Age Differences in Children's Responses to Television Advertising: An Information-Processing Approach

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Age differences in children's responses to television advertising are examined from an information-processing perspective. Evidence is reviewed that identifies age differences in learning, and describes the mechanism underlying these differences. On the basis of these data, appropriate strategies to regulate advertising for different age segments are identified.

During the past decade, there has been growing regulatory concern about the fairness of advertising to young children. It is contended that young children are unaware of the selling intent of television advertising, viewing it as a form of "informational programming." It is also asserted that young children recall little of the commercial content, and fail to assimilate the information necessary to understand the product message. And, there is a concern that children will learn content peripheral to the main selling proposition, particularly content conveying social norms and beliefs (Ratner 1978).

These contentions have served as the impetus for research pertaining to age-related differences in children's reactions to television advertising. Evidence from correlational studies suggests that older children pay less attention to advertising (Ward, Levinson, and Wackman 1972), are more able to discriminate between programs and commercials (Robertson and Rossiter 1974, Ward, Reale, and Levinson 1972), exhibit greater understanding of advertising's persuasive intent (Blatt, Spencer, and Ward 1972; Robertson and Rossiter 1974; Ward, Reale, and Levinson 1972; Ward, Wackman, and Wartella 1977), believe advertising is less truthful (Blatt et al. 1972; Clancy-Hepburn, Hickey, and Neville 1974; Robertson and Rossiter 1974; Ward, Reale, and Levinson 1972; Ward et al. 1977), and recall more of the commercial content than their younger counterparts (Blatt et al. 1972; Rubin 1974; Hendon, McGann, and Hendon 1978; Ward, Reale, and Levinson 1972; Ward et al. 1977).[1]

The prevailing candidate as an explanation for age differences in children's reactions to television advertising has been Piaget's theory of cognitive development (Wackman and Wartella 1977; Ward 1974; Ward et al. 1977). According to this view, age differences are explained in terms of stages. Each stage is characterized by the cognitive structures the child uses in perceiving and handling information from the environment. Cognitive structures are viewed as mediating the child's understanding of events and concepts. For example, children in the preoperational stage (two to seven years) have poorly organized ways of thinking about objects or ideas, concentrating only on dominant dimensions of a stimulus. In contrast, children in the stage of formal operations (11 years and older) have the ability to think abstractly about ideas, and reason using all possible information contained in a stimulus (Wackman and Wartella 1977). Piaget's conceptualization of children's cognitive abilities and research based on this framework have been instrumental in extending our understanding of age-related differences in children's responses to television advertising.

Although Piaget's theory has proved useful in describing age-related patterns, it is less than adequate as a theory of children's cognitive activity. Piagetian research with preschoolers, using training procedures to increase performance, has failed to confirm the theory's predictions regarding the limited capabilities of children in this age group (Gelman 1978). Methodological problems with statistical estimates of stage-related learning have also been noted (Brainerd 1977). Perhaps the most important shortcoming is the level of mechanistic detail provided to explain children's cognitive activity. Piaget's cognitive structures indicate limits on children's capacity to process information, but they do not explain how or why children process in-

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[1]Children's reactions to television advertising can also be affected by a variety of interpersonal variables. For an introduction to this topic, see Adler (1977).

formation within these limits (Calder, Robertson, and Rossiter 1975). As a result, Piaget's theory is silent with respect to the strategies likely to promote processing in young children.[2]

Several approaches have emerged to provide the level of mechanistic detail lacking in Piaget's theory. One of the most promising for understanding age differences in reactions to television advertising is information-processing theory.[3] This theory extends the Piagetian approach by providing a more detailed description of cognitive functioning in the light of structural limitations. According to this view, incoming information from a television commercial is represented in a store called short-term memory (STM). This store is of limited capacity, capable of holding a small amount of information for a short period of time. Given this limitation, information in STM is likely to decay unless it is transferred for permanent storage in long-term memory (LTM).[4] The mechanisms whereby information is transferred between STM and LTM are rehearsal and retrieval. Permanent storage in LTM is achieved by active rehearsal and elaboration of information in STM. Information in STM may also serve as a cue that stimulates the retrieval of thoughts from LTM, and results in their representation in STM. The incoming commercial information and the retrieved information represented in STM are the basis for children's reactions to the object of a commercial advocacy (Bettman 1979).

