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A Quebec law eliminating advertising to children on Quebec TV stations left American border TV stations as the only source of TV commercials for toys and children's cereals. As a result, English-speaking children in Montreal who watch more children's TV on American stations were exposed to more advertising than French-speaking children who watch more children's TV on French-language Quebec stations. This situation facilitated the structuring of a quasi-experimental design comparing the two groups of children. As expected, English-speaking children were able to recognize significantly more toys available in the marketplace and reported having more children's cereals in their homes than did French-speaking children. Correlational analyses within each language group helped confirm the role of exposure to American TV (and hence of the Quebec law) as the probable cause of the observed differences.

A Quasi-Experiment Assessing the Effectiveness of TV Advertising Directed to Children

Over the past two decades a sense of children's particular vulnerability to TV advertising has been the source of considerable debate in most countries with free market economies (Boddewyn 1984). Efforts to regulate TV advertising directed to children have typically been more rigorous than any comparable regulatory efforts pertaining to adult viewers. In the U.K., for example, three bodies, one dominated by members of the public, one by industry representatives, and one by state officials, oversee advertising directed to children (for a fuller discussion, see Armstrong and Brucks 1988).

In the U.S., the most intense period of public debate was in the mid to late nineteen-seventies, centering around the Federal Trade Commission (FTC). In 1978, Action for Children's Television (ACT), a public interest/lobbying group, Consumers' Union, and others petitioned the FTC to remove TV advertising aimed at children. The Commission ended a lengthy rule-making procedure by recognizing that though children age six or younger were unduly influenced by TV advertising, the FTC could find no practical way of isolating that segment to implement any ban on advertising directed to them. As a result, no regulatory steps were recommended (FTC 1981).

By 1988, advertisers' level of expenditure on children's TV programs had grown to an estimated $500 million (Leccese 1989). With the amount of advertising per hour during children's programs also edging upward (ACT 1989), critics have recently urged Congress to allow an antitrust exemption so that the broadcast industry might reinstitute an industrywide code limiting the number of commercials per hour placed on children's programs (*Television/Radio Age* 1989).

Previous Research

Research using an experimental paradigm has tended to support the view that the influence of commercials targeted at children is considerable. One experiment, for example, indicated that children's snack food choices were a function of the TV commercials to which they were exposed (Gorn and Goldberg 1982). A second experiment demonstrated that children (but not adolescents) set

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aside established preferences for snack foods and selected a less preferred alternative under the momentary influence of a commercial for that product (Roedder, Sternthal, and Calder 1983). Experiments pertaining to toy commercials have documented that children are persuaded by specific strategies designed to enhance the product (Ross et al. 1984) and that toy commercials can be more persuasive than the child's mother (Prasad, Rao, and Sheikh 1978).

To gain insight about the strengths and weaknesses of the experimental approach in studying the effects of advertising on children, it is useful to consider a typical experiment in somewhat greater detail. Gorn and Goldberg (1982) manipulated children's exposure to TV commercials for snack foods in the context of a summer camp. For two weeks, children 5 through 8 years old watched a half-hour videotaped TV cartoon each day, with just under 5 minutes of advertising embedded. Among the experimental groups was one that was exposed to commercials for orange juice and various fruits each day and one that was exposed to commercials for Kool-Aid and various highly sugared snacks such as candy bars. Each day, after the TV exposure, the children were given a selection of fruits or candy bars from which to choose, as well as a choice of orange juice or Kool-Aid. Their snack and drink choices reflected their TV viewing experience.

Evident in these procedures are some of the strengths and weaknesses of the experimental research approach. The major advantage or strength is the ability to assess and attribute causality unequivocally. The main weakness of this approach is the limited external validity of the results, given in this case the uniqueness of a summer camp setting and the narrow range of variables examined.

In contrast to the experimental research, much of the research stream that has utilized a *survey research/correlational paradigm* to study the effects of advertising on children tends to indicate that advertising has a fairly minor role in influencing measures such as children's preferences. Typical of the survey/correlational approach is a study conducted by Henderson et al. (1980). Mothers of 255 families in the Boston metropolitan area participated in a four-week-long diary study. A regression model was developed whereby children's purchase requests were predicted by using 10 predictor variables, including level of TV exposure, parent-child interaction, attitudes toward advertising, and demographic characteristics. The impact of television in this model was negligible. Similar results were noted in a study by Ward, Wackman, and Wartella (1977) in which exposure to television commercials was but one of 27 "family context variables."

Atkin (1981), however, using survey/correlational methods, reported significant relationships between children's exposure to TV advertising and several dependent measures. For example, Atkin found that respondents who reported heavier exposure to children's TV (and its advertising) also reported making more requests for advertised toys, cereals, and fast foods. Similarly, those who reported heavier viewing also reported eating advertised cereals more frequently ($r = +.41$). The association was positive but less strong for eating less-advertised brands ($r = +.27$).

