

ABSTRACT

A study was done examining the impact of toy-based television programs and program-related toys on children. One hundred and ten first- and second-grade children participated in an experiment which focused on imaginative play. The results indicated that, in general, the combination of watching a toy-based cartoon, followed by playing with a set of cartoon-related toys, produced stories that were more imitative of the immediately preceding experience, whereas watching the cartoon alone or playing with the cartoon-related toys alone led to more imaginative productions from other sources. However, for certain aspects of imagination at a more advanced cognitive level, the cartoon, especially when combined with cartoon-related toys, actually stimulated the imaginative processes of the younger children, thus serving as a learning tool at a transitional stage of cognitive development.

The Program-Length Commercial: A Study of the Effects of Television/ Toy Tie-Ins on Imaginative Play

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Television has become a major tool for marketing to children. One estimate is that children view more than 20,000 television commercials annually (Adler et al., 1977). However, the use of television to market to children

goes beyond commercials. Television programs themselves have become part of the marketing effort. For example, in host-selling, the same characters that appear in a program are used in adjacent commercials (Kunkel, 1988a).

The focus of the present research is a second, newer method of using the tv program itself to market to children: product-based programs. As part of the deregulation of the broadcast industry in the United States, in 1984 the Federal Communication Commission (FCC) lifted its prohibition against product-based programs, which it cynically termed "program-length commercials" (Kunkel & Watkins, 1987; Kunkel, 1988b). Since this repeal, the television industry, advertisers, and toy manufacturers have joined forces to produce a flood of product-based cartoons aimed at children (Boyer, 1986; Carlsson-Paige & Levin, 1987-1988). In earlier times, television programs (such as *Sesame Street*) were developed before related commercial products; today, the product has increasingly come first.

In both host-selling and product-based programming, the program itself can be as potent (Bryant, 1985) or even more potent (Kunkel, 1984) than an explicit commercial in stimulating young children's desires for a product. Despite the enormous popularity of product-based programs such as *The Transformers* and *Teenage Mutant Ninja Turtles*, and the overwhelming market success of the featured toys, no published research currently exists on the psychological effects of these programs or of the toys themselves.

In addition to the effects of "program-length commercials" in selling toys, the featured toys themselves may have psychological effects that stem from their tie-in with television programs viewed by children. Because the toys featured in television programs are likely to be used by children in make-believe or imaginative play, and because imaginative play is an essential part of the growing process, our study investigates the effects of these programs in this psychological domain.

Imagination can be defined as any form of representational activity that creates entities or events not found in the present or immediately preceding stimulus situation (Greenfield, Farrar, & Beagles-Roos, 1986). In terms of its significance for growth and development, imaginative play in the preschool period is, for example, positively related to creativity, reading, language comprehension, independence, and maturity in the elementary school years (Shmukler, 1983).

Television and Imagination

Given the significance of imaginative play in early childhood, there has been a great deal of concern about how television affects imagination in young viewers. Because television provides audiovisual images, one can hypothesize that television, rather than the child, will create the mental

images that are the essence of imaginative play, thus supplanting the imaginal processes of the child. A number of studies have found television to have a negative effect on the imagination of children and adolescents (Greenfield & Beagles-Roos, 1988; Greenfield et al., 1986; Meline, 1976; Meringoff, Vibbert, Char, Fernie, Banker, & Gardner, 1982; Peterson, Peterson, & Carroll, 1986; Singer & Singer, 1981, 1986; Harrison & Williams, 1986), while other studies have not (Murray, Kwiatek, & Clarke, 1982; Runco & Pezdek, 1984; Singer & Singer, 1976, 1981). Nevertheless, the majority of the research on television and imagination indicates a detrimental effect of the medium.

Possible Effects of Product-Based Programs and Program-Based Toys on the Development of Imagination

Critics of product-based programs such as Action for Children's Television and the American Academy of Pediatrics argue that these shows provide ready-made story lines for children to use in their make-believe play and, therefore, offer little motivation for them to think up their own creative ideas (Meyer, 1988). Studies comparing the effects of different media on imagination have shown that television not only elicits fewer creative responses but also elicits more recall-oriented responses than print or audiotape (Meline, 1976; Kerns, 1981; Greenfield & Beagles-Roos, 1988; Greenfield et al., 1986). Thus, past research indicates that it is the audiovisual medium, not the narrative form, that inhibits creative imagination.

