Why Can People Jump Higher on the Moon? A study of what children learned from Corners, a children's television programme

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ABSTRACT At the request of the production team, a study was carried out on the BBC children's general knowledge programme, *Corners*, in order to test how suitable and enjoyable the programme was for its intended audience (five to seven year olds). Three age groups of children (six, seven and 11 year olds) were tested on memory and liking for one episode of the programme. Eleven year olds were significantly better at remembering the programme than the younger age groups. But there was also an unexpectedly large significant difference between seven and six year olds. Six year olds found particular difficulty in answering questions based on large numbers. The programme was most popular with seven year olds and least popular with 11 year olds. Popularity of individual items was not associated with superior recall. Results are discussed in terms of their usefulness in guiding production decisions for the next series of *Corners*, and also in terms of possible developmental factors which could account for the age differences.

Introduction

The primary aim of children’s programmes is entertainment, but there is no reason why entertainment should be mindless, and the children’s producer is generally trying to inform and stimulate within the entertainment format (Home, 1983). The BBC programme, *Corners*, which is the subject of this study, stands within this tradition of aiming to inform and stimulate within an entertaining framework. However, *Corners* is different in some respects from the traditional informative programmes put out on children’s television, such as *Blue Peter, Think of a Number,*
or even *Play School* and *Rainbow*. In the first place, it is aimed at a rather neglected age group in children's programming—the five to seven year olds, whose needs have usually been served primarily by cartoons. In the second place, it is based entirely on questions sent in by children themselves: it exists to satisfy children's curiosity and to meet an apparently voracious demand for information, rather than to give them information which adults think they ought to have. The producers of *Corners* saw the programme as providing something unique in children's television, and wished to evaluate its impact on its intended audience—five to seven year olds.

Providing information about the world is identified by children as one of their primary requirements of television. Greenberg (1974) found that 'learning' was the commonest reason given by children for using television—surpassing other more apparently seductive motivations such as relaxation, excitement, escapism and time-killing. Noble (1983), in a study of Australian children, found a similar importance attached to learning. Although his concern was particularly with children's learning of social attitudes, he carried out a factual study similar to the present one on a nature programme called *Australia Naturally*. Noble found that seven to 11 year olds who saw the programme gained significantly more factual information and environmental awareness than did children not exposed to it.

The present study was also a study of factual learning but, unlike Noble's, was not able to use a control group of children who had not seen the programme. Thus it is open to the criticism that some of the information apparently gained from the programme could have been known already to at least some of the children. The primary question of concern to the producers was what differences there would be between different age groups in their responses to the programme. Any superiority of older children could be at least partly due to prior knowledge of topics like, for example, the workings of gravity. The correct answer to the question, 'Why can people jump higher on the moon?' could not necessarily be attributed to the information given in *Corners*.

To get round this problem, as many as possible of the questions asked in the study (like the question above) were based on the specific wording and events of the programme. Thus, even if children already knew about gravity, the question asked would, at least, test their ability to *apply* their knowledge to the new situation shown in the programme. This specificity precluded a genuine control group because, without seeing the programme, many of the questions would have been impossible for non-viewers to understand. Any control group would not have provided a complete and reliable set of controls for every question. Nevertheless, a control group would have helped to isolate the contribution of the information in the programme to children's knowledge more reliably.

Scientifically-reliable methods must also be found to study the impact of different visual techniques on what people learn from or feel about television, since television is primarily a visual medium. My own research (Davies *et al.*, 1985; Davies, 1987) demonstrated that television techniques such as cutting and camera focus can affect viewers' attention to and memory of televised material. To generate such comparisons different versions of the visual material need to be produced—either by shooting several different versions of a film, or through editing. This is an
expensive process and it has been carried out where resources are plentiful (e.g., Salomon & Cohen, 1977) but it is less often used in evaluating the impact of programmes in the UK. Many studies on what people learn from television news, as reviewed by Berry (1983), test viewers only on information gained from the soundtrack, but information may also be given visually. In evaluating television’s effectiveness at informing its audience, ways of evaluating its visual impact need to be found since many people (particularly young children) may be relatively unskilled verbally but have excellent powers of visual observation and memory, which television may help to facilitate (see for example Murphy & Wood (1983) who found that a filmed version of a construction task was much more easily remembered and reconstructed afterwards than pictorial instructions, or no instructions, in four to eight year olds). The present study used verbal methods of testing but based several of the questions on the visual information in the programme—that is, on actions or objects which children could see.

