

Influence of TV on Daydreaming and Creative Imagination: A Review of Research

Patti M. Valkenburg and Tom H. A. van der Voort

The research literature is reviewed on the influence of TV on daydreaming and creative imagination. The hypotheses proposed to explain why TV might influence children's and adults' daydreaming and creative imagination positively (stimulation hypothesis) or negatively (reduction hypothesis) are discussed. The hypotheses that propose that existing daydreaming patterns result in changes in viewing behavior are also discussed. The weight of the available evidence favors the hypotheses that TV viewing stimulates daydreaming and reduces creative imagination, although decisive evidence of a causal relationship is lacking. The assumptions that underlie the hypotheses about TV's relationship to daydreaming and creative imagination are analyzed and whether these assumptions have been supported by research is established.

It is frequently claimed in both popular writings (e.g., Mander, 1978; Winn, 1985) and the scientific literature (e.g., Greenfield, 1984; J. L. Singer, Singer, & Rapaczynski, 1984a) that TV viewing hinders the development of imagination. However, what exactly is meant by the word *imagination* in this respect often remains unclear. Most authors leave the concept undefined, and the definitions that have been given are not uniform. Moreover, a number of closely related terms that are in use (e.g., fantasy, daydreaming, imaginal skills, imaginative-ness, creative imagination, and creativity) are sometimes used as synonyms for imagination and sometimes to refer to something else.

Unraveling the jumble of terms and definitions would mean a journey through a semantic jungle, in which one might easily lose the way. However, when one ignores the terms and definitions used in studies of TV's influence on imagination and focuses instead on the way in which imagination and related concepts have been operationalized, it becomes clear that the research refers to three related, but clearly distinguishable, imaginal processes. On the basis of the operationalizations of imagination used in existing research, the studies on the influence of TV on imagination can be subdivided into three categories.

The first type is research on the influence of TV on *imaginative play*, defined as play in which children transcend the constraints of reality by acting "as if." This type of research has been carried out with preschoolers. Whether watching TV affects the content, frequency, and quality of imaginative play, as assessed through observations of play sessions, has been investigated.

The second type involves research on the influence of TV on the content and frequency of *daydreaming*. Daydreaming is a

state of consciousness characterized by a shift of attention. Instead of focusing on external stimulation or on a physical or mental task, the daydreamer's attention turns to thoughts and images that are based in memory (J. L. Singer, 1975a, 1975b). In more popular terms, *daydreaming* refers to mental processes such as musing, mindwandering, internal monologue, and being lost in thought. Daydreams are often referred to as *fantasies*; we use these terms interchangeably in this article. The research on the influence of TV on daydreaming has been carried out with school-age children and university students. It has been investigated whether TV viewing affects the frequency and content of daydreaming, which are usually assessed through standardized questionnaires.

The third type is research on the influence of TV viewing on *creative imagination*, defined as the capacity to generate many different novel or unusual ideas. These studies have been carried out with children and adolescents. In TV studies, creative imagination is usually investigated by giving subjects divergent thinking tests and creative tasks such as making up a story, solving a problem, or drawing.

The studies on the influence of TV on imaginative play have recently been reviewed (van der Voort & Valkenburg, 1994). In the current review, we examine the role TV plays in the development of daydreaming and creative imagination.

In many publications on the influence of TV on imagination, no clear distinction is made between TV studies that investigate daydreaming as opposed to creative imagination. Of course, daydreaming and creative imagination overlap to some extent. Both daydreaming and creative imagination require the generation of ideas (D. R. Anderson & Collins, 1988), and in both activities associative thinking plays an important role. Although daydreaming and creative imagination are related to each other, there are some important differences between the two activities:

1. Daydreaming is an inner activity, which most people treat as extremely private (Klinger, 1990). Creative imagination, by contrast, demands communication (Knowles, 1985; Presbury, Benson, Fitch, & Torrance, 1991) and is in general overtly observable in its products.

2. Although daydreams can sometimes be evoked deliberately by the daydreamer, most daydreams spontaneously pop into

Patti M. Valkenburg and Tom H. A. van der Voort, Center for Child and Media Studies, Leiden University, Leiden, The Netherlands.

We gratefully acknowledge the assistance of Laura T. Sweeney in translating this article from Dutch to English.

Correspondence concerning this article should be addressed to Patti M. Valkenburg, Center for Child and Media Studies, Leiden University, P. O. Box 9555, 2300 RB Leiden, The Netherlands.

mind (Klinger, 1990). Creative imagination, on the other hand, is characterized by a high level of voluntary control and goal directedness (Lewin, 1986).

3. Through daydreams, individuals can give free rein to their ideas, wishes and needs in a process that is free from evaluation. Creative imagination, by contrast, is often subject to evaluation (Pickard, 1990), and the product of creative imagination has to meet one or more specified requirements.

4. Whereas creative imaginative skills are generally viewed as socially desirable, daydreaming can be problematic. Although daydreaming is usually characterized as a beneficial activity that is important or even necessary for normal intellectual and mental development, one can also daydream too much (Klinger, 1990). It has been shown, for example, that recurrent frightening daydreams can increase fear and that vengeful daydreaming can increase anger and may lead to yet more angry brooding (Klinger, 1990).

Because daydreaming and creative imagination are different cognitive processes, it is conceivable that TV's influence on daydreaming is different from, or even opposed to, TV's influence on creative imagination. Therefore, we discuss the studies on daydreaming and creative imagination in separate sections. The first section is devoted to daydreaming. This section opens with a description of the various explanatory hypotheses that have been proposed concerning the influence of TV on daydreaming, after which the studies on the influence of TV on daydreaming are reviewed. The explanatory hypotheses are then discussed again, this time to analyze the assumptions that underlie each hypothesis and to establish whether these assumptions have been supported by research. In the second section, the hypotheses and research concerning TV's influence on creative imagination are reviewed. In the final section we discuss the overall results of the research and present some suggestions for further research.

Consistent with earlier reviews in this field (D. R. Anderson & Collins, 1988; D. G. Singer, 1982; D. G. Singer & Singer, 1981), our review has the character of a qualitative narrative review. We decided not to carry out a quantitative meta-analysis because the studies that have been conducted are too few and too varied to justify such an analysis. Our review differs in two respects from earlier reviews. First, we included the research that has been published since the reviews of D. G. Singer and Singer (1981) and D. G. Singer (1982). This is particularly important because research on the influence of TV on daydreaming did not come into full swing until the 1980s. Second, unlike D. R. Anderson and Collins (1988), who discussed a selection of the research, we attempted to provide a comprehensive review of the relevant studies. In preparing this review, we collected all relevant references from the standard computer-searchable databases in both the United States and Europe, including studies published up to the end of 1993.

TV and Daydreaming

Hypotheses

Effects and Functions Approaches

The hypotheses on the influence of TV on daydreaming can be subdivided into two categories that correspond to two traditions within communication research: the *effects approach* and

the *functions approach* (Murray & Kippax, 1981). The difference between these two approaches is often expressed in terms of the catchphrases that the effects approach concerns "what the media do with people," whereas the functions approach focuses on "what people do with the media" (Windahl, 1981). The effects approach stems from a communication model in which the arrow of influence points only one way, from TV to the receiver. Hence, in effects hypotheses TV is identified as the cause of changes in the viewer's fantasy life. The functions approach stems from a communication model in which the arrow of influence points from the viewer to TV. According to the functions approach, viewing behavior is regulated by the functions that TV can fulfill for the viewer. Therefore, in functions hypotheses people's fantasy lives are identified as the cause of changes in people's viewing behavior.

Effects Hypotheses

Reduction hypothesis. Most observers believe that TV viewing inhibits the viewer's daydreaming. We refer to this view as the *reduction hypothesis*. The reduction hypothesis is based on the idea that TV has a number of structural characteristics that hinder the development of daydreaming. In particular, it has been suggested that TV diminishes the viewer's ability to produce inner fantasies because (a) TV presents the viewer with ready-made visual images and thus does not provide viewers with practice in generating their own visual images (J. L. Singer, 1980); (b) TV presents fantasies produced by others that can be consumed with little mental effort, leading to a passive "let you entertain me" attitude (J. L. Singer et al., 1984a); (c) TV is geared toward maintaining the viewer's attention through rapid action and continuous movement, which allow the viewer no time to daydream while watching (J. L. Singer & Singer, 1981).

Stimulation hypothesis. Although it is often maintained that TV viewing inhibits daydreaming, there are also observers who take the opposite view: that TV encourages daydreaming. We call this view the *stimulation hypothesis*. According to the stimulation hypothesis, TV influences daydreaming through the content of the programs watched. It is hypothesized that viewers who frequently watch certain types of TV content tend to fantasize more frequently about themes that correspond to that content (McIlwraith & Schallow, 1983b). The stimulation hypothesis predicts, for example, that frequent viewing of violent programs results in an increase in aggressive and heroic fantasies (e.g., Huesmann & Eron, 1986).

Functions Hypotheses

Escapism hypothesis. According to the escapism hypothesis, TV viewing, regardless of content, is stimulated by an overproduction of daydreams to which the individual would rather not attend. Two versions of the escapism hypothesis can be found in the literature. The *thought-blocking hypothesis* argues that individuals suffering from many unpleasant fantasies tend to watch more TV in order to drive away these unpleasant thoughts (McIlwraith & Josephson, 1985; McIlwraith & Schallow, 1983b). A second version of the escapism hypothesis, which may be termed the *boredom-avoidance hypothesis*, argues that individuals suffering from "poor attentional control" are inclined to spend more time watching TV (Schallow & McIl-

wraith, 1986). Individuals with poor attentional control are easily distracted and bored, and hence tend to experience mindwandering and drifting thoughts. According to the boredom-avoidance hypothesis, viewers use TV to avoid boredom and the consequent overproduction of drifting thoughts (Schallow & McIlwraith, 1986).

Thematic correspondence hypothesis. This hypothesis suggests that the themes people fantasize about do not affect total viewing but the types of programs that they prefer to view. The thematic correspondence hypothesis argues that individuals tend to select TV content that reflects the themes of their fantasies (McIlwraith & Josephson, 1985).

Thematic compensation hypothesis. The thematic compensation hypothesis, by contrast, argues that people tend to select TV content that reflects those types of fantasy they cannot produce themselves. It has been suggested, for example, that individuals who are unable to produce arousing sexual fantasies on their own are more likely to turn to pornography (McIlwraith & Schallow, 1983b).

The Research

Correlational Studies With Children

Measures of daydreaming. In the correlational studies carried out with children, daydreaming was measured by means of the Imaginal Processes Inventory for Children (IPI-C). The IPI-C, developed by Rosenfeld, Huesmann, Eron, and Torney-Purta (1982), assesses children's daydreaming in terms of both content and structural characteristics. Two subscales reflect structural characteristics of daydreaming: Absorption and Vividness. Six other subscales measure types of fantasy content: Aggressive, Fanciful, Scary, Intellectual (problem solving), Active-Heroic, and Dysphoric. Factor analyses applied to the eight IPI-C subscales suggested three styles of daydreaming. Children who score high on the fanciful-intense daydreaming style frequently have pleasant, vivid, and childlike daydreams about things that could never really happen or exist. Because the fanciful-intense daydreaming style is defined partially by items that deal with pretend play, it does not provide a pure measure of daydreaming. Children with an active-intellectual daydreaming style frequently daydream about how things fit together and work, and about being a winner or hero. Finally, children with a dysphoric-aggressive daydreaming style frequently daydream about unpleasant things that could happen to them and about the things they would like to do to a person they dislike.

Cross-sectional studies. Six studies examined correlations between children's amount of viewing and the frequency with which they daydream about different themes (see Table 1). With the exception of one study (Valkenburg, Vooijs, van der Voort, & Wiegman, 1992), the correlational studies were cross-sectional (i.e., they were based on data collected at one point in time). The cross-sectional studies controlled for sex, age, or both, two variables known to be related to TV viewing (Sprafkin, Gadow, & Abelman, 1992) as well as to the IPI-C subscales and daydreaming styles (Rosenfeld et al., 1982). Researchers controlled for sex and age by computing partial correlations or, alternatively, by checking whether the TV-daydreaming relationships observed in the total group held for subgroups defined in terms

of sex and age. McIlwraith and Schallow's (1983a) study controlled for intelligence. However, because there is no evidence that intelligence is related to children's daydreaming, it is by no means certain that intelligence should be treated as a third variable that could account for obtained relationships between TV viewing and daydreaming.

