

A comparative study on the use of humor in the design of instruction

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Abstract This study examined the effects of three integrated and contiguous instructional designs using incongruity humor on the recognition and recall of information measured by immediate learning and retention tests. First graders in three classes (N=58) were randomly assigned to one of three humor design treatment groups and a control group. On two successive days prior to receiving a humor treatment, each group received a taped reading of a familiar story, which succeeded in the intended manipulation of subjects to low levels of arousal and interest across all groups. The three humor designs included a humor experience which was immediately followed by a serious presentation of new information (contiguous-immediate design), the same humor experience with a one week postponed presentation of the new information (contiguous-postponed design), and a presentation of the new information with humor interspersed within (integrated design). Results indicated that the two contiguous humor treatment groups had higher immediate memory and retention scores than the control group, particularly with regard to recall of the new information. The integrated humor treatment failed to have its intended humor reaction. Limitations of previous research, which generally does not support the instructional value of humor, are discussed in terms of basic theory and research in humor, motivation, and learning.

Introduction

An extensive review of the literature reflecting current philosophy and practice reveals strong support for the use of humor as a learning tool for various education and training settings (Armour, 1975; Dodge & Rossett, 1982; Gentile & McMillan, 1978; Goldstein & Ortiz, 1980; Hertz, 1978; Klasky, 1979; Krogh, 1985; Park, 1977; Pietropinto, 1974; Rutkaus, 1981; Wandersee, 1982; Winer, 1978). There is strong evidence that several textbook authors recognize the value of humor in textbook instruction. In an extensive content analysis of communications textbooks, Bryant, Gula & Zillmann (1980) found that a great deal of humor, mostly of the nonsense and written verbal variety, is employed by text writers. Furthermore, most of this humor was judged by the researchers to have been used for teaching, as opposed to merely attracting attention and entertaining. Trachtenberg (1979) recommends using jokes in teaching English as a second language to promote oral fluency, awareness of sociolinguistic rules, and understanding of certain values in North American culture. Other educators suggest reasons why using humor can be helpful in optimizing learning and subject appreciation in courses in reading improvement (Aaronson, 1977), English composition (Larson, 1982; McLaughlin, 1968), human sexuality (Adams, 1974), foreign language instruction (deMatos, 1974; Fleming, 1968), physics (Adams, 1972) and for teaching severely disturbed and retarded children (Kauffman & Birnbrauer, 1978).

In bleak contrast to the plethora of educational philosophy and practice in support of humor as an educational tool is the scanty amount of empirical research on the use of humor in instruction (Ziv, 1976). The research that does exist generally fails to support the widely touted value of humor, especially with regard to achieving outcomes of increased cognitive domain learning and retention of instruction. Although some studies have shown that humor can increase attention and interest in a topic (Gruner, 1970; Markiewicz, 1974), learning of a message or body of instruction has not been demonstrated to improve when the message includes humor (Bryant, Brown, Silberberg & Elliot, 1981; Cantor & Venus, 1980; Chu & Schramm, 1975; Gruner, 1967; Houndouadi, 1977; Jacobson, 1984; Kennedy, 1970; Markiewicz, 1974; Taylor, 1972, 1964). In fact, in one recent study it was found that humorous exaggerations led to perceptual distortions in young children up to grade four (Zillmann, Masland, Weaver, Lacey, Jacobs, Dow, Klein & Banker, 1984).

Yet it seems intuitively incontrovertible that any method, such as humor, which can cause increased focused attention toward and interest in a body of information, would lead to more effective information processing and learning. Notable exceptions to the past research trend of negative conclusions are studies by Zillmann, Williams, Bryant, Boynton & Wolf (1980) and Kaplan & Pascoe (1977). The latter study with adults found evidence that humor can be employed in a classroom lecture situation to optimize long-term learning retention when the humor is closely related to instructional content, such as with a humorous illustration of a concept. However, humor did not prove effective in learning concepts unrelated to the humor interspersed within the lecture. These findings were qualified in a study with children by Zillmann & Bryant (1983), who demonstrated an inverse relationship between age and instructional effectiveness of concept unrelated humor. Zillmann et al's (1980) study also found that concept unrelated humorous inserts in televised instruction improved children's focused attention to, and learning from, educational messages.

Limitations of past research

Problems in past research have frequently been directly or indirectly due to an incomplete or inaccurate understanding of humor as a common, yet complex, hypothetical construct. For example, past studies generally lumped two different types of humor – incongruity and tendentious – together in experimental treatments without an awareness of or a concern for the differential effects that these two different forms of humor may have upon subjects. Previous studies have also generally failed to examine the critical roles in the learning process played by attention, arousal, and interest--all components of motivation. There is a remarkable lack of an attempt, as suggested by Anderson (1972), to build research on humor

and instruction upon solid foundations of motivation and learning theory, as well as upon descriptive theory and basic research on humor. This lack has led to inadequate sensitivity to experimental response demands and other potential design problems.