Toys from product-based programs may also have an inhibitory effect on the imaginativeness of children's play because such toys could act as visual cues to the story lines and actions the children have just seen in the associated shows. Program-related toys could even serve as cues to recreate televised events seen in the more remote past. Work done by Hayes and Birnbaum (1980) suggests that preschool children tend to pay more attention to the visual aspects of television and ignore big chunks of the audio, thereby lending some support to this possibility.

In Piaget's (1962) scheme of representational development, delayed imitation is the earliest manifestation of imagination, appearing towards the end of the second year of life. With delayed imitation, the child mentally recreates an entity or action from a preceding situation. More creative forms of imaginal representation are added later to the child's repertoire. With development, there is also a movement toward symbolization that is increasingly independent of the immediate perceptual context (Fein, 1975; Ungerer, Zelazo, Kearsley, & O'Leary, 1981; Werner & Kaplan, 1963).

For all of these reasons, we expected product-based television and program-related toy products to stimulate the earlier, more imitative and context-dependent forms of imagination, relative to the more creative and

independent forms that develop later. This expectation was confirmed by the results of a pilot study. The same study also indicated that the combination of a product-based cartoon followed by cartoon-related toys might inhibit total imaginative output (i.e., imitative and creative imagination combined), in comparison with the same toys following a nonproduct-based cartoon.

Another possible outcome flows from Vygotsky's (1978) view that cultural tools stimulate cognitive development. A tool aids the developing child to carry out an emergent skill, thus preparing the way for later independent performance. Based on this view, televised narrative and thematically related toys may function as cultural tools that help the child to develop imaginative skills that can function independently at a later point in time.

METHOD

Design of the Study

To respond to the issues that have been raised, this study used an experimental pretest/post-test design with three randomly assigned groups. Based on Pulaski (1973), the pretest and post-test required the subjects to tell a story using one of two sets of toys: cartoon-related (*Smurfs*) or neutral (*Trolls*). In between the pretest and the post-test, subjects participated in one of two treatments: watching a cartoon (*Smurfs*) or engaging in a neutral activity (the game of connect-the-dots). Because an earlier study of children's imagination had already used radio in contrast to television (Greenfield et al., 1986; Greenfield & Beagles-Roos, 1988), it was decided to use a traditional children's game as the contrasting treatment in the present study.

The sequence of experiences in the three conditions can be summarized as follows:

Experimental Group—Smurf toys, Smurf cartoon, Smurf toys

Contrast Group 1—Smurf toys, dot game, Smurf toys

Contrast Group 2—Troll toys, Smurf cartoon, Troll toys.

Subjects

The subjects were 55 pairs of first- and second-grade children from an ethnically diverse public elementary school in Los Angeles. All available pairs of children with sufficient language skills were used. Although grade level was not of direct interest for present purposes, it was added as an independent variable because of the importance of cognitive development to the growth of imagination.

The final sample consisted of 30 pairs of girls and 25 pairs of boys, 28 pairs of first graders and 27 pairs of second graders. Cell sizes for each combination of age and condition are shown in Table 2. (Table 2 is discussed more fully later.)

In terms of ethnicity, 12.8% of the children were classified as African-American, 2.8% of the children were classified as Asian-American, 11.9% as Hispanic, and 72.5% as White. A substantial minority of those classified as White were Iranian immigrants.

Materials

The toys were two sets of nonbendable toy figures 5 cm high. The Smurf set contained four identical Smurf figures without any props in hand. The Troll set also contained four identical figures resembling naked unisex children with long white hair. It was thought that the use of identical, unadorned figures in each set would maximize and equalize the opportunity for children to use their imaginations to transcend the stimuli in the case of each set of toys.

The product-related cartoon was a videotaped, 10-minute episode of *Smurfs Adventures* titled "Baby's Enchanted Didey." A VCR and television monitor were used to show the cartoon.

A worksheet for connect-the-dots contained a matrix of 100 dots equally spaced out in a 10 × 10 cm square area. Pencils or pens were provided by the experimenter to play the game.

