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ABSTRACT

Fourteen second and third grade children viewed "The Electric Company" television series pilot shows while color slides flashed on a nearby screen competed for their attention. The children's visual attention was monitored and recorded. Bits from the shows were then ranked according to percentage of attention they received, and the highest and lowest scoring bits were studied to determine general attributes which had particularly high or low appeal to children. After attributes were identified and defined, a list of all the bits in the shows was examined to find those denoted by the definition and to reassess the general appeal by studying the attention span scores. Finally the attribute definitions were refined or modified. Nine major attributes appear to control children's visual attention. High appeal attributes were functionally relevant actions, electronic bridges, involvement of children, onstage correcting of verbal performance, and "Do It One Better" themes. Low appeal attributes were comprehensible spoken scripts, message monologues, and starting and ending bits. (CH)

ATTRIBUTES OF THE "ELECTRIC COMPANY" PILOT SHOWS THAT PRODUCED HIGH AND LOW VISUAL ATTENTION IN 2ND AND 3RD GRADERS

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ATTRIBUTES OF THE "ELECTRIC COMPANY" PILOT SHOWS THAT PRODUCED HIGH AND LOW VISUAL ATTENTION IN 2ND AND 3RD GRADERS

This project was undertaken to discover those attributes that control children's visual attention while viewing "The Electric Company" pilot shows and to define the attributes in a way that would make possible predictions of the visual appeal of new bits and provide guidelines for the writing and production of new shows.

The procedure had been developed and tested as part of the investigator's doctoral research. It is based on systems design principles, and it uses the empirical data of subjects' reponses to particular stimuli to discover and define the general attributes to which they respond. It is described fully in the dissertation, "Attributes that Differentiate Boys' and Girls' Preferences for Materials in the Preschool Classroom: A Systems Design Approach," by Langbourne Williams Rust, Ed.D., Teachers College, Columbia University, 1971.

Data

The data for this analysis came from the CTW Reading Show Research Staff Distractor Study on the five "Electric Company" pilot shows. There were fourteen subjects from the 2nd and 3rd grades. Each subject viewed the shows on a monitor while color slides were flashed on a nearby screen,

competing with the television material for the child's attention. The original distractor data had been calculated separately for two groups of seven children and resulted in percentage attention figures for every 7½-second period throughout the shows. These were retabulated for the present study to yield standard attention scores for each bit relative to the norm of the show in which it was found.[1] Appendix A presents the means and standard deviations of the percent attention scores for each of the test shows. Appendix B lists all the bits by name, gives figures on the duration of each, their raw percentage attention scores, and their calculated standard scores.

Scan List

The fifteen highest-scoring bits and the fifteen lowest-scoring bits were identified. They constitute the scan list and are listed in Table 1.

It stands to reason that these bits highlight the attributes that most control children's viewing. Accordingly, the scan list bits were studied and contrasted to yield prototype ideas of the attributes holding particularly high or low appeal to the children.

Derivation of Attribute Definitions

After a prototype attribute had been defined, the investigator went through a list of all the bits in the shows and listed those denoted by the definition. The attention scores to the denoted bits were looked up.

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[1] Since each show differed from the others in level and range of attention scores, the raw percentage attention figures were converted to standard scores. This permits more meaningful comparisons of bits found in different shows. Thus, a bit with 80% attention in Show 1 (which had an average attention per bit of 68% and a standard deviation of 15%), was given a positive score of +0.8 (80% - 60% ÷ 15%); whereas an 80% bit in Show 4 (average appeal = 91%, standard deviation = 6.6%) was given a negative score of -1.7. 80% in Show 1 is moderately high; 80% in Show 4 is extremely low.

Table 1

Scan List: the 30 bits with highest and lowest relative attention scores[a]

Name of Bit	Show	Duration[b]	percent attention	standard score
Credits	1	1	94.9%	1.79
Phone sightword	2	2	98.8	1.73
Short Circus "e on the end"	1	13	89.9	1.45
ALK monolith	4	3	100.0	1.43
ph Caveman animation	2	4	93.6	1.32
"In your own words" court scene	3	2	94.0	1.32
f,fr,ph Marquee	2	7	91.2	1.30
Short Circus"You can make up a word"	3	26	93.4	1.26
ALL monolith	4	4	98.7	1.23
Energy bridge	3	2	92.9	1.21
G sounds contest #1	3	16	92.6	1.18
2 Cosbies chip/chop	1	9	86.0	1.18
Grapefruit animation	2	6	91.9	1.18
Theater in the dark: gus	3	7	92.2	1.15
Movie set:"All for one..."	4	16	97.9	1.11
Credits	5	2	41.7	-3.25
Last word	5	1	43.5	-3.10
Julia Grownup	4	39	74.1	-2.58
Gag after Reasoner	1	2	30.8	-2.57
Opening song	4	11	76.2	-2.25
Cosby & Crank, f/ph	2	6	50.4	-2.07
Gag	1	1	38.5	-2.05
"I am cute very, animation	5	4	58.3	-1.92
Phil on the phone, animation	2	5	52.8	-1.88
Crank call: quotation marks	5	9	61.1	-1.70
Blow/grow/throw	3	3	63.5	-1.67
Fargo North: go get gas	3	21	63.6	-1.66
Cosby & Crank: hard g/soft g	3	13	63.7	-1.65
"For" animation with DJ	2	4	56.4	-1.60
Man in the street: uncle	5	6	63.0	-1.55

[a] Relative attention scores are derived from the raw percentage attention data, and express the difference of a bit's appeal from the average for the show in which it occurs. They are calculated by subtracting the % attention to the bit from the average % attention to the show, and then dividing by the standard deviation of bits in that show.

[b] Duration figures reflect the number of 7 1/2 second periods over which the bit extends.

If the scores did not reflect a general trend of high or low appeal, the definition was abandoned and another was searched for. If, on the other hand, there was a consistent trend of response to the bits, an attempt was made to refine the definition. This was done by contrasting those bits reflecting the general trend of response with those to which the children responded differently. Whatever attribute the children were actually perceiving, the one that the investigator was trying to discover, probably was not present in those bits, so the definition was modified to exclude them, without at the same time excluding any of the bits with the appropriate levels of response.

Definitions were modified until further improvement was impossible. The optimal definition would denote a large number of bits, to all of which the children responded with either above-average or below-average attention.