Evident in these correlational studies are the strengths and weaknesses of this approach. External validity tends to be strong, particularly given the broad range of potential influences considered. The weakness of the correlational method is in the difficulty in attributing causality. Assessing the direction of causality on the basis of correlational evidence is often difficult (does viewing more TV advertising lead to wanting more toys or vice versa?). Further, it is typically difficult to know whether important third factors acting either spuriously or as mediators have been considered.

QUASI-EXPERIMENTAL APPROACH

Clearly, one's research paradigm can drive one's results and conclusions (Hovland 1959). Experimental research focusing on children's TV advertising as the single (or perhaps one of two or three) manipulated variable(s) has tended to support the view of that it is a critical determinant of children's preferences and purchase requests. In contrast, though not as uniform in its conclusions, much of the survey research, in stressing a large number of simultaneous and interacting influences, has tended to minimize TV's influence on children. Intuitively one is led to the conclusion that both perspectives can be legitimate. Children aged 6 through 11 watch an average of more than three hours of commercial TV a day (Adler et al. 1980), which represents a significant portion of their waking hours. Children have been estimated to see an average of 20,000 commercials per year (Adler et al. 1980). The sheer weight of such stimuli lends some support to the experimentalist's perspective that TV is likely to be an important influence in shaping children's product preferences and purchase requests (etc.). At the same time, children's lives are embedded in a network of significant institutions beyond the TV. Foremost among them are family, friends, school, and church. To the extent that these institutions mitigate the influence of TV commercials, the perspective of the survey researcher, minimizing TV's influence, may be more appropriate.

Hovland (1959) noted the need to combine the two approaches by inducing the experimentalist to consider the broader network of variables operating in the environment and by inducing the survey researcher to recognize the shortcomings of the correlational method as a basis for establishing causal relationships. Quasi-experiments such as the one reported here represent a useful, complementary methodological approach incorporating some of the advantages of both the experimental and survey methods. In particular, the quasi-experiment allows for the determination of causal relationships, much as in the laboratory experiment, but in a broader "real-

world" context as is typically associated with survey research. One quasi-experiment involving television used archival data to link the introduction of TV in the U.S. in the 1950s to a wide variety of dependent measures including consumption, leisure, political behavior, workforce participation, local economic structure, public health, and crime (Cook, Campbell, and Wharton 1979, as reported by Cook and Campbell 1979). The study reported here is the first quasi-experiment to examine the potential impact of TV advertising on children.

The Quebec Experience

A Quebec law eliminating advertising to children on Quebec-based media was upheld recently by the Canadian Supreme Court (Supreme Court of Canada 1989). The law, in effect since 1980, has served to eliminate commercials directed at children throughout most of the TV schedule, including Saturday and Sunday mornings and weekday afternoons after school (Goldberg 1982).

Between-group analyses. Though the law eliminated advertising to children on Quebec TV stations, American border TV channels reaching Quebec (the three commercial networks) still carry heavy levels of TV commercials directed at children. Consequently, it was reasoned that the law ought to have maximal effects on children watching little if any American children's commercial TV (ACTV) and minimal effects on those watching considerable amounts of ACTV. The study design provided for a comparison of those exposed to higher and lower levels of ACTV and, by extension, the commercials inserted therein.

Two subgroups highly likely to have had different levels of exposure to ACTV were French-speaking and English-speaking children in Quebec. Bureau of Broadcast Measurement (BBM) data indicate that English- and French-speaking children aged 2 through 11 in Montreal watch identical amounts of TV: an average of 22 hours per week (or just over 3 hours per day, as reported by Caron, Letendre, and Van Every 1988). However, because their mother tongue facilitates access to American TV, it was reasoned that English-speaking children ought to watch considerably more ACTV programs than French-speaking children, and ought to be exposed to a commensurately higher level of children's TV commercials. Consequently, one central aspect of this study was a comparison of similar groups of English- and French-speaking children.

Supplemental between-group analyses. The design of the quasi-experiment comparing English-speaking and French-speaking children appears to be a strong one, with any differences between the two populations most likely due to American TV exposure. However, a major alternative explanation might be cultural differences between the two groups. One way of addressing this possibility is by comparing English- and French-speaking children who viewed the same amount of ACTV. Finding no difference in the dependent measures under consideration would rule out cultural factors as a potential confound. This analysis is structured in detail subsequently.

Within-group analyses. The level of exposure to ACTV was examined also *within* each of the language groups separately and related to the dependent measures. Though the level of exposure to ACTV was expected to be generally lower for French-speaking children, a range of scores among the French-speaking children was anticipated. Finding the level of scores for the dependent measures to be related to the level of ACTV viewed within each of the French- and English-speaking samples would provide additional evidence to rule out cultural or other differences as potential alternative explanations for the between-group differences noted. Under these circumstances, for any third variable to be accepted as an alternative causal factor, it would have to (1) differentiate between English- and French-speaking children, (2) be correlated with both the level of ACTV viewed and the two dependent measures, and (3) represent at least as compelling an explanation of the relationship involving the two dependent measures as is level of ACTV viewed.