McIlwraith and Schallow (1983a) examined whether total viewing was related to the three IPI-C daydreaming styles. The total amount of TV children viewed was assessed using a television identification measure (TVI) that consisted of a set of 20 photographs of TV characters and scenes. The number of correctly identified photographs was used as an index of the child's total viewing. The TVI instrument provides a crude measure of total viewing because children may be able to correctly identify photographs from programs they have watched only a few times. Inspired by the reduction hypothesis, the authors expected to find a negative relationship between total viewing and the fanciful-intense daydreaming style. Contrary to expectations, total viewing was not significantly related to the fanciful-intense daydreaming style. On the basis of the thought-blocking hypothesis, it was expected that total viewing would correlate positively with the dysphoric-aggressive daydreaming style, an expectation that proved to be true for the group as a whole and for girls. Although no significant correlation was found for boys ($r = .22$), a Z test (Hays, 1973) we carried out revealed that there was no significant difference between the correlations found for the two sexes, $Z(39, 35) = 0.61$.

The remaining four cross-sectional studies investigated whether TV viewing would be related to the Aggressive, Heroic, and Scary IPI-C subscales (Frączek, 1986; Huesmann & Eron, 1986; Sheehan, 1986; Viemerö & Paajanen, 1992). The influence of TV on children's aggressive behavior was the primary focus of investigation in these studies. Because children's daydreaming was seen as a variable that intervenes in the TV-aggression relationship, relations between TV viewing and daydreaming were also investigated. Viemerö and Paajanen (1992) assessed total viewing using children's self-reports of all programs watched in a 1-week period. The other three studies used a less sensitive index that measured only the frequency with which children viewed favorite drama series. Each child was presented with several lists of drama series. From each list, children were asked to select the one program they watched most and to indicate how often they watched it. Total viewing was related positively to aggressive daydreaming (Huesmann & Eron, 1986; Sheehan, 1986; Viemerö & Paajanen, 1992), heroic daydreaming (Huesmann & Eron, 1986), and scary daydreaming (Viemerö & Paajanen, 1992). However, TV violence viewing, that is, the frequency with which children were exposed to TV violence, was less strongly related to these IPI-C subscales: Either no relations or positive relations holding only for subgroups were found. This is a curious finding because one may expect that TV violence viewing would be related more strongly to aggressive, heroic, and scary daydreaming than would total viewing.

A possible reason for this unexpected finding is that the measure of TV violence viewing used in these studies was an inadequate index of the frequency with which children were exposed to TV violence. In all four studies, including that of Viemerö and Paajanen (1992), TV violence viewing scores were derived from the child's responses to the aforementioned instrument,

Table 1
Correlational Studies on the Relationship Between Children's TV Viewing and Daydreaming

Study	Age (years)	N	Control variables	Daydreaming measures	Direction of the relationship ^a
Mellwraith & Schallow (1983a)	7	82	Verbal IQ, sex, age	Three IPI-C daydreaming styles Fanciful-intense Active-intellectual Dysphoric-aggressive	0 (total viewing) 0 (total viewing) + (total viewing)
Huesmann & Eron (1986)	7-8, 9-10	594	Sex	Two IPI-C subscales Aggressive Daydreaming Heroic Daydreaming	+ (total viewing) 0 (TV violence viewing) + (total viewing) + (TV violence viewing, girls only)
Frączek (1986)	7-9, 9-11	205	Sex	Two IPI-C subscales Aggressive Daydreaming Heroic Daydreaming	0 (TV violence viewing) 0 (TV violence viewing)
Sheehan (1986)	9-11	119	Sex	One IPI-C subscale Aggressive Daydreaming	+ (total viewing, girls only) + (TV violence viewing, girls only)
Viemerö & Paajanen (1992)	8 and 10	391	Sex, age	Two IPI-C subscales Aggressive Daydreaming Scary Daydreaming	+ (total viewing) + (TV violence viewing, boys only) + (total viewing, boys only) + (TV violence viewing, boys and 10-year-olds only)
Valkenburg, Vooijs, van der Voort, & Wiegman (1992)	8 and 10 (Year 0); 10 and 12 (Year 2)	345	Year 0 levels of TV viewing and IPI-C measures	Three daydreaming styles identified in a shortened version of the IPI-C Positive-intense Aggressive-heroic Dysphoric	Longitudinal relations between TV viewing in Year 0 and daydreaming in Year 2 + (nonviolent children's programs) + (violent fantasy programs) + (violent realistic programs) + (nonviolent dramatic programs) 0 (no relation with each of the four program types distinguished)

Note. IPI-C = Imaginal Processes Inventory for Children.

^a "+" stands for a positive relationship that is significant at least at the 5% level, and "0" for a nonsignificant relationship between television viewing and daydreaming.

which measured only the frequency with which children viewed the drama series that they watched most. The viewing frequency score for each program selected by the child was multiplied by a violence score on the basis of experts' ratings of the amount of violence the program contained. The validity of the resulting TV violence index is questionable because the index measured only the extent to which children were exposed to TV violence via the programs they watched most. As a consequence, a child who selected a nonviolent comedy from each list of programs obtained a minimal TV violence viewing score, even though the same child could in fact have watched violent programs frequently. It is therefore doubtful whether the correlations reported between TV violence viewing and daydreaming are valid.

Longitudinal study. The cross-sectional studies just discussed did not permit conclusions about the causal direction of the relationship between TV viewing and daydreaming. A suitable method for investigating the causal direction of this relationship is the panel design. Valkenburg et al. (1992) reported a panel study in which the same group of children was surveyed

twice, 2 years apart. At both times, the children's TV viewing and daydreaming were measured. Daydreaming was assessed by means of a shortened version of the IPI-C. Amount of viewing was measured by asking children to indicate how often they watched each of 40 drama series, a measure shown to be positively related to both parent reports (van der Voort, 1986) and diary estimates of viewing (Vooijs, van der Voort, & Beentjes, 1987). Viewing scores were computed for two types of children's programs (nonviolent children's programs and violent fantasy programs) and two types of programs originally intended for adults (nonviolent dramatic programs and violent realistic programs). In a principal-components analysis applied to the full viewing frequency questionnaire, the two types of children's programs loaded on separate factors. However, the two types of adults' programs were strongly correlated and therefore loaded on a common factor.

Using path analysis, two opposite hypotheses were tested: (a) the stimulation hypothesis, which argues that children who frequently watch certain types of TV content tend to fantasize more often about themes that correspond to such content, and

(b) the thematic correspondence hypothesis, which postulates that children tend to select TV content that reflects the themes of their daydreams. The thematic correspondence hypothesis was not supported: No longitudinal relations were found between initial measures of daydreaming (Year 0) and subsequent measures of TV viewing (Year 2). However, the stimulation hypothesis did receive support. Over time, watching nonviolent children's programs stimulated a positive-intense daydreaming style, a style of fantasizing that is equivalent to the fanciful-intense daydreaming style. In addition, watching violent fantasy programs, and to a lesser extent watching violent realistic programs, appeared to stimulate the aggressive-heroic daydreaming style. Contrary to expectations, nonviolent dramatic programs also had a positive longitudinal effect on aggressive-heroic daydreaming, but this effect was smaller than that found for both violent program types.

According to the authors, the latter effect can be understood if the structure of children's viewing behavior is taken into account. They argued that because the nonviolent and violent adults' programs occupied a common factor, it was not possible to distinguish the separate effects of the two program types. Although the correlations between nonviolent and violent adults' programs were strong ($r_s = .76$ and $.63$ in Years 0 and 2, respectively), they were far from perfect. We would therefore suggest that the authors could have attempted to control statistically for the intercorrelations between the viewing measures. It should be noted, however, that the failure to control for intercorrelations among program types did not confound the results obtained for nonviolent children's programs (stimulation of a positive-intense daydreaming style) and for violent fantasy programs (stimulation of an aggressive-heroic daydreaming style), because these two types of children's programs appeared to represent independent dimensions in children's viewing behavior. We would further suggest that the study's results need to be replicated in longitudinal studies that control more adequately for third variables. The analyses did rule out any influence on the longitudinal TV effect resulting from the Year 0 correlation between TV viewing and daydreaming and, hence, also any influence of third variables that might have created that initial correlation. However, the analyses did not rule out the possibility that the longitudinal effects were caused by correlates of TV exposure that effected changes in daydreaming behavior over the interval of the panel study (Milavsky, Kessler, Stipp, & Rubens, 1982).

Conclusion. The correlational studies with children do not provide a basis for definitive causal conclusions because most of these studies were cross-sectional and because the only panel study that was conducted did not control completely for third variables. Nevertheless, it may be concluded that there is no indication whatsoever that TV reduces children's daydreaming (reduction hypothesis) because none of the studies yielded evidence of negative relationships between TV viewing and daydreaming. The results of the correlational studies are more in line with the stimulation hypothesis. In various cross-sectional studies positive relationships were found between TV viewing and aggressive and heroic daydreaming. However, the cross-sectional studies did not reveal whether the amount of violence seen on TV was responsible for the positive relationships found because these studies used a violence viewing measure of questionable validity. The panel study does suggest that violent TV

content may stimulate aggressive and heroic daydreaming, that is, at least as far as violent fantasy programs are concerned. In addition, the panel study suggests that nonviolent children's programs may stimulate a positive-intense daydreaming style.

The research does not provide much support for the functional view, according to which existing daydreaming patterns affect children's TV viewing. In the panel study no longitudinal effects of daydreaming on TV viewing were found (Valkenburg et al., 1992). The positive relationship between total viewing and the dysphoric-aggressive daydreaming style found by McIlwraith and Schallow (1983a) does not necessarily support the thesis that children who suffer from many unpleasant fantasies tend to watch more TV (thought-blocking hypothesis). First, the positive relationship that was found also allows of a reverse causal interpretation. Second, the aggressive rather than the dysphoric component of the scale might have been responsible for the positive relationship found because other studies suggest that total viewing is related to aggressive daydreaming (Huesmann & Eron, 1986; Sheehan, 1986; Viemerö & Paajanen, 1992) but unrelated to dysphoric daydreaming (Valkenburg et al., 1992).

Correlational Studies With Adults

Measures of daydreaming. The correlation between adults' TV viewing and daydreaming was studied using either the Imaginal Processes Inventory (IPI), developed by J. L. Singer and Antrobus (1972), or the subsequently developed and shortened version of the IPI, the Short Imaginal Processes Inventory (SIPI), constructed by Huba, Singer, Aneshensel, and Antrobus (1982). In both the IPI and the SIPI, three major styles of daydreaming have been identified. Subjects who score high on the Positive-Vivid (IPI) or Positive-Constructive (SIPI) daydreaming scales have a positive orientation toward their inner experiences, use daydreams for problem solving, and have daydreams with a high degree of future orientation (J. L. Singer, 1975b; Tower & Singer, 1980). Subjects with high scores on the Guilt and Fear of Failure scale have daydreams with depressing, frightening, and panicky qualities and are characterized as self-doubting and achievement-oriented individuals. High scores on the Poor Attentional Control scale represent tendencies toward mindwandering and drifting thoughts. An individual scoring high on this scale easily loses interest, tends to become bored, and cannot work at the same task for a long time. This daydreaming style seems less a measure of ongoing fantasy than of a difficulty in sustaining attention either to external stimuli or to extended sequences of private thought (Tower & Singer, 1980).

Cross-sectional studies. Three cross-sectional studies investigated whether adult viewing frequency would be related to daydreaming style (see Table 2). None of these studies controlled for possible third variables. There are at least four correlates of daydreaming—age (Giambra, 1974; J. L. Singer, 1975a), sex (Huba, Aneshensel, & Singer, 1981), socioeconomic status (Klinger, 1990), and ethnicity (Giambra, 1982)—which are also related to TV viewing (Murray & Kippax, 1981). These variables may therefore be considered as third variables that may be responsible for obtained relationships between TV viewing and daydreaming.

McIlwraith and Schallow (1983b) investigated the fantasy lives of students by means of a selection of the subscales of the

Table 2
Correlational Studies on the Relationship Between Adults' TV Viewing and Daydreaming

Study	Age (years)	N	Control variables	Daydreaming measures	Direction of the relationship ^a
McIlwraith & Schallow (1983b)	17-55 (<i>M</i> = 23.7)	219	None	Four daydreaming styles found in a shortened version of the IPI	
				Positive-vivid	0 (total viewing)
				Problem solving-interpersonal	+ (total viewing)
				Obsessional-emotional (\approx guilt and fear of failure)	+ (total viewing)
Schallow & McIlwraith (1986)	17-48 (<i>M</i> = 19.8)	473	None	Distractible mindwandering (\approx poor attentional control)	+ (total viewing)
				Three SIPI daydreaming styles	- (informational programs)
				Positive-constructive	0 (total viewing)
					+ (comedies)
McIlwraith, Jacobvitz, Kubey, & Alexander (1991)	Undergraduates	136	None		+ (music and entertainment)
				Guilt and fear of failure	0 (total viewing)
				Poor attentional control	0 (total viewing)
					+ (drama and comedies)
					- (news programs)
McIlwraith, Jacobvitz, Kubey, & Alexander (1991)	Undergraduates	136	None	Three SIPI daydreaming styles	
				Positive-constructive	0 (TV addiction)
				Guilt and fear of failure	+ (TV addiction)
				Poor attentional control	+ (TV addiction)

Note. IPI = Imaginal Processes Inventory; SIPI = Short Imaginal Processes Inventory.