When a definition could be improved no further, it was accepted, and the search began for a different attribute. Definitions were derived until as many of the bits on the scan list as possible were denoted and children's responses to them accounted for.

As a final phase of the design procedure, the derived definitions were studied to discover similarities among them. An attempt was made to discover more general definitions that would include several of the original ones within their scope without a weakening of performance.

Results: Derived Definitions

Nine attribute definitions were derived to account for the data. Their complete specifications follow, and lists of the bits denoted by

Table 2

Names of Attributes Discovered to Affect The Relative Visual Appeal of Different Bits

Attribute Name	No. of Denoted Bits Attended To Above Average	No. of Bits Attended To Below Average
Functionally-Relevant Action	30	4
Strong Rhythm and Rhyme	16	5
Electronic Bridges	12	1
Involving Children	11	1
On-Stage Correcting of Verbal Performance	8	3
"Do It One Better" Theme	5	1
Comprehensible Spoken Script	17	30
Message Monologues	1	10
Starting/Ending Bits	6	12

each definition are listed in Appendices C and D.

High-Appeal Attributes

Six attributes were discovered which were consistently appealing in high-scoring bits and rarely present in low-scoring bits. Each one is named and described below:

1. Functionally-Relevant Action (Appendix C-1 lists the denoted bits).

Bits in which there is on-screen locomotion or strong physical activity portrayed that is directly related to the primary meaning of the segment consistently result in high visual attention.

Pointing, writing, or arranging things by hand are not active enough to qualify under this definition. Action that is not directly functional to the plot or theme is not particularly attractive, either. For example, in the "Fargo North" sequences, there is quite a bit of walking around, but the walking does not do anything meaningful; it serves merely as a device for getting people on or off stage or for keeping the characters in view while switching the scene to the decoding machine. Walking to the decoding machine is not a very salient feature of the plot. By contrast, the physical activity in the movie set, "All for One" bit is very relevant to the main theme, and the children attended to it.

Thirty-five bits were denoted, and only four of them were attended to below average. Twenty-four of the bits were denoted by this definition and no other; only three of them were attended to ~~above~~ below average.

2. Strong rhythm and rhyme (Appendix C-2 lists the denoted bits).

Bits in which there is a strong repetitive rhythm and rhyme, either in songs, poetry, or "jive" talk (like that of Mel Mounds), consistently result in high visual appeal.

Twenty-one such bits were found, and sixteen had above-average attention levels. Eight bits had no other attention-controlling attributes than this one, and six of them were attended to at a high level. The data for this attribute would have been stronger if it were not for the fact, observed by the CTW researchers, that children would occasionally get up from their seats and dance around to particularly appealing songs. The "Sign Song" was attended to overall at a level slightly less than average, but it should be pointed out that only the first half of it included any lyrics, and at that part, the children's attention was at a higher level. When the lyrics stopped, visual attention dropped, and so brought down the overall score for the bit.

3. Electronic Bridges (Appendix C-3 presents the list of denoted bits).

Electronic bridges were quite generally attractive to the children. Of thirteen bits altogether, 12 were attended to at a high level. None of them possessed any of the other qualities discovered in this analysis. The source of their attractiveness is not altogether clear. Brevity is not it; short bits are not as a whole more attractive than long bits. More likely, they are appealing because they embody to the children something akin to the basic quality of "functionally relevant action" discussed above.

4. Involving children (Appendix C-4 presents the list of denoted bits).

Bits that involved children or child-like animated characters were consistently attractive to the subjects.

Eleven of the twelve such segments were attended to more than average. One of them was denoted by no additional definitions, and it was highly attractive.

5. On-Stage Correcting of Verbal Performance (Appendix C-5 presents the list of denoted bits).

> Bits in which one character corrected another on reading, pronunciation, or writing seemed to draw the children's attention to the screen, providing the characters were on stage.

Of eleven bits with this attribute, eight had higher than average scores. All of them possessed at least one of the other discovered qualities. Of the three bits not correctly accounted for by this attribute, two possessed non-appeal attributes, and the present attribute explains why four bits which otherwise would have been expected to have below-average appeal in fact seemed above average.

6. "Do It One Better" Theme (Appendix C-6 presents the denoted bits).

> Bits in which the central action is a theme of repetitive attempts to better the just-previous attempt, whether that previous attempt is done by a competitor (the two Cosbies bit) or by the central character (the movie set "All for One," the tongue-twisting theater marquee bits), attracted children's visual attention.

There were six such bits; five of them were very highly attractive and the sixth was only 1% below average. It may be that this attribute is just another manifestation of the "functionally relevant action" attribute, but since there were two bits to which the latter definition did not clearly apply, yet which seemed to have the present attribute and were highly visually attractive, it was decided to include this attribute definition as an independent factor.

Low-Appeal Attributes

Three attributes were discovered that were consistently present in low-appeal bits and seldom present in high-appeal bits.

1. Comprehensible Spoken Script (Appendix D-1 lists the denoted bits).

Bits in which the spoken soundtrack alone is comprehensible, not requiring the viewer to look at the screen to understand what is happening, tend not to have high levels of visual response.

Bits involving the slow sounding-out of letters (blending) were not judged to be comprehensible on the soundtrack alone, and so were not denoted by this definition. All together, forty-seven bits were judged to have this quality; thirty of them were attended to at below-average levels. Forty-two bits had this quality and no other; only nine of these were attended to above average.

This attribute was not discovered until the end of the analysis. It was derived from a number of attributes that had previously been derived in the conventional manner. First, it had been discovered that bits that could be described as "verbal gags" had consistently low visual appeal. Second, all bits on which a telephone voice could be heard were unappealing (not just those including Crank). (This finding seemed reasonable: these children would have long ago learned to dissociate the sound of a voice over a telephone from the need to look for the source of that sound). Third, it was discovered that bits in which all principal characters were seated tended not to have much visual appeal either (remaining stationary was not the reason; stationary characters who remained standing were not consistently unappealing). Finally, it had been found that eight of the eleven bits that lasted longer than 2½ minutes had produced lower-than-average levels of visual response.

