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Replays as Repetitions: Young Children's Interpretation of Television Forms*

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Young children's comprehension of instant replays was examined in two studies. In Study 1, 83 children, ages 4–9 years, viewed six TV bits in which instant replays were inserted. The content of the bits varied from familiar (placing a phone call) to unfamiliar (a baseball play). Children's detection and interpretation of replays were measured. Study 2 replicated the procedures of the first study, with 166 children, ages 4–9 years. The four experimental bits crossed two kinds of content (phone call vs. baseball), with presence or absence of a visual special effect marking the replay. Older children were more likely to detect replays than younger children. There were age and content effects for children's interpretation of instant replays. Young children interpreted the replays as repetitions. When they began to ascribe the replay to the medium, somewhere around first grade (age 6–7), they were more likely to do so for a baseball context than a phone call. Visual markers did not influence detection or interpretation. The findings support the hypothesis that children interpret the forms of television according to the expectations they have derived from their experiences with real people and objects.

Studies of children's comprehension of television have focused on the content of television programs, such as the concepts presented in educational programs (e.g., Ball & Bogatz, 1972) and the narrative stories of commercial programs (e.g., Collins, 1979, 1982). In order to make sense of the content, children must also interpret the forms of television—the auditory and visual production and editing techniques that characterize the medium (Huston et al., 1981; Salomon, 1979). Formal features often compress time and space, emphasize certain information, or

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suggest associated meanings or affect. Forms serve as the syntax of television, the grammatical glue that ties together a string of slots. Formal features can influence children's comprehension of program content (e.g., Calvert, 1982; Calvert, Huston, Watkins, & Wright, 1982; Campbell, Wright, & Huston, 1983).

Although little is known about the developmental patterns of form comprehension, it appears that preschool children understand production techniques that replicate real-world events. Smith, Anderson, and Fischer (1985) report that 4-year-old children can fill in the spatial, temporal, and sequential gaps denoted by the use of cuts, fades, pans, and zooms. Children's correct interpretation of the forms is attributed to the congruity between the simple sequences of the experimental television "stories" and the children's expectations for these events. Their results apply well to television forms that have a direct analog in everyday experience.

Another way to explore form comprehension is to present children forms for which a real-world enactment is not possible. In this case, children can either correctly interpret the form as being unique to the medium, or they can misinterpret it by assimilating it to their real world experiences. A case in point is an instant replay. A replay violates the temporal and sequential constraints of actual events. Instant replays are made possible by media technology.

If children rely on their preexisting event schemas to interpret forms, they may do so no matter how much the media presentations differ from the actual experience. According to this hypothesis children see what they expect to see. They encode and store in memory the sequence of events that correspond to their available event scripts (Nelson, Fivush, Hudson, & Lacariello, 1983). In the case of instant replays, there are two levels of script-related expectations. If the canonical sequence of events does not include a repetition, young viewers may not detect the insertion of a replay. On another level, if the children did detect a replay, they would impose their expectation that events will be repeated (Nelson, 1977). Instead of interpreting the replay as a media-generated representation of an already completed sequence, children would regard the replay as a real repetition of a previous set of events. That is, instead of interpreting the replay as a jump backward in time, children may assume that it is a jump forward into the last part of a second identical sequence (a repetition).

The possibility that children draw upon their real-world expectations for the interpretation of form is consistent with Collins's (1983) conclusion that children rely on their real-world experiences as a basis for comprehension of content. Collins reports that when children view televised narrative stories, they infer causal relationships on the basis of their own experiences.

An alternate possibility is that children have a separate set of expectations for media presentations. Just as they know early on that the people and places they view are not literally present in the television set, they may realize that media forms are not constrained by the physical laws of the world. When viewing a media technique without an analog in actual experience, they would ascribe it to the technology of the medium, such as interpreting the replay as a momentary malfunction of the set, a glitch, or an intentional distortion of a sequence of events. This interpretation may

be aided by the presence of accompanying media-specific markers, such as the expanding and closing geometric shapes that are frequently superimposed at the beginning and end of an instant replay.