^a "+" stands for a positive relationship that is significant at least at the 5% level, "-" for a significant negative relationship, and "0" for a nonsignificant relationship between TV viewing and daydreaming.

IPI. In this shortened IPI, four instead of three styles of daydreaming were found: (a) a positive-vivid style; (b) a problem-solving-interpersonal style; (c) an obsessional-emotional style, which was highly similar to the guilt and fear of failure daydreaming style of the SIPI; and (d) a distractible-mindwandering style, which resembled the poor attentional control daydreaming style of the SIPI. Amount of viewing was measured thoroughly by having subjects indicate how often they watched each program on a list of 414 TV programs. Three of the four daydreaming styles were related positively to total viewing. According to the authors, the positive relationship found between total viewing and the obsessional-emotional daydreaming style lent support to the thought-blocking hypothesis, although they recognized that causal hypotheses cannot be tested with cross-sectional correlational data. With the same reservation, the positive relationship found between total viewing and the distractible-mindwandering daydreaming style could be interpreted as a confirmation of the boredom-avoidance hypothesis. However, only total viewing was related positively to the distractible-mindwandering daydreaming style. A canonical correlation analysis, which determined the relative contributions of different types of TV content to the prediction of daydreaming styles, indicated that people who frequently watched informational programs reported experiencing less mindwandering and drift-off thoughts.

Schallow and McIlwraith (1986) did not find significant relations between total viewing and each of the three SIPI daydreaming styles. However, these "null findings" may be due to the poor validity of the measure of total viewing used (a one-item estimate of hours of TV watched per week made by the

respondents themselves). The frequency with which certain types of programs were watched was assessed by means of a more adequate measure that was similar to the one used in the McIlwraith and Schallow (1983b) study. Nine program types arrived at through factor analysis were entered in canonical analyses to establish their relative contributions to the prediction of each of the three SIPI daydreaming styles. Watching nonviolent programs (comedies, music, and entertainment) was related positively to the positive-constructive daydreaming style. The poor attentional control daydreaming style was associated positively with watching drama and comedy series, whereas watching news programs was related negatively to this daydreaming style.

McIlwraith, Jacobvitz, Kubey, and Alexander (1991) investigated whether daydreaming would be related to an extreme form of TV viewing: TV addiction. TV addiction was assessed using Smith's (1986) Television Addiction Scale, a measure shown to be positively related to self-report measures of viewing time. Simple bivariate correlational analyses showed that TV addiction was unrelated to the positive-constructive daydreaming style. However, TV addiction was connected positively with both the guilt and fear of failure and the poor attentional control daydreaming styles, a finding comparable to that of McIlwraith and Schallow (1983b).

Conclusion. As the correlational research conducted with adults consists of cross-sectional studies with no controls for third variables, it does not furnish a basis for causal conclusions. However, because none of the studies reported negative relations, there are no indications that watching TV reduces daydreaming (reduction hypothesis). As far as the positive-con-

Table 3
Experimental Studies on the Influence of Violent TV Programs on Projective Measures of Aggressive Daydreaming

Study	Age (years)	N	Comparison	Measure of aggressive daydreaming	Main results
Feshbach & Singer (1971)	8-18 (boys)	395	For a 6-week period, a minimum of 6 hr a week: violent TV diet and nonviolent TV diet (control)	Ratings of intensity of aggression in stories made up in response to pictorial stimuli (TAT and Lesser)	Those exposed to the violent TV diet tended to maintain aggressive fantasies, whereas the controls showed a decreased level of aggressive fantasy
Hart (1972)	8-10 (boys)	72	Five conditions, 20 min in length: three violent cartoons, one nonviolent and two violent cartoons, one violent and two nonviolent cartoons, three low-violence/high-arousal cartoons, and no-film control group	Ratings of intensity of aggression in responses to Holtzman Inkblot and TAT cards	No significant differences in aggressive fantasy

Note. TAT = Thematic Apperception Test.

structive daydreaming style is concerned, the evidence is more consistent with the stimulation hypothesis. In particular, nonviolent programs—comedies, music and entertainment programs—were associated positively with the positive-constructive daydreaming style, a finding that resembles the positive relationship observed in children between nonviolent children's programs and the positive-intense daydreaming style.

Not counting the study of Schallow and McIlwraith (1986), who used a measure of total viewing that is of questionable validity, total viewing was shown to be related positively to both the guilt and fear of failure and the poor attentional control daydreaming styles. The latter findings are consistent with the thought-blocking and boredom-avoidance hypotheses, respectively, although cross-sectional findings do not permit causal interpretations. The direction of the relationship between TV viewing and the poor attentional control daydreaming style appears to be partly dependent on the type of TV content. Poor attentional control was related positively to watching drama and comedies and negatively to watching informational programs.

Experimental Studies

Measures of daydreaming. In experimental studies daydreaming has been measured by means of projective tests that had subjects either produce stories in response to pictorial stimuli (e.g., the Thematic Apperception Test [TAT]) or report free associations in response to inkblots (e.g., the Holtzman Inkblot Technique or Barron inkblots). The responses to projective tests were usually rated on the extent to which their content was aggressive. A difference between projective responses and naturally occurring daydreams is that daydreams are private and occur spontaneously, whereas projective responses are communicated overtly and produced at the request of the researcher. Nevertheless, projective tests are seen as useful measures of the content of daydreams because the needs, emotions, and current concerns that are revealed by projective tests are similar to the content of daydreams (Klinger, 1971, 1990).

TV and aggressive fantasies. The influence of violent TV content on the aggressive fantasies of boys was examined in two experimental studies (see Table 3). Feshbach and Singer (1971)

controlled the types of programs watched by boys who attended residential schools and institutions. The boys were divided into two groups: One group was to watch only violent programs and the other only nonviolent programs. Each boy was required to watch at least 6 hr of TV per week for 6 weeks. The boys could view as much TV as they wanted, but all programs had to be selected from a designated list. In three of the seven participating institutions, one violent program ("Batman") was added to the list of 154 nonviolent programs because a number of boys objected to not being permitted to watch this program. Aggressive fantasy was measured by means of the TAT and TAT-like slides developed by Lesser (1958). Because the nonviolent diet proved to be less attractive to the boys than the violent diet, assignment to the nonviolent TV group could have led to frustration and hence to an artificial increase in aggressive fantasies. Nevertheless, boys in the nonviolent TV group showed a decreased level of aggressive fantasy, whereas the boys exposed to the violent diet tended to maintain their original level of aggressive fantasies.

Hart (1972) investigated the effect of violent cartoons on the aggressive fantasies of boys between the ages of 8 and 10. Aggressive fantasy was measured by means of Holtzman inkblots and the TAT. Three types of short cartoons were used: violent ("Roadrunner"), nonviolent ("Casper"), and low violence/high arousal ("Skyhawks"). The experimental groups were exposed to three cartoons that together lasted 20 min. Five conditions were compared: (a) three violent cartoons; (b) two violent cartoons and one nonviolent cartoon; (c) one violent cartoon and two nonviolent cartoons; (d) three low-violence/high-arousal cartoons; and (e) "no cartoons" as a control condition. No differential effects on aggressive fantasy were found. However, the absence of experimental effects might have resulted from the fantastic character of the stimulus materials used. Because school-age children do not take fantastic cartoons such as "Roadrunner" seriously and do not experience them as violent (van der Voort, 1986), there is little chance that children derive aggressive fantasies from such films.

To our knowledge, the influence of TV on the fantasies of adult men has been investigated experimentally only once. For a period of 1 week, Loye, Gorney, and Steele (1977) had 115

men, aged 20–70+, watch one of three diets of TV programming in their own homes. The three diets consisted respectively of prosocial programs, violent programs, and neutral or light entertainment programs. Both before and after the viewing week, subjects were tested with Barron inkblot cards presented via cable TV directly in their homes. The participants recorded their own responses and returned them to the researchers by mail. The inkblot responses were scored on, among other things, prosocial and violent fantasy. Compared with the prosocial TV diet, the violent diet resulted in a significant increase in prosocial fantasy. As noted by the authors, this curious finding is theoretically difficult to explain. However, a possible explanation may lie in two methodological deficiencies of the study. First, because half of the participants did not return the inkblot forms, the experimental differences found might have been due to differential drop-out rates in the three groups. Second, the validity of the inkblot scores is dubious because the test was administered under highly uncontrolled conditions.

Conclusion. The existing experimental studies hardly provide a basis for definitive conclusions about the effect of violent programs on aggressive fantasies. The most well-designed study (Feshbach & Singer, 1971) suggests that a violent TV diet can stimulate aggressive fantasies. However, because the Feshbach and Singer study is a quasi-experimental field study, alternative explanations for the findings cannot be completely ruled out. In Hart's (1972) experiment, violent cartoons did not evoke aggressive fantasies, but this result could have been due to either the short exposure time (20 min) or the unrealistic character of the cartoons. Finally, the results obtained by Loye et al. (1977) are open to serious methodological criticism.

The Hypotheses Revisited

In this section, we discuss the hypotheses about the relationship between TV viewing and daydreaming once more, this time to analyze the assumptions that underlie each hypothesis and to establish whether these assumptions are supported by research.

Effects Hypotheses

Reduction hypothesis. As yet, there is nothing to suggest that TV viewing reduces daydreaming. Negative correlations between TV viewing and daydreaming have not been found for either adults or for children. The experimental studies also provided no evidence that TV viewing hinders daydreaming.

The reduction hypothesis can also be questioned on conceptual grounds. According to one version of the reduction hypothesis, TV hinders daydreaming because it presents the viewer with ready-made visual images. Unlike verbal media, TV therefore does not provide viewers with the opportunity to form their own visual images (i.e., to call up visual images from memory that match a verbal message). Of course, daydreaming requires that people evoke their own visual images from memory. It is questionable, however, whether TV impairs one's skills in evoking images from memory. On the one hand, it is conceivable that TV even helps people generate visual images, because TV viewing leads to an increased store of images from which one can draw during daydreaming. On the other hand, TV does present viewers, certainly compared with reading, with little

practice in evoking their own images from memory. However, it has not been shown that this lack of practice impairs visual imagery ability. Kutner (1979) found no relationship between adults' total viewing and their visual imagery ability, the latter operationalized as the capacity to generate visual images in response to unrelated word pairs. It may be that TV viewing has a negligible impact on the development of visual imagery ability because there are many other activities that children regularly engage in, such as listening, reading, writing, and talking, during which they can practice calling up visual images that match verbal messages.

A second version of the reduction hypothesis is based on the idea that TV presents the viewer with fantasies produced by others, which are consumed with little mental effort. As a result, people are not willing to invest mental effort in producing their own fantasies. There are indeed indications that TV requires little mental effort, that is, less mental effort than reading does (Beentjes, 1989; Salomon, 1984). It is questionable, however, whether daydreaming requires a high amount of mental effort because most daydreams "spontaneously pop up without any effort on your part, and they unfold as spontaneously as they started" (Klinger, 1990, p. 29).

According to a third version of the reduction hypothesis, viewers have no time to daydream while watching TV because their attention is monopolized by TV's rapid pace and continuous movement. This view is inconsistent with the research finding that children often look away from TV and spend one third of their viewing time on other activities, such as talking with others, eating, playing with toys, reading, and coloring (D. R. Anderson & Collins, 1988). Because TV viewing is frequently combined with other activities, it seems likely that viewers are also able to combine TV viewing with daydreaming. It has never been investigated to what extent daydreaming occurs during TV viewing. Research suggests, however, that the viewer often feels relaxed while watching (Zillman, 1991). In electroencephalographic measurements taken during TV viewing, this relaxation is expressed in the appearance of alpha waves (e.g., Mulholland, 1974), which have been found to be associated with mindwandering (Klinger, 1990). Klinger therefore assumed that people tend to daydream frequently while watching TV.

Stimulation hypothesis. The results of most studies are consistent with the stimulation hypothesis, according to which TV encourages daydreaming through its content. Cross-sectional research has shown that adults who frequently watch nonviolent programs tend to report more positive–constructive daydreaming, and according to the panel study, children who frequently watch nonviolent children's programs over time show more positive–intensive daydreaming. In addition, cross-sectional studies and the panel study provide evidence that children who frequently watch TV tend to report more aggressive and heroic fantasies. Likewise, the experimental field study with the best design (Feshbach & Singer, 1971) suggests that a violent TV diet for a period of 6 weeks can result in increased aggressive fantasies. As noted earlier, however, none of the aforementioned positive TV–daydreaming relationships permit a conclusive causal interpretation. Therefore, the scientifically conservative conclusion should be that the weight of evidence is in favor of the stimulation hypothesis but that decisive evidence of a causal relationship is absent.