A video camcorder with an auxilliary microphone was used to record pre- and post-test stories and the dot game.

A seven-item questionnaire was used to interview participants concerning their familiarity with the toys and the activity used in their condition.

Procedure

Pilot testing had determined that children were more relaxed and fluent when tested with another child, and so our unit of testing (and analysis) was the pair rather than the individual child. Pairs were formed randomly, but with the constraints that they know each other and be of the same sex. In almost all cases, the former constraint was effected by pairing children within the same classroom. Because children usually play in same-sex groups, it was thought that they would feel more relaxed in same-sex than in mixed-sex dyads.

Testing began by presenting a set of four toys (either the Trolls or the Smurfs, depending on the condition) to each pair of children and asking them to tell a story using the toys. There was no time limit set for the stories.

After completing the pretest story, participants in the Experimental Group (cartoon plus cartoon-related toys) and Contrast Group 2 (cartoon plus neutral toys) viewed a ten-minute Smurf cartoon, whereas subjects in Contrast Group 1 (neutral activity [game] plus cartoon-related toys) played connect-the-dots, a paper-and-pencil game, for ten minutes. Participants were taught how to play the game if they did not already know. However, they were not corrected if they subsequently broke the rules.

At the conclusion of the cartoon or the dot game, the participants were asked to tell another story using the same toys as in the pretest; this second story constituted the post-test.

At the end of the post-test, each child was interviewed alone to assess familiarity with the toys and activity used in his or her particular condition.

Conceptualization and Operationalization of Imagination

We began with the following conceptual definition of imagination that we had used in previous research (Greenfield & Beagles-Roos, 1988; Greenfield et al., 1987; Greenfield et al., 1986): Imagination is any form of representational activity that creates entities or events not found in the present or immediately preceding stimulus situation.

Although it was desirable to have a pretest, both as a baseline and to assess the impact of the program-related toys in and of themselves, it was not possible to assess the relationship of pretest stories to the immediately preceding stimulus situation, which varied from child to child and was not known to the experimenters. Therefore, we developed a general category of imaginative behavior, *transcendent imagination* (assessable on both pre-test and post-test), with two subcategories, *creative imagination* and *imitative imagination* (assessable on post-test only).

Transcendent imagination was based on Pulaski's (1973) transcendence index: "the number of imaginary items supplied by the child, as opposed to what was already supplied in a given stimulus situation" (p. 85). Therefore, we assessed the extent to which the children's representations transcended the immediate stimulus situation, i.e., the experimental toys. For example, if a child was playing with a Smurf toy and labeled it "Baby Smurf," this was not considered transcendent imagination. If, however, the Smurf was labeled as something else (e.g., "bunny rabbit"), it was coded as an instance of transcendent imagination. This is an instance of what researchers on the early development of symbolic play term "substitution symbols": using one object to substitute for or symbolize another (Ungerer et al., 1981). "Imaginary symbols" constitute verbally represented objects which have *no* object symbol or object referent in the present situation. The participants in our study often created imaginary symbols when they verbally created an entity that was not present, usually an object (e.g., "glasses") or place (e.g., "home"). In addition to "substitution sym-

bols” and “imaginary symbols”, children also received credit for transcendent imagination when they symbolically created actions, feelings, mental states, or character dialogue. On the pretest, all these instances were labeled *transcendent*; on the post-test, they would be divided into *creative* and *imitative* imagination.

In order to receive credit for *creative imagination*, the child had to transcend not only the immediate stimulus situation, as in transcendent imagination, but the immediately *preceding* situation as well. Creative imagination involved transcending the experimental treatment, either the Smurf cartoon or the dot game, depending upon experimental condition; therefore, it could be assessed only on the post-test. Thus, an instance of transcendent imagination was considered *creative* if it transcended not only the toys present in the immediate story-telling situation, but also went beyond events in the preceding cartoon or game. If, in contrast, a representation in the story was found in the earlier cartoon or game, it was considered *imitative imagination*. Thus, creative and imitative imagination, measured on the post-test only, constituted two mutually exclusive and all-inclusive categories of transcendent imagination.