The information-processing view interprets age differences in children's reactions to television advertising in terms of cognitive abilities to store and retrieve information. The best documented shortcoming of young children is their failure to evoke and utilize cognitive plans for storing and retrieving information. Two types of deficiencies have been identified—production deficiencies and mediational deficiencies (Flavell 1970). Children with production deficiencies have the capacity to use storage and retrieval strategies as a means for remembering information. But this capacity is used only when they are prompted to do so. Children with mediational deficiencies can follow instructions to use storage and retrieval strategies, but cannot utilize the strategies to enhance remembering. Thus, instructions to use a learning strategy correct the problems exhibited by children with production deficits, but do not overcome the problems faced by children with mediational deficits.

In this paper, the author distinguishes three types of processors, reflecting different processing deficiencies—*strategic, cued,* and *limited.* Strategic processors are typically older children who possess and use the skills necessary to store and retrieve information. Younger children are characterized as cued processors; they exhibit production deficiencies in that they are capable of using storage and retrieval strategies only when prompted to do so. Limited processors, usually very young children, exhibit mediational deficiencies. These children cannot use storage and retrieval strategies to enhance learning even when prompted to do so.

If the information-processing view is correct, it has important implications for regulatory strategy. It suggests that devices that prompt the use of information storage and retrieval strategies are likely to overcome processing deficits evinced by children characterized as cued processors. It also implies that such devices will be of little use to limited processors, and that devices that control the stimulus information, if any, should be pursued. Finally, the processing view suggests that strategic processors do not require special regulatory attention.

The purpose of this paper is to assess the adequacy of the information-processing explanation for age differences in children's reactions, identify the policy implications emerging from this analysis, and suggest theoretical and methodological direction for future research. In addressing these aims, the review relies heavily on experimental investigations with samples from a wide range of age groups. In a few instances, other paradigms are examined when they provide particular insight into age differences in children's processing. In effect, this excludes consideration of correlational evidence and experimental studies focusing on one age group or a narrow range of age groups.

This review is divided into three sections. Considered first are early investigations pertaining to age differences in learning. These data document the existence of age differences in learning, but do not examine mechanisms underlying the differences observed. In the next section, detailed consideration is given to more recent research that addresses the storage and retrieval mechanisms postulated to underlie age differences. Storage strategies are examined first, followed by a discussion of retrieval strategies. In the final section, implications are drawn for regulating advertising to children of different ages. In addition, theoretical and methodological concerns relevant to future research are discussed.

The organization of the review is designed to appeal to several different audiences. All three sections are suggested for those interested or involved in research on children's information processing. For those interested in information-processing theory in general, the first two sections detail the experimental paradigms and evidence pertinent to the developmental aspects of the theory. Readers primarily interested in regulatory issues may wish to focus on the last section, which provides implications of the review for public policy matters.

[2]For an extended explanation of problems with Piagetian research, see Chestnut (1979). It should be noted that the critiques of Piaget's theory should not be extended necessarily to other stage theories. In particular, these criticisms are not applicable to extensions of Piaget's theory found in neo-Piagetian approaches.

[3]A second approach, also promising for the study of children's reactions to television advertising, is neo-Piagetian research. For an introduction to the literature, see Case (1978) and Pascual-Leone, Goodman, Ammon, and Subelman (1978).

[4]The distinction between STM and LTM is used as a heuristic device to characterize memory functions. STM and LTM should not be interpreted as separate anatomical stores.

AGE DIFFERENCES IN CHILDREN'S LEARNING

In this section, age differences in learning are examined using the central-incidental learning paradigm developed by Maccoby and Hagen (1965). This approach entails the presentation of information that is relevant and irrelevant to task performance. Learning is evaluated using two measures of retention—central and incidental learning. Retention of material that is relevant to task performance is operationally defined as central learning, while information that is irrelevant represents incidental learning. In some studies, central learning is aided; subjects are told what constitutes relevant information and instructed to ignore irrelevant material. In others, learning is unaided, and what is relevant remains unspecified. Both methods assess age differences by presenting the same stimulus materials to children of different ages.