The Programme

_Corners_ is put out by the Children’s Department of the BBC at around 4 p.m. on Fridays in the winter, and is repeated on Saturday morning. It lasts 20 minutes and usually consists of 6–10 items based on general knowledge questions sent in by children, such as ‘Why do we need sleep?’, ‘How is candyfloss made?’, ‘How do planes fly?’ and so on. It has two presenters, one male and one female, and uses a variety of formats—studio demonstrations, dramatic sketches, a puppet, film sequences, and special televisual techniques such as colour separation overlay. It is aimed at five to seven year olds, but many older children watch; the audience is about 1.1 million according to BARB (Broadcasters’ Audience Research Board) figures for November 1987.

The producers of _Corners_ wanted to find out whether the information in it was appropriate and enjoyable for their target audience. They wanted to know whether there were differences between what younger and older children gained from it. They were also concerned about pacing and content. Did a typical _Corners_ programme contain too much material, delivered at too fast a rate? The study was primarily designed to ascertain what age differences there would be between children’s responses to _Corners_ and what types of format seemed to be most effective.

The question of format was more difficult to address than that of age differences, because only one version of the programme was available. There were no examples of exactly the same _Corners_ material being made with different levels of pacing which would have enabled us to identify, for example, an optimum speech rate (something both producers and presenters were worried about). Nor were there different formats for the same items, which would have enabled us to establish the contribution of the format as distinct from content, to children’s learning and enjoyment. However, the particular programme chosen for the study included different types of presentation which would hopefully provide some comparison
between, for example, dramatised information and ‘talking head’ material given
direct to the camera.

After discussion with the producers, one edition of *Corners* was chosen for use in
the study. This programme contained nine different items including a spoken
introduction about long words and names; a demonstration of an experiment
designed to answer the question ‘How do leaves grow?’; some filmed items about the
Thames Barrier and about motorway weather conditions; a song-and-dance item
about ‘What it’s like on the moon’, and a series of quick-fire questions and answers
at the end of the programme. Joe Korna, the puppet, made some jokes and there was
also a demonstration of a trick with paperclips, and a puzzle at the end. This
provided enough variation in content and presentation to give some ideas about
which type of item children of different ages might find difficult or accessible,
appealing or unappealing.

Method

Design and Materials

The study was designed as a comparison between three age groups, on what they
remembered and liked about one edition of *Corners*. The oldest group (11 year olds)
would serve as a control against which the performance of the younger groups could
be measured. Since the programme is aimed at five to seven year olds it was hoped
that the information would be as accessible to the younger children as to the older
ones. However, it was borne in mind that direct questioning about what they
remember does not always tap everything that young children have gained from a
programme or an experience. Thus it would not be surprising if older children, used
to being tested and more confident in the test situation, performed better than
younger ones.

The material used was Programme 8 of the 1986–87 series of *Corners* recorded
on videotape and shown to the children on their own schools’ VHS videorecorders.
Questionnaires, to be administered orally to the younger groups and filled in
individually by the older group, were prepared. The questionnaires consisted of 23
questions about the information in the main items of the programme. Examples of
the questions are given in the Appendix.

Some questions required only a yes/no answer or supplied a choice of answers.
Others attempted to tap the children’s understanding of the scientific processes
described in the programme, for instance, ‘Why can people jump higher on the
moon?’ There was also a question about the illusion created in the moon item
(‘Were they really on the moon?’). This was designed to tap children’s awareness of
camera techniques and was not included in the memory scores.

It was borne in mind that some children might already have seen the pro-
gramme, which could affect their scores, so all children were asked whether they had
seen it or not. Ten out of the 77 claimed to have seen it; more said they had seen the
series at other times. These 10 made no difference to the final scores.

