.

The children studied attend a London comprehensive school which has won many prizes for originality and achievement in the field of Design. The catchment area of the school is predominantly professional and middle class but includes a very large council housing estate. The pupils have varying abilities and social backgrounds, as is the case with most comprehensive schools. The school was visited on several occasions and pupils, ex-pupils and Design Department staff discussed their record of success. Some of the difficulties inherent in maintaining such high standards gradually emerged during these visits.

Members of staff discussed the problem of changing the teacher's role from one of being in authority to merely being AN authority. They identified certain pupils' problems caused by having to cope with changing from the top of one school to the bottom of the next. Although this problem is common to all subjects and children, one teacher commented that the age at which it occurs in secondary education is particularly significant to the development of a stable "self-concept". He saw the design class as being the place where this area could be explicitly worked on as it was more feasible and open to negotiation with individual pupils than were other parts of the curriculum.

The staff made a distinction between getting prizes and teaching design well. They felt that the middling majority of pupils and the mediocre children need help to develop both the ability and confidence to generate ideas by themselves. They also agreed that the degree of structure imposed by them had to be related to the ability of their pupils, but this had to be disguised so that the children would believe they were arriving at their own decisions. The staff agreed that the success of this strategy is entirely dependent on the teacher's skill. For example an ex-pupil, currently studying for a diploma in design, spoke of her eventual resistance to ideas coming from her teachers and the powerful feelings of rebellion she had come to terms with during her design lessons.

The teachers were willing to take part in any experiment that might help them to manage the middling majority better. Three areas of investigation, emotional characteristics, creativity, and perception, were suggested. Of these the experiment concerning perception was chosen in which abstract questions such as "how do we look at things" and "what do we see" were considered of particular interest.

Some confounding variables present at the outset were:

1) mixed ability groupings meant that the group would contain some high and low ability children as well as the middling majority;

2) the school rule preventing girls from taking design until the third year meant the girls were having their first exposure to design while most of the boys already had two years preparatory lessons behind them;

3) therefore it would be difficult to discriminate between low ability and new (female) students.

## Theoretical Background

The personal construct theory of Kelly (1955) states that everybody perceives the world in their own individual way, and that there are significant differences between people in terms of the categories they use in perceiving the world. Individuals select certain meaningful dimensions which they use to organise their impressions of other people, objects and events. These dimensions are called constructs.

A construct differs from a concept in that it is bipolar. Black and white are two separate concepts whose opposites are 'not black' and 'not white'. Therefore, a person's shoes would be just as much 'not white' as a forget-me-not and her blouse would be as 'not black' as a pillar box. Kelly rejected the notion of concepts and assumed a different structure of thought. He said that we see things in terms of how different or similar things are to each other.

People vary in the number of constructs that they use in their appreciation of something, or somebody. One person may see a chair only in terms of its function and another may employ so many dimensions in her perception of the same chair that it becomes quite unique for her. People's constructs are related to one another in a complex way and are used as an organised system. For example, every time I rate an object as 'attractive' I may also rate it as 'unusual', 'muted in tone' and 'unpretentious'. It could be that these are the criteria I use for assessing whether or not to buy an article, pay a high price for it or give a good grade to the pupil who designed it. Further, if pupils discovered that I gave low grades to those items which I considered to be unattractive they would avoid using bright colours and conventional shapes that appeared rather ostentatious when completed.

A construct system is a way of 'seeing' that is determined by our attitudes and experiences. It results from our perceptions of similarities and differences between objects and events. Our present perceptions are open to question and reconsideration - even the most obvious occurrences in daily life might appear utterly transformed if we were to construe them differently. For example, suppose a dog were to run up to you and you construed its behaviour as an attack you might drop back or start to run away. If, instead you were to construe it as a friendly greeting you would behave quite differently. In this case you might stroke the dog or encourage it to jump up to you.

It is the way you interpret your perceptions that result in your unique view of the world. In this case the construct would be hostile vs. friendly and it interacts with other constructs that we have and affects the way in which we see the dog. A construct system is constantly changing and becoming more complex as we learn more about our environment.

The Personal Construct view of how perception works is as follows:

1) We notice things that are important to us.
2) We distinguish these things from others that are important by the similarities and differences between them.
3) A representational model, or construct system, is triggered by the links between these similarities and differences.
4) Our attention is then directed to the internal representation of the object rather than the object itself.
5) We then respond in accordance with our construct system, i.e. interpret our perception.

This approach begins to explain how it can be that some people construe an object as a work of art or an antique while others construe it as old junk.