The central-incidental learning paradigm is a particularly useful approach in the investigation of age differences, because it addresses issues of both regulatory and theoretical concern. From a public policy perspective, this paradigm allows empirical examination of the contention that young children are deficient in processing the information necessary to evaluate commercial intent and product claims. It also permits assessment of regulatory concerns regarding children's learning of information peripheral to the main product message—information that not only interferes with the processing of product information, but also conveys questionable social beliefs.

From a theoretical standpoint, the central-incidental paradigm represents an opportunity to examine several predictions based on information-processing theory. In studies where learning is unaided, the processing position predicts age differences in both central and incidental learning. Only strategic processors (age 13 years and older) should be able to suppress processing of incidental information to ensure greater retention of central content. Prompts provided in aided learning situations should enable cued processors (age eight years to 12) to approach a similar level of processing efficiency. Prompts should reduce production deficiencies due to processing of incidental material that interferes with learning of central content. Aided learning should have no effect on strategic processors who spontaneously use strategies suggested by prompts or on limited processors (below age eight years) whose mediational deficiencies cannot be corrected by prompts.

Unaided Learning

The procedure most closely resembling the typical television viewing situation entails the presentation of stimuli without cues to prompt learning of central information. Characteristic of this approach is a study by Collins (1970). A 25-minute situation comedy film was shown to children eight, 11, 12, and 14 years of age. Subjects were told only that their evaluation of the film would be used as a basis for developing a television series. Children were not instructed to focus on any particular element of the film. After viewing, children answered a series of questions concerning their evaluation of the film, and covering information contained in the program.

Informational aspects of the film were designated as either central or incidental based on the evaluations made by adult judges. Central content was operationally defined as "essential to the narrative sense of the presentation," with incidental content described as "nonessential to the plot." Using this procedure, Collins found central learning increased and incidental learning varied curvilinearly with age. Incidental learning increased until age 12, but decreased thereafter.

These findings are congenial to information-processing theory. As expected, both limited and cued processors learned less central information than did strategic processors. Presumably, this outcome was due to the fact that limited and cued processors allocated a disproportionate amount of their cognitive resources to processing incidental material. In contrast, strategic processors suppressed the processing of incidental information to ensure greater learning of the central theme of the communication.

Similar results have been obtained in a number of studies using tasks similar to those employed by Collins (Christie and Schumacher 1975; Collins 1979; Diechmann, Speltz, and Kausler 1971; Hale, Miller, and Stevenson 1968; Siegel and Stevenson 1966; but not Hawkins 1973). These findings support regulators' assertions that younger children experience difficulty in processing the central persuasive arguments advanced in commercial messages, and that young children process information peripheral to commercial content.

Aided Learning

The existence of age differences in learning suggests the need for an approach that overcomes younger children's inability to process central information selectively. Several strategies pertinent to this issue have been investigated using the central-incidental paradigm. One strategy involves aided learning. Prompts regarding what is central are provided to stimulate processing of central, but not incidental, information.

In a study using this approach, Hagen (1967) showed children (aged six, eight, ten, and 12 years) a series of picture cards, each card containing two black line drawings. One drawing depicted an animal and the other illustrated a household object, with one picture placed immediately above the other. Four to six picture cards were positioned on a display board for each trial. Children were instructed to remember the location of one category of pictures, either animals or household objects. On each trial, a measure of central learning was obtained by asking children to specify the location of the to-be-remembered items on the display board (now covered). After these trials were completed, a measure of incidental learning was obtained by

asking children to match animal pictures with pictures of household objects that had appeared together on the picture cards.

Hagen found that when learning was aided, central learning increased with age, whereas incidental learning remained constant across age levels. Children, particularly those characterized as cued processors, selectively processed more central information to the detriment of incidental learning. These results have been consistently found with visually presented stimuli (Druker and Hagen 1969; Hagen and Sabo 1967; Hale and Alderman 1978; Hale and Piper 1974; Hale and Stevenson 1974; Maccoby and Hagen 1965; Sabo and Hagen 1973; Wheeler and Dusek 1973; Zukier and Hagen 1978; but not Henek and Miller 1976)[5] and verbally presented stimuli (Conroy and Weener 1976; Doyle 1973; Hallahan, Kaufman, and Ball 1974; Maccoby and Konrad 1966; 1967).[6]

As predicted by information-processing theory, aided learning is of greatest value to children characterized as cued processors. As a result, incidental learning is a much smaller proportion of total learning than is typical in unaided learning situations. Also consistent with expectation, limited processors do not take full advantage of prompts to learn. Rather, they process a large proportion of incidental material along with central content. And, strategic processors benefit little from aided learning because they spontaneously use the strategies motivated by prompts.