Income as a moderator. There is considerable evidence that lower income children view much more TV than do middle or upper-middle income children (e.g., Comstock et al. 1978). As a result, any observed differences between English- and French-speaking children were anticipated to be noted more clearly for a lower income sample than for an upper-middle income sample.

Additionally, from a public policy perspective it was considered important to assess the generalizability across income levels of any differences between English- and French-speaking children. Hence, income was incorporated as a factor in the between-group analysis.

HYPOTHESES

The following hypotheses are based on two premises: (1) given the law outlawing advertising to children in Quebec, children were not exposed to advertising for children's products on Quebec TV stations and (2) English-speaking children watch considerably more ACTV and the commercials therein than do French-speaking children.[1]

Between-Group Analyses

H_1: In comparison with French-speaking children, English-speaking children respond more positively to products advertised on American children's TV.

H_2: French- and English-speaking children viewing the same amount of American children's TV respond similarly to products advertised during those programs.

Within-Group Analysis

H_3: Within each language group, children exposed to more American children's TV respond more positively to products advertised on those programs than do children exposed to less American children's TV.

[1]Data pertaining to this assumption are reported subsequently.

SAMPLE

English-Speaking Groups

A sample of 78 English-speaking children was obtained from a school in an upper-middle income English-speaking suburb of Montreal. Census tract data described the area in which the school is located as having a mean family income of $40,395 in 1980. Children aged 9 through 12 (grades 4 through 6) were included.

A sample of 66 English-speaking children (ages 9 through 12) of working class background was obtained from a day camp in a lower income English-speaking area of Montreal and a charity camp for English-speaking children about one hour from Montreal. Census tract data for 1980 were obtained for the two tracts from which the day camp drew children, as well as for 18 census tracts associated with the children at the low income country camp. Data for each tract were weighted according to how many children came from each census tract. The weighted mean for family income was $17,213.

French-Speaking Groups

A sample of 119 French-speaking children (ages 9 through 12) was obtained from an upper-middle class camp about one hour from Montreal. Analysis of income data for the camp was precluded because of the camp's desire to protect the privacy of the campers. Nevertheless, another component of socioeconomic status, occupation of the mothers and fathers (as supplied by the children), suggested that in comparison with the English-speaking upper-middle income children this group represented an approximately equal number of professional and business occupations, as well as an equivalent number of two-career professional families.

A sample of 212 French-speaking children was obtained from a school in a French-speaking working class neighborhood in Montreal. Census tract data from the 1980 census describe the area as having a mean family income of $17,206, almost identical to that of the lower income English-speaking group. Children aged 9 through 12 (grades 4 through 6) were included.

The study was run in the last week of classes in late June in the two schools (i.e., the lower income French-speaking and upper-middle income English-speaking samples). Two weeks later, early in July, it was administered in the camp settings for the upper-middle income French-speaking children and lower income English-speaking children. Tests to ensure that the setting/timing was not a factor in the results are reported subsequently.

QUESTIONNAIRE

To test the hypotheses, a questionnaire was developed that included the following independent and dependent variables.

Independent Variables

Between-group analyses. The children's cultural affiliation as defined by the language spoken in the school/camp was recorded and served as the independent variable for the between-group analyses.

Within-group analyses. The following procedure was adopted to estimate the number of ACTV programs viewed by each child, the independent variable for the within-group analyses. A *TV Guide* was used over a two-week period prior to the study to develop a listing of children's programs available on American commercial channels (the three networks) received in Montreal. Emphasis was placed on Saturday and Sunday mornings and weekday afternoons after school. In each case, children were asked to check how often they had watched each program over the last year. They could check one of five categories: never, 1 or 2 times, 3 or 4 times, 5 or 6 times, or more than 6 times. When the response was "more than 6 times," one of two followup questions was asked: for those programs on the air once a week, the children were asked to indicate whether, in a typical month, they watched the show 1, 2, 3, or 4 times; for shows on the air each weekday, the question posed was, "Do you usually watch the show 1, 2, 3, 4, or 5 times a week?" These responses were treated in such a way that it was possible to estimate the total number of ACTV programs each child watched during the year. Though estimates of this type tend to be subject to the inaccuracies of the child's memory, these scores were considered to be particularly useful in a relative sense in comparing the English- and French-speaking groups.

Dependent Variables

The underlying subject of investigation was the degree to which children are affected by TV advertising or its absence. The most prevalent product categories advertised to children are toys (comprising 50% or more of child-directed ads in the fourth quarter; Barcus 1981) and foods (comprising about 60% of child-directed ads other than during the fourth quarter; Barcus 1981). Of all foods advertised to children, about one-quarter are cereals, the largest single category (Barcus 1981). Therefore, children's toys and cereals were selected as the focus of the study.