Coding and Dependent Variables

Each pretest and post-test story was segmented into “propositions,” usually the equivalent of a simple sentence or a single nonverbal action. Most propositions combined verbal and nonverbal information. Coding continued with the identification of toy- or story-related material, which was then coded into the following subcategories of transcendent imagination:

A transcendent character was any proper noun, identity, or role that used a toy or toys as a representation of something other than what they are. For example, one pair of participants named two of the Smurfs after themselves. A character could also be an imaginary agent created through a verbal label, not referring to a toy.

A transcendent object or location was any inanimate entity, usually an object or place labelled with a noun. “Jail,” “boat,” “forest,” “mountain,” and “bacon” were some examples used by our subjects.

A transcendent physical activity was any observable action, represented either through words or action. Walking, climbing, playing, drowning, flying, and going were some examples that appeared in the stories.

A *transcendent mental activity* was any unobservable deed performed by the mind (e.g., "think," "knew").

A *transcendent feeling or state* was any expression of emotion or condition of being. It included states of characters such as "bored" and "young," as well as states of inanimate entities such as "new" and "big" (applied to fire). (Most codings in this category were feelings and mental states, rather than physical states.)

Transcendent dialogue was coded when a participant spoke as a toy character, usually indicated through a change in voice.

As a summary measure for imaginative output, any proposition coded for any of the above transcendent elements was categorized as a *transcendent proposition*.

For purposes of data analysis, characters, physical activities, and objects/locations were considered components of *physical events*; these variables were grouped together in multiple analyses of variance. Similarly, mental activities, character dialogue, and feelings/states were considered components of *mental events*, which were also grouped together in separate multiple analyses of variance. On the post-test stories only, transcendent elements (characters, entities, physical activities, mental activities, and feelings/states) were divided into *creative* and *imitative*, depending on whether or not they had appeared in the preceding cartoon or videotaped dots game. Because of the essential creativity of language, it was hard to draw the line between dialogue that imitated the cartoon and creative dialogue. Therefore, transcendent dialogue was not subdivided into creative and imitative subcategories.

All data were coded from written transcripts of the videotaped data. After coding from a transcript, the videotape was viewed to correct any possible errors. Creativity coding, done only on the post-test, also took into account the preceding treatment condition; therefore, coders could not be blind to subjects' treatment condition.

In the case of the cartoon treatment, a transcript of the sequence of events and a list of featured entities in the Smurf cartoon were prepared in order to help assess whether transcendent elements in post-test stories were creative or imitative in relation to the preceding cartoon. For the dot-game treatment, the videotape of the dots game of each pair was viewed to determine whether transcendent elements produced in post-test stories were creative or imitative in relation to what had transpired during the preceding game.

Detailed coding was based on the first 15 minutes of each story; almost

all (94%) of the stories were 15 minutes or less. However, because the first pilot study had indicated that story length might be affected by the experimental conditions, the number of nonrepetitive propositions in the entire story was counted for all stories in their entirety; this variable was labeled *length*.

Reliability

Pilot data were used to develop coding categories, train coders, and assess intercoder reliability. For purposes of assessing reliability, the first of the four coders was considered the standard against which the other three were compared. The coders agreed upon segmenting propositions an average of 90.8% of the time. Given agreed upon segmentation, content reliability was checked for all categories of transcendent, creative, and imitative imagination. Reliability for these categories averaged 94.7% agreement between coders. The various categories ranged from 83.9% agreement for dialogue to 100% agreement for imitative mental activity, imitative physical activity, and imitative entities.

Measures of Stimulus Familiarity

Data from the structured interviews were transformed into an eight-point scale of toy familiarity and a four-point scale of cartoon or game familiarity. The individual scores of pair members were averaged to yield familiarity scores for each pair as a whole.