In effect, aided learning encourages cued processors to learn central information by reducing processing of incidental content. Further processing efficiency might be expected if aided learning is used in combination with devices that directly inhibit the processing of incidental material. One such device involves spatial separation of central and incidental content.

Evidence to this effect has been reported by Druker and Hagen (1969). Using Hagen's (1967) procedure, children (ages nine, 11, and 13 years) were shown a series of picture cards. Cards depicting an animal and a household object were spatially separated for one group and presented next to each other for another. Spatial separation of the central and incidental elements decreased the level of incidental learning for children of all ages, but had no effect on central learning. *Similar results have been observed in other investigations (Hale and Piper 1974; Wheeler and Dusek* 1973; but not Hale and Piper 1973).[7]

These results are consistent with the information-processing view. Spatial separation has no effect on processing of central information, because it does not provide a means of overcoming limited processors' mediational deficiency or cued processors' production deficiency. It does, however, serve as a cue inhibiting incidental processing. As such, spatial separation is useful when the aim is to limit processing of information peripheral to the product message.

Summary

Findings from central-incidental learning studies are congenial to the characterization of children in terms of processing ability. They support the prediction that cued and limited processors learn less central information than strategic processors. The data also confirm expectations that aided learning would enhance the processing efficiency of only cued processors, by reducing incidental and increasing central learning.

However, the evidence reviewed thus far does not provide a direct test of the mechanisms that mediate age differences postulated by information-processing theory. Other paradigms are required to specify fully the source of age differences in children's learning, and to identify strategies effective in overcoming age differences. A promising approach to these problems emerges in studies focusing on the storage and retrieval of information, as examined in the next section.

MECHANISMS UNDERLYING AGE DIFFERENCES

The information-processing view identifies children's ability to use memorial strategies as a major cause of age differences in learning. Strategic processors (ages 10/11 years and older) spontaneously use information storage and retrieval strategies that cued processors (ages six to nine/ten years) do not always use, and that limited processors (below six years of age) cannot use. These observations imply that prompts to encourage the use of storage and retrieval strategies should be particularly effective in overcoming the learning deficits exhibited by cued processors. They also suggest that prompts to evoke memorial strategies should be of little benefit to limited processors, who have not yet acquired such strategies, or to strategic processors, who use them spontaneously. The validity of these assertions is examined in this section.

[5]Maccoby and Hagen (1965) report that incidental learning decreased in children from ages ten to 12 years. Hagen's (1967) replication of the Maccoby and Hagen study failed to reproduce this decrement in incidental learning in older children. Hagen (1972) attributes the discrepancy to problems with the stimulus materials in the earlier study, not to true age differences.

[6]Conroy and Weener's (1976) and Hallahan, Kaufman, and Ball's (1974) results are interpreted here as finding no age-related difference in incidental learning. It should be noted that Conroy and Weener found a decrease in incidental learning between children (seven, nine, and 11 years) and college students. Paired comparisons between the incidental learning scores of children indicated nonsignificant differences. Hallahan, Kaufman, and Ball reported a significant main effect of age, with incidental learning increasing with age, but paired comparisons between age groups yielded no significant differences in incidental learning.

[7]Using task materials with the central and incidental elements integrated into one picture, Hale and Piper (1973) found incidental learning increased in older children.

Storage Strategies

Individuals use a variety of devices to ensure storage of information. One device that is widely recognized as affecting children's information storage is verbal labeling (Reese 1962)—verbalizing the information to be stored as it is presented. Evidence pertaining to the effects of instructions to label has been reported in a serial recall study by Hagen and Kingsley (1968). Children ranging in age from five to ten years were shown picture cards of animals, one card at a time. After each card was shown, it was placed face down in a horizontal array in front of the child. While cards were being shown, one group of children was instructed to label, whereas other subjects were not required to label. After all cards were presented, learning was assessed by asking children to point to cards (now covered) that contained a particular picture.