Awareness of toys. Though the relationship between actual purchase of toys and exposure to ACTV was what we ultimately would want to assess, it was felt that this measure would not be sufficiently sensitive, as the intent was to concentrate on the limited set of heavily advertised toys (rather than ongoing classics, for example, which children would know about without advertising). Because most children were unlikely to have received more than one or two of these toys, it was anticipated that this constricted range would not allow for an adequate test of our hypothesis.

A multiple-choice recognition test assessing children's awareness of toys in the marketplace was developed. Twenty commercials for toys were taken from Saturday morning American network shows that had aired just a few weeks prior to the study. They included approximately equal numbers of toys targeted to boys (e.g., He-Man, GI Joe) and girls (e.g., Barbie, Snugglebums). In each case, the few seconds at the end of the commercials where the product name and logo were identified visu-

ally on the screen were eliminated. (The few commercials in which the product name or markings were visible on the product itself and hence visible throughout the commercial were not used). The 20 commericals were shown one at a time for the children, without sound, so there was no auditory identification of the toy. After each commercial the videotape was stopped and three names for the toy were presented, one correct and two incorrect. The children were asked to check the name they believed correctly identified the toy (e.g., "What was the name of the orange character we just saw?"). For the English-speaking children, the names were presented in English. It was anticipated that if they knew the toys, it would be by the toys' English names. For the French-speaking children, both the English and French names were presented, as they are on the packages of the toys themselves (e.g., Barbie du Reve/Dream Time Barbie; Le Monstre/Beast Man). Hence, whether these children had learned the toys' names in English from American TV, or in French from other sources such as on the package in the store, or from friends, they could find the appropriate name on the recognition test.[2]

Children's cereal purchases. Four supermarkets, one in each of the areas studied, were used in developing a list of children's cereals available on the market at the time of the study. No differences were noted in the cereals available at the four stores. A "children's cereal" was defined as meeting one or more of the following criteria: (1) commercials for the cereal were shown on Saturday morning children's programming, (2) the packaging was clearly targeted to children by use of cartoon characters, (3) promotions and premiums were targeted to children, and (4) the cereal had an especially high sugar content. In all, 17 cereals were labeled as "children's." They included cereals such as Cap'n Crunch, Fruity Pebbles, and Count Chocula. A group of four mothers of elementary school children acting as judges agreed unanimously with the identification of these cereals as children's cereals. The face validity of labeling these cereals as primarily children's was evident, even though one or two may also have qualified as adult cereals (e.g., Cheerios).

In the questionnaire, the children were asked to check whether or not each cereal was currently in their home. Because of the brand switching that occurs in this category, those with more children's cereals in their home at any given point in time would be likely to have purchased an even greater number of children's cereals across a period of months or a year. Hence the measure employed in this study—the cereals currently in the child's home—can be viewed as relatively constricted and thus potentially conservative in the estimate of differences between the two groups that it generates.

[2]Discussion with the managers of Toys 'R' Us Canada as well as executives of a chain of Canadian discount stores indicated that their respective stores in the greater Montreal area all stocked identical inventory, with no accommodation being made for English- or French-speaking areas.

Occupation of Father/Mother

As a last question, the children were asked to write their father's and mother's occupations on the front page of the questionnaire. (To ensure equivalence between upper-middle income English and French groups, occupation was considered in place of income because income could not be obtained for the French group).

PROCEDURE

A first draft of the questionnaire was pretested with one fourth grade class at the low income French-speaking school. At each stage of the questionnaire's development, translation and back translation procedures were used.

The procedure was for the interviewer (the same woman who had translated the questionnaire, a former teacher) to guide the children in each class (or groups of about 25 children in the summer camp) through the questionnaire. She first made some general explanatory remarks about a particular question and then did one or two examples with the children, ensuring that they all understood how to answer. For each question, each alternative was read aloud. For the first four or five alternatives, the response categories also were read aloud. A second interviewer stood ready to respond to any particular problem a child might have in responding. Administering the questionnaire took about 30 minutes.

RESULTS

Location/Timing of Study

The questionnaire was administered to two of the groups of children in late June in schools and to the remaining groups in early July at camp. To ensure that the location/timing of the study was not a factor in the children's responses, a comparison of both toy awareness levels and levels of children's cereals purchased was made. *T*-tests revealed no significant differences in either dependent measure as a function of the location/timing of the study.