A second questionnaire was prepared, asking children to rate their liking of the
items in the programme on a scale of 1 to 3 (1 = don’t like; 2 = don’t mind; 3 = like).
Such a scale cannot produce as much variation in children’s responses as a larger scale would have done, but it was thought that a five-point scale might have been too complicated for the younger children to understand and might have prolonged the testing to an extent that they would not be able to cope with. Therefore, the rating measurements are probably artificially high and more uniform than measurements using a more sensitive scale.

Subjects
Seventy-seven children were tested, 41 from a primary school in North London and 36 from a primary school in North-East London. There were 33 11-year-olds, 22 seven-year-olds and 22 six-year-olds and each group included as wide an ability range as possible. There were 43 boys altogether and 34 girls.

Procedure
The programme was shown to the younger children in small groups of four or five. They were told that the BBC was interested in finding out how well children understood and liked the programme, so they would be asked some questions after seeing it. The children sat on the floor or on a chair near the television—however they were most comfortable. When the showing was finished, two of the three testers each took an individual child to a quiet place outside and took him or her through both questionnaires orally. This was conducted at the child’s own pace, questions were explained if necessary, and all the child’s comments were noted. Meanwhile the third tester supervised the remaining children/child and asked them to do a drawing based on the programme. When there was only one child left, the third tester was able to test him or her. In this way delay between seeing the programme and testing was kept to a minimum. A note was made of which children had been delayed so that comparisons could be made between them and the children tested straight away, but delay made no significant difference to their memory for the programme.

The 11-year-olds in each school were shown the programme together and they were all given individual questionnaires to fill in themselves after the programme, supervised by the testers. This procedure took between 10 and 20 minutes. The experimenter also made a note of children’s comments and movements during the showing of the programme.

Results
The results of the memory scores, expressed as percentages, are given in Table I. There was considerable variation between individuals, which overlapped the age groups. The ranges in each age group are shown in Table I.

The group mean recall scores in Table I are expressed as percentages to make comparisons between item scores easier. It will be noted that some items scored higher because they provided much less margin for error, for example the Motorway
Table I. Recall of Corners: percentage recall scores for each age group, according to programme item (bases: 33 11-year-olds; 22 seven-year-olds; 22 six-year-olds)

<table>
<thead>
<tr>
<th>Item</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Highest individual total score</td>
</tr>
<tr>
<td>Introduction</td>
<td>2</td>
</tr>
<tr>
<td>Leaves</td>
<td>8</td>
</tr>
<tr>
<td>Motorway</td>
<td>2</td>
</tr>
<tr>
<td>Barrier</td>
<td>8</td>
</tr>
<tr>
<td>Moon</td>
<td>30</td>
</tr>
<tr>
<td>Questions</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
</tr>
</tbody>
</table>

Maximum score  
Age group:  
11 years  75.7  64.4  90.9  29.9  71.2  49.2  61.3  90  32  
7 years  50  51.1  78.4  36.3  46.3  17.4  43.3  67  13  
6 years  45.4  38.9  55.6  25.5  35.7  6.4  31.5  50  13  

item had only two questions, both of which were fairly easy to get right, resulting in a 90% score for the 11-year-olds.

The difference between the 11 and seven year olds' scores, as measured by an independent t test, was highly significant ($P<0.0001$; $t=3.4507$, d.f. 53). The difference between seven and six year olds was also highly significant ($P=0.001$; $t=3.4507$, d.f. 42). Individual tests between age groups for all the separate items were not carried out as the differences between them were nearly all as large, or larger, than the differences between the overall totals. The only exception to 11-year-old superiority is the Barrier item where seven year olds did better than 11-year-olds. There is a particularly large difference between 11 year olds and the younger age groups on the Questions item (where children had had to answer 'how many' type questions)—31.8% between 11 and seven year olds, as compared to the overall difference between these two groups of 18%.

Ratings Scores

Ratings for each item were measured on a scale of 1 to 3. The group mean ratings for each item, expressed as percentages, are shown in Table II. These show that seven year olds rated the overall content of the programme highest. The most popular item for 11 year olds was the Flood Barrier item; the most popular for seven year olds was the Moon item; the most popular for six year olds were the paperclip trick and the puppet and his jokes.