## Design of the Experiment

The teachers assembled a set of twelve available "designed objects" which the children could see and touch (Table 1). Every pupil was given a blank (8 x 12) grid matrix with the names of the objects printed along the top but the spaces for constructs at the side left blank (Figure 1). A giant (8 x 12) matrix was drawn on the blackboard before the experiment began.

The class was divided into two groups, those having two years experience of design education and those having just joined the class. Because of the school rule preventing girls from taking design until their third year, the first group contained only boys and the second group only girls. The first group contained thirteen children and the second group contained seven. Each group had a teacher supervising the sorting procedure, and both groups were shown exactly the same group of three objects, or triads, from the set of twelve.

The children were shown six sets of triads during the double lesson period of this experiment. The experiment took the whole afternoon and no more than six, out of the many triads possible could be accommodated in the time available.

| | | |
|---|---|---|
| 1) | Saw | woodworking handsaw, wooden handle, metal blade |
| 2) | Candle display | made by one of the children out of translucent blue plastic, three cubic candle holders |
| 3) | Toy duck | yellow plastic duck, 15cm high with painted eyes and orange beak |
| 4) | Mask | elaborately ornamented party mask |
| 5) | Nutcracker | made by one of the children out of wood, screw type mechanism, contrasting colours |
| 6) | Bicycle | traditional gentleman's bicycle (used) |
| 7) | Spanner | mechanical spanner, 23cm long |
| 8) | Machine valve | valve from a machine, 5cm x 6cm |
| 9) | Toy bat | cheap plastic toy bat, pink, 20cm x 12cm |
| 10) | Housebrick | red housebrick, depression on top for mortar |
| 11) | Marmite jar | empty jar, dark glass, 5cm x 5cm x 5cm yellow metal screw top, coloured label |
| 12) | Drilling machine | fixed, free standing drilling machine used in the school workshop |

Table 1: The set of designed objects

The children individually sorted the triads into their own personal two-plus-one arrangements according to their own personal constructs. The children all acted independently at this stage. Having elicited a construct for a triad each child wrote their left hand and right hand poles in the vacant spaces on the next blank row of their grid. Having done this, each child went through all twelve objects putting a tick if it fell on the left hand pole and a cross if it fell on the right hand pole. This was repeated for six triads. In this way thirteen grid matrices for boys and seven grid matrices for girls were obtained, these being the childrens' personal repertory

| ✓ | E1 SAW | E2 CANDLE DISPLAY | E3 TOY DUCK | E4 MASK | E5 NUT CRACKER | E6 BICYCLE | E7 SPANNER | E8 MACHINE VALVE | E9 TOY BAT | E10 BRICK | E11 MARMITE JAR | E12 DRILL | X |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 WOOD | ✓X | ✓ | — | ✓ | ✓ | X | X | X | ✓ | — | — | X | METAL |
| 2 HOLLOW | X | — | ✓ | ✓ | ✓ | X | X | ✓ | X | ✓ | ✓ | X | NON HOLLOW |
| 3 HARD | ✓ | X | X | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | SOFT |
| 4 MECHANICAL | X | X | X | X | X✓ | ✓ | X | ✓ | X | X | X | ✓ | NON MECHANICAL |
| 5 WORK TOOL | ✓ | X | — | — | X | X | ✓ | ✓ | X | X | X | ✓ | HOME TOOL |
| 6 CURVED | X | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | X | ✓ | ✓ | NON CURVED |
| 7 | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| ME-LIKE | 3 | 7 | 7 | 10 | 8 | 8 | 10 | 4 | 4 | 1 | 1 | 8 | |
| TEACHER LIKE | 8 | 8 | 10 | 5 | 10 | 10 | 10 | 10 | 8 | 7 | 2 | 10 | |
| | | | | | | | | | | | | | |

grids which show how the children construe the objects.

At the completion of this part of the experiment the children were asked to rate the objects on a scale between 1 and 10 as to how much they "liked the objects" or to what extent they judged the objects to be "good design". They were also asked to assess how their teachers would rate the objects on the "good-bad design" construct, the number 1 meaning VERY BAD and the number 10 meaning VERY GOOD. This provided two lines of numerical data per child. These lines gave the boys' assessment of the object, girls' assessment of the objects, and their guesses as to how the teachers would judge the objects.

Results:

a) The Childrens' Constructs

The data showed a marked difference between the boys' and girls' constructs. The boys' constructs tended to have logical opposites as poles while the girls' tended to use more complex constructs (Table 2).