The two studies reported below investigated how young children interpret instant replays as a function of age, program content, and accompanying media markers. In the first study we explored the influence of content in six different program bits for children ages 4 through 9 with a repeated measure design. In the second study we investigated the interaction of content, media markers, and age, with a between-subjects design.

STUDY 1

Methods

Subjects. Eighty-three children, ages 4 to 9 years of age, participated in this study. The number of girls and boys at each age level is reported in Table 1. The sample was drawn from two local day care centers and two elementary schools with predominantly white, middle-class populations.

Stimuli. The stimuli were six edited bits from real television programs ranging in length from 30–60 s. Each bit contained a replay, a repetition of a series of actions already shown. There was no dialogue at the point of insertion for the instant replays. All bits were in color.

The bits were selected to vary in how closely the content matched children's likely knowledge of event sequences in the world. Two sequences, eating and walking to and fro, were selected to represent basic event knowledge mastered early by young children (Nelson & Gruendel, 1979). One of these bits depicted Cookie Monster eating letters that spelled the word FOOD. The second consisted of a clown walking to a barrel to retrieve objects and then carrying the objects to a sawhorse to build an imaginary horse. The third and fourth bits consisted of *Sesame Street* actors placing phone calls, one with a desk phone, the other with a pay phone. The phone sequences were chosen because telephone games are popular instructional games between mothers and toddlers (Snow, Dubber, & DeBlauw, 1982), and by age 5

TABLE 1
Subject Information for Study 1: Number of Children by Age by Sex

	Age						
Sex	*4*	*5*	*6*	*7*	*8*	*9*	*Total*
Girls	5	9	6	9	6	9	40
Boys	11	9	9	4	5	5	43
Total	16	18	15	13	11	10	83

children know the full set of communicative rules for using the telephone (Shewan & Malcolm, 1981). The fifth and sixth bits, from a baseball game, were selected to be less familiar event sequences than everyday physical activities (eating, walking) and phone calls. By contrast, because sports broadcasts are typical contexts for the use of instant replays on television, children might call on their knowledge about the medium to interpret a replay in the baseball context. In sports, replays are often marked by a special effect, such as an expanding and closing geometric shape which might enhance correct interpretation. The content of both baseball bits was a prototypic "out": the pitch to the batter, a line-drive hit to third base, a catch by the third baseman and throw to the first baseman who caught it before the runner reached first base. One had the original visual special effect (an expanding and closing yellow diamond); the other did not.

One introductory and one control bit without replays were simple action sequences from *Captain Kangaroo*. The introductory bit was used to familiarize the children with the procedures. The control bit was inserted among the experimental bits to break possible response sets.

Editing. Instant replays were inserted by means of jump cuts from the end of the targeted sequence to the original beginning of the sequence. The replays were located at points where such repetitions could not actually be performed in the real world. For example, once food has disappeared into someone's mouth, it cannot instantaneously reappear in its original form. For instance, in the FOOD bit, Cookie Monster is behind the letters "FOOD." He puts the "F" in his mouth and eats it. The viewer can see the empty space previously occupied by the "F" and the broken bits of the letter as Cookie Monster consumes it. In the original sequence, Cookie Monster next eats the "O." In this replayed sequence, the letter "F" abruptly reappears, and Cookie Monster eats it again.

Procedure. Each session began with an informal test of the child's comprehension of the terms "do it over again" and "do it two times." The child was asked to clap two times or jump up and down and then do it over again. Children who were unable to do so were not included in the study. Each child individually viewed the eight televised bits (one introductory, six experimental, one control) on a color monitor. After each bit the videotape was paused and questions were asked about the bit.

All children viewed the practice bit first. The sequence of the remaining was as follows: desk phone, eating, unmarked baseball, control, pay phone, clown with sawhorse, marked baseball. The starting point for viewing was randomized across subjects within each age group.