Table II. Group mean ratings for Corners, according to item and age group

<table>
<thead>
<tr>
<th>Age group</th>
<th>Items</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>11 years</td>
<td>Leaves</td>
<td>73.5</td>
<td>72.6</td>
<td>80.4</td>
<td>78.8</td>
<td>75.2</td>
<td>69.5</td>
<td>70.0</td>
<td>80.0</td>
</tr>
<tr>
<td></td>
<td>Motorway</td>
<td>75.7</td>
<td>80.3</td>
<td>89.4</td>
<td>95.4</td>
<td>78.8</td>
<td>86.3</td>
<td>81.8</td>
<td>86.3</td>
</tr>
<tr>
<td></td>
<td>Barrier</td>
<td>59.1</td>
<td>71.2</td>
<td>84.8</td>
<td>86.3</td>
<td>77.2</td>
<td>90.9</td>
<td>83.3</td>
<td>90.9</td>
</tr>
</tbody>
</table>
A comparison with Table I shows that popularity does not equate with good memory scores, particularly not in the Barrier and Leaves items. Statistical analyses were not possible on individual scores for each item, because of the small range. A Spearman’s r test between the overall ratings and memory scores for each child showed no significant correlation between them.

**Boys and Girls**

Table III shows the breakdown between boys’ and girls’ ratings and memory scores for the whole programme. There is virtually no difference between boys and girls in what they remembered of the programme. Six- and seven-year-old girls rated the programme more highly than the boys, with six year olds’ differences particularly marked.

<table>
<thead>
<tr>
<th>Age</th>
<th>Male Ratings</th>
<th>Male Recall</th>
<th>Female Ratings</th>
<th>Female Recall</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 years</td>
<td>73</td>
<td>60-9</td>
<td>75</td>
<td>61-7</td>
</tr>
<tr>
<td>7 years</td>
<td>81</td>
<td>43-0</td>
<td>89</td>
<td>43-6</td>
</tr>
<tr>
<td>6 years</td>
<td>70</td>
<td>31-2</td>
<td>83</td>
<td>31-5</td>
</tr>
</tbody>
</table>

Within items, girls generally produced slightly higher recall scores than boys. Boys did better on the Motorway item and on the quick fire questions at the end. Younger girls did markedly better on the questions from the Introduction (55-45% for seven year olds, 55-37-5% for six year olds). There was some variation in ratings, too, with boys preferring the Motorway item (88:70 for seven year olds, and 80:60 for six year olds) and girls preferring the programme’s ‘special’ features such as the puppet, puzzle and trick. In general, there is no evidence that the programme is more suitable for one or the other sex; the differences in response reflect the fact that some items are likely to appeal to boys, others to girls, and that this is to be expected in a ‘magazine’ type format like *Comers*.

**Discussion**

The main finding of the study was that age made a significant difference to the ability of children to remember the information given in the programme. As expected, 11 year olds remembered significantly more than the younger age groups. As discussed earlier, this could well have been due to prior knowledge about topics such as photosynthesis and gravity, although such prior knowledge does not seem to have helped the 11 year olds who visited the Thames Flood Barrier—on this
question, 11 year olds did hardly any better than six year olds. There was some overlap between age groups, with the best six year olds performing much better than the worst 11 year olds.

A surprising finding was the unexpectedly large difference between the seven and six year olds (11.8% overall). Since the target audience includes five, six and seven year olds, this was of concern to the programme makers. It was obvious that there were some kinds of information (notably the quick-fire questions at the end of the programme) that six year olds found virtually impossible either to take in or to retain. Although some seven-year-old superiority might be expected, not least because of their extra year of schooling (although for some individuals in these particular schools there was only an extra term, or two, between the sixes and sevens), the gap still seemed surprisingly large. Because the aim of the study was to help improve production techniques in *Corners*, the question arose as to whether the differences between the younger age groups was an inevitable difference due to maturity and schooling, or whether the gap could be narrowed if the information were presented differently.

At this point, ideally, a controlled experiment should have been run using exactly the same material, but with different kinds of presentation. However, failing this, an examination of the age differences in recall for different items in the present study showed that some types of item seemed to be much more difficult than others for younger children—even allowing for an expected age difference. The overall difference between 11 and seven year olds was 18% and the overall difference between sevens and sixes was 11.8%—both significant at $P<0.001$. But in three items the differences between older and younger children were very much greater.