There continues to be a lack of theoretical understanding about how the use of humor may contribute to the learning process, and how it may not. Despite their improvements in precision and sensitivity of methodology, researchers have continued to consider and examine humor as somehow a direct factor in learning. Somewhat reminiscent of Thorndike (1913), they have tended to base their research on the rather untenable assumption that humor may serve to “stamp in” information upon a learner’s memory. Or they regard humor as a form of deep communication that somehow “bypasses many defense mechanisms that come with maturation” (Rutkaus, 1981, p. 8). These researchers have not adequately considered humor’s indirect motivation role as an integral part of the learning process. Only Zillmann, et al (1980) have suggested that an inattentive learner’s exposure to humor may increase the learner’s “vigilance” or attentive behavior, which may, in turn, facilitate the acquisition of subsequently presented information. This lack of a solid theoretical base in motivation and learning may well have led to the testing of humor treatments under inappropriate conditions, resulting in misleading findings.

Berlyne (1969, 1972) has well documented the notion that humor, like other forms of perceived incongruity, novelty, or expectancy violation, can result in an arousal boost that pushes a bored, inattentive learner (low learning performance) into a moderate level of arousal and attentive behavior to facilitate optimal learning performance. But when humor contributes to arousal being raised above that moderate level, learning performance declines (Brown & Itzig, 1976; Uehling, 1972). With arousal too high, the individual attends to too many cues, many of them irrelevant and too distracting to support effective processing of a particular message (Brockner, 1979; Wine, 1971).

As Schultz (1972) indicated in his examination of cognitive stimulation in instructional strategies, any novel stimulus situation, even the participation in a research experiment, may cause a subject’s arousal or vigilance boost. This boost may occur whether the subject is randomly assigned to an otherwise deadly boring instructional treatment or a pleasurable, interesting treatment employing humor. Hence, with subjects in all treatments at optimal levels of arousal to facilitate high learning performance, it is no surprise that the humor treatment fails to uniquely enhance arousal to support or facilitate significant learning differences. For this reason it is possible that in past studies, subjects who were assigned to boring or otherwise ineffective instructional treatment groups were at optimal levels of arousal for information processing simply due to the unintended novel stimulus experimental demands. In addition, when subject arousal was at a moderate level due to the novelty of experiment participation, humor treatments may

have even boosted arousal beyond an optimal level for learning performance, such as in the study by Cantor & Venus (1980).

Thus, it is quite possible that the failure of past research to find an effect of humor in facilitating learning is due at least in part to the arousing conditions involved in experimentation. A major contribution of the present study is the examination of the effects of humor upon the learning performance of individuals who receive treatments while they are at similar induced low levels of arousal, interest, and focused attention. According to the above rationale, these conditions of boredom, low interest, and inattention would be most appropriate in assessing the true merits of humor in instruction. With subjects in these conditions, humor's indirect facilitating effect upon learning may be more clearly demonstrated than has been in the past.

The studies by Zillmann et al (1980) and Kaplan & Pascoe (1977) contain important methodological improvements over past studies which generally failed to assess the actual humorousness of the intended humor treatments. Past studies were also far from precise in examining the impact of humor on learning, as indicated here by Kaplan & Pascoe (1977):

Another difficulty with the research on humor and learning has been the method of evaluating learning. No experimenter stated exactly from where in the message that test items were taken. Because of this, two important questions become obvious: Did any test questions assess recall of material presented immediately before or after a humor item? Was humor associated in some way with the major points on which a listener was to be tested? Knowing how the humorous items in a message corresponded to subsequent test questions would allow a more accurate appraisal of humor's effect on learning. [p. 61]

Although recent research has been more precise in evaluating the effects of humor upon the learning and retention of various parts of a message treatment, a basic, clear description of what is meant by the dependent variable "learning" has been consistently lacking. Past studies tended to test learning using a multiple-choice format, inappropriately classifying the learning as comprehension or recall learning, when actually in those studies recognition learning was the more accurate classification.

Recognition tests of basic knowledge present problems in which alternative answers are available (i.e. true-false and multiple choice items), while recall tests (i.e. short answer essay, fill-in completion questions) present problems which require a person to come up with correct answers without the availability of alternative answers (Estes, 1976). It would therefore follow that recall tests would generally be more difficult than recognition tests of the same basic knowledge, and that these recall tests would measure a deeper level of learning. Furthermore, the recall mechanism would be more useful in accomplishing more complex

educational objectives (Bloom, 1956). It would be interesting to note and compare the effects of incongruity humor treatments on comprehension and retention test performance of questions requiring recognition and questions requiring recall.