After studying these results, though, it was seen that many of the most

unappealing bits shared one or more of these attributes, the bits described as "verbal gags," "seated bits," or "telephone-voice" bits especially seemed to share a common highly-verbal quality. A search was undertaken to discover and define a more comprehensive attribute, and eventually the above definition was approached. Those bits that had the previously-defined qualities but that were not denoted by the present definition were found not to have consistently low visual appeal, while the bits that had the present quality but which had not been denoted previously were found to have markedly lower levels of visual appeal than average. So the other attribute definitions were abandoned in favor of the more comprehensive one.

It may still be that gags, telephone voices, bits that are too long, or seated characters have low visual attractiveness in their own right. The data cannot be viewed as conclusive on this point, but it can be said that they do not offer sufficient support for postulating the separate identities of attributes.

It appears that the presence of this attribute in a bit has an effect on the visual attention only when a particularly attractive attribute is not present.

Of the eight denoted bits that had an attractive attribute, seven were attended to at higher than average levels. Being comprehensible did not diminish their visual attractiveness.

The effect of this attribute was most consistent in the least popular shows. In shows 1 and 2, sixteen denoted bits scored low and five scored high. But in shows 3, 4, and 5, fourteen scored low while twelve scored high.

There are several factors that might have played a role here. It could have been that some as-yet undiscovered attributes were present in the comprehensible bits of shows 3 through 5. But there is no way of supporting that hypothesis without discovering the identity of those attributes, and one can question why the segments in shows 1 and 2 did not embody them.

There may have been contextual factors operating. Perhaps children turn away from the comprehensible bits when they are not very interested in the show as a whole.

It may be that children adopt different response strategies to different types of programs: in some they may look at the screen regardless of the bits' auditory sufficiency; in others they may respond less dominantly in a visual mode. If so, the qualities that lead children to choose one strategy or the other should be investigated.

Perhaps conditions extraneous to the program material led to the differential effects of this attribute in the different shows. If there were more distractions, the children may have looked away when they could do so without losing the thread of what was going on.

2. Message Monologues (Appendix D-2 lists the denoted bits).

When there is a single character on the screen and he is in a more or less stationary position, telling the audience something (reading to himself does not qualify), children's visual attention seems to waver from the screen. Interestingly, similar sorts of messages directed at other characters were not as a group so unappealing.

There were eleven bits judged to meet the above criteria. Ten of them were below average in visual appeal. Five possessed no other defined attributes, and all of these were below average.

Although this attribute seems to be similar to the previous one (comprehensible spoken script), the two did not overlap completely. There

were five bits that were "message monologues" but which were not comprehensible without reference to the screen, and they were all given low visual attention by the children.

3. Starting/Ending Bits (Appendix D-3 lists the denoted bits).

The conventional opening and closing bits of the shows, and any bits that preceded the conventional opening, were found to produce generally lower than average visual attention.

This was true despite the fact that for 1/5 of the cases, children were seeing the bit for the first time and so might not have learned that it was the conventional opening or closing (each child saw five shows). Of the eighteen bits denoted by this definition, twelve had low visual response. Those four with higher attention were only very slightly above average. Thirteen of the bits had no other defined attributes, and nine of these were below average.

Two factors may have been operating here to produce low visual attention. It could have been that the opening bits caught the children before they had settled down to watch. This might not occur in a home viewing situation where the child has already settled in before the program comes on the air. Likewise, the closing bits may have been signals that it was time to go. It could also be that these children are conditioned by current television practice to not expect anything very interesting to happen during conventional openings and closings, and so they do not attend closely to them.

Some Attribute Definitions That Did Not Work Out

Animation - Bits with animated characters had been expected to be visually appealing. As a group they did reflect generally high appeal.

Of thirty-six bits, twenty-five had higher than average attention scores. But this attribute was found to add nothing to the other attributes that had been discovered. The ten bits which were animated, but which possessed none of the other defined qualities averaged only 0.02% above the norm; four of them were attended to less than average.

Many animated bits had the attribute of "functionally relevant action." There were nineteen such bits, and only two of them had relatively low appeal. But the animated bits that did not have this additional quality averaged below the norm in appeal. On the other hand, bits with functionally relevant action that were not animated were visually attractive: out of sixteen, only three had below-average scores.

> Clearly, then, it is not animation per se that is attractive; it is the quality of functionally relevant action, which is often found in animated bits, to which children respond.

Music - The existence of a musical score does not seem to be associated with visual appeal. Fifty bits had music for most or all of their duration. Nineteen of them were below average in visual response. But they averaged only 2.3% above the norm. More important, only one bit with much music had no other defined attributes to account for children's response, and it scored below average in visual appeal.

Lively Music - This quality has been suggested as an attention-getter in the past, too. In these shows and for these subjects, it is associated with even fewer appealing bits than was music as a general category. Lively music excludes many of the bridges, the two "True-Blue Sues," and the three Monoliths, all of which were appealing. Also excluded from this category

were the two "Love of Chair" bits, one of which scored above average and one below. The net effect is that "lively music" performs even less adequately than "music" does.

Overly-Long Bits - The attribute of excessive length was discussed above while outlining the derivation of "comprehensible spoken script." Although, taken by itself, this quality seems to be related to low visual attention, closer examination of the data reveals that the length of time is not the controlling factor. Eleven bits lasted longer than 2½ minutes; only three of these had above-average attention scores. But eight of these overly-long bits involved a comprehensible spoken script, only one of which was attended to more than average. The remainder, bits overly long but without this other attribute, were not low in visual appeal; two of them scored above the average and the third scored only 0.2% below. Additional evidence that duration was not a primary factor can be seen in the shifts of attention within the longer bits. If it had been time that was important, one would have found a gradual dropping-off of attention as time progresses; but often the opposite pattern could be noted: attention would increase with time as often as it would decrease.

Durations other than "2½ minutes or longer" did not reveal any strong patterns. Of thirty-six bits between one and two minutes in duration, nineteen were above average, seventeen below. The twenty-three very short bits (seven seconds or so) did not show any pattern, either. They averaged about 1% below the average for all bits in visual appeal.

Characters - The identity of a character from bit to bit does not seem to affect the appeal of those bits directly. This is so even when that character has been in very unappealing bits previously. Bill Cosby,

for example, participated in some of the worst bits of all, but when he was in a good role, children attended to it. While making this point about identity, it should be stressed that characters do make an immediate difference in appeal. Who they are is not important in the sense of what they have been seem to do before. But who they are is important in the sense of what they do right now. In a sense, then, children appear to be forgiving of bad roles -- they won't hold it against an actor, but they are equally forgetful of good roles -- it will not help a bad bit to put in a previously popular actor. The only way that would help would be if the actor changed the bit, or changed his role in it. If Easy Reader were to play Julia Grownup's role, the children would like it no more than they did (unless, of course, he introduced an air of more functional action). And if you could get Crank on stage to play "All for one and one for all," he, too, might be a hit.