HYPOTHESES

- H1:** The imaginative stories of children who are shown an episode of a product-based cartoon and then given toys depicted in the cartoon will be less creative and more imitative than that of children who are shown the episode but given toys thematically unrelated to the program. (post-test prediction)
- H2:** The imaginative stories of children who are shown an episode of a product-based cartoon and then given toys depicted in the cartoon will be less creative and more imitative than that of children who use the same toys, but do not see a television program. (post-test prediction)
- H3:** Because of their past association with television shows, program-related toys alone (i.e., on the pretest) will stimulate a lesser quantity or quality of transcendent imagination. (pretest prediction)

Although not hypothesized in advance, the data analysis explored the following idea, based on Vygotsky's (1978) notion of the role of cultural tools in cognitive development:

Product-based television and related toys could stimulate the creative imagination of younger children, helping them to move beyond delayed imitation, while inhibiting or supplanting the imagination of older children, already able to independently exercise their creative imagination

RESULTS

Pretest Imagination: Effect of Cartoon-Related Toys

In order to assess the effects of program-related toys per se on transcendent imagination, multivariate and univariate analyses of variance were carried out on pretest measures of transcendent imagination, using condition and grade as the independent variables. Contrary to H3, there were no significant main effects or interactions involving condition with respect to either individual imaginative components, overall quantity of transcendent imagination, or story length. In other words, scores on transcendent imagination were not substantially different whether a child told a story about Smurfs (cartoon-related toys) or about Trolls (neutral toys) on the pretest.

While contrary to H3, the lack of significant differences between conditions on the pretest does establish that any group differences found on the post-test are a function of the differing experimental conditions and do not stem from sampling errors in group composition or systematic error as a function of the toy.

Pretest Imagination: Effect of Grade

While showing no effect of condition, the pretest analyses did reveal an age effect, however. A multivariate analysis of variance showed that there were significantly more *transcendent physical events* (transcendent characters, transcendent physical activities, and transcendent objects/ places) created by second graders than by first graders ($p = .021$, Hotelling's multivariate test of significance). Although the multivariate tests were not significant for the effect of age on *transcendent mental events* (composed of transcendent mental activities, transcendent dialogue, and transcendent feelings/states), univariate tests of significance revealed that second graders created more mental activities ($F(1, 49) = 4.66, p = .036$) and feelings than did first graders ($F(1, 49) = 4.50, p = .039$). These developmental differences seemed to be mainly a function of the fact that

the second graders produced stories that were, on the average, more than twice as long as those of first graders (means of 60 vs. 25 propositions). An analysis of variance indicated that the probability of this difference occurring by chance was .044 ($F(1, 49) = 4.28$).

Post-test Imagination

The multiple analysis of variance for *creative physical events* (percentage creative characters, percentage creative physical activities, and percentage creative objects/locations) showed a significant effect for condition (Hotellings multivariate test, $p = .027$), as well as a significant condition by grade effect (Hotellings multivariate test, $p = .008$). (Percentage scores are based on the number of creative elements in a particular category divided by the total number of elements in that category.) The main effect is illustrated in Figure 1.

The graphs reveal a consistent pattern: the combination of product-based cartoon and cartoon-related toys results in the lowest proportions of creative imagination; the combination of cartoon plus neutral toys yields

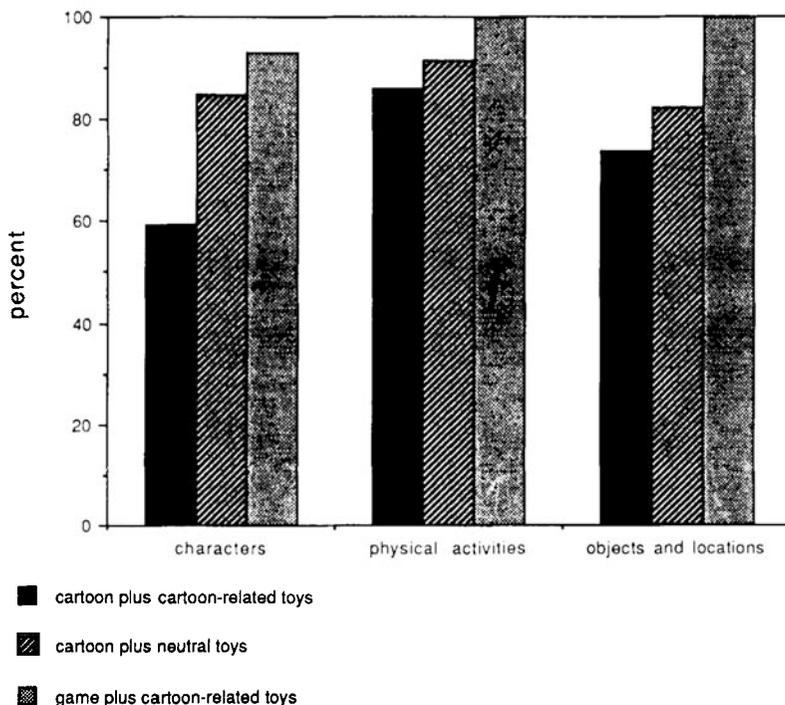


FIGURE 1
Percentage creative elements in imagined physical events under different conditions.

intermediate proportions of creative imagination; and the combination of game plus cartoon-related toys yields the highest proportions of creative imagination.