The stimulation hypothesis also seems plausible on theoretical grounds. A series of studies have shown that environmental stimuli can evoke daydreams, especially when these stimuli correspond to respondents' current concerns (Klinger, 1990). Because TV forms an important part of people's everyday environment, it is likely that daydreaming is evoked not only by real-life events but also by the TV experience.

Functions Hypotheses

Escapism hypothesis. The research conducted with children lends little support to the escapism hypothesis. In the panel study, no longitudinal relationship between dysphoric fantasies and TV viewing was found. McIlwraith and Schallow (1983a) did find a positive relationship between total viewing and the dysphoric-aggressive daydreaming style, but, as discussed earlier, this relationship may be attributed to the aggressive component of the scale.

The findings from cross-sectional research carried out with adults are consistent with both versions of the escapism hypothesis. Consistent with the thought-blocking hypothesis, adults with a guilt and fear of failure daydreaming style watch more TV. In agreement with the boredom-avoidance hypothesis, adults with a poor attentional control daydreaming style watch more TV and in particular more drama and comedies. However, informational programs are watched less by adults with a poor attentional control daydreaming style, a finding that is consistent with Schramm, Lyle, and Parker's (1961) proposition that reality content, which invites effort and offers enlightenment, is less likely to fulfill an escapist function than fantasy content, which invites relaxation and offers pleasure.

In conclusion, there are as yet no indications that the escapism hypothesis holds for children. It is also not likely that it would apply to children because various studies suggest that TV does not usually fulfill an escapist function for children (e.g., Brown, 1976; Furu, 1971; von Feilitzen, 1976). With respect to adults, assessment of the validity of the escapism hypothesis should be postponed until there is evidence that offers a stronger basis for causal conclusions. For now, we can say only that the positive cross-sectional relationships that have been found are consistent with the possibility that the escapism hypothesis is true (alternatively, if no relationship had been found at all, a causal relationship would be highly unlikely). Whether adults indeed turn to TV in order to avert unpleasant fantasies and drifting thoughts must be verified in causal correlational research that controls for possible third variables.

Thematic correspondence hypothesis. The thematic correspondence hypothesis is the causal counterpart of the stimulation hypothesis. Both hypotheses assume positive relationships between daydreaming and TV watching, but the thematic correspondence hypothesis argues that the arrow of influence points from daydreaming to TV viewing, rather than the other way around. According to a series of cross-sectional correlational studies, frequent daydreaming about specific themes goes together with frequent watching of corresponding programs. It is, however, questionable whether daydreaming is the causal factor in this relationship. The causal studies carried out with children (Feshbach & Singer, 1971; Valkenburg et al., 1992) give reason to suspect that TV is the cause and daydreaming the effect.

However, because the available causal evidence is not conclusive, it would be premature to conclude that the thematic correspondence hypothesis has been proved wrong. Theoretically, it is conceivable that both the thematic correspondence hypothesis and the stimulation hypothesis are valid. In this case, the relationship would be reciprocal, that is, certain types of TV content could stimulate corresponding daydreaming themes, which in turn could stimulate interest in watching these contents in the future.

Thematic compensation hypothesis. To our knowledge, the thematic compensation hypothesis has never been investigated. The hypothesis presumes a negative relationship between the frequency of daydreaming about specific contents and the viewing of corresponding program types. Because the research to date has shown only positive and null relationships, the thematic compensation hypothesis is not plausible. There is, however, a possibility that the viewing of erotic programs compensates for a poor capacity to produce one's own erotic fantasies, a supposition that has never been investigated (to our knowledge).

TV and Creative Imagination

Hypotheses

Stimulation Hypothesis

Only a few authors have proposed that TV encourages creative imagination, a position we again call the stimulation hypothesis. Adherents of the stimulation hypothesis argue that TV stimulates creative imagination through its content (i.e., by providing a source of ideas from which the individual can draw when engaged in creative tasks). TV characters and events are picked up, transformed, and incorporated into the products of creative imagination (Gardner, 1982). However, even if viewers incorporate elements from TV programs in their creative products, it does not necessarily follow that such TV-inspired products are more creative than products not derived from TV. To demonstrate a stimulating effect of TV, it is therefore not enough to prove that TV acts as a source for creative products. There should also be evidence that the quality or quantity of creative products is improved through exposure to TV.

Reduction Hypothesis

Most authors instead argue that TV hinders the development of creative imagination, a view we again term the reduction hypothesis. Five types of reduction hypotheses have been proposed in the literature. Three of them are based on arguments that are similar to those used in hypotheses that claim that TV reduces daydreaming. The reduction hypotheses can be summarized as follows.

Visualization hypothesis. In this view, the visual nature of TV is held responsible for TV's reductive effect on creative imagination. Unlike verbal media such as radio and print, TV presents the viewer with ready-made visual images and thus leaves little room for forming one's own images. When engaged in creative thinking, it is hard to dissociate oneself from the images supplied by TV, with the result that one has difficulty generating novel ideas (Greenfield & Beagles-Roos, 1988; Melline, 1976; Webb, 1980).

Rapid pacing hypothesis. TV's reductive effect is attributed to the rapid pace and continuous movement of TV programs, which allow the viewer little time to reflect on the program content. As a result, TV encourages a nonreflective style of thinking. Because reflective thinking is a prerequisite for creative imagination (Harrison & Williams, 1986), the development of creative imagination is impaired (J. L. Singer & Singer, 1981).

Passivity hypothesis. TV is seen as an "easy" medium, requiring little mental effort (Salomon, 1984). With a minimum of mental effort, the viewer consumes fantasies produced by others. This leads to a passive let you entertain me attitude that undermines the mental effort necessary for creative imagination (Harrison & Williams, 1986).

Arousal hypothesis. The arousing quality of action-oriented and violent programs fosters a physically active and impulsive behavior orientation, which disturbs the peace and quiet necessary for creative imagination (J. L. Singer et al., 1984a).

Displacement hypothesis. A final hypothesis assumes that TV takes up time that could otherwise be spent on other activities. The hypothesis argues that watching TV occurs at the expense of other experiences, such as reading, that are thought to stimulate the creative imagination (Harrison & Williams, 1986; J. L. Singer & Singer, 1986).

The Research

Measures of Creative Imagination

The types of measures of creative imagination used in TV studies vary with the different types of research carried out. Nonstandardized measures were used in experimental studies that investigated the effect of short films on creative imagination. After a film (or an alternative condition), children were asked to answer questions, to invent problem solutions, to make up stories, or to make drawings. The products thus obtained were usually scored on novel elements not found in the stimulus materials. Creative imagination measures that were unrelated to stimulus materials were used in correlational research and in quasi-experimental field studies. Three types of instruments were used: divergent thinking tests, teacher ratings, and inkblot tests.

A divergent thinking test demands that the testee come up with as many solutions as possible to some open-ended problem. Examples of verbal open-ended problems are "How many uses can you think of for a shoe?" (Alternate Uses) and "Just suppose you hang on the clouds, what would happen?" (Just Suppose). In addition to verbal tests, figural tests have been used (e.g., the Pattern Meanings test, which asks the testee to generate interpretations of abstract line drawings). The ideas generated can be scored on four different aspects: (a) the number of ideas (fluency); (b) the number of distinct and different conceptual categories produced (flexibility); (c) the number of unique ideas, that is, ideas that are statistically infrequent relative to the sample (originality); and (d) the extent to which the ideas are worked out in detail (elaboration). Because the four types of scores are usually highly interrelated (Runco, 1992), some researchers choose to use only a selection of these scores. Investigations of the association between divergent thinking tests and other measures of creativity have yielded inconsistent results,

with some researchers finding a moderately positive relationship and others finding no relationship (for reviews, see Barron & Harrington, 1981; Hocevar, 1981; Runco, 1992).

In teacher ratings a classroom teacher assesses the creative imagination of each student on a rating scale ranging from 3 to 5 points. The validity of teacher ratings of creative imagination is questionable because raters have difficulty distinguishing between creative imagination and other personality traits (Hocevar, 1981).

The Barron Human Movement Threshold Inkblot Test (Barron, 1955) presents subjects with a series of inkblots that show an increasing tendency to invoke movement responses. The test assumes that the earlier a subject observes human movement in the inkblots, the more imaginative the subject is. This test does not usually correlate with other measures of creative imagination (Baker, 1978; Barron, 1969; Joseph & Pillai, 1986; Sanders, Tedford, & Hardy, 1977).

The low correlations found between different measures of creative imagination have the important implication that researchers who use different measures investigate to a certain extent different phenomena. Because the studies on the relationship between TV viewing and creative imagination use many different measures of creative imagination, it is difficult to integrate the studies' findings.

Studies Conducted During the Introductory Stage of TV

During the introductory stage of TV two quasi-experimental studies were carried out. In these studies the creative imagination of children who could already watch TV at home was compared with the creative imagination of children without TV (see Table 4). Himmelweit, Oppenheim, and Vince (1958) matched a group of children who already had a TV set at home with a group of controls who had no TV at home and were also not regular guest viewers. Viewers and controls were matched on four criteria: sex, age, intelligence, and social class. Children's imaginative capacities were rated by teachers on a 3-point scale ranging from *unusually imaginative* (1) to *unimaginative* (3). No significant differences in creative imagination were found between children with and without a TV set. According to the authors, the study showed that TV does not dull children's imagination. This conclusion may be questioned, however, because the study suffered from at least three methodological defects: (a) Despite the matching procedure used, the comparison groups were not fully equivalent (Himmelweit et al., 1958); (b) the validity of the measure of creative imagination (teacher ratings) was dubious; and (c) because judges appear to have trouble discriminating between creativity and intelligence (Hocevar, 1981), matching viewers and controls on intelligence to a certain extent might also have resulted in an equalization of the two groups on creativity; hence, it seems highly unlikely that the study would have yielded significant differences in creative imagination between the two groups.

Harrison and Williams (1986) investigated the creative imagination of children from three Canadian communities, one without TV (NOTEL), one with only one TV channel (UNITEL), and one with multiple channels (MULTITEL). The children were tested twice, both before (Year 0) and 2 years after NOTEL children gained access to TV (Year 2). Divergent thinking was measured by means of a verbal Alternate Uses test and a

Table 4

Quasi-Experimental Studies on the Influence of the Introduction of TV on Children's Creative Imagination

Study	Age (years)	N	Comparison	Measure of creative imagination	Main results
Himmelweit, Oppenheim, & Vince (1958)	10-11, 13-14	1854	Matched pairs of children with and without TV	Teacher ratings	No significant differences in creative imagination between children with and without TV
Harrison & Williams (1986)	10 and 13 (Year 0); 12 and 15 (Year 2); 10 and 13 (Year 2)	284	Children in <i>NOTEL</i> (no TV), <i>UNITEL</i> (one channel), and <i>MULTITEL</i> (multiple channels), before (Year 0) and 2 years after <i>NOTEL</i> children gained access to TV (Year 2)	Verbal Alternate Uses Test, scored on fluency Figural Pattern Meanings Test, scored on fluency	Before the arrival of television, <i>NOTEL</i> children scored highest on the Alternate Uses Test, an advantage lost after <i>NOTEL</i> had had television reception for two years The arrival of television did not affect <i>NOTEL</i> children's Pattern Meaning scores

figural Pattern Meanings test (Wallach & Kogan, 1965). Judging from the findings obtained with the Alternate Uses test, the introduction of TV had a negative effect on creative imagination. Before their town had TV, children in *NOTEL* obtained higher fluency scores on the Alternate Uses test than did children in *UNITEL* and *MULTITEL*. Two years after the arrival of TV in *NOTEL*, the fluency scores of the children there had fallen to the level of the children in the other towns. However, the arrival of TV did not affect the *NOTEL* children's Pattern Meanings test scores, possibly because figural tasks draw more on visual-spatial skills. According to Harrison and Williams, it is possible that experience with TV facilitates performance on the visual-spatial aspect of figural tasks but also displaces activities that would otherwise facilitate divergent thinking, resulting in an absence of a net effect.

Harrison and Williams (1986) were unable to assign subjects randomly to *NOTEL*, *UNITEL*, and *MULTITEL*. They compared the three towns on a large number of variables, but they failed to find preexisting differences that might have offered a plausible rival explanation for the change observed in the creative imagination of *NOTEL* children.