In the introductory item the two questions about word lengths led to a difference between 11 and seven year olds of nearly 26%; in the Moon item, the 11/7 difference was 24.9% and in the quick fire questions item the 11/7 difference was 32%. The differences between sixes and sevens on individual items were much more stable, ranging from 11 to 15%, with the exception of the Motorway item—the six year olds' highest item score, but still 22% behind the seven year olds. On the Questions item, the six year olds’ score was very little above zero. Their answers to questions such as ‘How many babies are born each year?’ revealed a complete failure to register even an approximate idea of this information. Even their guesses were wildly out, e.g. ‘one’. Although the younger children’s scores were well below the 11 year olds’ for the Introduction and Moon items, their scores on these items were still above the overall group average and thus show comparatively good learning. The questions they had most difficulty with were questions involving memory for large numbers; the failure of the younger age groups even to remotely register information involving large numbers was an unexpected finding of the study.

Most of the studies on children's conception of number as reviewed by Michie (1984) have used only small numbers (fewer than 10) represented in concrete form such as dots stuck on a card. The primary concern of such studies arises from questions drawn from Piagetian theory, about young children’s presumed inability to conserve, seriate or even to count. Mathematical ability in such studies is rightly seen in terms of logical problem-solving skills. The question of sheer numbers, as
such, seems to attract less academic attention. Yet young children do seem to have a fascination for huge numbers. ‘Thousands’ and ‘millions’ occur frequently in their conversation, and a high proportion of questions sent into *Corners* are of the ‘how many?’ variety. What do children actually mean by ‘thousands?’ It would be useful to have some research which could tell us.

The present results indicate that, when large numbers such as 30,000 or 340 are presented verbally, young children cannot even memorise them in a rote-learning fashion. Scores of 0-5 were given for any answer remotely approximating to the correct one (9000 for 9 million, for instance) and even so, only two out of the 22 six-year-olds gave a single correct answer in the Questions section. Interestingly, in the Moon item, a much higher proportion of six and seven year olds were able to identify the correct distance from earth to moon (384,000 kilometers). This had been written up on a signpost during the moon item. The number was repeated to them as part of a multiple choice and about a quarter of the younger children got it right. This underlines the importance of presentational factors, and of having a variety of testing methods, in getting information both into and out of young children.

The finding of a large age difference between six and seven year olds could be in accordance with Piagetian theory, which argues that there is an important transition of cognitive development at around six, from ‘pre-operational’ thinking to ‘concrete operations’. Pre-operational children are held to be very egocentric, bound by the ‘here and now’ and incapable of extended logical reasoning. Children in the concrete operations stage can make logical inferences, and they can imagine alternative possibilities to the current state of affairs, but they are still supposed to be dependent on the evidence of their senses. Their powers of memory are also held to be limited. This obviously informs such educational practice for young children—‘learning through play’—including the way television programmes for them are made.

Nevertheless, a considerable body of research has now built up (Donaldson, 1978, is still one of the best accounts) which suggests that if the task is changed, children can demonstrate skills which, according to Piaget, they are not supposed to have. Finding appropriate presentational techniques to make abstract concepts clearer is a creative challenge to the makers of television programmes for young children and the difficulty with large numbers found in this study was seen as one such challenge. After discussions with the producers it was agreed that, in future, any references to very large numbers or dimensions would be concretely illustrated with examples from children’s own range of experience—for example, ‘as big as 10 double-decker buses’, with an appropriate illustration. Young children’s programme makers and advertisers are already aware of the importance of correctly representing scale on the small screen; toys are not allowed to be advertised, for instance, without being shown next to a scale reference point such as a child’s hands. Television techniques, such as close-up and zooming, actually provide ways not found in other media to demonstrate size and scale. The *Corners* producers are keen to exploit such techniques to demonstrate relative sizes in the future.