Dependent Measures. Children's *recall* was measured in two ways. First, they were asked, "What happened?" Then they were asked to seriate five photographs taken from the bit. Recall was measured to provide an index of the

complexity of the depicted events and to serve as a control for memory. *Detection* of a replay was probed with the question. "Did anything happen two times?", or, "Did anything happen over again?" If the replayed portion was detected, the child's *interpretation* of it was probed with the questions: "Could that really happen? Could *character name* really do that over again if he were doing it in the real world and not on TV?" Finally, after all the bits had been viewed, the child was asked to *define* an instant replay.

The children's verbal responses were audiorecorded and transcribed for coding. Children received credit for recall if they described at least three of the major actions in the event sequence or if they ordered four out of the five pictures in the seriation task correctly. Detection was credited if a child described the replay in free recall or responded affirmatively to the probe question, with identification of the replay. Interpretations of the replay were coded from free recall descriptions, responses to the detection probe, and responses to, "Can you really do that?" Their responses fell into two categories. *Real world* responses described real world possibilities, usually involving a repetition of actions. Examples are: "He called, got a busy signal, called again"; "He got some letters, got some more letters"; "He hit it two times"; "He hit it and then another guy hit it." *TV-related* responses involved acknowledgement of media characteristics, such as "The TV skipped back"; "They showed it over again"; "You can only do that on TV." All responses were codable as either real-world or TV-related.

For the definition question, children were credited with knowledge of an instant replay if they included the notion of repetition of events to be found on television. An example is: "It's when they show it over again."

Reliability. Reliability was calculated as the number of agreements divided by the number of agreements plus disagreements. Word level transcription reliability for the audio recordings of the subjects ranged from 81% to 89%, with a mean of 85%. Agreement for two raters' coding of responses to questions was 94%, with a range of 86% to 100%. Disagreements were resolved by discussion between the raters.

Results

Analyses were performed to determine how children's responses to the replayed events varied as a function of age and the context of the replay. The dependent variables formed a hierarchy. Only if children recalled the program content could they notice or ignore the reoccurrence of an event sequence (detection). Only if they detected a replay could they interpret it as an actual repetition of events (real-world interpretation) or as a technological phenomenon of the medium (TV-specific). As a consequence of the repeated sifting of available subjects, the number of subjects per cell for the higher level analyses is greatly reduced. Therefore, the stability of the proportions is questionable. What is of interest is the pattern of findings, and the replication of the patterns across the two studies.

Recall. Recall of the control bit was 98% (81 subjects). The mean proportion of experimental bits recalled by age were; 4s, 86%; 5s, 90%; 6s, 96%; 7s, 100%; 8s, 98%; 9s, 100%. Four-year-olds had the poorest recall. By age 6, children recalled almost all the bits.

Recall was most difficult for the baseball bits. Pairwise comparisons with the Multiple Sign Test (Miller, 1966) indicated that the baseball bits (Mean for unmarked = .86, Mean for marked = .87) were less likely to be recalled than the food ($M = 1.00$), clown with horse ($M = .99$), or pay phone ($M = .98$) bits, $p = < .05$.

Detection. The mean proportion of repetitions detected by children of different age levels is reported in Table 2. A two-way analysis of variance of Age (6) × Sex (2) was performed for the total detection scores.[1] There was a main effect of age, $F(5, 71) = 6.31$, $p < .001$. Neither the main effect of sex nor the Age × Sex interaction were significant. Pairwise Scheffé contrasts indicated that 9-year-old children more often detected the replays than 4- or 6-year-olds. Since each age group received each order (resulting in very small cell sizes for any order analyses), and any variance due to effects of presentation order could contribute to the error variance, order of presentation was not analyzed.