Conclusion. The study conducted by Himmelweit et al. (1958) is inadequate in a methodological sense and should not be regarded as evidence that TV has no effect on creative imagination. Harrison and Williams's (1986) study, which was better designed, provided evidence that TV's arrival was detrimental to children's divergent thinking as measured by a verbal test.

Correlational Studies

Correlations between TV viewing and children's creative imagination were established in seven studies (see Table 5). Except for the study by Peterson, Peterson, and Carroll (1987), all of these correlational studies controlled for one or more possible third variables. Four studies controlled for age, a variable known to be related to both TV viewing (Sprafkin et al., 1992) and creative imagination (Runco, 1992). The same four studies also controlled for sex. There is evidence that sex is related to TV viewing (Sprafkin et al., 1992), but there are no indications that boys and girls differ in creative imagination (Kogan, 1974; Wallach & Kogan, 1965). Zuckerman, Singer, and Singer (1980)

controlled for sex and age using partial correlation analysis, whereas investigators in the other three studies computed separate correlations for subgroups defined in terms of sex and age. Some of the correlational studies controlled for three other correlates of TV viewing: socioeconomic status (Sprafkin et al., 1992), intelligence (Sprafkin et al., 1992), and parenting style (Signorielli, 1991). Socioeconomic status (Runco, 1992), intelligence (Runco, 1992), and parenting style (Torrance, 1964) have also been shown to be related to creative imagination and hence might account for the relationship between TV viewing and creative imagination.

Peterson et al. (1987) reported simple bivariate relationships between TV viewing and divergent thinking. Amount of viewing was measured by means of time diaries kept by children, and divergent thinking was assessed using a nonstandardized alternative uses test that had children suggest alternative uses for TV sets. Heavy viewers could generate fewer alternate uses than light viewers.

TV's relationship to divergent thinking was investigated in four correlational studies that did control for third variables. Childs (1979), Furu (1971; 10- and 13-year-olds), and Vogler (1975) assessed total viewing using TV logs or time diaries. Wade (1971) and Furu (1971; 16-year-olds) used a more crude measure of viewing: child-reported direct time estimates. Childs (1979) found no significant correlations between total viewing and scores on verbal and figural Torrance divergent thinking tests (Torrance, 1974). Using the same measures of creative imagination, Vogler (1975) similarly found that the Torrance scores were mostly unrelated to TV viewing. Only verbal originality and figural elaboration were negatively related to TV viewing. In addition, children who frequently watched TV were rated as less creative by their teachers.

Furu (1971) used a Japanese verbal divergent thinking test that included many Alternate Uses and Just Suppose tasks. In Furu's (1971) first study, children who frequently watched TV and rarely read (the TV type) performed less well on the divergent thinking tests than did children who rarely watched TV and often read (the print type). This finding applied only to 13- and 16-year-olds; for 10-year-olds, no differences between the print type and the TV type were found. In Furu's (1971) second

Table 5
Correlational Studies on the Relationship Between TV Viewing and Creative Imagination

Study	Age (years)	N	Control variables	Measure of creative imagination	Direction of the relationship ^a
Furu (1971)	10, 13, and 16	1,489	Sex, age	Study 1 Summed score on Japanese verbal tests of divergent thinking (Sumida)	– (high-TV/low-print group was less creative than low-TV/high-print group only among older age groups)
	10 and 13	647	Sex, age, SES, IQ, etc.	Study 2 Summed score on Japanese verbal tests of divergent thinking (Sumida)	– (total viewing)
Wade (1971)	14	105	IQ	Summed score on verbal divergent thinking tests (Guilford)	– (total viewing)
Vogler (1975)	10	190	Parenting style	Verbal and figural divergent thinking tests (Torrance), scored on Fluency Flexibility Originality Elaboration	0 (total viewing) 0 (total viewing) – (total viewing, verbal test only) – (total viewing, figural test only)
Childs (1979)	8 and 12	121	Parenting style Sex, age	Teacher ratings	– (total viewing)
				Verbal and figural divergent thinking tests (Torrance), scored on Fluency Flexibility Originality Elaboration	0 (total viewing) 0 (total viewing) 0 (total viewing) 0 (total viewing)
Zuckerman, Singer, & Singer (1980)	9–11	167	Sex, age, SES, IQ, etc.	Teacher ratings	0 (total viewing) – (fantasy violent programs)
J. L. Singer, Singer, & Rapaczynski (1984a)	3–4 (Year 0); 8–9 (Year 5)	63	Parenting style, family lifestyle, etc.	Human movement responses to Barron Inkblots	– (total viewing) – (realistic action and adventure programs)
Peterson, Peterson, & Carroll (1987)	12 and 13	291	None	Nonstandardized Alternate Uses test scored on fluency	– (total viewing)

^a “–” stands for a negative relationship that is significant at least at the 5% level, and “0” for a nonsignificant relationship between TV viewing and creative imagination.

study, multiple regression analysis was used to investigate whether divergent thinking would contribute independently to the prediction of viewing time when background variables such as sex, socioeconomic status, and intelligence, as well as various measures of TV addiction, were included in the predictor set. When all of these variables were controlled, divergent thinking was not significantly related to TV viewing. However, when the various measures of TV addiction were removed from the predictor set, divergent thinking emerged as a significant negative predictor of TV viewing. In our view, the latter analysis provided a better test of the predictive value of divergent thinking because there is little logic in attempting to explain TV viewing in terms of a variable that is itself an alternative measure of TV viewing. Finally, Wade (1971) found a negative relationship between total viewing and aggregate scores on three divergent thinking tests after controlling for intelligence.

In the two remaining studies summarized in Table 5, creative imagination was related not only to total viewing but also to the frequency with which violent programs were watched (J. L.

Singer et al., 1984a; Zuckerman et al., 1980). In both studies, TV viewing was measured by means of TV logs kept by parents. In the Zuckerman et al. study, teachers rated children's creative imagination on a 4-point scale. Multiple regression analysis was used to determine the independent contributions of background and viewing variables to the prediction of creative imagination. Viewing variables included total viewing and viewing of eight different types of TV content. Children's viewing frequency for violent fantasy programs was the only viewing variable that contributed significantly to the prediction of creative imagination: Children who often watched violent programs such as “The Incredible Hulk” and “Wonder Woman” were rated as being less creative by their teachers.

J. L. Singer et al. (1984a) followed a group of preschool children over a 5-year period. In the last year of the study, creative imagination was assessed using Barron inkblots. Multiple regression predictions of the children's inkblot scores were conducted using background and viewing variables as predictors. Two viewing variables contributed to the prediction of the chil-

dren's inkblot scores: Total viewing established in the first year (Year 0) was related negatively to the Barron inkblot measure obtained 5 years later (Year 5); for subsequent measures of viewing time, only the time spent watching action and adventure programs was related negatively to the inkblot measure.

Conclusion. Because none of the correlational studies reported a positive relationship between TV viewing and creative imagination, it is not likely that TV stimulates creative imagination. The evidence is more in line with the reduction hypothesis, with more than half of the studies reporting a negative relationship between TV viewing and creative imagination. The design of the cross-sectional studies and the measures used appeared to have little effect on the results.

1. When the influence of possible third variables was controlled, approximately half of the studies still showed a negative relationship between TV viewing and creative imagination.

2. Negative relationships have been reported in studies using relatively accurate viewing measures (TV logs and time diaries) as well as in studies using weaker viewing measures (child-reported direct time estimates).

3. Negative relationships have been found in studies using divergent thinking tests as well as in those using inkblot and rating measures of creative imagination.

4. Finally, contrary to the findings of Harrison and Williams's (1986) natural experiment in three Canadian communities, the correlational studies produced no evidence that TV is differentially related to verbal and figural measures of divergent thinking.

The correlational studies were all based on the assumption that TV viewing and creative imagination are linearly related; none explored the possibility of a curvilinear relationship between TV viewing and creative imagination. In other domains of TV research, curvilinear relationships have been found between TV viewing and reading skills (for a review, see Beentjes & van der Voort, 1988) and between TV viewing and academic achievement (for a meta-analysis, see Williams, Haertel, Hearstel, & Walberg, 1982). In the latter study it was found, for example, that the TV-achievement relationship was slightly positive until the amount of viewing reached a threshold level (at 1.5 hr of viewing a day), above which the relationship was negative until viewing time reached a second threshold level (at 5 hr a day), beyond which additional viewing was unrelated to achievement.

In addition, most of the correlational studies failed to explore whether the TV-creative imagination relationship is sensitive to the type of programs watched. The results of two studies suggest that children who frequently watch violent programs display less creative imagination (J. L. Singer et al., 1984a; Zuckerman et al., 1980), a relationship that is consistent with the arousal hypothesis.

Experimental Studies on the Influence of TV Programs

In two experimental studies the influence of certain TV programs, rather than the influence of television per se, was investigated (see Table 6). Stern (1973) examined the differential influence of six program types on the creative imagination of highly gifted children. Children were requested to increase their viewing time for a period of 3 weeks and were assigned to watch as much as possible of one of six program types. Children in the

control group were encouraged to continue watching whatever programs they usually watched (normal viewing). Before and after the 3-week period, several Guilford divergent thinking tests were administered. The various program types had no differential effects on creative imagination. However, according to the author, the study did show that watching an increased amount of TV depressed children's creative imagination. This conclusion was based on an analysis in which the six experimental conditions were combined into one group and contrasted with the control group. According to the author, a sign-rank test applied to the pretest-posttest change scores observed for six subgroups on five creativity tests showed that the test scores of the experimental group decreased more frequently than did those of the control group. However, in this analysis, the author erroneously included, in addition to the independent cell means, all of the dependent marginals. A chi-square test we applied to the independent change scores revealed that the number of negative change scores found for the experimental group did not significantly differ from that found for the control group, $\chi^2(1, N = 30) = 1.72$.

Greenfield et al. (1990) explored the impact of toy-based cartoons on children's creative imagination. Toy-based cartoons show characters or objects that are also for sale as toys. The researchers examined what happened to children's creative imagination when they were confronted with toy characters from a cartoon they had just watched. After exposure to a 10-min *Smurf* cartoon (a) one group of children was asked to tell a story using *Smurf* toys; (b) a second group told their stories using *Troll* toys; (c) in a no-film control group the *Smurf* cartoon was replaced by a connect-the-dots game, followed by the assignment to tell a story with *Smurf* toys. For our purposes, only the comparison between the first and third groups is relevant, because we were interested in the effect of TV (not that of toys). Creative imagination was established by scoring children's stories on novel elements not already supplied in the toys present in the storytelling situation and the immediately preceding cartoon or dot game.

Compared with the no-film control group, children shown a *Smurf* cartoon made up stories with *Smurf* toys that contained fewer novel elements. However, this finding applied only to the physical elements (e.g., objects, locations, and physical activities) in the stories invented by children. When scarcely observable mental elements (e.g., mental activities, feelings, and mental states) were taken into consideration, a preceding confrontation with a *Smurf* cartoon turned out to inhibit the creative imagination of 7-year-olds and to stimulate the creative imagination of 6-year-olds. The latter finding was explained by the authors in terms of the different developmental stages of the two age groups. The confrontation with a concrete film story combined with program-related toys could help young children to introduce new mental elements into their stories because the concrete stimulus materials give them the opportunity to elaborate on what has been seen. Because older children are already able to exercise their creative imagination unaided by concrete tools, the confrontation with a concrete film and play materials could inhibit their production of novel mental elements.

Conclusion. In our view, Stern's (1973) study does not permit the conclusion that watching an increased amount of TV decreases creative imagination. In addition, it may be questioned whether this study really established the effect of an in-

Table 6
Experimental Studies on the Influence of TV Programs on Creative Imagination

Study	Age (years)	N	Comparison	Measure of creative imagination	Main results
Stern (1973)	9-12	227	Seven conditions: for a 3-week period an increased TV diet composed of educational programs, sports programs, cartoons, comedies, dramatic programs, children's favorite programs, and control (normal viewing)	Verbal, figural, and mathematical Guilford tests scored on fluency and originality	No significant differences in creative imagination
Greenfield et al. (1990)	6 and 7	110	Three conditions: <i>Smurf</i> cartoon followed by storytelling with Smurf toys, <i>Smurf</i> cartoon followed by storytelling with Troll toys, and no film (dot game) followed by storytelling with Smurf toys	Child-produced stories scored on physical and mental elements not already supplied in the toys present in the storytelling situation and the immediately preceding cartoon or dot game	Physical elements: <i>Smurf</i> cartoon followed by Smurf toys generated least creative stories Mental elements: Among 6-year-olds, <i>Smurf</i> cartoon followed by Smurf toys stimulated creative imagination; among 7-year-olds, <i>Smurf</i> cartoon followed by Smurf toys inhibited creative imagination

creased amount of viewing because Stern did not check whether the participants who were encouraged to increase their viewing time actually watched more TV. The study by Greenfield et al. (1990) is limited to a specific situation: exposure to toy-based programs and program-related toys. The study suggests that the confrontation with a toy-based program and program-related toys can decrease the originality of child-produced stories because children tend to incorporate observable physical elements from the film into their stories. However, the effect of toy-based programs on the introduction of unobservable mental elements in child-produced stories is more ambiguous and could be dependent on the child's level of cognitive development.