Check for Assumed Difference Between English- and French-Speaking Children's Level of ACTV Viewing

As expected, there is a significant difference in the mean number of hours of ACTV viewed by English-speaking children (1.94 hours per day) and French-speaking children (.76 hours per day; $t = 11.18$, $p < .0001$).[3]

Income as a moderator. A language by income interaction for exposure to ACTV was predicted. Because

[3]As described above, initial scores were estimated on the basis of programs viewed across an entire year. Scores reported here are based on the number of hours viewed per day, which is considered likely to be intuitively clearer. These results correspond to those in one report identifying the 20 shows most widely viewed by English and French Canadian children (Caron 1977). Virtually all of the top 20 shows for the English-speaking children were American (*Ghostbusters, Smurfs,* etc.). In sharp contrast, all of the top 20 shows for the French-speaking children were either of French-Canadian or French-European origin.

a substantial portion of the TV viewed by English-speaking children would be ACTV (Goldberg 1982), and because low income children are likely to view more TV than upper-middle income children (Comstock et al. 1978), low income English-speaking children were hypothesized to view significantly more ACTV than upper-middle income English-speaking children. In contrast, among French-speaking children, for whom the bulk of the viewing was for French-language programming, no comparable difference between low and upper-middle income children was expected.

A 2 × 2 ANOVA with two levels of language (English-, French-speaking) and two levels of income (low, upper-middle) was conducted, with the estimates of the level of ACTV viewing as the dependent measure. In addition to a significant main effect for language (F = 142.39, $p < .0001$), there is a significant effect of income on level of ACTV viewing ($F = 29.49$, $p < .001$) and a significant income by language interaction (F = 28.75, $p < .0001$). As expected, Newman-Keuls *post hoc* analyses indicate that low income English-speaking children watched more ACTV (mean = 2.53 hours per day) than did upper-middle income English-speaking children (mean = 1.43 hours per day). Both English-speaking groups watched significantly more than either French-speaking group (Newman-Keuls $p < .05$). The two French-speaking groups watched identical amounts of ACTV (low income French mean = .76 hours per day; upper-middle income French mean = .76 hours per day).

Given the significant main effect of language and the language by income interaction on level of ACTV viewed, a language by income interaction was predicted for both level of toy awareness and children's cereals purchased, such that low income English-speaking children would have the highest scores on both measures.

Between-Group Analyses

Toy awareness level. A two-way ANOVA was conducted with two levels of language and two levels of income as independent factors and toy awareness level as the dependent measure. As hypothesized, English-speaking children were significantly more aware of the toys than were French-speaking children (F = 400.47, $p < .0001$). The latter were able to recognize an average of only 8.73 toys correctly, not significantly more than the one in three chance level (i.e., 6.67 toys). In comparison, English-speaking children were able to identify an average of 15.44 toys. A significant income effect is found ($F = 7.08$, $p < .01$). Upper-middle income children recognized more toys (mean = 11.94) than low income children (mean = 9.94). Contrary to the hypothesis, no significant language by income interaction is found ($F < 1$). The likely reason is a ceiling effect, as all English-speaking children had very high scores. (Of the few mistakes made by English-speaking children, most consisted of boys misidentifying a few girls toys and vice versa).

Children's cereals purchased. A two-way ANOVA was conducted with two levels of language and two levels of income as independent variables and the number of children's cereals purchased as the dependent measure. As predicted, English-speaking children purchased a significantly greater number of children's cereals than did French-speaking children ($F = 5.51$, $p < .02$; English mean = 2.42, French mean = 2.03). A significant effect for income is found, with low income children purchasing a greater number of children's cereals than upper-middle income children ($F = 23.92$, $p < .0001$; low income mean = 2.56, upper-middle income mean = 1.38). Both of these main effects must be interpreted in light of a significant language by income interaction ($F = 3.68$, $p = .05$). As expected, the difference in the number of children's cereals purchased is significant between the low income English- and French-speaking groups, but not between the upper-middle income groups. (Low income groups: English-speaking mean = 3.59, French-speaking mean = 1.44, Newman-Keuls test $p < .05$; upper-middle income groups: English-speaking mean = 1.44, French-speaking mean = 1.30, Newman-Keuls test $p > .05$).

Within-Group Correlational Analyses

To further establish the plausibility of exposure to ACTV as a causal factor in toy awareness and children's cereal purchases, analyses were conducted for the English- and French-speaking samples separately. Observing significant correlations between ACTV and toy awareness/children's cereals purchased within each group would strengthen the case for level of ACTV viewing as a causal factor in the observed differences between English and French samples. Any alternative explanations would have to account both for these within-group relationships and the between-group differences.

As a first step, the correlations between level of ACTV viewing and both toy awareness and children's cereals purchase scores were examined. For English-speaking children the correlation between level of ACTV viewing and (1) toy awareness is .18 ($p < .05$) and (2) children's cereals purchased is .35 ($p < .0001$). For French-speaking children the correlation between level of ACTV viewing and (1) toy awareness is .34 ($p < .0001$) and (2) children's cereals purchased is .19 ($p < .01$). Hence, H_3 is supported.

As a second step, primarily for descriptive purposes, the ACTV viewing scores for both English- and French-speaking children were each divided into low, middle, and high levels (one third of each group at each level). For each language group the level of ACTV viewing was treated as a discrete variable with three levels. This independent variable was used with toy awareness and children's cereals purchased as the dependent measures in one-way ANOVAs.[4]

[4]This procedure also tests for nonlinearity in the data.