It can be seen that although there were only half the number of girls they generated more constructs than the boys. This remains true even after the constructs which were common to both groups are removed (Table 3).

This table shows that none of the boys used a 'colour' construct and none of the girls used a 'work/home' construct. It seems rather suprising that this should happen, especially when these types of constructs recurred within the group. The boys, with two years of design education generated several variants of the 'work/home' construct and the girls, new to design, generated several variants of the 'colour' construct.

**BOYS = 2 years design** N = 13

| | |
|---|---|
| wood | - not |
| curved | - not |
| transparent | - not |
| transparent | - opaque |
| handmade | - machinemade |
| tool | - not |
| minerals | - not |
| wood | - metal |
| hollow | - not |
| hard | - soft |
| mechancial | - not |
| worktool | - hometool |
| curved | - straight |
| still | - not |
| plastic | - not |
| metal | - not |
| home | - not |
| glass | - not |
| constructive | - not |
| household | - not |
| container | - not |
| domestic | - not |
| mobile | - static |
| industrial tool | - home tool |
| turn | - doesn't turn |
| used in house | - not |
| cutting | - not |
| shiny | - not |

**GIRLS = new to design** N = 7

| | |
|---|---|
| Hard | - soft |
| heavy | - light |
| dull | - shiny |
| hard | - flexible |
| container | - not |
| ugly | - nice |
| useful | - not |
| metal | - not |
| coloured | - not |
| play with | - not |
| curved | - sharp |
| painted | - not |
| force needed | - no force |
| metal | - no metal |
| tool | - not |
| toys | - transport |
| hollow | - solid |
| brightly coloured | - dull |
| moving parts | - cannot move |
| toy | - useful |
| plastic | - metal |
| young children | - adults |
| noisy | - quiet |
| mechanical | - not |
| straight | - curved |
| metal | - wood |
| playtoy | - not |
| floatable | - not |
| moveable | - stationary |
| handmade | - machinemade |
| colourful | - dull |
| flat | - bumpy |
| screws | - non screws |
| tools | - ornaments |
| floatable | - sinkable |
| mastered by hand | - not |

**Table 2: The School Childrens' constructs**

Constructs with duplications removed

Boys & Girls N = 20

To do with materials (e.g. metal/wood)
handmade/machine made
curved/straight
container/not
hollow/not
hard/soft
shiny/not
mechanical/not
tools/not
mobile/static
cutting(sharp)/not

11 constructs

Girls only N = 7

Transport/toys
Flexible/hard
heavy/light
ugly/nice
useful/not
solid/(hollow)
has screws/doesn't
flat/bumpy
noisy/quiet
ornaments/(tools)
*brightly coloured/dull
coloured/not
painted/not
floatable/sinkable
to play with/not
for children/for adults
mastered with hand/not
force needed/not

16 constructs

Boys only N = 13

Transparent/opaque
constructional/not
mineral/non-mineral
*work/home
household/industrial
domestic/not

4 constructs

* Recurred within the group, but other group not a single example.

Table 3:

In some cases contrary to instructions, some children recorded objects as being related to both poles of a construct. This showed up in the grid matrix as a tick and a cross in one cell. In some cases, too, some children recorded a dash in a cell of their grid indicating that the construct was not relevant to that particular object.

This was apparent in the grids of both groups but occurred more often in the girls' grids. It is probably due to the fact that, although at first sight the girls' constructs appear to be more interesting, they are much more difficult to use than the boys. The complex constructs, which were perfectly meaningful when elicited from a specific triad, presented dilemmas for the children when they tried to apply them to other objects. An example of such a dilemma would be the need to decide whether to place a wooden handled, metal bladed saw on the right or left hand pole of the construct 'wood/metal' and where a plastic bat fits along this construct.

The tables show the range and variety of the childrens' individual constructs which they generated independently. Nevertheless, they were able to agree on constructs tr be put on the blackboard. Table 4 gives the consensus constructs arrived at by the two groups separately, It can be seen that the boys did include a complex construct 'transparent/opaque' in their consensus grid but the girls did not include a single logical opposite type of construct in theirs, even though there had been several in their individual grids.