Hagen and Kingsley found labeling increased the learning of six- and eight-year-olds, but did not affect the learning of five- and ten-year-olds. Other researchers have also reported beneficial effects of labeling in children aged five to ten years (Wheeler and Dusek 1973), and no effect of labeling for children ten to 14 years old (Hagen, Meacham, and Mesibov 1970). These data are consistent with the information-processing prediction that cued processors should benefit from prompts that suggest storage strategies. Labeling instructions did not affect learning in limited processors who cannot use strategies even when prompted, nor did instructions affect strategic processors who are capable of labeling spontaneously.

Labeling not only affects the amount of information stored, but also affects the kind of storage. In the Hagen and Kingsley study, labeling was found to facilitate learning of items in the recency position (items presented last), but not in the primacy position (items presented first). The superior learning of items in the recency position is thought to reflect the retrieval of information stored in short-term memory. Learning of primacy material is believed to involve the retrieval of information stored in long-term memory (Murdock 1962). Viewed in this way, the finding that labeling affects only recent information is interpreted as evidence that labeling affects short-term storage.

The foregoing analysis implies that labeling enables the cued processor to inhibit the decay of information represented in short-term memory. It does not, however, ensure the permanent storage of information in long-term memory. This requires a second storage strategy, termed rehearsal. In contrast to labeling, rehearsal involves the repetition or elaboration of material not only as it is presented, but also after it has been presented. Age-related trends in rehearsal have been illustrated by Ornstein, Naus, and Stone (1977). Unrelated lists of words were presented orally, one word at a time, to children seven and 12 years old. One group of children was instructed to practice the words aloud, without suggesting a particular rehearsal strategy. Another group was given a cumulative rehearsal strategy, instructed to practice each word with as many of the preceding words as possible. After the presentation of each list, children were asked to recall the words in any order.

On the basis of information-processing theory, it is predicted that only strategic processors would spontaneously use a rehearsal strategy and, therefore, would exhibit learning superior to cued or limited processors. Ornstein et al.'s (1977) data confirm this expectation. Without instructions to rehearse, only older children rehearsed several words together and subsequently recalled more words than did younger children. Older children also recalled more words in the primacy position, indicating superior long-term storage achieved through rehearsal.[8] A number of other investigators have also reported the spontaneous use of rehearsal in children from ten to 13 years of age, but not in children aged six to nine years (Bray, Justice, Ferguson, and Simon 1977; Kellas, McCauley, and McFarland, 1975; Naus, Ornstein, and Aivano 1977; Naus, Ornstein, and Kreshtool 1977; Ornstein, Naus, and Liberty 1975).

Ornstein and his colleagues also reported that with instructions to rehearse, younger children characterized as cued processors were able to rehearse several words together. As expected, the provision of storage strategies enhanced the recall of cued processors, but did not affect the performance of strategic processors who spontaneously use rehearsal. As in older children, rehearsal facilitated cued processors' learning of items in the primacy position. Other researchers also have reported rehearsal instructions to be effective in inducing cumulative rehearsal in children from eight to nine years of age, but not in children aged five to six years (Bray et al. 1977; Hagen, Hargrave, and Ross 1973; Naus, Ornstein, and Aivano 1977).[9] Children designated as limited processors can use rehearsal, but require extensive training or constant prompting in addition to simple rehearsal instructions (Bray, et al. 1977; Hagen, Hargrave, and Ross 1973).

Further support for the information-processing hypothesis that age differences in learning are related to rehearsal abilities emerges in studies that inhibit the spontaneous use of rehearsal. Inhibiting rehearsal should eliminate the processing superiority of strategic processors, thereby reducing learning to the level of younger children.

Evidence supporting this position has been reported by Hagen and Kail (1973). A serial recall task, with picture cards shown one at a time, was administered to children seven and 11 years old. One group of children was allowed to rehearse during a 15-second study interval between the presentation of the last card and the retention test. Another group was required to perform a distracting task (counting backward) during the study period to suppress rehearsal. When allowed to rehearse, older children exhibited superior learning. When distracted, the performance of strategic and cued processors did not differ. As predicted, inhibiting re-

[8]A small primacy effect has sometimes been found with children who do not rehearse. This result is thought to occur because some experimental tasks bias children's memory for the first item presented. For further details, see Allik and Siegel (1976) and Siegel, Allik, and Herman (1976).

