THE EFFECT OF TELEVISION AND RADIO ON CHILDREN'S CREATIVITY

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The literature on creativity posits that creative abilities are stable and relatively impervious to short-term interventions. Several studies have, however, reported differential effects of media on children's imaginative play and thinking. The results of these studies are difficult to interpret owing to their reliance on non-standardized measures of creativity. The present study examines the relative effects of television versus radio on children's creativity. Third and sixth graders were presented a story on television or radio and were then given an adapted version of the "Just Suppose" test of divergent thinking developed by Torrance (1974). Responses were scored in terms of ideational fluency, flexibility, and originality. The results indicated that the two media did not have a differential effect on children's creativity.

A large number of researchers in the last 25 years have focused on the effects of television on children (see Murray, 1980, for a review of this literature). This is a particularly compelling issue given reports that children in this country watch an average of 27.6 hours of television a week (Lyle & Hoffman, 1972).

One approach to the study of television is to compare the effects of television with the effects of other media. As the amount of television viewing has increased in the past three decades, people on the average spend less time with verbal media such as reading and listening to the radio. The question addressed in the present study is that of the relative effects of television versus radio on children's cognitive processing. In

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particular, this study compares television and radio as stimuli for creative ideas in children.

Schramm, Lyle, and Parker (1961) in the United States, and Murray and Kippax (1978) in Australia, reported that children in communities without access to television listened to the radio two to three times more than children with access to television. In terms of time spent reading, Furu (1971) in Japan; Himmelweit, Oppenheim, and Vince (1958) in England; and Werner (1975) in Norway, all reported a drop in the number of books read by children when television was introduced into communities. This relatively stable shift in allocation of time from strictly verbal media to television may have significant cognitive consequences for the viewer. The present study examines one potential cognitive consequence, that is, the differential effect of television and radio on children's creativity.

The interest in media as a stimulus for creativity in the present study follows from conflicting reports in the literature. On the one hand, the literature on creativity would predict that short term interventions would have little or no effect on creativity. Here, creativity is defined as "the forming of associative elements into new combinations that either meet some specified requirements or are in some way useful" (Mednick, 1962, p. 221). Operationally, creativity can be defined as the production of divergent ideas (Guilford, 1968; Torrance, 1974; Wallach & Kogan, 1965). Creative individuals generate a high quality and quantity of ideas. For example, given an open-ended question, creative individuals will produce more ideas ("ideational fluency"), and more ideas that are statistically infrequent ("ideational originality"). Importantly, creativity defined in this manner has been demonstrated to be reliable and valid with kindergarten children (Ward, 1968), seven-year-old children (Rotter, Langland, & Berger, 1971), and college students (Wallach & Wing, 1969). Divergent thinking is independent of other forms of measured intelligence, and generally correlates with other tests of creativity (Barron & Harrington, 1981). But, more relevant to the present study, creativity is considered to be a stable trait (e.g., Barron, 1955; Guilford, 1968). Therefore, reliable and valid measures of creativity should not be differentially affected by short term exposure to television versus radio.

media materials. We also appreciate critical comments on this manuscript by Robert Albert and Edward Teyber. Correspondence should be sent to Kathy Pezdek, Psychology Department, Claremont Graduate School, Claremont, CA 91711.
On the other hand, it has been suggested elsewhere that whereas listening to the radio actively stimulates creativity (Carnegie Commission, 1979; Morisset, 1976; Palmer, 1926), television does not influence "imaginativeness" (Singer, 1978; Singer & Singer, 1976a, 1976b; Tower, Singer, Singer, & Biggs, 1979). Imaginativeness was operationally defined as "the extent to which a child transcended the constraints of reality in his or her play—for example, by using an object to represent another one, by adding vocalizations suggesting he or she was symbolizing a role or object, or introducing a story line" (Tower et al., 1979, p. 271).

Murray, Kwiatek, and Clarke (1982) examined the relationship between the average amount of television viewing in five- to eleven-year-old children and several measures of "fantasy and imagination." Imagination, measured in terms of (a) responses to the Barron Inkblot Test and (b) responses to questions about involvement in fantasy, did not significantly relate to the amount of television viewing. However, in a second series of tasks, children were asked to make up stories. On this task, increased television viewing was related to the production of stories that were longer and included a greater diversity of characters. Conclusions from this study regarding the relationship between the amount of television viewing and "fantasy and imagination" are thus clearly restricted by our understanding of what these various indices measure.

Greenfield, Beagles-Roos, Farrar, and Gat (1981) had six- to eleven-year-old children complete a prematurely ended story that was presented on television or radio. The children were asked to "tell a story about what you think will happen next!" (p. 7). Responses were scored for imaginative elements, defined as "elements such as character, event or setting which had not appeared in the stimulus story" (p. 7). The results were that the radio presentation stimulated more novel ideas in the conclusions given by the children than did the television. The television story, in contrast, was associated with conclusions based more directly on elements of the presented story.