For the English-speaking children, the division of ACTV viewing scores is such that the mean for the lowest third of the sample is .63 hours per day. For the middle third of the sample the mean is 1.58 hours per day and for the highest third the mean is 3.59 hours per day. For the French-speaking children (who viewed considerably less ACTV on average), the comparable means are .12 hours per day for the lowest third, .57 hours per day for the middle third, and 1.59 hours per day for the highest third.

The one-way ANOVAs for English-speaking children reveal significant effects for both dependent measures (toy awareness $F = 3.19$, $p < .05$; children's cereals purchased $F = 6.90$, $p < .01$). Newman-Keuls analysis for toy awareness indicates that the mean scores for the highest and lowest thirds are significantly different (16.21 and 14.60, respectively), with the mean score for the middle level being between (15.50) but not significantly different from either. For children's cereals purchased, the Newman-Keuls test reveals that children with the highest level of ACTV viewing had significantly more children's cereals in their homes (mean = 3.81) than did those with the middle and lowest level scores (mean = 2.23 and 1.23, respectively).

Much as for the English-speaking children, the one-way ANOVAs for French-speaking children reveal significant effects for level of ACTV viewing on both toy awareness level and children's cereals purchased (toy awareness $F = 8.87$, $p < .001$; children's cereals purchased $F = 5.24$, $p < .01$). Newman-Keuls analyses for toy awareness indicate that scores for children in the high and middle levels of ACTV viewing are significantly higher (mean = 9.53 and 8.92) than those for children in the lowest level (mean = 7.75). For children's cereals purchased, the Newman-Keuls tests indicate that scores for children at the highest level of ACTV viewing (mean = 2.66) are significantly higher than those for children in the middle and lowest categories (mean = 1.89 and 1.49, respectively).

The relationships between toy awareness level and level of ACTV viewing for both English- and French-speaking children are illustrated in Figure 1. The relationship between children's cereals purchased and level of ACTV viewing is similarly illustrated for both groups in Figure 2. Like the correlations reported before, these relationships within each group support the view that the differential level of ACTV viewing noted between English- and French-speaking children is responsible for at least a portion of the observed differences between the two groups on the two dependent measures.

Comparison of English and French groups at comparable levels of ACTV viewing. To the extent that English- and French-speaking children who watched the same levels of ACTV are similar in terms of either children's cereals purchased or toy awareness levels, factors other than exposure to ACTV commercials could be ruled out as additional independent sources of the observed differences. To the extent that significant differences are

Figure 1
RELATIONSHIP BETWEEN EXPOSURE TO AMERICAN CHILDREN'S TV AND TOY AWARENESS LEVELS

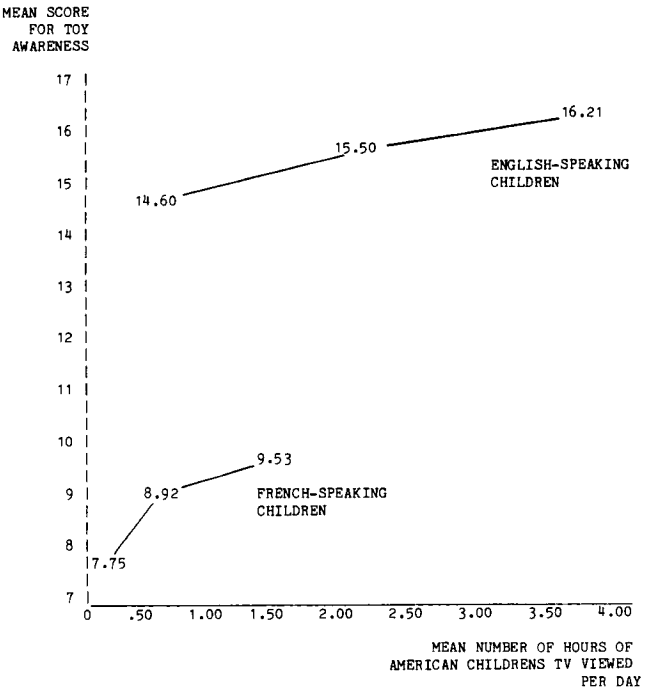
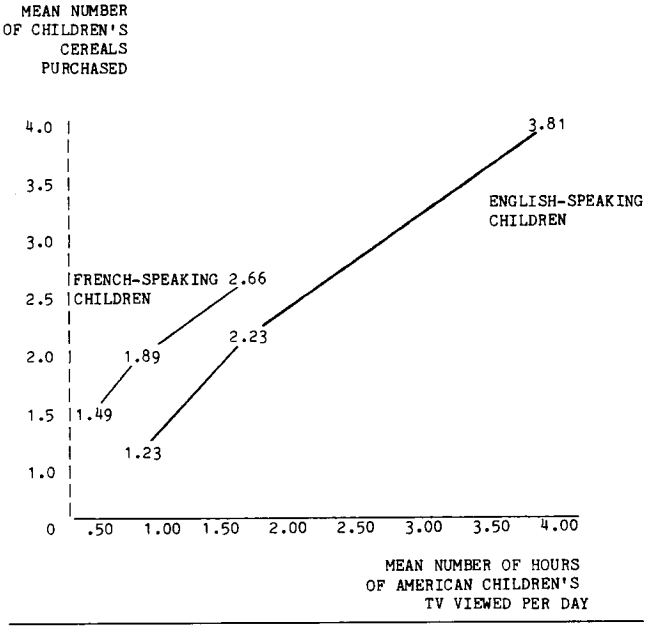