[9]The effects of cumulative rehearsal on recall are most evident when task materials involve unrelated words as opposed to taxonomically related words. For a discussion of rehearsal with related words, see Ornstein, Naus, and Liberty (1975) or Ornstein, Naus, and Miller (1977).

hearsal eliminated the superiority of strategic over cued processors.

Detrimental effects of inhibiting rehearsal through distraction have been observed in similar research contexts (Cuvo 1975; Sabo and Hagen 1973; Zukier and Hagen 1978). Rehearsal can also be inhibited by requiring older children to use less effective strategies than rehearsal, such as labeling. Forced overt labeling interferes with the use of a cumulative rehearsal strategy, thereby decreasing learning in older children. Detrimental effects of forced labeling have been found for children aged 11 and 12 years (Ornstein, Naus, and Miller 1977; Ornstein, Naus, and Stone 1977).

In sum, the review of information-storage strategies suggests the value of two devices to increase the learning ability of cued processors. Labeling allows the cued processor to retain information for further processing, and rehearsal permits permanent storage of that information. Despite the effective use of these strategies, they are not sufficient to ensure the utilization of incoming information. Also needed are strategies for the retrieval of information stored in long-term memory.

Retrieval Strategies

Information retrieval requires at least two abilities. The processor must be capable of using available cues to pinpoint the location, or address, of previously stored information. And, the processor must be able to conduct a thorough search for all pertinent information once a memory address has been accessed (Kobasigawa 1977). Given a cue, i.e., cued retrieval, strategic processors use it to access the appropriate memory address and to conduct an exhaustive search for all relevant material stored at that address. Cued processors not only need cues to locate information, but also require additional prompting to conduct a complete search for all information at the accessed location. Prompts that present cues and constrain children to retrieve as much information as possible for each cue, i.e., constrained retrieval, should correct young children's retrieval deficits.[10]

Age differences in the use of retrieval cues have been reported by Kobasigawa (1974). Children (aged six, eight, and 11 years) were shown display boards that contained pictures of 24 different objects. Each object belonged to a different category, such as "animals" or "toys." Also mounted on the board were retrieval cues for each category, with the cue picture placed immediately next to each object in that category. For example, a picture of a zoo was placed next to each picture of an animal. After presentation of the display boards, one group of subjects was simply asked to recall as many objects as possible without assistance. In the cued retrieval group, children were given a deck of cards that pictured the retrieval cues presented with the objects on the display board. Subjects in this group were told to look at the deck of retrieval cue pictures to help them remember the objects.

Using this procedure, Kobasigawa found that retrieval cues facilitated total recall and category recall (number of categories recalled) for children characterized as strategic processors. Cued processors did not use retrieval cues to aid recall, a finding corroborated by Emmerich and Ackerman (1978) with six- and ten-year-olds. Apparently, cues are a necessary, but not sufficient, condition for information retrieval for cued processors. It has also been noted that retrieval cues are most effective when they resemble the cues provided with the learning materials (Ceci and Howe 1978; Geiss and Hall 1978).

Constrained retrieval procedures, which provide maximal prompting by providing both cues for where and how to search memory, have been investigated by Kobasigawa (1974) in the study described earlier. Children (ages six, eight, and 11 years) were shown a display board with pictures and retrieval cues. In the cued retrieval group, children were given a deck of cards illustrating pictures of the retrieval cues presented with the objects to be recalled, and were told to use the retrieval cue pictures to help them remember the objects. In the constrained retrieval groups, children were also given a deck of retrieval cue cards. In addition, subjects were reminded that three objects went with each retrieval cue, and were constrained to recall all possible objects associated with a retrieval cue before going to the next retrieval cue.

For children categorized as cued processors, the constrained retrieval procedure enhanced total recall, category recall, and objects per category recalled. The performance of strategic processors was not affected by the presence or absence of constrained retrieval procedures. In addition, the retrieval assistance provided in the constrained condition allowed the younger children to recall as many objects as the oldest children.