Attributes of Bits on the Scan List

Each of the discovered attributes was manifested in at least one of the bits on the scan list, which gives strength to the assertion that all the attributes have strong effects on viewing behavior.

The attributes which were strongest throughout the data accounted for the bulk of the scan list items. Eight of the fifteen most appealing bits had the quality of "functional action." Eleven of the fifteen least-appealing bits had "comprehensible spoken script."

Table 3 lists the scan list items and the attributes they were found to possess.

The appeal of four of the bits was not successfully explained by the

Table 3

Attributes of Bits on the Scan List

Name of Bit	Attributes Possessed by Bit
Credits (Show 1)	Start/End
Phone Sightword	Functional Action
Short Circus: "e on the end"	Children, Strong Rhythm & Rhyme
ALK Monolith	Functional Action
ph Caveman Animation	Functional Action
Court Scene "In Your Own Words"	
f,fr,ph Marquee	Functional Action, "One Better"
Short Circus: "You can make up a word"	Functional Action, Children, Strong Rhythm & Rhyme
ALL Monolith	Functional Action
Energy Bridge	Bridge
G Sounds Contest #1	On-Stage Correcting, "One Better"
2 Cosbies: Chop/Chip	"One Better"
Grapefruit Animation	Functional Action, Children
Theater in the Dark: Gus	Comprehensible Spoken Script
Movie Set: "All for one"	Functional Action, "One Better," On-Stage Correcting
Credits (Show 5)	Start/End
Last Word (Show 5)	Start/End
Julia Grownup	Comprehensible, Message Monologue
Gag After Reasoner	Comprehensible, Message Monologue

(Continued)

Table 3 - Attributes of Bits on Scan List

(Continued)

Name of Bit	Attributes Possessed by Bit
Opening Song (Show 4)	Start/End, Strong Rhythm & Rhyme
Cosby & Crank: f/ph	Comprehensible Spoken Script
Gag (Show 1)	Comprehensible Spoken Script
I am cute very, Animation	Message Monologue
Phil on the Phone, Animation	Comprehensible Spoken Script
Crank Call: Quotation Marks	Comprehensible Spoken Script
Blow/Grow/Throw	
Fargo North: Go Get Gas	Comprehensible Spoken Script
Cosby & Crank: Hard g/Soft g	Comprehensible Spoken Script
"For" animation with DJ	Comprehensible Spoken Script
Man in the Street: Uncle	Comprehensible Spoken Script

findings of this study. Among the attractive bits, two ("Theater in the Dark" and "Show 1 Credits") had low-appeal attributes, and one ("Court Scene: In Your Own Words") had none at all. Among the unattractive bits, one ("Blow/Grow/Throw") had none of the discovered attributes. On the whole, these bits were quite short. They averaged 24 seconds in length, versus an average of 60 seconds for all bits. Brevity may have influenced their measured appeal in two ways. First, there was a greater chance of error in matching the raw percentage scores (which were taken for every 7½-second period) with the program material for the short bits, so the actual appeal may not have been as high as the measured appeal indicates. Second, contextual factors probably have stronger effects on short segments than they do on long ones. Longer segments provide more time for the children to get over the effects of the just-previous bits and to respond to the intrinsic qualities of the one at hand.

Overall Performance of the Defined Attributes

Of the 149 bits in the five pilot shows, 133 of them (89%) were denoted by at least one attribute definition. 119 bits (80%) had high-appeal or low-appeal attributes exclusively. Over all, children's responses to those 119 bits were accounted for successfully at a rate of about four to one. Highly attractive bits were more successfully accounted for than relatively unattractive bits: a success ratio of five to one was reached for the former; a ratio of three to one for the latter.

Fourteen bits had both high-appeal and low-appeal features. As a group, their mean was about one percent below the norm. One cannot conclude, however, that a mixture of high and low appeal attributes results in intermediate attraction. It depends on the particular attributes involved,

as was pointed out in the discussion of the "comprehensible spoken script" attribute.

Sixteen bits were not denoted by any of the discovered attributes. They averaged about 1/20 of one percent below the norm.

It seems that the greater number of appealing attributes a bit has, the more likely it is that children will find it appealing.

Children respond more consistently to bits with two or more high-appeal attributes or two or more low-appeal attributes than they do to those with only one attribute. The ratio was 11 to 1 for multiple attribute bits and 3.3 to 1 for single attribute bits.

Table 4 presents the summary data on which the above conclusions were based.

Some Limitations of this Research

The attributes discovered in this study are obviously not all of the qualities that control children's visual response to television material.

1. For one thing, they relate only to relative appeal, not to absolute appeal. It was decided to use the relative measure (the standard score), instead of an absolute one (percentage attention) because the shows differed in both level and range of absolute appeal to such a degree that the factor of the show in which a bit occurred would have masked all other factors that might have been operating.

Relative and absolute appeal are strongly related, however. The

Table 4

Summary Data:

Appeal of Bits with Different Combinations of High and Low Appeal Attributes

Attribute Combination	Number of Bits Attended To Above Average	Number of Bits Attended To Below Average	Average Standard Score
1 High-Appeal Attribute	41	6	0.59
2 High-Appeal Attributes	14	2	0.65
3 High-Appeal Attributes	2	0	0.65
1 Low-Appeal Attribute	14	33	-0.59
2 Low-Appeal Attributes	0	7	-1.38
1 High-Appeal & 2 Low-Appeal Attributes	1	0	0.16
1 High-Appeal & 1 Low-Appeal Attributes	8	5	-0. 08
No Attributes	89	7	-0.04

relative scores of bits in Show 1, which had by far the lowest absolute level of response, were not nearly so successfully accounted for as were the scores of bits in the other shows. There were nine errors in that show alone, compared with an average of four per show in the others. The primary reason was that the absolute level of appeal which would have been relatively low in the other shows was relatively high in the first. Although the attribute definitions were designed to account for relative appeal, they also accounted better for absolute appeal in Show 1.