Detection means for each bit (across age groups) are presented in Table 2. The order of ease of detection, from highest to lowest percentage of detection is as follows: desk phone, eating food, marked baseball, unmarked baseball, pay phone, and clown on a sawhorse. The detection scores for different stimuli were highly intercorrelated. All correlations were significant beyond the .01 probability level, with a range from .27 to .62.

Although the dichotomous nature of the detection scores makes analysis of variance somewhat problematic, one-way analyses of variance using age as an independent variable were performed for each bit separately to determine whether age differences occurred consistently across bits. The effects of age were significant at $p < .01$ for each stimulus.

Interpretation. Children's interpretations of the replays they detected were coded 0 for real-world rationale and 1 for TV-related explanations. The proportion of detected repetitions given TV-related interpretations is reported for each age group and for each bit in Table 3. The high multicollinearity evident in the detection data did not occur in the interpretation data. Interpretation scores for the two baseball bits were correlated ($r = .56$, $p < .01$), but the baseball bits are not associated with the other four bits, with a range of .01 to .22.

Therefore, a multidimensional analysis for discrete data (Bishop, Fienberg, & Holland, 1975) could be applied in order to investigate the structural associations of

[1] A three-way ANOVA, of Age × Sex × Bit, was not possible due to the dichotomous nature of the scores. In the full design, the summary statistic for the cell is the percentage of subjects who detected or interpreted. Therefore, two-way ANOVAs were performed.

TABLE 2
Mean Proportion of Experimental Bits Detected Within Age Groups[a]: Study 1

	Stimuli						
Age (N = 83)	*Pay Phone*	*Desk Phone*	*Eating Food*	*Clown Horse*	*Marked Baseball*	*Unmarked Baseball*	*Row Means*
4	.27 (15)	.46 (13)	.38 (16)	.20 (15)	.25 (12)	.18 (11)	.29
5	.41 (17)	.78 (18)	.61 (18)	.22 (18)	.54 (13)	.64 (14)	.53
6	.27 (15)	.47 (15)	.47 (15)	.33 (15)	.62 (13)	.46 (13)	.44
7	.38 (13)	.92 (13)	.77 (13)	.62 (13)	.77 (13)	.62 (13)	.68
8	.64 (11)	.82 (11)	.82 (11)	.64 (11)	.82 (11)	1.00 (10)	.79
9	1.00 (10)	1.00 (10)	1.00 (10)	.70 (10)	.90 (10)	.50 (10)	.85
Column Means	.49	.74	.68	.45	.6[illegible]	.57	

Note. Figures in parentheses are the number of children who recalled the stimulus.
[a]Coding was binary, 0 = no, 1 = yes. Figures are proportions of children who detected out of those who recalled.

both age and bit with interpretation in a single analysis. This analysis also assesses the interaction between age and bit for the interpretation data. It is not an appropriate procedure for the detection data because of the high multicollinearity. The model-fitting procedures for categorical data are roughly analogous to multiple regression procedures. Logs of expected cell frequencies are analyzed with a general linear model (Fienberg, 1980). The loglinear model is similar to an ANOVA model except that the logarithm of the expected cell frequency replaces the expected value of the ANOVA model. Interpretation is parallel, with main effects and interactions.[2]

The best fitting model was that of pairwise relations among the three underlying variables, with each two-variable interaction unaffected by the value of the third variable, $\chi^2 = 10.65, p = .91$. Interpretation was associated with age, independent of bit. Older children were more likely to give TV-interpretations than younger children. Interpretation was also associated with bit, independent of age. Repeti-

[2] Loglinear analyses are generally used with independent measures. The procedure is problematic if there is high multicollinearity among the repeated measures. In this case, the detection data were sufficiently intercorrelated to rule out loglinear analysis, but the interpretation data did not have this problem. The main point is the replicability of the loglinear model for the interpretation data across the two studies, given the difference in designs. Procedurally, the repeated measures are treated as levels within the dimension. There are no special error terms analogous to ANOVA.