Meline (1976) compared the influence of audio-visual information with solely verbal information (audio-tape or text) on children's problem-solving. Sixth- and seventh-grade children were asked to invent solutions to specific problems, and sample solutions for each problem were presented through audio-visual or solely verbal media. Each child was allowed one solution for each problem and six judges rated the solutions as either creative or not. The audio-visual sample
solutions resulted in fewer creative solutions than did the solely verbal sample solutions.

The studies discussed above report interesting results concerning the effects of media on certain cognitive processes. The issue to be addressed in the present study, however, is that it is unclear exactly what cognitive processes were measured. Singer and Singer (1976a, 1976b) used a behavioral measure, and their focus was ostensibly on "the ability to use images" (cf. Singer, 1978, p. 153). Murray et al. (1982) measured "fantasy predisposition" and components of stories generated by children. Their results were not consistent on these two measures. Greenfield et al. (1981) scored "novel" ideas; although the cognitive process was never referred to as "creativity," the definition of scored responses was similar to Mednick's (1982) definition of "creativity." In Meline's (1976) study, creative problem-solving was defined as a process requiring, "on a first level, a departure from or freedom from and on a higher level, the transformation of given stimulus information" (p. 84).

These findings are inconsistent with the literature on creativity cited above, that considers creative abilities to be generally stable, and not malleable. As such, creative abilities would not be expected to be differentially influenced by different stimulus media. In the one study that did utilize a standardized test of creativity to evaluate media effects, Stern (1973) reported no significant effects of television viewing on thinking. However, this study employed gifted children (fourth-, fifth-, and sixth-graders) and compared effects of exposure to cartoons versus situation comedies using only one form of media, television. The purpose of the present study is to clarify the effects of television versus radio on children's creativity, by using a standardized test of creativity, known to be valid and reliable. Although the previous studies in this area are provocative, they are limited by the use of nonstandardized measures. This restriction is important because it is unclear what cognitive processes have been measured. The interpretation and generality of these findings are consequently limited.

The present study was designed to replicate the work of Greenfield et al. (1981) using standardized measures of creative potential. Children were presented a story either on television or radio. Immediately after the story, three separate standardized measures of divergent thinking were administered. Ideational fluency, flexibility, and originality in the responses of the two groups were compared. This study experimentally
compares the effects of television versus radio on children's creativity, using a standardized test of creativity.

METHOD

SUBJECTS

The subjects, 32 third-graders and 32 sixth-graders, were recruited from ethnically mixed, lower-middle-class public schools in Montclair, California. Half of the children in each age group were males and half were females. The children were brought to the university campus by a parent to participate. The parents completed a questionnaire on the television viewing habits of their child. Children in this sample watched an average of 23 hours of television per week. This average is consistent with national norms for children reported by Lyle and Hoffman (1972).

MATERIALS AND DESIGN

Two different stories were used in the study to increase the generalizability of the results. The two stories used were A Story, A Story, an African folktale, and Strega Nona, the story of a magical old woman. Color animated videotapes of these two stories were obtained from Weston Woods Studios. New soundtracks were made for each story based on the original storybook text, using the same female narrator and style of narration for each. The same soundtrack was thus used in the television and radio conditions. Strega Nona was 7 min. 44 sec. long. A Story, A Story was 8 min. 29 sec. long. These were the same materials utilized by Greenfield et al. (1981).

The experiment utilized a 2 (grade) × 2 (media condition) × 2 (story) independent groups design. Half of the subjects in each grade were presented a story in the television form and the other half were presented only the audio version of a story in the “radio” condition. Subjects were randomly assigned to conditions to control for socioeconomic status, reading, television viewing and radio listening differences.

PROCEDURE

Each child participated individually in a comfortably furnished room on the campus. The children were instructed that they would be
presented a story either on television (19-in. Sony Trinitron) or on a tape recorder, "like listening to the radio." After the story, an adaptation of the "Just Suppose" test of Torrance (1974) was administered requiring subjects to generate ideas in response to a hypothetical situation that followed from the presented story. The instructions for the test were:

Now you will be given a new situation, one that did not happen in the story. You are to suppose that it did happen and use your imagination to think of all of the exciting things that would happen if this situation had occurred. So pretend that the situation that I am going to tell you happened, and think of all the things that would have happened because of it. Make as many guesses as you can.