The univariate effects are significant for percentage of creatively imagined characters ($F(2, 42) = 6.11, p = .005$) and percentage of creatively imagined objects and locations ($F(2, 42) = 3.86, p = .029$); the univariate effect approaches significance for percentage of creatively imagined physical activities ($F(2, 42), p = .084$). When toy familiarity is statistically equated across conditions through analysis of covariance, the univariate effect for percentage creative physical activity also becomes statistically significant ($F(2, 41) = 3.48, p = .040$). Post hoc *t*-tests found the percentage of creative characters in the Experimental Group (product-based cartoon plus cartoon-related toys) was significantly less than that in both the Contrast Groups ($t(32) = 2.10, p = .022; t(27) = 2.47, p = .010$, one-tailed tests). In addition, children produced a lower percentage of creative objects and locations when toys were combined with a thematically related program, than when the same toys were used in the absence of a tv program ($t(32) = 1.92, p = .032$, one-tailed test). *This pattern of results confirms H1 and H2.*

The univariate analyses showed that the condition-by-age interaction is concentrated in the creative character variable ($F = 6.59, p = .003$); the negative effect of product-based cartoon and program-related toys on the creation of imagined characters is extremely strong for first-grade children, but does not exist in the second grade (Table 1).

TABLE 1
Percentages of Creative Elements in Imagined Physical Events under Different Stimulus Conditions

	First Grade			Second Grade		
	Mean	SD	N ^a	Mean	SD	N ^a
Percentage creative characters						
Cartoon plus cartoon-related toys	30.00	42.82	7	85.36	23.68	8
Cartoon plus neutral toys	90.28	19.54	9	80.17	32.32	10
Game plus cartoon-related toys	100.00	0.00	6	87.50	35.36	8
Percentage creative physical activities						
Cartoon plus cartoon-related toys	81.07	17.75	7	90.10	18.76	8
Cartoon plus neutral toys	97.89	3.65	9	85.98	28.71	10
Game plus cartoon-related toys	100.00	0.00	6	100.00	0.00	8
Percentage creative objects and locations						
Cartoon plus cartoon-related toys	78.57	19.25	7	69.75	35.15	8
Cartoon plus neutral toys	79.00	33.30	9	85.18	28.84	10
Game plus cartoon-related toys	100.00	0.00	6	100.00	0.00	8

^a Six pairs of first graders and one pair of second graders were lost to the analysis when they failed to produce even one element in a category, thus creating a zero denominator for the calculation of a percentage.

T-tests for differences between means indicated that, for first-grade children, the combination of product-based cartoon and cartoon-based toy (Smurf toys, Smurf cartoon, Smurf toys) yielded a significantly lower percentage of creative characters than game plus cartoon-based toy (Smurf toys, dot game, Smurf toys) ($t = 3.98, p = .0025$, one-tailed test) or than cartoon plus neutral toys (Troll toys, Smurf cartoon, Troll toys) ($t = 3.77, p = .0045$, one-tailed test).

To place these effects in context, it is important to note that condition had no effect on story output (length). The effects were specific to qualitative measures of imagination, particularly creative (vs. imitative) imagination. While increased age brought increased imaginative production, the proportion of creative and noncreative output did not generally change between first and second grade.

For *mental events* (mental activities, character dialogue, and feelings/states), the multivariate analysis could not use percentage of creative elements because imagined mental activities and feelings were almost always creative, imagined mental activities were infrequent, and a coding distinction between creative and imitative dialogue could not be made.

Instead of *percentage* creativity scores, therefore, our multivariate analysis of variance used post-test *frequencies* of transcendent mental activities, feelings, and dialogue as the dependent variables for creative mental events. Hotelling's multivariate tests revealed a significant condition-by-grade interaction ($p = .033$), in the context of a significant main effect for grade ($p = .034$) (Table 2).