Other researchers have replicated the facilitative effects of constrained retrieval for children aged six to ten years (Emmerich and Ackerman 1978; Scribner and Cole 1972).[11] These data support the view that the retrieval deficits of cued processors can be overcome by prompts that guide access to, and search for, stored information. Strategic processors do not require special assistance in using retrieval cues and, therefore, do not benefit from constrained retrieval procedures.

IMPLICATIONS

The major finding reported in this paper is that children constitute three segments in terms of processing abilities: strategic, cued, and limited. Strategic processors sponta-

[10]A constrained recall procedure may help older children in the limited processor group if the task is sufficiently simple. For a demonstration with children this young, see Williams and Goulet (1975).

[11]Several investigators have examined the effects of constrained retrieval versus free recall. These studies are not considered here because effects due to constrained recall may be due to the mere existence of retrieval cues or to constraining recall by category information (see Eysenck and Baron 1974; Grimmett and Johnson 1977; Lange 1973; Weist and Crawford 1977).

neously employ storage and retrieval strategies. Cued processors also exhibit these storage and retrieval skills, but only when prompted to do so. And, limited processors appear not to have acquired efficient storage and retrieval skills. The existence of these segments has implications for designing public policy measures to regulate advertising to children, and conducting research pertaining to information processing.

Public Policy

Previous research on children's reactions to television advertising has identified young children's difficulties in understanding and processing advertising messages. Based on this evidence, past regulatory efforts were aimed at banning television advertising to young children (under the age of eight years). The implementation of this proposal no longer seems probable due to the existing political environment, and it appears that alternative measures will need to be designed.

An alternative regulatory approach is to allow television advertising to children, while instituting policies that enhance children's abilities to process advertising information in a more critical and systematic manner. This approach is based on the belief that children's ability to understand commercial messages can be furthered by affecting the processing of incoming commercial content and previously stored information relevant to evaluating commercial claims. The design of alternative regulatory policies can be guided by a consideration of storage and retrieval factors responsible for age differences in children's processing. Regulatory strategies can be identified for each age segment, but the implementation of these strategies may present legal difficulties.

Special regulatory effort is not required for children characterized as strategic processors. These children are able to select and store the central product information necessary for understanding persuasive product arguments. Strategic processors' evaluation of the product appeal is enhanced by their ability to retrieve stored information that may include thoughts about advertising's selling intent, other products on the market, and past experiences. And, because strategic processors focus most of their attention on central message material, they are unlikely to process peripheral message content that may convey social beliefs.

In contrast, cued processors exhibit deficiencies that limit their understanding of commercial messages. Without prompts, these children experience difficulty in processing central product information due to interference from learning incidental content, storing product information, and retrieving stored information associated with the advertised product. These deficiencies can be corrected by implementing strategies that make central message content more salient than peripheral material. One is aided learning. It entails instructing children, as part of a consumer education effort, regarding what constitutes the central aspects of product appeals.

An additional device for suppressing incidental material involves the spatial separation of product-relevant and product-peripheral information. This strategy has the advantage of suppressing processing of information that may interfere with product learning and also convey undesirable social beliefs. A third approach involves the repetition and elaboration of central product information. This strategy not only forces cued processors to attend to the information necessary to understand product appeals, but also approximates a rehearsal strategy needed to store information in long-term memory.

A final approach designed to aid retrieval requires that product information be presented on an attribute-by-attribute basis, with attributes labeled with concepts familiar to children, e.g., cost and taste. This device approximates a constrained retrieval procedure by presenting retrieval cues in the form of attribute labels. It also suggests a strategy for searching memory for information regarding other products by retrieving this information one attribute at a time. Policies designed to control commercial content would require participation by government agencies or further involvement by industry groups presently controlling several production aspects of advertising aimed at children.

Children characterized as limited processors constitute the segment most affected by past regulatory proposals. Limited processors exhibit processing difficulties similar to those of cued processors, but these children's deficiencies cannot be alleviated through prompts to select, store, and retrieve information. Even with prompts, limited processors process a proportionately greater amount of incidental material to the detriment of learning product information. Learning of peripheral message content including social beliefs can be somewhat reduced by separating the peripheral material from product information. Processing of central product information is more difficult to alter because limited processors do not utilize storage and retrieval prompts. As a result, these children will process a very small amount of message content necessary to understand the commercial message. Because storage and retrieval prompts are unlikely to be effective, strategies other than those described in this paper will have to be pursued to reduce limited processors' difficulties. One approach would be to reduce the need for elaborate processing by reducing the complexity or quantity of product information presented.