Past studies have also focused predominantly upon the effect upon learning of humor incorporated or integrated within an instructional message or learning activity, such as interspersed within a biographical text, audio or videotaped lecture, written programmed instruction, or radio message. Unless closely related to the material to be learned (Kaplan & Pascoe, 1977), or unless the learner, such as a child, has a very short attention span so as to minimize distraction time (Zillmann et al, 1980), it is quite possible that integrated humor distracts the learner from the surrounding material to be learned (Zillmann & Bryant, 1983; Zillmann, 1977). For example, a learner may selectively attend to the humor and humor related conceptual information to be learned, yet pay little attention to the surrounding non-humorous instructional elements. Furthermore, an intense laugh or even a moderate mirthful reaction may distract the learner and cause immediately subsequent material to be entirely missed. Attempts by learners to pleasurably repeat or commit humorous jokes to memory would likely prolong such distracting effects and further impair the acquisition of the information being delivered. Only Cantor & Venus (1980) and Kaplan & Pascoe (1977) have examined, albeit tangentially, a "contiguous" use of humor, as suggested by Markiewicz (1974), where humor precedes subsequently presented information to be learned.

Research questions of the present study

Humor in the present study is broadly treated as an emotional experience resulting from the perception of an incongruity or discrepancy based upon present expectations, and characterized by pleasure and increased cognitive arousal. Humor may also include an emotional experience resulting from the resolution of the same discrepancy, and be characterized by pleasure and a decrease in arousal. This two-part theory of incongruity humor, which was proposed by Berlyne (1972) and based upon motivation-drive theory, conflicts with the humor orientation of such cognitive theorists as Suls (1975) and McGhee (1971, 1972, 1974, 1976). These latter theorists define humor as only the resolution of incongruity with accompanying pleasure. Berlyne's approach is more useful to the present study because it covers a broader range of phenomena, such as very young children who may be unable to resolve a complex incongruity but still exhibit increased arousal, attention, and humor reactions at the mere perception of such incongruities as novelty and surprise.

Unlike traditional research employing integrated humor designs, a contiguous humor design may avoid the distracting effects of integrated humor, yet benefit from the concomitant arousal and pleasure. When interest is initially low, the

learner's performance in encoding new information may be greater with an immediately preceding humor experience than without the experience. The preceding humor experience may raise the learner's level of attention and information seeking, promoting optimal learning of the immediately following new information.

In a different contiguous design, the expectancies of pleasure formed or altered during the humorous experience may also continue from the specific situation and influence task specific motivation in a similar learning task that occurs a considerable time after the humorous experience, having a postponed or spreading facilitating effect upon learning (Porter & Lawler, 1968; Rotter, 1972; Rychlak, 1977; Thorndike, 1933). It should be noted that these contiguous designs employ either an immediately-following or a postponed-following presentation of non-humorous material to be learned. It may therefore seem that learners could become quickly frustrated and disappointed with the following new learning task, since the new information is not humorous as expected. Yet the new learning material, constituting a change from the previous arousing humorous condition, may even be experienced as pleasurable with the reduction of arousal (Berlyne, 1972, 1967; Berlyne & McDonnell, 1965; Deckers & Kizer, 1975; Gerber, 1975).

The present study examines hypothesized beneficial effects upon various specific dependent variable measures of learning (recognition and recall) of two contiguous incongruity humor designs over and above an integrated humor and no humor control design. One contiguous design deals with the effects of a contiguous humor treatment upon the learning of an immediately following body of information. The other contiguous design deals with the long-term transfer effects of the same contiguous humor treatment upon the learning of a body of information presented at a later date. It is also hypothesized, based on the previously found distraction effects of integrated humor, that the integrated humor design would not contribute to greater learning than would a non-humor control design. The specific hypotheses for this study can be listed as follows:

Hypothesis 1. Subjects who receive incongruity humor immediately prior to a new body of non-humorous information (contiguous-immediate group) will perform better on dependent variable measures of learning than subjects in a control group.

Hypothesis 2. Subjects who receive the new body of non-humorous information several days after the incongruity humor experience (contiguous-postponed group) will perform better on the dependent variables than subjects in the control group.

Hypothesis 3. Subjects who receive the new information containing integrated incongruity humor (integrated humor group) will perform no better on the dependent variables than subjects in the control group.

Method

Subjects

The initial group of subjects selected for the experiment were 74 first graders attending three classes in a Northeastern public elementary school. The boys and girls in each of the three first-grade classes were assigned to one of four treatment groups, using a random assignment procedure stratified by sex and classroom. Due to absenteeism, 16 children were not part of the final subjects in the experiment, making a total of 58 children (21 girls and 37 boys) participating fully in the experiment.

Treatments

The first group in this study (contiguous-immediate), after being repeatedly exposed to an audiotape of a familiar children's story, heard content violations in the familiar story, resulting in a humor experience. They immediately thereafter received a taped new unfamiliar story about a trip to a library where several books about animals were encountered. In the second group (contiguous-postponed), children heard the same content violations, but received the same new story one week following the humorous content violation experience. The third group (integrated humor) featured humor integrated within the new story. Group 4, the control group, heard the familiar story followed by the new story, with neither story containing humorous incongruity. As a control group, group 4 differed from the other three groups only in terms of lack of a humor treatment.