While the creation of mental events increases between first and second grade, the effect of condition changes. For the first graders, the cartoon

TABLE 2
Frequency of Elements in Transcendent Mental Events under Different Stimulus Conditions

	First Grade			Second Grade		
	Mean	<i>SD</i>	<i>N</i>	Mean	<i>SD</i>	<i>N</i>
Mental activities						
Cartoon plus cartoon-related toys	0.78	1.39	9	2.22	1.99	9
Cartoon plus neutral toys	0.67	1.12	9	1.40	1.78	10
Game plus cartoon-related toys	0.30	0.68	10	2.38	2.72	8
Feelings or states						
Cartoon plus cartoon-related toys	4.44	9.13	9	5.11	7.46	9
Cartoon plus neutral toys	4.67	3.54	9	8.80	7.33	10
Game plus cartoon-related toys	1.80	1.81	10	15.63	18.54	8
Dialogue						
Cartoon plus cartoon-related toys	16.67	30.94	9	10.11	19.61	9
Cartoon plus neutral toys	9.00	17.13	9	35.00	35.67	10
Game plus cartoon-related toys	8.50	17.58	10	22.50	28.50	8

(with both thematic and neutral toys) is a positive stimulus for the creation of mental events; for second graders, in contrast, it tends to have an inhibiting effect. This pattern is strongest for feelings/states (Table 2). Although none of the univariate effects was significant, Table 2 indicates that the interaction works slightly differently for character dialogue: the combination of thematically related toys plus cartoon leads to the highest production of character dialogue for first graders, whereas this same combination leads to the lowest production of character dialogue for second graders. These results tend to confirm H1 and H2 for second graders only (although the pattern is most visible for dialogue and feelings/states, as Table 2 shows). The results also support the idea that television, particularly when combined with thematically related toys, functions as a cultural tool that aids the imaginative development of younger children.

Effects of Stimulus Familiarity

Whereas Smurf toys were not significantly more familiar than Troll toys, the Smurfs cartoon was significantly more familiar than the game of connect-the-dots ($F(2, 47) = 14.89, p = .000$). However, there were almost no significant correlations of treatment (program or game) familiarity with any measure of creative imagination, either within individual conditions or across the whole sample. The only exception was a significant negative correlation of $-.29$ (one-tailed probability of $.022$) for the total sample between familiarity of treatment and percentage of creative characters. In order to see whether familiarity could account for the effect of condition on creative characters, a univariate analysis of covariance was carried out, this time using cartoon or game familiarity as a covariate. The interaction of condition and grade remained highly significant ($F(2, 41) = 6.66, p = .003$) while the main effect of condition entered the borderline area ($F = 3.11, p = .055$).

Although there were no significant differences in familiarity between Smurfs and Trolls, there was a significant positive correlation of $.48$ ($p = .037$, two-tailed test) between the familiarity of the Trolls (in the Troll condition) and number of transcendent mental activities on the post-test. Therefore, the mental events multiple analysis of variance was run again with toy familiarity as a covariate; the Hotellings multivariate test remained significant ($p = .045$).

From these results, we can conclude that, overall, the experimental effects on creativity are not an artifact of differential familiarity of the stimuli in the different conditions.

DISCUSSION

As predicted (H1 and H2), the combination of product-based television and thematically related toys is clearly most inhibiting to creative

imagination, and, conversely, most stimulating to imitative imagination. No predictions were made concerning the relative effects of television alone (cartoon plus neutral toy) vs. program-based toys alone (game plus cartoon-related toys) on imagination. However, Figure 1 indicates that television alone is consistently more inhibiting to the imagination than are toys alone, although the differences are not statistically significant.

Conversely, a neutral activity with a tv-related toy consistently stimulates more creative responses than television plus a neutral toy. The following excerpt from a pair of children who played connect-the-dots and then told a story about the Smurfs may explain why. Their story does not reflect the preceding game, but instead reflects marked experiences (Bruner & Lucariello, 1989) in the life of Los Angeles children:

Sometimes everybody visits in different houses. Sometimes they have a party at the house. Sometimes they, they go out and they buy some new clothes. Sometimes they go out and buy, um, bicycles to ride the, to ride, uh, to go faster to get a guy that stole their things. Sometimes they go fishing and they go bike riding at the ocean.