As mentioned, the ratings scores were too narrow to reflect the full potential
range of children’s responses. Nevertheless, they gave a clear indication of which age group enjoyed the programme most—the seven year olds. This gratified the producers who felt that this was probably their ideal audience. Given that children ‘grow into’ popular long-running programmes, six year olds’ understanding and appreciation of the programme was likely to improve during the series’ lifetime, so they did not feel that material had to be made easier to accommodate six year olds rather than seven year olds.

Appreciation, or liking, for programmes are of obvious concern to programme makers. Appreciation indexes are gathered by BARB (Broadcasters Audience Research Board) for all programmes on British television, but they are confidential to producers, so the public generally has no way of knowing which programmes are most liked, although we do know which programmes are most watched. In an informative programme like Corners what the audience actually learns, as well as what it likes, it also important and the producers were interested in the relationship between learning and liking: do children learn better from material that they most enjoy?

The present results showed no statistical relationship between learning and liking. Some items were of interest because they actually showed better than average learning allied with low ratings, for instance the Leaf item. This explained photosynthesis, a complex process, almost certainly unfamiliar to many infant school children. Nevertheless, the six year olds scored nearly 40% for this item (compared to their overall group average of 31%), and the seven year olds scored over 50% (compared to their overall average of 43%). Yet both six and seven year olds rated the item lowest out of all items. It was suggested to the producers that, in such cases, popularity might be worth trading off against informativeness. Pure entertainment could still be provided by other more light-hearted items, such as the puppet and the jokes. One item in which good ratings and good learning seemed highly related was the Moon item, which also gave information about a complex scientific process—the workings of gravity. The informative song in this item was sung twice, which could well have helped recall. The item’s high popularity suggests that children have no objection to repetition of material they enjoy and it was suggested that repetition was another way of making sure information got across more effectively.

The study also looked at children’s responses to TV illusions. Because the programme had used a special television technique, overlay, to suggest floating through space and low gravity in the Moon item, which also had very realistic-looking scenery, the opportunity was taken to ask children about the moon setting, and how they thought it was done. The majority of six and seven year olds and virtually all the 11 year olds who answered, said that the presenters were ‘not really on the moon’. Among the six year olds, however, five said ‘yes, they really were on the moon’. Many of the six and seven year olds’ answers showed confusion about how the moon impression had been created. Only a minority of the younger children were able to employ the appropriate vocabulary of illusion—‘they went to another studio’ and so on.

It was suggested to the programme makers that this blurring of illusion and
scientific fact might have some effect on the reliability of the information given in
the item. Some answers suggested that the younger children made no distinction
between what was 'really' on the surface of the moon (dust, rocks, craters) and the
fantasy items included for fun ('talking' moon rocks). Simon Davies, the presenter,
found this point of particular interest. He felt that it was important that items
should have internal consistency; so long as something was clearly fantasy a lack of
realism was acceptable. Fantasy's rules allow magic, trickery and illusion. However,
if facts were given in a fantastic setting, this might be confusion. Thus it might not
be wise to have 'talking' moon rocks in an otherwise realistic setting on the moon, in
which scientific information was being given.

This study was done in July 1987 and the results were completed, presented to
and discussed with the people involved in the programme in time to be utilised in
the shooting of the following series of Corners during September 1987. As well as
the recommendations already mentioned, the producers agreed that a slowing down
of the speech delivery rate might be helpful in enabling younger children to hear and
understand what was said, even though we had not been able to establish conclu-
sively through the study that the pace of the programme was, in fact, too fast.
Hopefully, these findings have helped to make Corners even more informative and
entertaining than it was already. They also gave the programme makers some close
and detailed insights into the minds and attitudes of the child audience than can be
obtained from the more usual methods of audience research, which involve simple
'head counting'. Even qualitative discussion methods, which are used by many
market and broadcasting researchers to supplement head counting, do not provide as
much information as the kind of individual testing used here, in which each child
was given an equal opportunity, and as much time as he or she needed, to make
their own individual and unique contribution to the questions asked.

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Appendix: *Corners*: examples of questions based on the programme

1. How many letters are there in the longest word in the English language? Was it 23; 47; 55?
2. What foods do leaves get from the soil?
3. What happens when there is a high tide in the River Thames?
4. Why can people jump higher on the moon?
5. How many countries are there in the world?