Consensus Constructs

| Triads | Boys | Girls |
|---|---|---|
| Mask, Nutcracker, Bike | Wood/not | Machinemade/handmade |
| Saw, Drilling M/C, Mask | Tools/not | Tools/ornament |
| Marmite jar, Brick, Bike | Curved/not | Solid/hollow |
| Bat, candle display, Spanner | Transparent/opaque | metal/plastic |
| Toy duck, candle display, M/C valve | Handmade/not | Hard/soft |
| Drilling M/C, Brick, Marmite jar | Constructional/non-constructional | ugly/nice |

Table 4:

b) The children's assessment of design objects

Each child rated how much they liked or disliked the objects, and gave their estimate of how much they thought their teachers would like the objects. The rating scale was from 1 (very bad) to 10 (very good). The teachers also recorded their likes and dislikes of the objects on the 1-10 scale according to their criteria for "good design". The data which resulted gave the boys' ratings of the objects, the girls' ratings of the objects, they boys' estimates of their teachers' ratings of the objects, and the girls' estimates of their teachers' ratings of the objects as well as the teachers' actual ratings. Table 5 gives the mean scores for all these ratings.

All the children liked the bicycle best and disliked the toy bat most, the boys also disliked the marmite jar. The childrens'opinions were quite different from each other, although the girls agreed more than the boys. The teachers' ratings coincided exactly on only four objects - the nutcracker, bicycle, bat and marmite jar, and differed by a maximum of 5 points on the toy duck.

Although there was no correlation between the boys ratings of the objects and the teachers', there was a significant correlation ($r = 0.61$ $p = .029$) between the teachers ratings and the boys estimates of the teachers' ratings. Therefore it seems that the boys have learned what constitutes good design in the teachers eyes even though they, themselves, may not like those objects very much.

There was a highly significant correlation ($r = 0.8$: $p = 0.001$) between the girls ratings of the objects and the teachers. There was also a correlation of $r = 0.8$ between the teachers' ratings and the girls' estimates of the teachers' ratings. This may mean that the girls could not handle the concept of putting themselves in the teachers place to make a decision and so their assessment of the teachers' ratings may have simply been a reflection of their own tastes. Alternatively, the girls, untrained as they were, were nevertheless appreciating the elements of design that the teachers liked while also disliking objects that their teacher considered to be examples of poor design. The ratings in Table 5 show that the teachers' mean rating of both the marmite

| Teachers Raw Scores | Saw | Candle Display | Toy Duck | Mask | Nut-cracker | Bicycle | Spanner | M/C Valve | Bat | Brick | Marmite Jar | Drilling M/C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Y | 8 | 6 | 5 | 5 | 7 | 10 | 8 | 7 | 1 | 10 | 9 | 5 |
| Z | 9 | 4 | 10 | 8 | 7 | 10 | 9 | 5 | 1 | 9 | 9 | 7 |
| Mean Scores Teachers | 8.5 | 5 | 7.5 | 6.5 | 7 | 10 | 8.5 | 6 | 1 | 9.5 | 8.5 | 6 |
| Boys | 5 | 4.8 | 7.3 | 8.1 | 6.8 | 8.2 | 6.6 | 6.2 | 2.7 | 5.5 | 2.4 | 6.5 |
| Boys/teachers | 7.6 | 6.5 | 6.5 | 7 | 8.3 | 9.5 | 8.6 | 8.8 | 3 | 7.4 | 3.5 | 8.9 |
| Girls | 7.1 | 6.4 | 6.8 | 5.8 | 8.6 | 8.9 | 8.4 | 7.2 | 1.5 | 8.6 | 7 | 8.9 |
| Girls/teachers | 7.4 | 6.8 | 6.3 | 7.3 | 7.5 | 9.2 | 8.1 | 8.1 | 1 | 7.6 | 8.7 | 9.1 |

Table 5

jar and the saw was 8.5 while the girls' mean rating for each object was 7 and the boys' mean ratings were 2.4 and 5 respectively. Overall the girls were more accurate in their assessment of the teachers' likes and dislikes than were the boys. This is curious since one would expect the boys to know the teachers better than the girls after being taught by them for two years. The discrepancy could arise from the boys disliking the marmite jar while the girls and the teachers thought it was well designed for its purpose, regardless of their likes or dislikes.

The data also show instances where the girls and the teachers marked lower than did the boys. The mean ratings for the mask were 8.1 boys, 6.5 teachers and 5.8 girls, while the bat, which was rated only 1 (mean score) by the teachers and 1.5 by the girls, was given a mean rating of 2.7 out of 10 by the boys. Why should this be so ... that after two years of design education, the boys personal taste is not consistent with what they know to be the taste of their teachers while girls with no background in design have similar taste to the teachers?