Future Research Directions

This review implies a dual focus for future research. One purpose is to determine whether age differences in children's reactions to television occur under storage and retrieval conditions specified by information-processing theory. Although information-processing theory has provided insights into consumer evaluation and choice processes, research is needed to assess its explanatory value for understanding developmental aspects of consumer behavior. The second purpose is to determine the efficacy of information-processing-based strategies in overcoming younger children's deficiencies.

Operationally, this would entail examining three categories of independent variables. As in past research, age should be an independent variable. By sampling limited, cued, and strategic processors, the opportunity to detect age differences in processing is enhanced. A second independent variable that warrants consideration is the processing demands made by a message. Varying this factor permits the identification of situations in which age differences in processing can be most efficiently offset by regulating the communication to which children are exposed. Finally, incorporating variables that involve the manipulation of storage and retrieval prompts facilitates identification of the situations in which consumer education is a compelling approach to regulation. In this context, consumer education focuses on teaching children how to process information and not on teaching product-specific information.

Responses to these manipulations should include measures of message learning, attitude toward the communication advocacy, and message-related behavioral reactions. These dependent measures are of primary concern in evaluating the impact of regulatory programs. The impact of alternative strategies on these dependent variables can also provide additional data regarding consumer information processing. Because children of different ages vary with respect to processing skills, factors affecting consumer decision making that may be difficult to isolate and study with adult subjects can be studied in children.

In pursuing these aims, there are several methodological issues to be considered. These include selecting age samples, designing experiments, and constructing dependent measures. Direction in sample selection has been provided by identifying age ranges where differences in processing are likely to occur. It should be noted that these ranges depend on the processing mechanism being investigated. When the task involves the allocation of processing effort to central and incidental material, the following age segments are relevant: strategic, 13 years and older; cued, ages eight to 12 years; and limited, under eight years of age. For utilization of storage and retrieval strategies, the ranges are: strategic, 10/11 years and older; cued, ages six to nine/ten, and limited, under six years of age. Thus, it is important to select age samples on the basis of the particular processing function of interest.

Once age samples are selected, special attention must be devoted to designing experimental treatments and procedures. Threats to internal validity can be handled by ensuring that the processing effects of interest are not confounded by other age differences. For example, if age differences in storage of product information are of interest, procedures that control or eliminate age differences in retrieval must be implemented. If age differences in retrieval of product information are of interest, age differences in storage must be minimized in the experimental setting.

Several procedures are available for controlling unintended effects. Age differences in storage can be minimized by providing rehearsal prompts to younger children. From the evidence reviewed, prompts to use rehearsal should enable cued processors to store a similar amount of information as that stored by strategic processors. To control for storage problems in limited processors, a different technique is required. One used with some success is to allow young children to look at and study the stimuli until they demonstrate adequate recognition of most items.

Other procedures are suitable for minimizing age differences in retrieval. Retrieval prompts can be provided to enable younger children, those characterized as cued processors, to search memory more effectively. Retrieval can also be made simpler by using recognition rather than recall measures (Brown 1975a; 1975b). Recognition tests do not require children to generate information from memory; they need only recognize information as that previously seen or heard.

CONCLUSION

On the basis of age differences in information processing, three segments were identified—strategic, cued, and limited processors. These segments were described with respect to utilization of processing strategies needed to select, store, and retrieve message information. These findings imply two types of regulatory strategy. For cued processors, educational strategies are appropriate to facilitate message processing. Education entails teaching these children how to store and retrieve information. For limited processors, regulation is required that controls commercial information. More specifically, peripheral information that is likely to convey social beliefs requires close scrutiny. Special regulatory effort is not required for strategic processors.

To determine the efficacy of these strategies, research is required that examines what children of different ages learn from television commercials, their attitudes toward the product advertised, and the behavioral consequences of these responses. Moreover, the age differences observed should be qualified by identifying the impact of varying the processing demands of the communication and the effect of introducing educational strategies. With such inquiry, knowledge regarding the effects of processing differences among children of different ages can be added to our present understanding of age differences in children's responses to television advertising.

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