TABLE 3
Mean Proportion of Experimental Bits Given a TV-Type Interpretation Within Age Groups[a]: Study 1

	Stimuli						
Age	*Pay Phone*	*Desk Phone*	*Eating Food*	*Clown Horse*	*Marked Baseball*	*Unmarked Baseball*	*Row Means*
4	0	.20	.20	.50	0	—[b]	.15
	(4)	(5)	(5)	(2)	(0)	(3)	
5	0	0	0	0	0	0	0
	(7)	(12)	(10)	(4)	(4)	(8)	
6	0	.14	0	.25	.29	.20	.15
	(4)	(7)	(6)	(4)	(7)	(5)	
7	0	.08	.33	.12	.38	.28	.20
	(5)	(12)	(9)	(8)	(8)	(7)	
8	.14	.22	.22	.17	.25	.25	.21
	(7)	(9)	(9)	(6)	(8)	(8)	
9	.20	.10	.30	.43	.67	.80	.42
	(10)	(10)	(10)	(7)	(9)	(5)	
Column Means	.06	.12	.18	.24	.27	.26	

Note. Figures in parentheses are the number of children who detected the replay.
[a]Coding was binary, 0 = no, 1 = yes. Figures are proportions of children who gave TV-type answers out of those who detected the replay.
[b]Missing data.

tions in baseball bits were more likely to be interpreted as TV-related than in other contexts.

Instant Replay. The proportion of children within each age group who correctly defined an instant replay is as follows: 4s, .15; 5s, 0; 6s, .15; 7s, .20; 8s, .21; 9s, .42. A two-way ANOVA revealed significant effects for age and sex. For age, $F(5, 71) = 9.916, p < .001$. For sex, $F(1, 71) = 4.90, p < .05$. A total of 55% (22) of the girls correctly defined a replay, whereas 28% (12) of the boys did so. There were no Age × Sex interactions. Scheffé contrasts indicated that 4- and 5-year-olds were significantly less accurate than 8-year-olds, and 4-, 5-, and 6-year-olds were less accurate than 9-year-olds.

STUDY 2

Study 2 was designed to determine the replicability of the age and content findings of the first study. Two types of content, varying in real-world familiarity, were included: telephone calls and baseball. Second, the effects of a visual special effect marker for an instant replay were investigated by presenting each type of content with and without a marker. Insofar as children are familiar with media codes,

marking should enhance detection of a replay and increase the probability of a TV-specific interpretation.

Method

Subjects. One hundred sixty-six children, ages 4–9, preschool through third grade, participated. The number of children in each grade assigned to each condition is reported in Table 4. The children were drawn from a local day care center and three public elementary schools, all of which enrolled predominantly white, middle-class students.

Stimuli. Four experimental bits were selected to fill a matrix with two kinds of content, baseball play and placing a phone call, and presence or absence of marking. The baseball and desk phone bits were selected from Study 1 because they provided the clearest contrast in event sequences and in overall differentiation in children's detection and interpretation. Each had one version with an accompanying visual special effect and one version without the marker. A visual special effect similar to the baseball marker (same geometric shape, different color) was added to the phone sequence for the marked version. In addition, there were two introductory bits: the food sequence from the earlier study without the replay, and the clown with sawhorse, with the replay included.

Procedure. The procedures differed from Study 1 in the following ways:

1. Each child saw two practice bits and one experimental bit. All children saw the same practice bits. Each child was assigned to one experimental condition.
2. At the end of the questions regarding the experimental bit, each child was asked, "What is an instant replay?" A second question was asked for further clarification, "Where would you find one—on television, radio, records, or just any-

TABLE 4
Subject Information: Number of Children by Grade by Condition: Study 2

	Condition				
Grade	*Unmarked Phone*	*Marked Phone*	*Unmarked Baseball*	*Marked Baseball*	*Total*
Preschool	7	7	7	7	28
Kindergarten	6	10	15	14	45
1st	9	9	7	5	30
2nd	8	11	10	7	36
3rd	8	5	7	7	27
TOTAL	38 (21)[a]	42 (15)	46 (22)	40 (15)	166

[a]Number of girls in each condition.

where in the world?'' Otherwise, the procedures were the same as in the earlier study.