Figure 2
RELATIONSHIP BETWEEN EXPOSURE TO AMERICAN CHILDREN'S TV AND CHILDREN'S CEREALS PURCHASED



observed between English- and French-speaking children at comparable levels of ACTV viewing, additional independent factors might also be responsible for the observed differences between the two groups on the two dependent measures. Simple observation of Figures 1 and 2 suggests the latter might be the case, in particular for the ACTV viewing/toy awareness relationship. At roughly comparable levels of ACTV viewing, the English-speaking children have considerably higher toy awareness scores than do the French-speaking children. The same comparisons in Figure 2 for children's cereals purchased reveal considerably smaller differences.

To test these observations more formally, the entire sample of English- and French-speaking children taken together was divided into lower, middle, and upper levels of ACTV viewed. At each level, a comparison of English- and French-speaking children was made for the toy awareness and children's cereals purchased variables.

On the ACTV viewing variable, the mean score is .21 hours per day for the lowest third, .85 hours per day for the middle level, and 2.42 hours per day for the highest third. The mean scores for toy awareness and children's cereals purchased at each of these three levels of ACTV viewing are reported in Table 1.

For children's cereals purchased, none of the comparisons (at each of the three levels of ACTV viewing) are significant (t-tests, n.s.). Thus, as suggested by Figure 2, for children's cereals purchased, H_2 is supported. Other language/cultural factors appear to have little if any role, leaving the level of ACTV viewing as the primary predictive factor.

For toy awareness, the means between English- and French-speaking children are significant at each of the three levels of ACTV viewing (t-test $p < .001$). Thus, for toy awareness, H_2 is not supported. As suggested by Figure 1, for toy awareness, factors other than ACTV viewing levels seem to account for some of the difference between English- and French-speaking children's scores. Hence, though the preceding analysis suggests that the level of ACTV viewing contributes significantly to the differences in French-English toy awareness levels, other independent factors also appear to have a role.

Table 1
ENGLISH/FRENCH-SPEAKING COMPARISONS WITHIN EACH LEVEL OF ACTV VIEWING

Level of ACTV TV viewing	*Mean toy awareness level*[a]	*Mean children's cereals purchased*[b]	*N*
Lowest third			
English-speaking	15.16	.95	19
French-speaking	7.88	1.72	132
Middle third			
English-speaking	14.44	1.49	39
French-speaking	8.92	1.98	114
Highest third			
English-speaking	15.95	3.17	86
French-speaking	10.40	2.83	65

[a]For toy awareness level, all three English-French comparisons are significant (t-test, $p < .001$).
[b]For children's cereals purchased, none of the comparisons are significant (t-test, n.s.).

Simultaneous Consideration of Language and ACTV as Predictors

Figures 1 and 2 reflect the rationale for the strategy of assessing the relationship between ACTV viewing and both toy awareness and children's cereals separately for English- and French-speaking children. The figures not only reveal significant relationships between ACTV viewing and each of the dependent measures, but also show that though there is overlap, the English-speaking children tend to be highest on both axes and the French-speaking children tend to be lowest on both axes. In Figures 1 and 2, there is (approximately) no English equivalent for the lowest third of the French distribution and conversely no French equivalent for the upper third of the English distribution. This analysis helps clarify the unique role of language in establishing the wide range of ACTV viewing scores, and hence in making possible the natural experiment reported here.

Parsimony. The cost associated with these separate analyses of French- and English-speaking samples is a certain degree of parsimony. Greater parsimony might be achieved by treating language and ACTV (and income) in a single design simultaneously assessing the independent contributions of each as well as any potential interactions.

In a single analysis, the level of ACTV viewed might dominate language as an effective predictor given that level of ACTV viewed was measured more sensitively as a continuous variable, whereas language was dichotomous. To minimize this problem, level of ACTV viewed was dichotomized at the midpoint. This approach provided an adequate number of English-speaking children in the low level of ACTV viewed category (30 of 199) and an adequate number of French children in the high level of ACTV viewed category (103 of 217).