The children who were presented *Strega Nona* were then told:

*Just suppose Strega Nona did not come back when she did. What would have happened? What would Big Anthony have done? What would the townspeople have done? Remember, make as many guesses as you can.*

The children who were presented *A Story, A Story* were then told:

*Just suppose the Fairy was too smart for Ananse and would not touch the gum baby. What would have happened? What would Ananse have done? What would the Sky God have done? Remember, make as many guesses as you can.*

Each child was given five minutes to generate ideas. Responses were tape recorded and then transcribed for scoring. Each child was prompted once if he or she did not respond. The experimenter asked, "Can you think of anything at all?"

Two trained coders independently evaluated responses of each child. The scoring scheme developed by Torrance (1974) was used. Specifically, three scores were calculated for each child's responses. Fluency reflects the number of ideas given by the child. Flexibility reflects the number of distinct and different conceptual categories of ideas used by the child. Originality reflects the number of unique (i.e., statistically infrequent relative to the complete sample) ideas generated by the child. If a child responded, "Ananse would call the cops, and Ananse would go for help," they would be given two fluency points, one flexibility point, and the originality score would depend on the responses given by the other children. Inter-rater reliability, calculated with Pearson Product-Moment correlations, was .90 for fluency, .82 for flexibility, and .86 for originality.
TABLE 1
Mean Fluency, Flexibility, and Originality Scores as a Function of Grade and Media Condition

<table>
<thead>
<tr>
<th></th>
<th>Television</th>
<th>Radio</th>
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<tbody>
<tr>
<td><strong>Third Graders</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluency</td>
<td>3.38 (.17)*</td>
<td>3.44 (.44)</td>
</tr>
<tr>
<td>Flexibility</td>
<td>2.06 (.46)</td>
<td>1.94 (.21)</td>
</tr>
<tr>
<td>Originality</td>
<td>1.06 (.38)</td>
<td>0.50 (.24)</td>
</tr>
<tr>
<td><strong>Sixth Graders</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluency</td>
<td>4.25 (.74)</td>
<td>4.44 (.53)</td>
</tr>
<tr>
<td>Flexibility</td>
<td>3.19 (.60)</td>
<td>2.94 (.42)</td>
</tr>
<tr>
<td>Originality</td>
<td>0.31 (.15)</td>
<td>0.75 (.25)</td>
</tr>
</tbody>
</table>

*Standard error in parentheses.

RESULTS

A multivariate analysis of variance was performed on the mean fluency, flexibility, and originality data. Media condition, grade, and story were included in this analysis as between-subject factors. The range of scores for fluency was 1-12, flexibility 1-10, and originality 0-5. The means and standard errors of the three creativity indices are presented in Table 1.

The results of this analysis indicated that grade was the only factor that significantly influenced the creativity indices. This effect was evident in the multivariate test ($R^2 = .37, F_{13, 54} = 2.91, p < .05$) and in the univariate test for flexibility ($\eta^2 = .28, F_{1, 56} = 4.79, p < .05$). The effect size was nonsignificant for multivariate tests of story ($F_{13, 54} = .69$) and media ($F_{1, 54} = .40$), as were the univariate tests and the two- and three-way interactions.

An additional analysis was conducted to test whether performance on the divergent thinking test was significantly influenced by subjects' verbal ability. Verbal ability scores were obtained for each child from the school district psychologist. These scores were a standardized
composite of the verbal subscales taken from the Cooperative Primary Test for the third graders and from the Comprehensive Test of Basic Skills for the sixth graders. Three hierarchical multiple regression analyses were conducted using fluency, flexibility, and originality as criteria. Predictor variables added to the function, in order of inclusion, were the reading comprehension score, the square of this score, and the cube of this raw score. There were no significant first-order correlations (all $r_s < .20$), nor quadratic (all $r^2$ added < .01) or cubic trends (all $r^3$ added < .003). Thus, the three creativity indices do not appear to be confounded by verbal ability.

Finally, in order to compare results on the three indices of creativity used in the present study with results reported by Torrance (1974), the interrelationships between the three creativity indices were evaluated with Pearson Product-Moment correlations. Fluency was significantly related to flexibility ($r = .85, p < .001$) and originality ($r = .44, p < .001$). Flexibility and originality were also significantly related ($r = .37, p < .01$). These intercorrelations are similar to those reported by Torrance (1974) suggesting that these indices of creativity performed as they were designed to and in a manner consistent with previous research.

**DISCUSSION**

This study assessed the effects of television and radio on creativity as measured by a standardized test of divergent thinking. There were no differences between the two forms of media in terms of consequent ideational fluency, flexibility, or originality. Further, the three measures used performed as they were designed to. That is, the three indices of divergent thinking were significantly intercorrelated, but not entirely oblique, and they were all unrelated to verbal ability.