Coding of Responses. Responses were coded in the same manner as before. The definition of an instant replay was coded on a 3-point scale, with 0 for no credit, 1 for partial understanding, and 2 for full understanding. A child received partial credit if the replay were defined as a repetition to be found on television (e.g., ''If something is wrong with it they do it again''). For full credit, a child had to restrict the repetition to television and include an intent to replay the event to provide viewers with a second opportunity to view (e.g., ''In case you didn't see it, then they could show it over and then you could see it'').

Reliability. Word level transcription reliability for the audio recordings of the 166 subjects ranged from 94% to 100%, with a mean of 96%. Agreement for two raters' coding of the responses was 94% over a sample of 14 transcripts, with a range from 82% to 100%.

Results

Recall. The phone sequences were recalled at or near ceiling levels across all ages sampled. There were age differences on the baseball sequences. The propor-

TABLE 5
Proportion of Children who Detected Replays: Study 2

	Condition				
	1	*2*	*3*	*4*	
Grade	*(Unmarked Phone)*	*(Marked Phone)*	*(Unmarked Baseball)*	*(Marked Baseball)*	*Row Mean*
Preschool	.50[a]	.83	.33	.67	.58
	(6)	(6)	(3)	(3)	
Kindergarten	.50	.75	.55	.55	.59
	(6)	(8)	(11)	(11)	
1st	.67	.67	.57	.80	.68
	(9)	(9)	(7)	(5)	
2nd	.63	.82	.89	.86	.80
	(8)	(11)	(9)	(7)	
3rd	.75	1.00	1.00	.71	.86
	(8)	(5)	(7)	(7)	
Column Means	.61	.81	.67	.72	

Note. Numbers in parentheses are the number of children who recalled.
[a]Figures are proportions of the children who detected replays out of the children who recalled the bit.

tion of children who recalled the unmarked baseball bit, listed in order from preschoolers to third graders, was: .43, .73, 1.00, .90, and 1.00. Chi square analyses of children who did versus did not recall the unmarked version indicated a significant age effect $\chi^2(4, N = 46) = 10.75, p < .05$. The proportion of children who recalled the marked baseball bit, listed in order from preschoolers to third graders, was .43, .79, 1.00, 1.00, and 1.00, $\chi^2(4, N = 40) = 11.80, p < .05$. Hence, as expected, the telephone bit was easier for young children to comprehend and recall than the baseball bit.

Detection. The proportion of children who detected replays for each of the bits is reported in Table 5.

Multidimensional analyses of the condition by age table indicated a lack of associative structure (no significant differences in detection) as a function of age or condition.

Interpretation. The proportion of children who provided TV-specific interpretations within conditions and grades is reported in Table 6.

Multidimensional analyses were completed to examine the association among interpretation, grade, and content (collapsing over marking because there were no significant marking effects according to initial χ^2 analyses). As in Study 1, the best model was that of additive two-way associations, with no three-way association, χ^2

TABLE 6
Proportion of Children who Provided TV-type Interpretations[a]: Study 2

	Condition				
	1	*2*	*3*	*4*	
Grade	*(Unmarked Phone)*	*(Marked Phone)*	*(Unmarked Baseball)*	*(Marked Baseball)*	*Row Mean*
Preschool	0	0	0	0	0
Kindergarten	0	0	.17 (1)	.33 (2)	.13
1st	0	0	.50 (2)	.25 (1)	.19
2nd	0	.33 (3)	.37 (3)	.67 (4)	.34
3rd	0	.40 (2)	.71 (5)	.60 (3)	.43
Column Means	0	.15	.35	.37	

Note. Number in parentheses are frequencies.
[a]The proportion of real-world interpretations are = 100 − percentage TV type.