Discussion

Both sets of results (those relevant to the number and type of constructs as well as those relevant to the childrens' assessments of the objects) show differences between the groups. The groups were, of course, made up of boys who had two years experience of design education and girls who were new to the subject. Unfortunately, it is not possible at present to disentangle these two factors but let us assume that the differences were due more to what had occurred in the two years of design lessons than to any inherent differences between the sexes.

Personal construct theory includes the idea of a cyclic process in construing. The cycle is concerned with the amount of differentiation with which people view a particular subject area. This means that when a person is new to an area and has very little knowledge of it most aspects are treated equally, that is they are not differentiated.

Once the person starts to explore the area and becomes familiar with parts of it she goes through a period of high differentiation. At this time most aspects are treated separately and difficulty might be experienced when attempts are made to co-ordinate all the individual conponents. Although Kelly refers only to learning (as a general life process) as changes in construing, it is possible that learning about something specific has occurred when there is a small but organised amount of differentiation. The suggestion here is that this happens once the area has been understood and the separate parts have been integrated. At this point, the way in which the subject area is differentiated in the individual's thoughts helps her to grasp the significant features without being confused by more trivial details.

In the present experiment, although the girls were new to design the long list of constructs they generated suggests a very high level of differentiation. This is probably due to the fact that the objects were very familiar to them, being part of their everyday experience. What appears to be happening is that the girls were considering all parts of the objects as being equally important and so produced a heterogeneous list of constructs. The boys on the other hand tended to focus their attention onto significant features of the objects. In this way they produced a more homogeneous list of constructs which was less differentiated, as one might expect given their two years of exposure to design lessons.

An example of this way of focussing attention is the lack of a colour construct from any of the boys. This could be because they have a monochrome view of the objects compatible with drawing in one colour on the drawing board, perhaps thinking along the lines of "make it first - paint it later"?

The childrens' constructs showed that there was a tendency for those new to design to use more complex constructs while those who had had two years in the design class tended more toward constructs made up of logical opposites.

There is sometimes an unfortunate confusion between being logical and scientific versus being dull and uncreative. It is sometimes thought that complex constructs can cause dilemmas, but not using composite constructs can be dull and unlikely to generate exciting new perceptions. This perhaps reflects preoccupations with inductive versus deductive thinking, both of which complement each other and are equally necessary for innovative design to result in produced objects.

All of us presumably have our heads full of subconscious constructs which produce "new ideas" as we carelessly day-dream, or even as we brain-storm a problem. In creative thought the more constructs one has the better, and a way to ensure that children have a wide range of constructs is to see they are exposed to many concepts which can become the poles of new - if sometimes odd - constructs. The practical interpretation of this coincides with the conventional wisdom that children should be exposed to many different things in their (design) education.

Given a new idea, the bridge between that idea and making it into a practical artefact depends on "common sense", deduction and the application of known principles. None of these can be expected if the design process is constantly being obscured by dilemmas and uncertainty. At some stage the complex constructs so useful in "lateral" or "innovative" thinking must be resolved into simpler, more logical constructs for the procedures of actually making the object. There can be no advantage in using constructs which obscure the nature of the known, as for example the children in this experiment generating confusion for themselves by the combination of the known constructs (wood/not-wood) and (metal/not-metal) to (wood-metal).

There are two practical deductions from this view. First that design students should be exposed to many things so that, combinatorially, they may possess many personal constructs which will enable them to have new, wierd, wild, bizarre personal insights. As a result of this they may see connections which others have not, they may have new if unclearly stated design ideas. Second, that the logical way of proceeding requires all the ambiguity be taken out of the description of the idea so that the complicated new whole can be coherently investigated as the set of its (well-understood) parts. Therefore a useful educational outcome of this type of classroom exercise could be that pupils learn to refine complicated constructs into simpler ones. In doing this they would be refining the way they see the world and developing their personal construct systems into more public ones which they can share with others. They would, in fact, be developing sophisticated, publicly - shared concepts of the world.

The metal saw with wooden handle caused many children dilemmas, particularly those using a wood-metal construct. Most people would agree that the saw is part wood and part metal, and those children assigning it to both poles (contrary to instructions) of a wood-metal construct are consistent with the general (adult) convention. Those children plumping for either wood or metal on the wood-metal construct are not consistent with the (adult) consensus view since they either deny the saw is partly wood or deny it is partly metal.

Those who coded "incorrectly" may have done so for the following reasons:

1) they could only "see" part of the object, for example the only important part of the saw was seen as its cutting edge which is metal on the wood/metal construct. The saw has been perceived in terms of its function rather than in terms of what it is;

2) they could not resolve the difference between parts of the object and the application of some constructs presented a real dilemma i.e. the object could not be resolved into parts;

3) although they were able to resolve the construct into parts, the application of some constructs applied to the parts differently. Rather than question their instructions, the children coded against their intuition and observations.