Experimental Media Comparisons

Six experiments in the United States were designed to test the visualization hypothesis, which postulates that TV is less stimulating for creative imagination than verbal media such as radio and print (see Table 7). In these media comparison studies, children were presented with either a story or a problem. The text of the story or problem was usually kept the same, whereas the presentation modality was varied. Besides TV (video), radio (audio), print (written text), or both were used to convey the stimulus materials.

Two studies (Kerns, 1981; Meline, 1976) compared TV's effect on creative imagination to that of audio and print media. Meline (1976) confronted children via video, audio, or print with four problems (e.g., the problem of getting people to stop smoking). Children were presented with one sample solution for each problem. Subsequently, the children were asked to invent and write down one new solution for each problem. Creative imagination was measured by scoring children's problem solutions on stimulus-free elements not found in the given information. As anticipated, 12-year-olds who saw the video presentation produced problem solutions that were less stimulus free than those invented by age-mates who heard the audio presentation. No significant differences in creative imagination

were found between print and audio or between print and video. For 13-year-olds, the results for the audio group had to be discounted because the experimenter inadvertently provided incorrect instructions. In this age group, the video presentation led to less stimulus-free problem solutions than did print.

Kerns (1981) exposed 12-year-olds to either (a) a 6-min fragment from the film *The Shopping Bag Lady*; (b) a silent version of the film fragment; or (c) a comparable but not identical audio version of the film story. For 16-year-olds, there was a fourth condition: a print version of the story. The story's ambiguous ending allowed for a variety of interpretations. Following the story, the children answered three questions designed to elicit creative responses to the story. The responses were scored on stimulus freedom, originality, fluency, and flexibility. The four presentation modalities did not result in differential effects on children's fluency and flexibility. As predicted, children who watched the film with sound were the least effective in producing stimulus-free and original responses. Surprisingly, the silent-film story evoked more stimulus-free and original responses than did the audio and print stories. The author attributed the latter finding to the fact that silent-film stories are more ambiguous than printed or audio stories.

In the remaining four experiments summarized in Table 7, only two conditions were compared: a TV story (video) and a radio story (audio). Greenfield, Farrar, and Beagles-Roos (1986) and Greenfield and Beagles-Roos (1988) interrupted a video or audio story just prior to the end, after which children were asked to think up a story completion. In both studies two stories were involved: *A Story, A Story*, an African folktale, and *Strega Nonna*, a story of a magical old woman. Creative imagination was operationalized as the number of novel elements in the story completions that were not found in the video or audio stimulus. The Greenfield et al. (1986) study, which involved White middle-class children, showed that video presentations evoked less stimulus-free story completions than did the audio presentations. However, for some indicators of creative imagi-

Table 7
Experimental Comparisons of the Effects of TV, Audio, and Print on Creative Imagination

Study	Age (years)	N	Comparison	Measure of creative imagination	Main results
Meline (1976)	12 and 13	120	Problem solutions presented via video, audio, and print	Child-produced problem solutions, scored on stimulus freedom (response elements not present in the given information)	<i>12-Year-olds</i> Video resulted in fewer stimulus-free solutions than audio No significant differences between print and audio, and between print and video <i>13-Year-olds</i> Video resulted in fewer stimulus-free solutions than print
Kerns (1981)	12 and 16	210	A 6-min story presented via video, silent film, audio, and print (16-year-olds)	Responses to questions, scored on stimulus freedom, fluency, flexibility, and originality	Video resulted in fewer stimulus-free and fewer original responses than silent film, audio, and print
Vibbert & Meringoff (1981)	9-10	60	A 10-min story presented via sound film, audio, and control (no story)	Content analysis of children's drawings of four selected points in the story	Film elicited drawings based on pictures in the film, whereas audio drawings more often relied on children's general knowledge and personal experience Film encouraged children to depict story content in nonconventional ways Audio elicited conventional drawings similar to those obtained from the control group No significant media differences in creative imagination
Runco & Pezdek (1984)	9 and 12	64	Two 8-min stories presented via video and audio	Adaptation of Torrance's Just Suppose test scored on fluency, flexibility, and originality	Video resulted in fewer novel elements in the story completions than audio, especially for the more comprehensible story
Greenfield, Farrar, & Beagles-Roos (1986)	7-8; 9-10	48	Two 8-min stories, interrupted just prior to the end, presented via video and audio	Children's story completions scored on novel elements not found in the video or audio stimulus	For the more comprehensible story, video resulted in fewer novel elements in the story completions than audio, a finding that held for White children but not for Black children
Greenfield & Beagles-Roos (1988)	7-8; 9-10	192	Two 8-min stories, interrupted just prior to the end, presented via video and audio	Children's story completions scored on novel elements not found in the video or audio stimulus	

nation the advantage of the audio presentation held only for one story, which Greenfield et al. judged as the one best understood by the children.

In Greenfield and Beagles-Roos's (1988) study, the Greenfield et al. (1986) data obtained from White middle-class children were extended to include new data collected from Black middle-class children and working-class children, both Black and White. Again, the video presentation led to less stimulus-free story completions than did the audio presentation. However, this effect was moderated by both content and audience factors. For the most important indicators of creative imagination, the advantage of the audio presentation held only for the better comprehended story. In addition, the audio presentation was superior to the video presentation only in the case of the White children. For the Black children, creative imagination did not vary across media, a result that could have been a consequence of the generally low creative-imagination scores of these children on the story completions.

Using the same stimulus materials that were used in the two aforementioned studies of Greenfield and colleagues (Greenfield & Beagles-Roos, 1988; Greenfield et al., 1986), Runco and Pezdek (1984) also compared the effects of TV and audio on creative imagination. Unlike in the Greenfield et al. studies, the

stories were not interrupted just before the end. When the children had watched or heard the complete stories, they were given an adaptation of Torrance's Just Suppose test, which required them to generate ideas in response to hypothetical questions about what would have happened if the story had turned out differently. The responses of the children were not scored on stimulus freedom but on fluency, flexibility, and originality. Contrary to Greenfield and colleagues, Runco and Pezdek did not find differential effects of video and audio on creative imagination. This finding confirmed the authors' expectations. According to Runco and Pezdek, creative abilities are generally stable and therefore cannot be influenced differentially by different media. We doubt, however, whether divergent thinking is a stable trait that cannot be molded by environmental influences because a series of studies have shown that children's divergent thinking is influenced by environmental factors such as models, incentives, and reinforcement (see Runco, 1992, for a review).

The fact that Greenfield and colleagues (Greenfield & Beagles-Roos, 1988; Greenfield et al., 1986) did find medium effects was, according to the Runco and Pezdek (1984), attributable to the less adequate experimental measure of creative imagination used in the Greenfield and colleagues studies. They

argued that the Greenfield and colleagues' measure, which had children complete an unfinished story, can be considered more of a convergent than divergent thinking task because it requires children to integrate the information presented and infer how the story should logically end. We doubt, however, that Greenfield and colleagues' measure tapped convergent thinking because the information that was presented did not logically lead to a single correct story completion but left room for a multitude of story endings. It is even possible that the Runco and Pezdek task was in fact less open-ended than Greenfield and colleagues' task. When a child is asked to indicate what would have happened if a specific event in a story had not occurred, the number of possible story completions is restricted not only by children's knowledge of everything that preceded that event but also by their knowledge of what happened after that event.

Besides the different operationalizations of creative imagination, various other differences in the design and methods used by Greenfield and Beagles-Roos (1988), Greenfield et al. (1986), and Runco and Pezdek (1984) can be held responsible for the different findings: (a) Whereas Runco and Pezdek used a between-subjects design, Greenfield and colleagues used a more powerful within-subjects design (Greenfield et al., 1986); (b) the test of creative imagination used by Runco and Pezdek elicited considerably fewer creative responses than did the test used by Greenfield and colleagues, which suggests that the former test might have been less sensitive (Greenfield et al., 1986); (c) the Runco and Pezdek study was conducted with an ethnically mixed group of children, which could explain the absence of medium effects because Greenfield and Beagles-Roos (1988) found that medium-related differences in creative imagination varied for different ethnic groups.

Finally, Vibbert and Meringoff (1981) asked children to create drawings depicting four selected points in a story that was presented via either video or audio. The drawings of the video and audio groups were compared with drawings about the same topics produced by a control group who had not seen or heard the story. The drawings were scored on the presence or absence of specific story content as well as on form features such as figure orientation (e.g., frontal vs. side view) and perspective. Children exposed to the audio condition produced relatively stimulus-free drawings, which were often based on their general knowledge and experience rather than on the specific content of the story. Children who watched the film, by contrast, produced more stimulus-bound drawings: Both the content and form of their drawings were often directly derived from pictures shown in the film. Compared with the controls, the children who watched the film produced less conventional drawings, whereas the audio children produced drawings that were similar to those made by the control group. The less conventional nature of the film drawings was attributable to the unconventional examples set by the film, for example, a close-up, head-on depiction of a fish instead of the conventional side view. It cannot be concluded that the film drawings were more original because the film children actually copied what they had seen in the film. Greenfield (1984) suggested that although TV may not lead to more imaginative drawings, it may foster visual skills, such as those required for the creation of visual perspective.

Rival explanations. According to D. R. Anderson and Collins (1988), the media comparison studies might have confounded differences between media and the amount of informa-

tion provided by each medium. They argued that because the verbal stories contained less information than the audiovisual versions, the children who completed the verbal stories were forced to fill the holes in their knowledge by generating novel information. To clarify their argument, D. R. Anderson and Collins presented the following two sentences: (a) "A person was walking down a street when something happened and the person stopped" and (b) "An old man with a cane was walking down the street when a traffic light signaled 'don't walk,' so he stopped." Of course, a person asked to complete the story given in the first sentence would be expected to provide more novel and nonrepetitive information than an individual given the more informative second sentence. Likewise, the verbally informed children in the media comparison studies could be expected to incorporate more novel and fewer nonrepetitive elements in their story completions than the better informed "television children," not because verbally informed children were exposed to a different medium but because they were provided with less information.

There is no question that verbally informed children in the media comparison experiments received less information than did the TV children. In all media comparison studies, the TV children received detailed additional visual information about the story's setting and the characters' appearances that was not conveyed through the soundtrack. Only some of these visual details could be incorporated into the verbal stories because verbal descriptions of all visual details would have led to extremely long and tedious texts. However, the fact that TV provides additional visual information constitutes an inevitable and inherent difference between the two media. In our opinion, D. R. Anderson and Collins's rival "less information" explanation would be relevant only if the verbal stories in the media comparison experiments could be shown to lack essential information that is conveyed in the TV stories. The media comparison studies did not investigate whether the TV stories would contain essential extra information. The less information explanation therefore deserves further exploration. We do think, however, that D. R. Anderson and Collins's less information hypothesis provides a possible explanation for Kerns's (1981) finding that a silent-film story elicited more novel responses than did verbal and audiovisual stories. Because Kerns's silent-film condition was created by eliminating the soundtrack from an audiovisual film, the children who received the silent-film story were deprived of essential story information.

A second possible rival explanation, discussed by Greenfield and Beagles-Roos (1988), is that the verbal messages elicited more novel responses because they were remembered less well than were the TV messages. A series of studies indeed showed that children remember a TV story better than a verbal story (Beagles-Roos & Gat, 1983; Beentjes & van der Voort, 1991a, 1991b; Gibbons, Anderson, Smith, Field, & Fischer, 1986; Greenfield & Beagles-Roos, 1988; Hayes, Kelly, & Mandel, 1986; Meringoff, 1980). Because the verbal message was less clear in children's minds, the verbally informed children might have been less able to incorporate repetitive elements in their responses than were children shown an audiovisual message. The view that differential recall provides a rival explanation is based on the assumption that superior story recall results in story endings that contain more repetitive and fewer novel responses, whereas inferior story recall results in fewer repetitive

and more novel responses. If this assumption is true, one would expect to find a negative correlation between the number of repetitive and novel responses produced by children. Instead of a negative correlation, however, Greenfield et al. (1986) found a nonsignificant positive correlation ($r = .16$) between repetitive and novel responses, which suggests that the number of novel (and repetitive) responses does not depend on the level of story recall.