= 2.14, $p = .71$. The fit of this model is not significantly reduced when only the linear components of the two-way associations of interpretation with grade and content with grade are allowed. This model excludes nonlinear relations between interpretation and grade and between interpretation and content (see Fienberg, 1980, pp. 61–68 for analysis of ordered categories). The fitted curve is reported in Figure 1. Children were more likely to provide TV-specific interpretations for the baseball bits than for the telephone sequence. Older children were more likely than younger children to give a TV-specific interpretation. The association between interpretation and content was the same over age.

Definition of Instant Replay. Chi square analyses of children at the three levels of definition revealed significant age effects for children's definitions of instant replays, $\chi^2(8, N = 165) = 48.04, p < .001$. None of the preschoolers could define a replay. The percentages of children who gave partial and full definitions for each grade are as follows: kindergartners, 9% partial, 4% full; first-graders, 17%, 17%; second-graders, 19%, 19%; third-graders, 44%, 33%.

Correct definition of an instant replay was associated with the probability that children would interpret the instant replays as a TV-related phenomenon. The percentage of children who gave a TV-interpretation within each of the definition levels is as follows: no knowledge of replay, 12%; partial knowledge, 22%; full knowledge, 70%; $\chi^2(2, N = 103) = 27.24, p < .001$, Pearson's $r = .48, p < .001$.

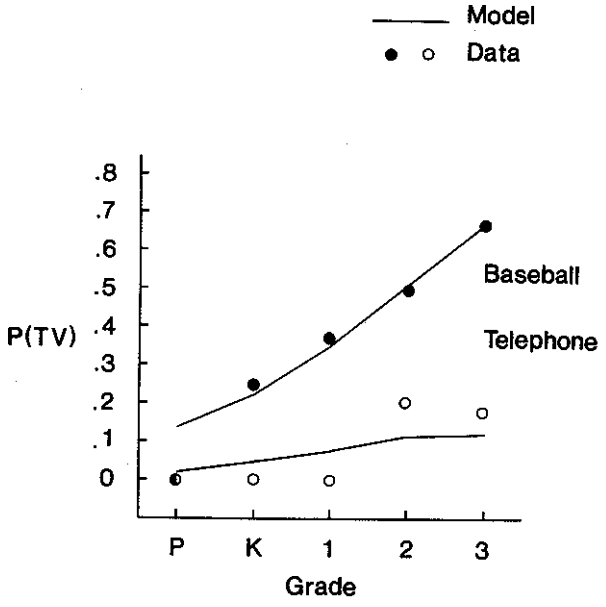

Figure 1. Fitted values for interpretation data for loglinear model of additive two-way associations with residuals adjusted for linearity.

DISCUSSION

The findings of the two studies are consistent. Age differences in the detection of replays were clear in Study 1 and marginally apparent in Study 2. In the age range sampled, older children were more likely to detect an instant replay than were younger children. Content effects for detection were not consistent in either study. While the patterns of raw data are comparable across the two studies, neither the familiar content of the phone sequence nor the presence of a visual special effect increased the probability that children would detect an instant replay.

Across the two studies, age and content effects for children's interpretation of instant replays were consistent and strong. Young children interpreted the replays as repetitions. Somewhere around first grade (age 6–7) children began to ascribe the replay to the medium. They were much more likely to give a TV-related interpretation for a baseball context than for a phone call sequence. The type of interpretation was not influenced by accompanying visual markers.

Both studies indicated developmental differences in children's ability to define an instant replay. In the age range sampled, there was a shift from no explicit knowledge of replays to a nearly complete understanding. Children were able to define a replay somewhere around ages 7 or 8, although their knowledge was often incomplete as late as third grade. Children's awareness of the significance of replays was closely tied to how they interpreted instances of replays; greater accuracy of definition of replays was associated with an increased probability of TV-related interpretations after viewing a replay.