These results suggest that part of the children's training should enable them to formulate and use simple constructs that can be applied to many objects. They should be shown how to resolve problematic composite constructs into more basic constructs which will not cause such problems. In particular they require guidance in resolving complicated mixed ideas into their logical components as exemplified by constructs with logically opposite poles. They should also be taught when it is appropriate to use different kinds of constructs. In particular that at the creative, 'ideas' stage of design, complex constructs are useful while simpler, logical constructs are more appropriate when it is time to operationalize these ideas.

The children to whom the third explanation applies may have deliberately coded against their observations because this was the only way they could be consistent with the instructions they were given. These children could be encouraged to be more questioning, and to have more confidence in themselves.

To some extent the children who had received two years of design education did show more confidence than the others. In their estimates of how the teachers would assess the objects, the boys gave ratings that were different to the ratings they themselves had given to the objects. The girls, whose personal taste coincided with that of their teachers, rated the teachers very similarly to themselves. It is possible that this showed an awareness of the correlation in their own and their teachers estimates of good design. However, the more probable explanation is that these naive pupils were unable to distance themselves sufficiently to imagine themselves in the teachers place. The boys' confidence extended to stating explicitly, by giving different ratings for themselves and their teachers, that although they thought the teachers would not agree they still had their own ideas about what constitutes good and bad design.

## The experiment as a classroom activity

The children made their own decisions about the grouped objects and wrote their personal constructs on their individual grids. They were then quite happy to select one of the constructs generated from their group to go on the blackboard as part of the consensus grid. There was no problem in agreeing either as a result of discussion or by yielding to the majority on a show of hands.

They accepted other children's constructs as equally applicable and comprehensible. They were not surprised or disturbed to discover that others in their group were construing the objects in ways that were different to their own. In fact the children thought of different ways in which they might construe the objects themselves.
For example:

"Is wood a good way to describe it? You might not know it's made of wood, it could be plastic". This was during the boys discussion about the mask which was covered in bright paint. Other examples show how certain ambiguities were made explicit and discussed in some detail.

"is a nutcracker a tool?"
"is a saw constructional when what it does is take things apart?"
"do movable ears make the mask mechanical?"

The children were very interested in their teachers' assessment of the objects, which they were shown once the experiment had been completed. It might be that such an exercise, two hours of 'getting to know' a set of objects and then revealing how 'experts' rate them as examples of design, could increase childrens' design awareness and appreciation.

The teachers were able to listen to the children and guide their discussions without imposing their own bias on them during completion of the consensus grids. This suggests that such an exercise could be used to help teachers to make the difficult move from being in authority to being an authority as discussed in the early talks with the teachers involved in this experiment. The teachers were controlling a spontaneous but structured discussion among their pupils as had been hoped at the preparation stage of the experiment.

The children themselves enjoyed taking part in the experiment but could not understand what it was all about or why they should have engaged in the activities they did. In fact the teachers reported that the children thought it was "a waste of time". Nevertheless, the teachers have expressed a wish to try a similar experiment with younger children and with those of a lower ability group. This is because they see the activity as encouraging the children to focus on some specific features of a group of objects and get them talking. With these younger, less able children, the main problem seems to be to get them to articulate anything at all. In fact, the teachers agree that it is the communication aspect of the activity that is important for them. They have requested that a similar activity be incorporated into the 'graphics' part of their teaching programme.

## Conclusions

In terms of the objectives, the experiment has given interesting insights into children's perception of designed objects, and shows they have different ways of construing things. The children with two years design education used simpler constructs, and the composite constructs used by those without this experience caused them some problems. The children's perception of the designed objects did not appear very different from their teachers', but it was surprising to note that those less familiar with the teachers guessed their assessment best.

Those with two years experience were able to focus their attention onto specific features of objects while those new to design were highly differentiated in their perceptions.

In terms of integrating the kinds of activities undertaken during the course of this experiment into regular classroom procedures, there are some indications that both teachers and pupils might benefit. The teachers might be helped to guide, as opposed to direct, their pupils ideas, the pupils might be encouraged to talk about things they would not normally make explicit. This would eventually result in an increase in confidence on the part of both teachers and pupils.

## References

Kelly G.A., 1955 The Psychology of Personal Constructs, New York Norton.

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