The third group featured incongruity humor by means of cartoon animal drawings which were simultaneously presented with the new story, and which occasionally violated the content of the new story. As the books were mentioned in the taped new story, an experimenter assistant held up a cartoon drawing of the respective animal topic of each book. For some of the books mentioned, a drawing was raised of the incorrect (incongruous) animal.

A major problem in this integrated humor design exists in group 3 receiving information in the form of pictures in addition to the reading of the new information received by both contiguous incongruity humor groups. The potential confounding effect of the pictures may contribute to the integrated humor group's higher learning simply due to the additional visual source for receiving the new story information (Sewell & Moore, 1980; Dwyer, 1978). Thus, it would be impossible to distinguish whether the integrated humor group's enhanced learning, if such is the case, were due to the integrated humor design or simply due to the presence of an additional source of relevant information, or both. However, if the integrated humor group performs no better than the control group, that result

would occur in spite of the learning facilitating effect of the additional channel of information. Therefore, the potential confounding effects of the visually integrated design in this study seem to be critical in the analysis of results only should the integrated humor group perform significantly better on measures of learning than the control group.

The experimenter and his adult assistants met with the children on the first two days of the four-day experiment to present an audio-taped version of only the familiar children's story for three reasons: (1) to attempt to achieve the groups' equal level of familiarity with the story; (2) to accustom the students to having an unfamiliar group of adults present; and (3) to manipulate interest and attention to relatively low levels across all groups. It was necessary in this contiguous humor design that the children be familiar with the story. A word or phrase in the story is not a humorous incongruity of the present kind unless it violates the child's familiar expected story line content. It was also felt that prior familiarization with the children would help to offset subject contaminating effects of heightened arousal or anxiety due to the several combined novelties inherent in conducting the research, which was observed in a previous study (Vance, Keller & Kopp, 1980). It was attempted to build a comfortable, relaxed, familiar group situation. Finally, the repeated conventional reading of the familiar story was also intended to contribute to the children's low level of listening interest and attention across all groups prior to the group treatments.

Materials

An audio cassette recording of the familiar story, played concurrently to all four groups, contained a standard version of "Goldilocks and the Three Bears". The familiar story was converted into a humorous stimulus by making word and phrase substitutions that violated the story's familiar content. For example, this recording began with, "Once upon a time, in a little house in the middle of a forest, there lived three ducks".

It was intended for the library-trip new story not to be inherently interest-arousing, to test for evidence of arousal and learning caused by the preceding story presentation design. All recordings featured the same male voice, made with as little expression as possible to minimize a confounding effect upon arousal and attention (and subsequently upon learning) of a dynamic and expressive taped reading. The new story was purposely short to assess the effects of the previous experience on learning the new information. A longer new story would begin to introduce its own effects upon arousal, attention, and interest, which could easily mask the same effects of the preceding listening experience. Nine colored drawings of the animals mentioned in the new story, with four of the drawings misplaced, served as a source of integrated incongruity for children in group 3.

The normal and content violated versions of the familiar story were previously presented to kindergartners and first graders in pilot tests. Those listening to the content violation version expressed much laughter and smiling, while those listening to the traditional version listened passively. The effects of the drawings were also examined with first graders, who manifested a humor reaction to the same four misplaced drawings simultaneously presented as they listened to the audiotape. However, children did not manifest a humor reaction when the taped library story was presented with the drawings in proper sequence. First graders were also asked to identify the animal in each of the nine drawings to assess the drawings' familiarity and recognition difficulty. This check indicated that the animals were easily and immediately recognizable by the children.

Measures

Treatment effects were measured in terms of post test short-term or immediate memory, and long-term memory or retention performance. Higher scores were considered as evidence of an indirect effect of humor which caused higher task relevant attention and effective information processing, which, in turn, facilitated learning. With the previous distinction between recognition and recall, this study noted and compared the effects of the group treatments on test performance of questions requiring recognition, questions requiring recall, as well as total questions representing overall immediate memory learning and overall retention learning. Measures included an orally administered memory test and an experimenter assistant's observation questionnaire. The orally administered memory test consisted of 21 true-false (yes-no) recognition items followed by three short answer recall items. There were no test order effects between recognition and recall items since the recall items followed and did not test the same material as the recognition items.

It was critical in the assessment of the humor design effects that the test instrument be sensitive to differential effects of the various group treatments. If the test were too difficult, all groups may have done very poorly without a significant difference. If the test had been too easy for the children, all groups might have performed equally well. The recognition item instrument developed and used by Vance et al (1980) was used in the present study since there was evidence that the instrument possessed adequate discriminating power.