2. The shows on which this study was based were basically similar. Only examination of shows that differ over the full spectrum of possibilities could reveal the nature of all features that can control visual response. On the other hand, one can assert that the features most affecting response to these particular shows, written and produced by the same people who will be making the new shows, are the ones of most importance to CTW's practical needs.

3. The procedure, in its present stage of refinement, can discover only those attributes that occur often enough in fairly undiluted form to distinguish them as unique. Many other factors may have been operating but not have been discovered because they occurred only in conjunction with other attributes that masked their effects. Because of the conventions of writers, clusters of attributes often occur together that, in fact, do not need to (for example, it was noted that Functional Action was a frequent quality of animated bits, though it is by no means a necessary correlate); but the result is to offer no evidence of their separate identities.

4. Because the task of this project was to discover the attributes highlighting the most and least appealing bits, attributes that might

lead to intermediate levels of response were not discovered. Related to this high-response versus low-response dichotomy was the all-or-nothing way in which attributes were treated. In reality, many of them may best be conceived as varying along continua of strength. Ideally, one might be able to predict different levels of response appropriate to different degrees of attribute strength. (On the other hand, this speculation rests on the assumption that viewers do not respond to attributes as all-or-nothing, and this assumption may not be warranted).

5. It should be stressed that findings relate to visual attention, not to attention as a global sort of response. It may be that when a child attends visually, he usually also listens and that when he looks away he ceases to listen attentively. But that may not always be the case, and since there is no evidence one way or the other, one cannot assume it to be true.

6. Another limitation has probably already become obvious to the reader. Other persons may use the attribute definitions differently from this researcher. A bit seen to possess a certain defined quality to one may be seen not to possess it to another. This problem of the reliability of the attribute definitions is a crucial one, for the discoveries of this paper are useful only insofar as they can be communicated so that others can use them. The magnitude of the problem with these definitions is not yet known. It is a simple matter to have a number of persons classify the bits on the basis of the present definitions and to improve the definitions on the basis of the outcome. But it has not yet been done.

Future Research Possibilities

There are some obvious needs for more research.

Research on Existing Data

Some research could be done with the present body of data.

1. An analysis of moment-to-moment differences in visual attention would lead to results with much finer-grained predictive power. Such analysis would relate the data on each 7½-second time period to the program material within it instead of relating average attention scores for total bits to features characterizing them as a whole.

2. Absolute level (percentage attention) could possibly be investigated, but it is suggested that only Shows 2, 3, and 5 be studied in this regard, as their means and standard deviations are most comparable. This would leave too few bits out of which to get results, so analysis should be on a moment-to-moment basis.

3. Attention change is a variable that should be investigated, both on the bit level and on the 7½-second level. One would seek to characterize the attributes that lead to the greatest positive or negative shifts in attention level. Obviously, the amount of shift that is possible depends on the absolute level of the preceding bit, so some variant of this measure would be required to compensate for this effect (otherwise one would discover that the most significant attribute of bits that reflect strong upward shifts in attending is that they follow bits with low visual attention: all other factors would be masked). An index like "percent of possible

change" also has its problems: in this light a shift from 95% to 100% is equivalent to a shift from 60% to 100%. Whatever index is chosen, some preliminary analysis would be necessary to determine whether change in attention level is a regular, predictable sort of variable in the first place.

4. Closer examination of the soundtrack might be useful. Although this researcher found no regularities in children's responses to bits with music or with lively music, a more intensive examination (perhaps by someone with a more sensitive ear) might produce some important discoveries.

5. A search for factors of context and pacing that affect a bit's visual appeal could be begun with these data, though it is possible that a greater variety of material will be required to give results with confidence.

6. Preliminary work on the inter-rater reliability of the present findings could be done, and the definitions of the attributes could be modified to produce consistently high agreement as to which bits possess which defined qualities...it would be important in such work to check how producers or writers use the definitions in comparison to researchers. It is, after all, the former persons who need to apply these findings directly to new materials, so their ability to use them consistently is of paramount importance.

The stop-tape data already collected by CTW Research on these shows might permit a search, similiar in form to the present study, for the attributes of materials that are comprehensible or incomprehensible to the children. Comprehension itself could be looked at in two ways:

1. vis-a-vis the children (do they have an understanding that satisfies

them?) or 2. vis-a-vis the producers (do the children understand what we want them to understand?). In either case, one would discover the kinds of things children do not or do understand, and specify them in a way that could be used to guide further development.

Research Requiring More Data

There is a need to conduct a study that would involve a greater number and variety of shows and a sample of children that is larger and more carefully selected than the present one. The technique of data collection, though, would be basically the same. Such a study would be useful in a number of ways:

1. The attributes that had been discovered with the existing data could be validated by using them to predict the relative appeal of new bits, and then comparing the predictions with the results.

2. Nearly all the research on the existing data could be done much more fruitfully on a larger body of data. More attention-controlling attributes could be discovered and their exact nature more precisely determined. If the data collection situation in the new study were comparable to that in the old one, the two bodies of data could be pooled, and a substantial savings realized (the new study could involve fewer subjects). A thorough moment-to-moment analysis might not be easier with more data; there might be too much for one person to handle. A team of several persons and the services of a computer with substantial memory capacity might be required.

3. The search for contextual and pacing attributes would be greatly facilitated. Five shows, all quite similar, permit only limited inferences

perhaps two or three variables could be built into the sample selection, and then could be studied in their own right (sex probably should be one of them, since there is strong evidence of extensive sex-typed preferences; reading level might also be appropriate since it relates so directly to the definition of the target population; age, too, might be worthwhile). Later projects could investigate some of the other differences. Trying to find out about all between-child differences at once, one would ideally have all levels of all variables represented in the sample. With six variables, each with only two levels, and with at least five children of each type and level, the sample would have to include 320 children. With three variables the sample would have to include 40 children, which is still three times the size of the sample already studied.

Studies of the Distractor Condition Itself

The effects of the present system of rotating the distractor slides should be evaluated. Presently, the distractors repeat 3½ times in a half-hour show. The distractor material itself may have variously distracting effects on different types of material or in different types of shows. One might conclude that a particular type of material is unappealing, whereas it may lack appeal only when a certain type of distraction is present. A study that uses different kinds of distracting material with the same television material would be easy to do, and a small sample would be sufficient.