Overall, support for a script-based processing of television is mixed. The major inconsistency is that there were no clear content effects for detection, although script theory suggests that disruptions from a familiar script should be more noticeable than disruptions from an unfamiliar script. The index of familiarity of scripts used in these studies was children's recall of the bits. While consistent with operational definitions of scripts, it may be that the recall measure did not capture the relevant familiarity dimensions, or perhaps there was insufficient contrast in content. One of the challenges facing contemporary script theory is to generate a generalizable metric of script organization and familiarity. Until a metric is available, manipulation of script content as an independent variable will be problematic.

On the other hand, there is strong support for the hypothesis that children process television according to the expectations they have derived from their experiences with real people and objects. Young viewers, under age 5 years, evidently assume that the canonical version of the activity sequences presented do not contain repetitions of events, insofar as they were unlikely to detect the presence of a replay. In fact, their assumption is correct. The bits were chosen and edited to avoid sequences where a repetition interpretation would be accurate. Nevertheless, when children begin to notice a replay, they are likely to interpret it as if a repetition had occurred. In other words, when they do not know what to make of replays, children call upon the closest match from their actual experience.

The strategies that children bring to the viewing situation are similar to those

that they apply to other domains of symbol acquisition. For example, young children call upon their knowledge of the probabilities of events in the world for their earliest understandings of grammar (e.g., errors in the interpretation of passive sentences reported by Bever, 1970, and deVilliers & deVilliers, 1973). Similarly, when asked to judge the acceptability of language (whether or not something is "said right"), 4- and 5-year-old children base their judgements on the sentence content, not form. They determine grammaticality by analyzing the propositional content of the sentence and relating it to their real world experiences to determine truth value. Around age 6 children are able to focus on the formal properties of language, to differentiate language form from content, and to reflect upon linguistic form in a wide range of environments (Hakes, 1980; Saywitz & Cherry-Wilkinson, 1982). It is interesting that this is the age when children begin to understand that the formal properties of television are distinct from the content.

Hakes (1980) argues that metalinguistic abilities and cognitive competencies that emerge at the same developmental level share a common underpinning. He suggests that the commonality "involves an increasing capacity to engage in controlled cognitive processing, and, in particular, an increasing ability to stand back from a situation mentally and reflect upon it" (p. 100).

It appears that the emergence of children's ability to differentiate the formal properties of the television medium from the content of the program is another manifestation of the more general ability to reflect upon information processing. As in other symbol-processing domains, children's initial strategy for interpretation is to call upon what they know, what they expect to happen. Their interpretations of instant replays suggest that they make the transition from misinterpretation to understanding by noticing the form-content associations of the medium, as revealed by the clear content effects of Study 2. Instant replays are most commonly found in televised athletic events. The baseball bit replays were more likely to be interpreted as a consequence of the media, in explanations such as "they showed it over," or "the TV skipped back." The form-content association was also evident in a frequent kind of definitional error. A number of children defined an instant replay as something that is done over in an athletic event, sometimes restricting it to the medium of television and sometimes asserting that a replay could be found in any baseball game.

The nested occurrence of replays within athletic events provides a localized linkage of content with form. One way in which the linkage may lead to differentiation of form and content is by enhancing attention to the forms. The lack of detection effects for content, however, rule against the attention-enhancement interpretation. A more likely explanation is that instant replays in athletic events are often accompanied by a voice-over statement clarifying the intent of the replay, something like, "Let's take another look at what happened there" (although this voice-over information was not evident in the experimental bits used in the studies). This piggy-backing of a familiar code onto a less familiar code could facilitate a young viewer's understanding of the meaning of the form (Rice & Wartella, 1981).

Productive questions for future investigations include the extent to which

there is a generic ability to reflect on communicative codes and information processing elements, the role of form-content associations in arriving at an understanding of the distinctions between the two, and the role of scripts, attention, and memory in the processing for formal codes.

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