Group behavior during taped stories was observed and documented daily by each experimenter assistant. After being asked to briefly describe in writing how the assigned group subjects behaved during each group session, each assistant was asked to rate on a Likert type scale the amount of humor and the level of interest behavior manifested during the session. The daily behavior evaluation was necessary since laughter and smiling reactions were important, albeit not conclusive, in

verifying the intended humor reactions. Furthermore, since the researcher of this study was absent from the treatment sessions to prevent experimenter bias, it was necessary to have group observation data available about what actually took place in each group as opposed to what the researcher supposed had taken place. Since only two to four assistant experimenters attended each group and recorded their observations on a given day, their group average humor and interest scale ratings should be received with due caution. To further prevent bias, the assistants had no advance information about the research questions underlying the study, nor the hypotheses pertaining to their particular assigned groups.

Procedure

The experimenter and 14 adult assistants conducted the research on Monday, Tuesday, and Wednesday of one week, and returned on Wednesday of the following week. The same two to four experimenter assistants met simultaneously with one group, the exact number depending upon the availability of the volunteer assistants. Several assistants were required for the one-on-one administration of the oral test after each treatment in the brief time available for the research.

On the first and second day, the lead assistant in each of the four groups played to the children the three minute tape recording of the familiar story. Each lead assistant then thanked the children and excused them to their respective classes. On the third consecutive day, groups 3 and 4 received the same recording of the familiar story, while groups 1 and 2 received instead the version of the familiar story containing content violations. On the third day, immediately following the first story, groups 1, 3, and 4 were presented with the taped new story about the library trip, which was then followed immediately by the brief test administered orally and individually to each child by an assistant. The test was announced by each lead assistant following the taped new story, and was called a "remember game". The children were not given feedback on any test performance, but were individually thanked for playing the game. Group 2 (contiguous-postponed) received no other activity on this third day beyond the story content violation reading. On the following Wednesday, groups 1, 3, and 4 received only the same test administered in the same fashion, which served as a retention measure of the new story.

Group 2, which did not hear the new story heard by the other groups on the third day, heard the new story alone on the following Wednesday, and was then given the orally administered immediate memory test. Group 2 was not given a retention test due to the relative lack of importance of those data compared to the inconvenience of disturbing the classes an additional day. The major importance of group 2 was to allow for the possibility of identifying a lingering, postponed or

general transfer effect of humor which facilitated the learning of a block of new information. Table 1 contains a summary of the research procedure conducted with each group for the four days of the experiment.

Results

Group equivalence

A group equivalence check on child age was made to assess the effectiveness of the random assignment procedure. An analysis of variance of age among the four treatment groups revealed no significant difference. IQ test data were not available for an additional check on random assignment.

Immediate memory test

The results by group of child performance on total test items, recognition items, and recall items of the immediately administered memory test are presented in Table 2. As indicated, a one-way analysis of variance of the recognition item performances failed to reach significance. However, an analysis of the means of both the recall and total test items did reveal significant differences.

A Tukey pairwise comparison procedure adjusted for small differences in sample sizes revealed, as predicted, that group 2 (contiguous-immediate) scores were significantly higher than the scores of group 4 (control) on total test items ($p < .05$). However, other groups' differences on total test items failed to reach significance. Results of pairwise comparisons on recall test items revealed, as predicted, that children in either of groups 1 and 2 had higher immediate memory test scores than the children in group 4. As expected, no differences were found between groups 3 and 4 in any of the three test item scores on the immediate memory test.

Retention test

The results by group of retention test performance are presented in Table 3. As indicated, an analysis of variance of the group means of the total items, recognition items, and recall items revealed significant group differences within each of those test item categories. A pairwise comparison of total test item group means

Table 1. Procedure summary.

Groups	Day-by-day procedures for each treatment group			
	Day 1	Day 2	Day 3	Day 4 (7 days after day 3)
1. Contiguous-immediate	Normal reading of familiar story	Same as day 1	Familiar story with content violations, new story, then test 1	Test 2
2. Contiguous-postponed	Normal reading of familiar story	Same as day 1	Familiar story with content violations	Test 2
3. Integrated humor	Normal reading of familiar story	Same as day 1	Same as day 1, new story with drawings, then test 1	New story, test 1
4. Control	Normal reading of familiar story	Same as day 1	Same as day 1, new story, then test 1	Test 2

Table 2. Means, standard deviations and analysis of variance of immediate memory on total test, recognition and recall scores for each group.

(#) Group	N	Total items		Recognition items		Recall items	
		M	SD	M	SD	M	SD
1. Contiguous-immediate	16	14.75	3.38	13.69	2.77	1.06	0.93
2. Contiguous-postponed	14	13.86	3.96	12.93	3.69	0.93	0.73
3. Integrated humor	17	13.35	3.46	13.12	3.43	0.24	0.44
4. Control	16	11.00	2.48	10.81	2.37	0.19	0.40
F (3,59)		3.65 (p<.05)		2.65		7.68 (p<.001)	

Table 3. Means, standard deviations and analysis of variance of retention on total test, recognition and recall scores for each group.