It is also important to validate the distractor situation against a home-viewing situation, and to characterize the most potent differences between them. At this stage, one cannot be too sure that behavior patterns in the distractor setting a comparable to those at home. Finally, one should take a more complete look at children's behavior in a distractor

setting. There is an implicit assumption that children look either at the television screen or at the distractor, since only by making that assumption can one assert that one has control over the distractions to a child's attention in the distractor setting. Obviously, other distractions can intrude (or be sought by the child). It may be found that providing a single distractor is not the optimal procedure. Perhaps two distractors, each with different sorts of material, would yield more useful results. Perhaps auditory as well as visual distractions should be present, active as well as static displays. Maybe manipulative stimuli would help. One advantage of having a large number of alternatives open to a child is that a choice to attend to one thing will not so much be a function of a choice against another thing, as may now be the case. Presently one cannot be sure if the data come from attraction to one thing or from repulsion from its only alternative.

Thorough study of the distractor condition, with an eye toward ways of improving it, is of utmost importance. This setting provides the basic structure upon which all else is built, and any distortions built into the data are magnified in later analyses. One must have utmost confidence in the appropriateness of the distractor situation if any confidence is to be placed on results that derive from it.

Conclusion

In conclusion, though, the attributes discovered in this project account strongly for the visual appeal of the different bits in the shows that were studied.

Their definitions may be refined by further research. Some of them may be found to be just extensions or facets of others. Slightly

different formulations may lead to higher agreement among users. But as a group they embody the most powerful factors operating in the given context. Visual attention is not all that producers should be concerned with, but it is one of the most important variables. Little can be accomplished with a bit to which children do not attend.

Appendix A

Means and Standard Deviations of Percent Attention Scores for Each Show

Show Number	Mean of Percent Attention Scores	SD of Percent Attention Scores
Show 1	68.6%	14.7%
Show 2	76.8	12.7
Show 3	80.5	10.2
Show 4	90.7	6.6
Show 5	82.3	12.5

Appendix B

Attention Data on Each Bit

Show Number	Bit Name	Duration*	Percent Attention	Standard Score
1	Opening Song	7	71.1	.17
1	Show number (match)	1	69.2	.04
1	Op joke (fireman's suspenders)	8	49.4	-1.31
1	Op blending	7	64.5	-.28
1	st-Marquee	10	67.7	-.06
1	Message Man: step back	6	80.8	.83
1	Gag: Cosby's pants fall	1	59.0	-.65
1	Sh - sheet animation	4	61.5	-.48
1	Shopping/chopping	7	82.1	.92
1	Bridge	1	84.6	1.09
1	2 Cosbies: chop, chip	9	86.0	1.18
1	Bridge	1	82.1	.92
1	Gag: sticks to hold pants up	1	84.6	1.09
1	"e on the end" song	13	89.9	1.45
1	Rob/robe animation	6	83.8	1.03
1	Crank call #1 rob/robe	15	56.2	-.84
1	Gag	1	38.5	-2.05
1	Sam's Pizza: Try Sam Pizza	13	64.5	-.28
1	Gag: bank robber to burning building	1	71.8	.22
1	Bridge	1	74.4	-.80
1	George	5	56.9	-.80
1	Easy Reader	14	78.6	.68

*Duration figures reflect the number of 7½-second periods over which a bit extends.

Show Number	Bit Name	Duration	Percent Attention	Standard Score
1	Bridge	1	76.9	.56
1	Cosby & kids: punctuation	18	69.5	.06
1	Top of cop	1	56.4	-.83
1	Crank Call #2 silent e	7	62.3	-.43
1	Harry Reasoner	7	48.7	-1.35
1	Gag at end of Reasoner	2	30.8	-2.57
1	Sign song	20	67.4	-.08
1	-op song	4	62.8	-.39
1	Credits	1	94.9	1.79
1	Last word	5	69.7	.07
2	TV Commercial #1	14	61.2	-1.23
2	Opening Song	8	78.2	.11
2	Croma-key Blending	21	85.3	.66
2	Left animation (right!)	2	83.3	.51
2	Fly & flea in flue	5	85.6	.69
2	TV Commercial #2	2	84.6	.61
2	Sal's Diner (Fr- blending)	5	80.3	.27
2	ph bridge	2	89.7	1.01
2	ph Caveman animation	16	93.6	1.32
2	Phone - sightword (dial & ring)	2	98.8	1.73
2	Marquee: f,f,fr,ph	4	91.2	1.13

(Continued)

Show Number	Bit Name	Duration	Percent Attention	Standard Score
2	Cosby & vismo	2	69.9	-.54
2	Cosby & Crank: f, ph	7	50.4	-2.07
2	Phil on the phone animation	5	52.8	-1.88
2	TV Commercial #3	1	61.5	-1.20
2	"For" animation with DJ	4	56.4	-1.60
2	Short Circus: "He hi ho"	11	83.4	.52
2	Cosby & 3 kids: two me me on the street	19	74.6	-.17
2	Cosby on phone	2	82.0	.41
2	is/isn't animation (a bird?)	4	76.9	.01
2	Phil's Flounders	27	68.0	-.69
2	TV Commercial #4	2	85.9	.71
2	Grapefruit animation (little boy & girl)	6	91.9	1.18
2	Fargo North: bug	25	71.5	-.42
2	Theater in the Dark: flea, fly, flounder	8	76.6	-.02
2	TV Commercial #5: Fenster's Furnaces	4	67.3	-.75
2	End	2	73.1	-.29
2	Last Word: Flounder	3		
3	Opening Song	9	68.8	-1.15
3	Fargo North: Gert Go Get Gas	21	63.6	-1.66
3	Together	2	85.4	.48

(Continued)

Show Number	Bit Name	Duration	Percent Attention	Standard Score
3	Shoe blending	7	86.1	.55
3	Giggles-Goggles	10	85.2	.46
3	Message Man: Go Away	10	83.3	.27
3	Glory bridge	2	85.7	.51
3	Gladys Gloworm	9	89.7	.90
3	Groovy	1	88.1	.74
3	G-sound contest #1	16	92.6	1.18
3	Energy Bridge	2	92.9	1.21
3	G-sound contest #2: bug a big dog	9	75.1	-.51
3	Cosby & Crank: hard g/soft g	13	63.7	-1.65
3	Bridge (weird music)	2	75.0	-.54
3	Grow/Blow/Throw	3	63.5	-1.67
3	Cosby & Crank: ow/ow	10	76.9	-.35
3	ow Monolith	5	84.3	.37
3	ow animation (hammer toe)	4	89.9	.92
3	Mel Mounds	5	84.3	.37
3	Short Circus: "I'm just a clown"	11	82.0	.15
3	Mel Mounds	2	90.5	.98
3	bit/bite animation	1	73.8	-.66
3	Grim/grime photo cartoon	5	76.7	-.37
3	"the" animation: standup comedians	9	78.3	-.22
3	Love of chair #1	9	81.5	.10