The contrast between this example and the more imitative stories told following the Smurfs cartoon suggests that images of characters and actions from a tv program partially supplant creative imaginal elements generated by the child's own experience. Although the cartoon in our study was prosocial in thematic content, the implication of the results is that antisocial tv models, such as violent behavior, will also be incorporated in children's imaginative play.

Thus, our results complement previous studies showing that television elicits more recall-oriented and fewer creative responses than other media (Greenfield & Beagles-Roos, 1988; Greenfield et al., 1987; Greenfield et al., 1986; Kerns, 1981; Meline, 1976). While imitation is valued over creativity in some subsistence cultures (e.g., Greenfield, Brazelton, & Childs, 1989), television differs in providing models created by institutions that are more remote than the child's family and face-to-face social group.

The difference made by one year of age was unexpected. However, when one considers the nature of cognitive development in this age range, the developmental differences become understandable. According to Piagetian theory, as children become concrete operational (a development that consolidates around second grade), there is a general increase in the ability to conceptualize transformational connections between successive states. This development could yield longer narratives with more complex connections being produced by the second graders. At the same time, increasing metacognitive awareness (i.e., the ability to symbolically rep-

resent mental states) could manifest itself in the observed age-related increase in the symbolic creation of mental events.

One difficulty with the study lies in the definition of creative and imitative imagination. Only elements repeated from the immediately preceding stimuli could be coded as imitative, the experimenters having no way of measuring what each individual child's experiences consisted of preceding the experiment. So, although the subjects were coded as having highly creative responses across all conditions (see Figure 1, for example), the true originality of their responses was probably lower. In addition to personal experience, some children's stories coded as creative came from other media sources. For example, one pair of participants used the Smurfs to reenact *Charlie and the Chocolate Factory*, while another built their story around *Teenage Mutant Ninja Turtles*. These informal observations indicate that it is probably more accurate to say that television and program-related toys change the *source* of imagination, rather than its creativity or quantity.

At the same time, these examples show the children's willingness to transcend the Smurf-like properties of the toys to create characters from other films—thus illustrating that television or film has far greater power than toys to influence the content of children's imagination. Indeed, when they are separated in time from a thematically related television show (pretest measures), program-based toys do not seem to have any discernible effect on imagination; H3 thus failed to be confirmed. However, when program-based toys are temporally linked to the show, they do seem to act as a damper on creative imagination (post-test measures). Thus, the difference between Smurfs and Trolls did not affect transcendent mental events on the pretest; but the combination of toy-based program and thematically related toy was, for the older children, a detriment to the creation of transcendent mental events on the post-test.

While the absence of condition effects on the pretest may argue against long-term effects of tv-based toys, the fact that children in the United States watch about three hours of television a day means that the influence may well take place as an extended series of ongoing short-term effects.

In line with Salomon's (1979) conceptualization of the supplanting effects of media, we found that television (especially combined with thematically related toys) stimulated the transcendent imagination of mental events for the younger child not yet able to do it on his or her own, while it dampened the transcendent imagination of mental events for the older child with more advanced cognitive skills. Therefore, we would predict that television would stimulate the creative imagination of physical events for an even younger child, not yet able to imaginatively create physical events on his or her own. The findings and predictions are very consonant

with the Vygotskian emphasis on the role of cultural tools in cognitive development (Vygotsky, 1978). Our results suggest that television, as well as tv-based toys, are potent cultural tools for developing the symbolic representation of mental events.

Implications for Using Toy-Based Programs and Program-Related Toys to Market to Children

In terms of imagination, product-based television is not, in and of itself, any different from other forms of television. Nor are program-related toys any different in their impact on imagination than other comparable toys. However, the fact that the *combination* of program-related toys and toy-based programs ultimately has a negative impact on creative imagination could be an argument for the elimination of both the product-based programs and the program-based toys. What would be useful are alternative sources for funding children's television that do not rely on selling toys to a young audience. This development would move children's television in the United States toward the elimination of both product-based television programs and program-based toys.

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