(#) Group	N	Total items		Recognition items		Recall items	
		M	SD	M	SD	M	SD
1. Contiguous-immediate	13	13.31	2.50	12.38	2.22	0.42	1.04
2. Contiguous-postponed (no retention test)							
3. Integrated humor	16	12.63	2.55	12.50	2.31	0.13	0.50
4. Control	15	11.00	1.93	10.67	1.84	0.33	0.49
F (2,41)		3.67 (p<.05)		3.46 (p<.05)		4.91 (p<.05)	

Table 4. Experimenter assistants' mean group behavior ratings for experimental sessions. (Note: rating scale 1-7, 1=very little interest/humor; 7=very much interest/humor)

Groups	Day 1		Day 2		Day 3		Day 4	
	Humor	Interest	Humor	Interest	Humor	Interest	Humor	Interest
1. Contiguous-immediate	3.0	4.0	1.5	2.0	6.0	6.0		
2. Contiguous-postponed	2.5	4.0	2.5	2.5	6.5	6.0	2.5	3.3
3. Integrated humor	2.3	3.7	3.3	4.0	3.5	3.5		
4. Control	2.5	4.0	2.0	3.5	2.0	3.0		

revealed, predictably, that children in group 1 performed better on the total test items than those in the control group. However, children in group 2 performed no better on these items than children in group 4. As expected, group 3 did not perform differently on these items than group 4.

A pairwise comparison failed to reveal a significant difference among group means on recognition item retention performance. Although the overall analysis of variance procedure found a significant difference among these means, the conservative post hoc analysis procedure resulted in a failure to reject any pairwise comparison null hypotheses. Finally, recall item mean score differences between group 1

and group 4 failed to reach significance in this test, although the differences were in the predicted direction.

Experimenter assistants' observations

The daily observations of group behavior made by the experimenter assistants provided quantitative and qualitative evidence of what went on in the experimental groups. Table 4 indicates mean ratings for the amount of group humor behavior (e.g., laughing, smiling) and interest behavior (e.g., attention) manifested during the taped stories on each of the four-day sessions. Since groups 1, 3, and 4 received no story on the fourth day, no rating was recorded, but general observations were made.

These ratings indicated that the contiguous humor manipulations in groups 1 and 2 had the intended effects, with higher levels of child humor and interest behavior expressed on the third day in which the content violation humor design was introduced relative to those measures on the previous two days. The general descriptions of child behavior in these two groups on these days also supported the anticipated presence of relatively high humor and interest reactions to the tape as compared to the previous two days in which only the same familiar story was read. Excluding those behaviors observed in group 3 (integrated humor), the second day session had a general effect of dampening all humor and interest behaviors. The ratings and descriptive data for group 4 reveal that humor and interest behavior during the same taped familiar story remained at about the same relatively low levels for the first three days of the experiment.

An examination in Table 4 of group 3's third day ratings of humor and interest behavior indicates very little difference in those categories from the ratings of the previous two days. An examination of the general descriptions for group 3 on the third day supports this evidence of a failure of the integrated incongruity humor to have its intended effect. The kids in group 3, who were assigned to the stage as a site for the experiment, grew progressively more restless and rambunctious on each successive day of the experiment. They evidenced very little focused attention. Evidently, for these children, arousal was already extremely high by day 3, and they simply didn't notice the animal pictures being out of sequence, thus failing to experience humor from the intended integrated humor design.

Discussion

The overall results of this study, which indicate that contiguous humor may be useful in the design of instruction, are worthy of note in that they contradict the overall conclusions of previous empirical research, which has generally discounted any utility of humor in enhancing learning. The prediction in Hypothesis 1, that

learners receiving the content violation humor experience immediately before the new information would perform better on immediate memory and retention tests than the control group, was generally supported by the results. Only on the recognition questions of the immediate memory test did the difference fail to reach significance ($r=.057$). Even here, however, the performance trends were in the predicted direction. It is also interesting to note that, based on the analysis of retention test recognition performance, group 1 performed better than the control group.

It was predicted in Hypothesis 2 that children receiving the content violation humor experience several days prior to the presentation of the new information (group 2) would perform better on immediate memory and retention tests than the control group. This prediction was supported only in terms of recall item responses on the immediate memory test. It should be remembered that group 2 did not receive a retention test, and was therefore not included in the retention test analysis. With regard to the effects on dependent variables of learning of the integrated humor design, the intended humor reaction manipulation did not take place, evidently due to the unanticipated distracting and overly arousing cues of the stage as a site for experimentation. It is very likely that the ebullient behavior displayed by these children was evoked by the assignment to the stage, the surroundings of which had a decided distracting and confounding influence upon the intended integrated humor effect. Although the intended manipulation in group 3 failed, it is still useful to examine this group's performance on the dependent variables compared to those of groups 1 and 2. A question may be raised as to why group 3 failed to perform significantly worse in most of the different tests than groups 1 and 2, especially since group 1 frequently performed better than the control group. Only on recall items in the immediate memory test did groups 1 and 2 perform better than group 3. In fact, the mean score for group 3 on the recognition items of the retention test was higher than that of group 1, although not at a significant level. Based on the assistants' descriptions of the children's inattentive, restless, noisy, and distracted behavior on the day in which the new information was presented, it is interesting that these children possessed so much of the information for ready retrieval.