(Continued)

Show Number	Bit Name	Duration	Percent Attention	Standard Score
3	Cosby & boy: bow/bow	10	89.3	.86
3	Court Scene: "In your own words"	2	94.0	1.32
3	Short Circus "You can make up a word"	26	93.4	1.26
3	Theater in the Dark: and leave the driving to Gus	7	92.2	1.15
3	Easy Reader, George, & Gert	13	86.3	.57
3	Credits	2	79.8	-.07
3	The last word	2	79.8	-.07
4	Opening Song	11	76.2	-2.25
4	Julia Grownup	39	74.1	-2.58
4	Anaform	1	92.3	.24
4	"Pass" animation	8	97.1	.98
4	Telestrator Magician #1	11	88.8	-.30
4	Lorenzo the Magnificent animation	10	90.5	-.08
4	Telestrator Magician	21	85.5	-.81
4	Scram animation	1	89.7	-.16
4	Sign Shop: chicken fate	23	93.2	.38
4	Anaform	1	87.2	-.55
4	Short Circus: e on the end	14	94.9	.64
4	cap/cape animation	1	92.3	.24
4	All monolith	4	98.7	1.23
4	Movie set: all for one	16	97.9	1.11

(Continued)

Show Number	Bit Name	Duration	Percent Attention	Standard Score
4	Anaform	1	94.9	.64
4	Up the wall, animation	7	94.9	.64
4	Humpty Ferguson	11	97.2	1.00
4	ALK monolith	3	100.0	1.43
4	Humpty Ferguson (fallen)	7	96.7	.92
4	Bird on car animation	8	91.3	.09
4	Jumping animation (Iam, he is,)	3	92.3	.24
4	Love of chair #2	9	85.2	-.86
4	Fargo North: a fall trip	22	82.1	-1.34
4	Graffiti wall, fat sam	17	87.2	-.55
4	Closing	3	88.0	-.42
4	Last word: hammer	4	91.0	.04
5	Man in the street: tub/tube	8	71.9	-.84
5	Opening song	8	75.0	-.59
5	Cosby and Kids, Blending up/pup	17	85.6	.26
5	Message Man, run	5	77.9	-.36
5	Animation	1	72.2	-.81
5	Up/down animation	2	94.4	.96
5	Message Man: duck	5	87.8	.44
5	Pup/up animation	1	80.6	-.14
5	Clancy the clockmaker	7	90.9	.68
5	Clip, clod, close animation	3	86.1	.30

(continued)

Show Number	Bit Name	Duration	Percent Attention	Standard Score
5	Man in the street: quartet	7	86.1	.30
5	Wild Guess quiz show	24	83.2	.07
5	Marquee: quit quizzing	11	95.7	1.07
5	Quake animation	1	94.4	.96
5	True Blue Sue #1	5	95.0	1.01
5	Sign Shop: glue #1	5	91.7	.75
5	True Blue Sue #2	6	95.4	1.04
5	Sign Shop glue #2	3	84.3	.16
5	Cub/cube	3	83.3	.08
5	Supper/super (python)	4	86.8	.36
5	Sal's Diner: word repair woman	13	91.0	.69
5	Bridge	1	83.3	.08
5	Packing/unpacking	9	86.8	.60
5	Man in the Street: unlock	6	91.0	-.11
5	Dressing/undressing	6	83.3	.04
5	Short circus: unbutton your heart	12	89.8	.72
5	Sal's Diner: clunkies	10	81.0	.67
5	Crank: quotation marks	9	82.9	-1.70
5	I am cute very, animation	4	58.3	-1.92
5	Man in the Street: uncle	6	63.0	-1.55
5	Credits	3	41.7	-3.25
5	Last Word: quiet	2	43.6	-3.10

Appendix C-1

Functionally-Relevant Action: List of Denoted Bits

Show Number	Bit Name	Visual Attention Standard Score
1	st-Marquee	-0.06*
	Shopping/chopping	0.92*
	Sh-Sheet animation	-0.48
	Message Man: Step Back	0.83
	Rob/robe animation	1.03
2	Chroma-key blending	-0.66
	Fly and flea in a flue	0.69*
	Sal's Diner: fr	0.27
	ph Caveman animation	1.30
	Phone sightword	1.72
	F,fr,ph Marquee	1.13*
	Grapefruit animation	1.18*
3	Shoe blending	0.55
	Message Man: go away	0.27
	OW Monolith	0.37
	OW animation	0.92
	bit/bite animation	-0.66
	Short Circus: you can make up a word	1.26*
4	Pass animation	0.98
	ALL Monolith	1.23
	Movie set: "All for One"	1.11*
	Crooner: up the wall	0.64*
	ALK Monolith	1.43
	Jumping animation	0.24
5	Message Man: Run	-0.36
	Up/down animation	0.96
	Message Man: Duck	0.44
	Clip,clod,closed animation	0.30
	qu-Marquee	1.06*
	Sign Shop: Glue #1	0.75
	Sign Shop: Glue #2	0.16*
	Super/Supper animation	0.36
	Packing/unpacking	0.60
	Dressing/undressing	0.04

*Denotes bits that possess additional attention-affecting attributes

Appendix C-2

Strongs Rhythm and Rhyme: Denoted Bits

Show Number	Bit Name	Visual Attention Standard Score
1	Opening song	0.17*
	Short Circus: "e on the end"	1.45*
	Sign Song	-0.08
	-op song	-0.39
2	Opening song	0.11*
	Fly and flea in flue	0.69*
	Short Circus: "he hi ho"	0.52*
3	Opening song	-1.15*
	Gladys Gloworm	0.90
	Mel Mounds #1	0.37
	Mel Mounds #2	0.98
	Short Circus: "I'm just a clown"	0.15*
	Short Circus "You can make up a word"	1.26*
4	Short Circus: "e on the end"	0.64*
	Opening song	-2.25*
	Crooner: up the wall	0.64*
	Humpty Ferguson #1 (Anaform recites poem)	1.00
5	Opening song	-0.59*
	True Blue Sue #1	1.01
	True Blue Sue #2	1.04
	Short Circus: "Unbutton your heart"	0.72*