Even if recall does not influence the quantity of novel responses, the possibility remains that differential recall may influence the quality of novel responses. Because verbal information is less well remembered, the story completions produced by audio children could be less relevant, in the sense that they more frequently contain novel elements that are inconsistent with the preceding story information. The degree to which story endings were consistent with the preceding story information was not systematically examined in the media comparison experiments. However, on the basis of informal observations, Greenfield and Beagles-Roos (1988) noted that "imaginative endings were not irrelevant to the preceding story but typically maintained continuity with it" (p. 86), which suggests that irrelevant novel responses seldom occurred in the story endings. In summary, although it is not impossible that differential recall was a confounding variable in the media comparison experiments, there is no indication that it provides a plausible rival explanation.

Conclusion. Except for the Runco and Pezdek (1984) study, all media comparison experiments suggest that TV presentations are less stimulating for creative imagination than verbal presentations. However, verbal presentations do not lead to more stimulus-free responses in all circumstances. The effect of verbal presentations, as opposed to TV presentations, on stimulus-free responses is modified by two factors:

1. *Content factors;* Greenfield et al. (1986) and Greenfield and Beagles-Roos (1988) found that the advantage of audio presentation is most pronounced when the content is readily comprehended by the child.

2. *Audience factors;* the advantage of audio presentation seems to be moderated by ethnicity (Greenfield & Beagles-Roos, 1988).

The media comparison studies have only demonstrated that children who receive information via TV tend to use fewer novel elements in creative tasks that are closely related to the stimulus materials. Further research should investigate whether the reductive effects on creative imagination observed in the media comparison experiments also apply to creative tasks that are unrelated to stimulus materials. It is questionable, however, whether the short film fragments used in the media comparison experiments are sufficiently powerful to yield changes in creative imagination on non-stimulus-related tasks. A more appropriate test of the latter effect is probably provided by studies that assess the effects of prolonged media exposure on creative imagination, for example, field experiments comparing children exposed to a verbal or audiovisual media "diet" for several weeks.

It must be noted, however, that even if the effect of TV is confined to stimulus-related tasks, it would not necessarily follow that TV's effect on creative imagination is negligible. A stimulus-related TV effect need not only pertain to tasks related to films children have just seen but may also extend to tasks

related to information children have acquired via TV in the past. TV accounts for an overwhelming proportion of children's media exposure, and there are many aspects of social reality for which TV acts as a primary source of information (e.g., occupations, politics, news items, foreign countries and cultures). Moreover, TV images have been shown to be well remembered. It is therefore possible that children who are engaged in a creative task that is seemingly unrelated to TV may associate the content of that task with information previously acquired via TV and consequently have difficulty dissociating themselves from images derived from TV. Such a delayed stimulus-related effect of TV on creative imagination would probably be more likely to occur as children watch more TV and less frequently use verbal media.

The Hypotheses Revisited

Stimulation Hypothesis

The stimulation hypothesis assumes (a) that TV provides a source of ideas from which the individual can draw when engaged in creative tasks and (b) that this results in an improvement in the quality or quantity of creative products. It is evident that TV, in its role as information provider, can enrich the viewer's repertoire of ideas (Assumption A). The media comparison experiments have demonstrated, for example, that children who have just seen a film story incorporate elements from the film in their story completions or drawings. However, there is little evidence that the quality or quantity of creative products is improved through exposure to TV (Assumption B); none of the studies demonstrated positive relationships between TV viewing and creative imagination. The only evidence that TV fosters the quality of creative products is the finding that TV may further the technical quality of drawings made in response to film stories (Vibbert & Meringoff, 1981). Therefore, there is little indication that the stimulation hypothesis holds true.

Reduction Hypotheses

The available evidence. The majority of the cross-sectional correlational studies showed that TV viewing and creative imagination were negatively related, and in approximately half of the correlational studies the negative relationship remained when possible third variables were controlled. The latter studies suggest that there is a genuine negative relationship between TV viewing and creative imagination, although the causal direction of this relationship remains unclear.

However, the available experimental evidence suggests that TV is the cause and creative imagination the effect. The quasi-experimental study carried out during the introductory stage of TV that was least open to methodological criticism (Harrison & Williams, 1986) showed that TV's arrival resulted over time in a decrease in creative imagination. In addition, most experiments that established the short-term effects of exposure to short films suggested that TV leads to less creative imagination than do verbal media.

In summary, each of the different types of research that have been conducted provide indications that TV viewing and creative imagination are negatively related. However, findings from

the cross-sectional correlational studies do not permit causal interpretations, and the (quasi-)experimental studies that have been carried out do not permit conclusive causal interpretations because they do not completely rule out rival explanations. Therefore, the scientifically conservative conclusion is that the weight of evidence is in favor of the reduction hypothesis but that decisive evidence of a causal relationship is absent.

Visualization hypothesis. The visualization hypothesis, which has been investigated in the media comparison studies, is the only reduction hypothesis that has been directly tested. The hypothesis is based on three assumptions: (a) Because the visual medium presents the viewer with ready-made visual images, TV leaves less room for forming one's own images than do verbal media; (b) viewers have difficulty dissociating themselves from TV images during thinking; and (c) as a result of Assumption B, the development of creative imagination is impaired.

It is obvious that TV viewers do not need to produce their own visualizations, whereas readers and listeners are induced to convert verbal information into their own visual images (Assumption A). Assumption B is supported by media comparison studies that had children draw inferences from a TV or radio story. These studies indicated that children who had watched a TV story more often used visual content as a basis for drawing story-related inferences, whereas children who had heard the radio story more often based their inferences on the verbal content and on information from outside of the story, such as personal experience (Beagles-Roos & Gat, 1983; Greenfield & Beagles-Roos, 1988; Meringoff, 1980; Vibbert & Meringoff, 1981). Finally, Assumption C is supported by the media comparison experiments that suggested that TV led to fewer stimulus-free responses than did radio or print.

Although the media comparison experiments suggested that TV actually stimulated creative imagination less than did verbal media, it was not ascertained whether TV's negative effect occurred because viewers had difficulty dissociating themselves from TV images while thinking (Assumption B). Kerns (1981) demonstrated that a silent film, which contained only visual information, elicited more creative responses than did verbal media. The author attributed her finding to the fact that silent films are more ambiguous and hence leave more room for one's own interpretations than do verbal media. Kerns's finding suggests that TV may reduce creative imagination not so much because it provides ready-made images, but because it provides ready-made images that, owing to the additional auditory and verbal information, do not leave much room for further interpretation.

In the visualization hypothesis the influence of TV on creative imagination is contrasted only with that of verbal media. The hypothesis fails to stipulate how TV's influence may differ from that of other information-providing experiences. If TV's reductive effect on creative imagination is a result of the explicit visual images supplied by the medium, it may well be that this effect is not specific to TV but also applies to other audiovisual experiences, such as witnessing a car accident or visiting an art museum. Although TV images need not be unique in their potential to reduce creativity, TV has two properties that may increase its influence relative to that of other audiovisual experiences. First, as a window to reality, TV acts as a primary source of information for a great many aspects of reality that one could not observe through direct experience. Second, TV provides

common experiences that are shared by most people. Whereas the images gained from direct experience are stored only in the memories of actual eyewitnesses, TV images that are watched by a wide audience create a collective memory, which may set bounds on the originality of thinking.

Rapid pacing hypothesis. The validity of the rapid pacing hypothesis has never been established. Although it is unknown whether the mechanisms proposed by the rapid pacing hypothesis indeed form the foundation of a reductive effect of TV on creative imagination, we may examine whether the available evidence gives reason to believe that these mechanisms operate at all. The rapid pacing hypothesis assumes that (a) TV leaves the viewer little time to reflect on the program content because of the medium's rapid pace and continuous movement; (b) reflective thinking therefore decreases; (c) reflective thinking is a condition for creative imagination; and (d) as a consequence of Assumptions B and C, the development of creative imagination is impaired.

Of course, rapidly paced programs leave children less room for reflection on program content than slowly paced programs (Assumption A). Contrary to Assumption B, there is no evidence that fast-paced programs hinder reflective thinking (e.g., D. R. Anderson, Levin, & Lorch, 1977). Nevertheless, there are some indications that TV viewing per se can lead to less reflective thinking and, more specifically, that TV may shorten the time people are willing to spend searching for an answer to intellectual problems they are asked to solve (e.g., Suedfeld, Little, Rank, Rank, & Ballard, 1986). Consistent with Assumption C, there is evidence that reflective thinking is important for creative imagination (Harrison & Williams, 1986; Tardif & Sternberg, 1988). However, whether TV-induced decreases in reflective thinking are responsible for reductions in creative imagination has not been studied.

Passivity hypothesis. The validity of the passivity hypothesis has also never been directly investigated. Some studies have, however, examined the validity of the assumptions on which the passivity hypothesis is based. The passivity hypothesis assumes that (a) the processing of TV information requires little mental effort; (b) the low level of mental effort elicited during TV viewing leads to a tendency to expend little mental effort in other domains; (c) the viewer consumes fantasies produced by others; (d) creative performance requires mental effort; and (e) as a result of Assumptions B–D, the development of creative imagination is hindered.

Although children in particular are cognitively far from passive while watching TV (Collins, 1982), there is evidence that TV viewing requires less mental effort than does reading (Beentjes, 1989; Salomon, 1984), lending some support to Assumption A. It has, however, never been investigated, to our knowledge, whether TV viewing leads to a general tendency to expend little mental effort (Assumption B). Of course, TV viewers consume fantasies produced by others (Assumption C), but there is little reason to assume that this results in reductions of creative imagination. People who read a story, listen to a story, or watch a play also consume fantasies produced by others. Nevertheless, it has not been argued that verbal stories or theater hinder the development of creative imagination. Consistent with Assumption D, there is evidence that creative performances require concentrated mental effort (Sternberg & Lubart, 1991; Tardif & Sternberg, 1988). However, to our knowledge it has never been investigated whether TV-induced de-

creases in mental effort are responsible for reductions in creative imagination (Assumption E).

Arousal hypothesis. Because the validity of the arousal hypothesis has also not been directly investigated, the discussion again must be confined to the evidence relevant to the assumptions that underlie this hypothesis. The arousal hypothesis argues that (a) watching action-oriented and violent programs has arousing effects on the viewer; (b) the arousal produced by these programs leads to a restless and impulsive behavioral orientation; (c) creative performance requires that one allows oneself the peace and quiet needed to give a matter considerable thought; and (d) as a result of Assumptions B and C, the development of creative imagination is hindered.

Violent programs can produce intense arousal in the viewer (Zilman, 1991), a finding that lends support to Assumption A. Assumption B is supported by research showing that violent programs may increase children's restlessness (J. L. Singer, Singer, & Rapaczynski, 1984b) and impulsivity (C. Anderson & McGuire, 1978) and may diminish children's tolerance of delay (Friedrich & Stein, 1973). Assumption C is confirmed by research showing that an ability to tolerate aloneness with one's thoughts and ideas is important for creative performance (Dellas & Gaier, 1970).

Although there is evidence in support of Assumptions A–C, to our knowledge it has not been directly investigated whether the mechanisms proposed in these assumptions are responsible for reductions in creative imagination (Assumption D). It is true that two correlational studies found that watching a large number of violent programs went together with a low level of imagination (J. L. Singer et al., 1984a; Zuckerman et al., 1980), but it is unclear whether this relationship resulted from a TV-induced impulsive behavioral orientation.

Displacement hypothesis. This hypothesis argues that (a) TV viewing takes time from other activities, which (b) are thought to stimulate creative imagination more than does TV viewing, (c) with the result that the development of creative imagination is hindered.

Assumption A is supported by research that showed that the arrival of TV resulted in a displacement of other media, such as the cinema, comic books, radio (see D. R. Anderson & Collins, 1988, for a review), and books (see Beentjes & van der Voort, 1989, for a review). To our knowledge, it has not been investigated whether the cinema or comic books stimulate creative imagination more than TV viewing. However, the media comparison experiments suggest that radio and books do enhance creative imagination more than TV viewing, a finding that lends support to Assumption B. Although there is evidence for Assumptions A and B, it has not been directly investigated whether these assumptions form the basis of TV's tendency to reduce creative imagination. Harrison and Williams (1986) showed that the arrival of TV did lead to a decrease in children's creative imagination, but the authors failed to check whether this reductive effect was caused by a diminished use of verbal media such as radio and books.

In summary, it may be concluded that there is evidence that the causal mechanisms proposed by the visualization, arousal, and displacement hypotheses actually operate. What remains to be proved, however, is whether these causal mechanisms really are responsible for TV-induced decreases in creative imagination. The assumptions that underlie the rapid pacing and passivity hypotheses have been supported only partially by research because there are no indications that fast-paced programs hinder reflective thinking or that TV leads to a general tendency to expend little mental effort.