One reason for group 3's unexpectedly high performance may be that these children had a visual channel of communication in the form of the drawings in addition to the taped reading of the new story (Sewell & Moore, 1980). This additional channel or source of information may have reinforced or supplemented the learning from the concurrently presented audiotaped information. Another possible explanation unrelated to humor is supported by Travis & White (1979), who found that a student's simultaneous acting out of a story being presented aurally may contribute to the student's increased learning of the story. In fact, experimenter assistants noted, predominantly with group 3, that children would act out the familiar story as it was being received from the taped reading. Since the children

in the other groups did very little of this simultaneous story enactment, it is possible that the unique stage environment facilitated the tendency to act out the taped information. The pun is not suggested here that the stage itself necessarily abetted acting out behavior, but that the cues inherent in the stage environment lessened the children's inhibitions and permitted enactment behaviors. The enactment behaviors, without possible cues of inhibition within the classroom, may have been a natural reaction to the first two familiar story readings which lacked novelty and change. And when the children in group 3 began hearing the new information following the third reading of the familiar story, they continued their previous attention mode of acting out the taped information, which led to an enhancement on learning the new information.

The results of this study support the assertion that the presentation of contiguous humor can lead to improved immediate memory and retention of a subsequently presented message. These results are particularly true with regard to recall of new information. It is possible that humor may be especially important where higher levels of learning, such as recall, are desired, and which may be more amenable to retrieval and long-term retention.

According to this study, humor may serve to raise flagging levels of arousal, attention, and interest to levels which support optimal information processing, and therefore enhance learning in terms of immediate memory and retention. In previous research, the role of arousal and attention in incongruity humor and their subsequent effects upon learning were not adequately taken into account, both in conceptualizing the research and in implementing the research design. An important contribution of the present study is its sensitivity to arousal and information seeking as parts of the process of learning from an instructional design strategy employing incongruity humor.

A major problem with the present study is the assumption that group 4 served as a control group for comparison with all the other groups. It is true that group 4 did not receive an incongruity humor treatment, but it did receive an additional third reading of the normal version of the familiar story, unlike groups 1 and 2. It is possible that the extra experience of hearing the familiar story could decrease interest, arousal, and attention below the level resulting from the second reading of the familiar story, a reading common to all four groups. Therefore, not only could learning performance differences in comparison with group 4 be attributed to an effect of a humor treatment that enhances interest and attention, but also to an interest and attention dampening effect on group 4 from the additional familiar story reading.

Suppose group 4 would instead receive only the new story on the third day, and be tested immediately afterwards as before. This procedure might cause the problem of children having heightened arousal and interest due to the novelty of the new story on a new day of the experiment, and therefore allowing the children to process the new information more effectively. The interest evoking properties of the new story as the first recording on the new day may therefore raise attention

and arousal to optimal levels and cancel out any learning performance differences due to the arousal and interest evoking properties of the incongruity humor treatment itself. Of course, this same argument could be posed about the new story being presented to group 4 after the familiar story reading on the third day, in which the novelty of the subsequent new story as compared to the third reading of the familiar story would immediately jack up interest and arousal, and therefore facilitate learning performance. As the results indicate, however, this learning enhancement did not occur. The most critical difference here is that the children on the third day, most likely from prior experience, believed that the reading would present no pleasure or material of value to them. Evidently, their expectations from the taped reading were that their efforts in listening carefully to the tape would not be sufficiently rewarded. They therefore did not apply the concentrated effort, which significantly affected the processing of information contained in the new story presented immediately following the familiar story.

A major challenge of this study was to make the control group 4 differ from the other treatment groups only in terms of absence of arousal raising humor. In fact, the control group should be devoid of any forms of novelty or incongruity that would have arousal evoking properties. The experience prior to the new story of group 4 on the third day must not in itself cause either a decrease or an increase in arousal, focused attention, and interest. Either a decrease or an increase would confound conclusions about the effects of incongruity humor on performance in learning the new information. A decrease would most likely impede the learning of new information and thus represent an alternative explanation for group learning performance differences. An increase would facilitate learning in group 4 and thus render facilitating effects due to incongruity humor indistinguishable. However, such a neutral prior experience in the control group is probably impossible to achieve. Even if children received on the third day another familiar story which they had not received on the previous days, that story could also be a novelty experience which would raise interest and focused attention, and thus enhance the learning of the subsequently presented new story.