These findings, both the nonsignificant media effects and the significant grade effect, are consistent with literature on creativity that holds that creative abilities are enduring traits (e.g., Barron, 1955; Guilford, 1968). These findings do not support the positions taken by the Carnegie Commission (1979) and Morisset (1976), that radio actively stimulates creativity. However, these positions were not data based. The results also contradict the finding of Greenfield et al. (1981). One explanation for this difference is that the experimental measures used in the two studies were different. In the Greenfield et al. study, children were asked to finish a prematurely ended story. This can be considered more of a convergent than divergent thinking task because it
requires children to integrate presented information and infer how a story should logically end. The task is not, therefore, entirely open-ended, and not comparable to the divergent thinking task used in the present study. Because convergent thinking is not consistent with the definition of creativity, this could account for the difference in the results of Greenfield et al. (1981) and the present study.

Similarly, there were important procedural differences between the study of Meline (1976) and the present study. Simply put, Meline’s task was also probably tapping a cognitive process that is unrelated to ideational fluency, originality, and flexibility. Meline asked subjects to give only one solution to each program, and subjects were explicitly instructed to give “the best . . . most original idea” (p. 84). Both of these procedures have been known to significantly influence ideation. The ideation of a subject when given instructions to be original is qualitatively and quantitatively different from the ideation of the same subject given less restrictive instructions (Harrington, 1975). With unrestricted instructions, ideation is more spontaneous, playful, and probably requires less effort than with restricted instructions (Wallach & Kogan, 1965). Along these same lines, the scoring procedures used by Meline (1976) focused on “departures” from, or “transformations” of given information. This is thus a measure of ideational distance, that is, remoteness. Although this is vaguely similar to Guilford and Guilford’s (1980) “remoteness” index, distance is not a well-defined index of divergent thinking; and it is not related to ideational fluency, originality, or flexibility. These three divergent thinking indices are estimates of the number and unusualness of ideas in ideational categories regardless of their absolute distance from the given information. These three indices indicate that an original idea could be “close” to the given stimulus information. In fact, truly creative ideas are often viewed as both original and “close,” that is, relevant to the task at hand (e.g., Bruner, 1962).

The crux of the issue is in the definition of “creativity.” The present project does not presuppose that creativity is synonymous with divergent thinking. Divergent thinking tasks were used simply because they are the most commonly used estimate of creative potential and because they are psychometrically understood. In short, divergent thinking indices were employed because they are highly interpretable.

Overall, then, in making generalizations based on these data, one must be specific about the type of problem being presented by the media. Given the work of Greenfield et al. (1981) and Meline (1976), it may be
that different forms of media differentially influence responses on convergent thinking tasks or tasks that require strategic ideation. However, the results of the present study suggest that ideational fluency, originality, and flexibility are not influenced differentially by the form of media with an open-ended divergent thinking task. Moreover, these indices of divergent thinking are distinct from other forms of measured intelligence, and predictive of real-world creative performance (Barron & Harrington, 1981; Wallach & Wing, 1969).

An alternative explanation of the results of the present study is that the experimental treatments, that is, the radio and television presentations, were not sufficiently robust to produce differences on any measure of cognitive processing. However, five additional dependent variables were included for other purposes (Pezdek & Lehrer, 1983). The five dependent variables assessed memory and comprehension in the radio and television conditions. Four of these five cognitive measures resulted in significant differences between the two media conditions. Therefore, the absence of media differences with the three creativity measures in the present study does not appear to be due to generally insufficient treatment effects.

Given that it is uncommon to present research that supports the null hypothesis, it is important to note that the conclusion that divergent thinking is not influenced differentially by television versus radio is not based entirely on this one investigation. Rather, this study is one application of the "trait" theory of creativity. For this reason, presenting support for the null hypothesis is justifiable in this study and follows from specific suggestions by Binder (1963).

The present study and the studies by Greenfield et al. (1981) and Melane (1976) do not test the possibility that creativity may be influenced significantly by more long-term media exposure. Indeed, this direction is interesting for future research. However, at present it can be concluded that creativity, measured by standardized tests of ideational fluency, flexibility, and originality, is not affected differentially by short-term exposure to television versus radio.

**NOTE**

1. The results with the additional cognitive measures were based on the same 64 subjects included in the present study plus an additional 16 subjects in each condition. The statistical results for the main effect of media on each of these measures were the following: accuracy of responses to comprehension questions, $F(1, 92) = 13.33$; sentence recognition...
accuracy, $F(1, 92) = 20.24$; sentence rearrangement accuracy, $F(1, 92) = 1.75$; picture recognition accuracy, $F(1, 92) = 63.48$; sentence rearrangement accuracy, $F(1, 92) = 50.25$.

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