Epilogue

Main Conclusions

As noted earlier, daydreaming and creative imagination overlap to some extent but are unmistakably different cognitive processes. Therefore, TV's influence on daydreaming can be different from, or even opposed to, TV's influence on creative imagination. The available research indeed provides indications that TV may affect daydreaming and creative imagination differently. Although decisive evidence of a causal relationship is absent, the weight of evidence favors the view that TV viewing fosters daydreaming and hinders creative imagination. With respect to daydreaming, the stimulation hypothesis therefore seems to be the best working hypothesis, whereas the reduction hypothesis is the most eligible working hypothesis in the case of creative imagination.

Assuming that these working hypotheses hold true, there arises the question of how it is possible that TV could have differential effects on daydreaming and creative imagination. This question cannot be answered definitively on the basis of the available research because most research has examined only how TV viewing is factually related to daydreaming and creative imagination, without exploring what mechanisms underlie the relationships found. Nonetheless, there is sufficient circumstantial evidence to explain why TV may influence daydreaming positively and creative imagination negatively.

When one examines more closely the different hypotheses about TV's influence on daydreaming and creative imagination, the hypotheses appear to refer to different roles that TV can simultaneously play in the viewer's life. The stimulation hypotheses refer to the role TV plays as an information provider (Dorr, 1986). TV is thought to have a stimulating effect because it enriches the store of information from which viewers can draw when engaged in daydreaming or generating creative ideas. Reduction hypotheses, on the other hand, focus on two other roles that Dorr (1986) ascribed to TV. In some reduction hypotheses, TV is regarded as a medium that provides a special information-processing experience. It is feared that TV viewing furthers information-processing habits that interfere with daydreaming and creative activities. Other reduction hypotheses focus on TV's role as a time-consuming activity. It is argued that TV viewing takes time away from daydreaming and activities that are thought to stimulate creative imagination. Because TV can simultaneously play the different roles to which the stimulation and reduction hypotheses refer, it is in principle possible that TV stimulates and reduces daydreaming and creative imagination at the same time. In this view, the net effect of TV on daydreaming and creative imagination is determined by the type of effect that is most powerful, TV's stimulating or reductive effect.

In the case of daydreaming, TV's stimulating effect is probably stronger than its reductive effect. There is little doubt that TV encourages daydreaming via its role as information provider. Because in principle all experiences gained by people can be incorporated in daydreams, it is evident that the experiences learned during many hours spent watching TV can also induce daydreaming. On the other hand, there are no indications that TV's stimulating effect is annulled because it is counteracted by the two other roles TV can play. TV viewing has not been shown

to lead to information-processing habits that interfere with daydreaming. First, it has not been demonstrated that people's visual imagery ability is impaired because TV provides them little practice in forming their own visual images. Second, there is no reason to suspect that daydreaming is hindered because TV cultivates a passive let you entertain me attitude. In addition, even if TV did lead to such a "lazy" attitude, it probably would not hinder daydreaming because daydreaming is a spontaneous process that requires little or no mental effort. Finally, there is also no evidence to suggest that TV discourages daydreaming through its role as a time-consuming activity. Watching TV and daydreaming can be combined, and some observers even believe that people daydream frequently while watching TV (e.g., Klinger, 1990).

Whereas the stimulating effect of TV on daydreaming seems to meet with little opposition from reductive effects, the balance with respect to TV's influence on creative imagination seems to tip toward the negative side. As an information provider, TV enriches the repertoire of ideas from which viewers can draw when engaged in creative tasks. Although an enrichment of the viewer's repertoire may be assumed to encourage imagination, there is little evidence that the quality of creative products is improved through TV. A possible reason is that TV's stimulating effect is overridden by effects in the opposite direction associated with two other roles of TV. First, TV viewing may lead to information-processing habits that interfere with creative imagination. There is evidence that TV may adversely affect a number of conditions that are important for creative imagination, that is, the ability to dissociate oneself from existing information, a reflective style of thinking, sustained effort, and the peace and quiet necessary to give a matter careful thought. Although it has not been directly investigated, it is possible that these adverse effects on information-processing habits are responsible for TV's reductive effect on creative imagination. It is also possible that TV suppresses creative imagination via its role as a time-consuming activity. TV viewing occurs at the expense of the time spent with verbal media, such as radio and books, which could stimulate creative imagination more than TV viewing does.

To summarize, TV may stimulate both daydreaming and creative imagination through its role as information provider. In the case of daydreaming this stimulating effect probably prevails. Because daydreaming makes few demands on people's information-processing habits, there is no reason to suspect that daydreaming is hindered because TV adversely affects the development of information-processing habits. TV's stimulating effect on creative imagination, by contrast, may be outweighed by TV's more powerful reductive effect. The stimulating effect could be undermined, on the one hand, because TV is detrimental to information-processing skills that are important for creative imagination. On the other hand, TV viewing could occur at the expense of other activities that have a greater stimulating effect on creative imagination.

Suggestions for Further Research

TV and Daydreaming

Because there is no evidence to suggest that TV hinders daydreaming, there is no need for further research into the validity

of the various versions of the reduction hypothesis that have been proposed. The stimulation hypothesis, however, deserves further research attention. The short-term stimulating effects of TV on daydreaming have been studied only in two experiments, which were confined to the influence of violent programs on children's aggressive fantasies. Therefore, there is a need for laboratory and field experiments that systematically assess the influence of different types of TV programs on different daydreaming themes.

The laboratory experiments should investigate not only whether TV programs stimulate daydreaming but also the conditions that may codetermine TV's stimulating effect on daydreaming. As formulated in the literature, the stimulation hypothesis is a simplistic input-output proposition, which states only that the consumption of TV content (input) results in daydreaming about corresponding themes (output). The stimulation hypothesis should therefore be enlarged to include postulates about the determinants of TV's stimulating effect on daydreaming. These postulates can in part be derived from theories of daydreaming. Klinger's (1990) daydreaming theory suggests, for example, that daydreaming is more likely to occur if people are confronted with external stimuli that correspond to their current concerns or stir their emotions. Applied to TV, this theory would suggest that daydreaming is more likely to occur if TV's content is associated with people's current concerns or arouses us emotionally. These predictions can be tested through experiments in which subjects' current concerns as well as the content and emotional impact of TV programs are experimentally varied. The frequency and thematic content of the daydreams that subjects generate during and after TV exposure can be assessed by signaling the subjects at short intervals and asking them to describe their thoughts.

Experiments are useful only for establishing TV's short-term effects on daydreaming and for testing effects hypotheses. Therefore, there is a need for causal correlational research on the longitudinal relations between TV viewing and daydreaming. Long-term studies should not only address possible stimulating effects of TV on daydreaming but also pay attention to the possible influences of daydreaming on TV viewing as predicted by the thematic correspondence hypothesis and both versions of the escapism hypothesis.

The following points should be taken into consideration in the planning of future longitudinal causal correlational studies.

1. In addition to total viewing time, the amount of time spent watching different program types should be examined. It is advisable that factor analysis be used to determine whether program types that are distinguished a priori can be confirmed empirically.

2. Future research should investigate an extended number of daydreaming themes as well as the total amount of daydreaming. The IPI-C should be expanded because the reliabilities of the subscales measuring daydreaming themes leave much to be desired (Vooijs, Beentjes, & van der Voort, 1992). Because of the absence of a suitable measurement instrument, there is no research that has addressed the influence of TV on the daydreaming patterns of adolescents, the age group for which daydreaming is at its peak (J. L. Singer, 1975a). Therefore, the development of a questionnaire specifically designed to measure adolescents' daydreaming is necessary. This questionnaire should represent the themes of daydreaming that are prominent

among adolescents: romance, sex, achievement, and occupation (Klinger, 1969).

3. Studies carried out with children should investigate background variables such as age and sex, which are correlated with both TV viewing and daydreaming. Studies conducted with adults should include measures of age, sex, socioeconomic status, and ethnicity. Before controlling for these possible third variables, the investigator should seriously consider the causal model involved. It may be that the causal model entertained by the researcher is better tested by means of separate analyses of subgroups defined in terms of sex and age, for example.

TV and Creative Imagination

Although there is no evidence that TV stimulates creative imagination, it cannot be ruled out that specific types of TV programs may foster creative imagination. In a related domain of TV research, no evidence was found that TV stimulates fantasy play; nonetheless, it was shown that fantasy play could be encouraged through programs that were specifically designed to foster fantasy play (van der Voort & Valkenburg, 1994). Similarly, it is possible that children's creative imagination could benefit from educational programs meant to foster creative imagination.

As discussed earlier, there is evidence to suggest that the causal mechanisms proposed by the visualization, arousal, and displacement hypotheses actually operate. However, it remains to be proved that these mechanisms really are responsible for TV-induced decreases in creative imagination. Although the assumptions that underlie the rapid pacing and passivity hypotheses have received only partial empirical support, these hypotheses have not been proved wrong. There are thus at least three and possibly even five plausible explanations for why TV may have reductive effects on creative imagination. The five explanations are by no means mutually exclusive, and on the basis of the available evidence, it is not possible to single out one as the most plausible. We discuss shortly the research needed to investigate each of the five reduction hypotheses.

The rapid pacing and passivity hypotheses attribute reductive effects to TV-induced changes in information-processing habits (decreases in reflective thinking and mental effort), which can be expected to have observable consequences only in the long term. It therefore makes little sense to validate these hypotheses through laboratory experiments. The rapid pacing hypothesis can be tested in field experiments comparing children exposed to a "diet" of either slowly or rapidly paced programs for a relatively long period. Longitudinal panel studies seem to be less suitable for exploring the validity of the rapid pacing hypothesis because "slow" and "fast" programs are unlikely to represent separate dimensions in children's viewing behavior.

The validity of the passivity hypothesis, however, can be explored via panel studies. At each measurement time, data collected on children's TV viewing and creative imagination should be extended to include data on the amount of mental effort children invest in cognitive tasks. Children's mental effort can be assessed by means of retrospective questions (Salomon, 1984) or by measuring secondary reaction times, although further research on the validity of both methods is needed (Beentjes & van der Voort, 1993). Four additional points should be considered when conducting panel research:

1. Panel studies should pay attention not only to the effects view but also to the functional view, according to which people's creative abilities determine the amount of time they spend watching TV.

2. It must be determined whether there is a curvilinear relationship between TV viewing and creative imagination.

3. It should be examined whether the TV-creative imagination relationship is sensitive to program types that can be distinguished empirically through factor analysis.

4. Finally, the causal model that is tested should include the background variables socioeconomic status, intelligence, and parenting style, which have been shown to be correlated with both TV viewing and creative imagination.

The displacement hypothesis attributes reductive effects to the displacement of activities that are assumed to encourage creative imagination, a phenomenon that probably has observable consequences only in the longer term. Laboratory experiments are therefore not suitable for testing the displacement hypothesis. Of greater value would be TV-deprivation studies in which families are requested to reduce their viewing time temporarily, if possible, to zero. However, this research approach may not be practicable because it is unlikely that many families would be willing to make do without TV for a period of time long enough to reveal consequent changes in creative imagination. Panel research seems to be the most workable research approach. In addition to measures of TV viewing and creative imagination, each data wave should include measures of the amount of time subjects spend on activities that are thought to further creative imagination.

The validity of the arousal and visualization hypotheses can be examined through laboratory studies because the causal mechanisms proposed by these hypotheses are perceptible during and directly after a film is watched. The arousal hypothesis can be validated through laboratory and field experiments comparing children exposed to either violent or nonviolent programs. In addition, panel studies can be carried out to investigate whether the viewing of violent programs affects creative imagination in the long term.

The visualization hypothesis attributes TV's reductive effect on creative imagination to an inability to dissociate one's thoughts from TV images. This inability is conditional, arising only when thinking is TV related; it is not a general trait that can be investigated as an intervening variable in a panel design. Therefore, the validity of the visualization hypothesis cannot be tested by means of panel studies. It is possible to investigate the visualization hypothesis through field experiments that compare children exposed to either a TV or a verbal media diet, although such experiments would not reveal why creative imagination may be differentially affected by verbal and audiovisual media.

In media comparison experiments carried out in a laboratory setting, an indirect indication of the difficulty viewers experience dissociating themselves from TV images may be obtained through an inference test measuring the extent to which children's thinking is based on visual information conveyed in programs that have just been watched (e.g., Greenfield & Beagles-Roos, 1988; Meringoff, 1980). Media comparison experiments should pay attention to the two previously discussed rival explanations for the finding that verbal messages lead to more novel responses than do TV messages. The rival "less information"

hypothesis may be addressed by checking whether the TV images contain essential additional information that is absent in the verbal message. The second rival explanation, which attributes the superiority of the verbal message to the fact that it is less well remembered, can be tested through the introduction of an additional verbal condition in which children are better able to remember the verbal message, for instance, because it is presented twice.

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