A dummy variable regression was performed, with ACTV, language, and income as independent variables, as well as all possible interactions among them. The dependent measures were level of toy awareness and children's cereals purchased.[5]

Children's cereals purchased. Two significant main effects are noted for the number of children's cereals purchased. There is a significant main effect for level of ACTV viewed ($F = 14.30$, $p < .001$), with children in the high level having purchased more children's cereals (mean = 2.67) than those in the low level (mean = 1.62).

[5]The SAS general linear model (GLM) procedure was utilized and sums of squares three (SS-3) was considered, though sums of squares one yielded virtually the same results (SAS Institute Inc. 1985).

There is also a significant main effect for income ($F = 19.78$, $p < .0001$), with low income children having purchased more children's cereals (mean = 2.42) than upper-middle income children (mean = 2.03). There is no significant main effect for language ($F < 1$) or any significant interactions, though the level of ACTV viewed by income interaction approaches significance ($F = 2.48$, $p < .07$; the difference in children's cereals purchased as a function of level of ACTV viewed is somewhat larger for the low income groups than for the high income groups: the low income groups' mean for low level of ACTV viewed is 1.86 and for high level of ACTV viewed is 3.27; the high income groups' mean for low level of ACTV viewed is 1.05 and for high level of ACTV viewed is 1.62).

Toy awareness level. Three significant main effects are noted for toy awareness scores. There is a significant main effect for level of ACTV viewed ($F = 20.55$, $p < .0001$) with children in the high level more aware of the toys (mean = 12.55) than those in the low level (mean = 8.99). There is also a significant main effect for language ($F = 216.03$, $p < .0001$), with the English-speaking children more aware of the toys (mean = 15.44) than the French-speaking children (mean = 8.73). Last, there is a significant effect for income ($F = 9.27$, $p < .01$), with upper-middle income children more aware of the toys (mean = 11.94) than the lower income children (mean = 9.94). No significant interactions are found.

DISCUSSION

A Quebec law eliminating advertising to children on Quebec TV stations left American border TV stations as the only source of TV commercials for toys and children's cereals. As expected, English-speaking children in Montreal watched more children's TV on these American stations than did French-speaking children in Montreal. Hence a quasi-experimental design could be structured to compare the two groups of children. As hypothesized, English-speaking children were able to recognize significantly more toys available in the marketplace and reported having more children's cereals in their homes than did French-speaking children.

Other than the level of ACTV viewed, the most likely alternative explanation is that the differences between English- and French-speaking children in toy awareness and children's cereals purchased are due to cultural differences between the two groups. To address this issue, two strategies were employed initially. First, for each language group considered separately, significant relationship was shown between level of ACTV viewing and each of the two dependent measures.

Additional analyses indicated that at comparable levels of ACTV viewing, English- and French-speaking children purchased equivalent numbers of children's cereals. This finding serves further to lessen the likelihood that alternative variables such as culture might be the causal factor for level of children's cereals purchased. For children's toys, however, at comparable levels of ACTV viewing, English-speaking children recognized significantly more toys than did French-speaking children. This finding suggests that other factors, in addition to the viewing of ACTV, may have contributed to the observed difference in toy awareness levels between English- and French-speaking children.

The dummy variable regressions that allowed for a partitioning of the variance among the three independent variables helped confirm the preceding analyses. For children's cereals, only the level of ACTV viewed and income are significant. Language is not a significant factor. For toy awareness, all three independent predictors, including language, are significant.

The predicted language by income interactions suggested that low income English-speaking children would have the highest level of (1) ACTV viewed, (2) toy awareness, and (3) children's cereals purchased. The convergence of these interactions was intended to increase confidence that level of exposure to ACTV and its commercials was a causal factor in the relationships examined. As Cook and Campbell (1979, p. 265) note, interactions can provide ". . . relatively strong inferences about cause in the absence of pretest data." The expected interaction is observed for children's cereals but not toys. As noted, the problem in the case of toys appears to be a ceiling effect due to very high scores for all English-speaking children.

The strategy followed in this study of juxtaposing a between-group quasi-experiment with within-group correlational data represents an effort to heed Hovland's (1959) admonition to merge the real-world, correlationally oriented survey and the causality-oriented laboratory experimental paradigms. This study demonstrates that the causal effect for exposure to children's TV commercials, as previously noted in laboratory experiments, is also observed in a natural setting without the artificial disentangling of other causal agents.

Though this study does not address whether the effect of exposure to children's TV commercials is larger or smaller than that of other potential causal agents, the issue is one that can be addressed legislatively. The Quebec law served to reduce children's exposure to commercials for sugared cereals and hence appears to have reduced consumption of those cereals. There is no reason to believe that comparable legislation in the US would not have comparable results. For toys, the expectation was that reduced exposure to commercials would leave children unaware of the toys and thus less able to pressure their parents to buy them. The law seems to have been effective in this context. Here, too, one might anticipate that comparable legislation in the U.S. would be equally effective.

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