*Denotes bits that possess additional attention-affecting attributes

Appendix C-3

Electronic Bridges: Denoted Bits

Show Number	Bit Name	Visual Attention Standard Score
1	Bridge	1.09
	Bridgw	0.91
	Bridgw	0.39
	Bridge	0.56
2	ph Bridge	1.01
	Left Bridge	0.51
3	Glory bridge	0.51
	Energy Bridge	1.21
	Groovy bridge	0.74
	Bridge	-0.54
5	Quake bridge	0.96
	Cub/cube	0.08
	Bridgw	0.08

Appendix C-4

Involving Children: Denoted Bits

Show Number	Bit Name	Visual Attention Standard Score
1	Short Circus: "e on the end"	1.45*
	Cosby & Kids: punctuation	0.06*
2	Short Circus: "he hi ho"	0.52*
	Cosby & 3 kids	-0.17*
	Cosby on phone	0.46*
	Grapefruit animation	1.18*
3	Short Circus: "I'm Just a Clown"	0.15*
	Cosby & bow: bow/bow	0.86
	Short Circus: "You can make up a word"	1.26*
4	Short Circus: "e on the end"	0.64*
5	Cosby & kids: blending	0.26
	Short Circus: "unbutton your heart"	0.72

*Denotes bits that possess additional attention-controlling attributes

Appendix C-5

On-Stage Correcting of Verbal Performance: Denoted Bits

Show Number	Bit Name	Visual Attention Standard Score
1	Shopping/chopping	0.92*
	Sam's Pizza	-0.28*
	Cosby & kids: punctuation	0.06*
2	Cosby & 3 kids: two me me	-0.17*
	Phil's Flounders	-0.69*
3	Giggles/goggles	0.46*
	G-sounds contest #1	1.18*
4	Sign shop: chicken fate	0.38*
5	Cosby and kids: up/pup	0.26*
	Sal's Diner: word repair	0.69*
	Sal's Diner: clunkies	0.68

*Denotes bits that possess additional attention-controlling attributes

Appendix C-6

"Do It One Better" Theme: Denoted Bits

Show Number	Bit Name	Visual Attention Standard Score
1	2 Cosbies: chop/chip	1.18
	st-Marquee	-0.06*
2	f,fr,ph Marquee	1.13*
3	G-sounds contest #1	1.18
4	Movie set: "All for one"	1.11*
5	qu-Marquee	1.06*

*Denotes bits which possess additional attention-controlling attributes

Appendix D-1

Comprehensible Spoken Script: Denoted Bits

Show Number	Bit Name	Visual Attention Standard Score
1	OP joke (fireman's suspenders)	-1.31
	OP blending (end of it)	-0.27
	Crank call, rob/robe	-0.84
	Gag: sticks to hold plants up	1.09
	Gag	-2.05
	Gag: bank robber	0.22
	Crank call: silent e	-0.43
	Harry Reasoner	-1.35*
	Gag at end of Reasoner bit	-2.57
2	TV Commercial #1	-1.22*
	TV Commercial #2	0.61
	Cosby & vismo	-0.54*
	Cosby & Crank: f & ph	-2.01
	Phil on the phone animation	-1.88
	Cosby on phone	0.41
	Phil's Flounders (messy letters)	-0.69*
	TV Commercial #3	-1.20
	TV Commercial #4	0.71
	Fargo North: zug	-0.42
	Theater in the Dark: flea, fly, flounder	-0.02
	TV Commercial #5: Fenster's Furnaces	-0.75
3	Fargo North: Gert	-1.66
	Giggles/Goggles	0.46*
	G-sounds contest #2	-0.53*
	Cosby and Crank: hard g/soft g	-1.64
	Cosby & Crank: ow/ow	-0.35
	Crim/Crime photo cartoon	-0.37
	"the" animation: standup comedians	-0.22
	Love of chair #1	0.10
	Theater in the dark: "leave the driving to Gus"	1.15
	Easy Reader et al	0.57
4	Julia Grownup	-2.58*
	Sign shop: chicken fate	0.38*
	Humpty Ferguson	1.00*
	Humpty Ferguson #2	0.92
	Love of chair #2	-0.86
	Fargo North: a fall trip	-1.34
	Graffiti Wall: fat Sam	-0.55

(Continued)

Appendix D-1 - Comprehensible Spoken Script

Continued

Show Number	Bit Name	Visual Attention Standard Score
5	Man in the street: tub/tube	-0.84*
	Clancy the Clockmaker	0.68
	Man in the street: quartet	0.30
	Sign shop #2: glue	0.16
	Sal's Diner: word repair	0.69*
	Man in the street: unlock	-0.11
	Sal's Diner: clunkies	0.68*
	Man in the Street: uncle	-1.55
	Crank: quotation marks	-1.70

*Bits that possess additional attention-affecting attributes

Appendix D-2

Message Monologues: Denoted Bits

Show Number	Bit Name	Visual Attention Standard Score
1	-op blending	
	George	-0.27
	Harry Reasoner	-0.85
	Gag after Reasoner	-1.35*
		-2.57*
2	Cosby & vismo	
		-0.54*
3	G-sounds contest #2	
		-0.53*
4	Julia Grownup	
	Telestrator Magician #1	-2.58*
	Telestrator Magician #2	-0.30
		-0.81
5	Sign Shop: glue #2	
	I am cute very, animation	0.16*
		-1.92

*Denotes bits which possess additional attention-controlling attributes

Appendix D-3

Starting/Ending Bits

Show Number	Bit Name	Visual Attention Standard Score
1	Opening, song	0.17*
	Show number	0.04
	Credits	1.79
	Last Word	0.07
2	TV Commercial #1	-1.22*
	Opening song	0.11*
	End	-0.29
3	Opening song	-1.15*
	Credits	-0.07
	Last Word	-0.07
4	Opening Song	-2.25
	Closing	-0:42
	Last Word	0.04
5	Man in the street: tub/tube	-0.84*
	Opening song	-0.59*
	Credits	-3.25
	Last Word	-3.10

*Denotes bits which possess additional attention-controlling attributes