Although the control group in this study allows for a possible confounding effect in dampening interest and attention, it does represent a realistic situation in which lack of interest and boredom might exist in the classroom. Also, by the end of the second day most of the children in all four groups were at low levels of interest and focused attention, and were attending to other stimuli instead of the tape recording. Since group 4 on the third day displayed the same inattentiveness as on the second day, it is quite possible that the third day familiar story reading didn't have an interest and attention dampening effect on group 4 beyond those low levels resulting from the second day's familiar story reading. In other words, it is possible that, based on experimenter assistant observations, the kids could endure only so much of a dampening of interest and arousal in listening to the tape before they would begin to seek more rewarding stimuli. Most of the kids on all four groups were inattentive and seeking other stimuli during the familiar story on

the second day, and this same behavior of the kids in group 4 continued with the familiar story reading on the third day.

The experimental design of this study would have been more effective if groups 2 and 3 had their respective control groups, for group 4 did not serve as a true control for these groups. Even if the integrated humor manipulation in group 3 had succeeded, which was not the case as indicated by the experimenter assistants, the fact that the colored animal drawings were presented in group 3 and not in group 4 posed a potential confounding effect. As was already indicated, the mere fact that group 3 had an extra visual source of information about the new story could have caused group 3 to have higher test scores than those of group 4. Another group with the same drawings as those in group 3, but in proper sequence, would have been a more adequate control in assessing the effects of integrated humor caused by the drawings.

The present results involving group 2 are vulnerable to historical and maturation effects, since the performance of group 2 on the immediate memory test was analyzed with the other groups' same test performance occurring six days earlier. In fact, the assistant experimenters generally agreed that the children in all groups on the last day of the experiment were more aroused and excited than on any of the previous days. One assistant attributed this increased state of arousal on the last day to a rapidly approaching thunderstorm, or to the anticipation of Halloween which was only three days away. Also, it is possible that after several days of not seeing the experimenters, the children may have had an increase in excitement and arousal, thus confounding the postponed incongruity effect. There are many confounding variables which could affect arousal, and thus obscure the true effects of arousal due to the experimental manipulation of incongruity humor. A more adequate control of maturation and historical effects would consist of comparing group 2 with another group which would receive the familiar story on day three, as did group 4, but then postpone the presentation of the new story until day four, as was the case with group 2. Therefore, the use of the control group in the present experimental design is not without fault. Future research should compare the test performances of such treatment groups as groups 2 and 3 with their more appropriate respective control groups to more effectively assess each humor treatment effect.

The present study provides support for the rather intuitive notions held by present day practitioners that incongruity humor can be an effective tool in enhancing learning. In particular, the results of this study suggest that, when learner interest or arousal is low, the learning of intended instructional material may be enhanced by preceding the instructional material with a humorous experience. It was interesting that the recognition test items didn't differentiate the treatment effects upon learning as well as did the more memory taxing recall items. The value of an instructional strategy employing contiguous humor may be particularly

high when a learning outcome using the more difficult memory retrieval process of recall is desired.

The results using a contiguous design provide evidence that incongruity humor may have a two-edged benefit. A humor design may cause arousal to be raised to a level for optimal information processing and learning, as well as elude a humor experience, the positive affect of which may transfer to other subsequent associated or similar contexts to facilitate attention behavior and learning. A student who associates the humor experience with a particular subject or instruction may carry these learned associations and expectations as personal input variables (Keller, 1979) into other learning situations with the same teacher or similar topic, with a continued facilitative effect upon learning.

Implications from this study for practitioners may be valid only in the particular context tested, and should not be applied to other contexts without due caution. Groups 1 and 2 represented only two designs for testing a contiguous humor strategy within the particular context. Other areas for examination might include the amount of prior incongruity humor necessary for optimal learning, or the optimal amount and duration of new information to be presented for a given prior incongruity humor experience. It seems likely that an integrated design may become a contiguous design when a large amount of non-humorous instruction separates the integrated humor. At what point is one design contiguous and another integrated? Future research should test various contiguous designs in other contexts with different subjects. For example, content violations in a familiar story may not work with an older group of subjects. Also, the contiguous design may represent unrelated information for adults and thereby result in unimproved or even inhibited learning (Zillmann & Bryant, 1983; Kaplan & Pascoe, 1977). More research should examine whether present findings are due only to the kind of incongruity humor used in the study, or whether similar results can be found using other kinds of incongruity humor in their different instructional design contexts.

Another area requiring more study lies in the transfer and maintenance of arousal and positive affect from the contiguous humor experience to the subsequent learning task. Although arousal may transfer merely due to the propinquity or immediacy of the subsequent learning task, no matter what it is, how similar do the humor experience and subsequent task have to be for positive affect to effectively transfer over a longer period of time?

A major contribution of this study is its assertion that past research has generally failed to adequately consider the effects of arousal. Future comparative studies in instruction and communication methods should have a stronger concern for how subject arousal across experimental treatments, due to subject demand cues in experimentation, may greatly impede the detection of learning enhancement. Past research on integrated incongruity humor may very likely have suffered the confounding effects of arousal from experimental demands. Finally, more sensitive research must also be conducted on the use of humor which is integrated within

instruction to better determine in what ways and under what conditions integrated humor may enhance learning.

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