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Humor in the classroom: the effects of integrated humor on student learning

San Bolkan[a], Darrin J. Griffin[b] and Alan K. Goodboy[c]

[a]Department of Communication Studies, California State University, Long Beach, U.S.A.; [b]Department of Communication Studies, University of Alabama, Tuscaloosa, U.S.A.; [c]Department of Communication Studies, West Virginia University, Morgantown, U.S.A.

ABSTRACT

This study was conducted to examine the impact of integrated humor on direct measures of students' ability to retain and transfer information from educational lessons. In two experiments, participants were randomly exposed to either a lesson with humorous examples or standard examples and were subsequently asked to take tests on the material. Data were analyzed to examine differences in students' test scores while controlling for the impact of perceived concreteness, interestingness, cognitive overload, and coherence within each lesson. In Study 1, results revealed that, compared with students exposed to standard examples, students exposed to lessons with humorous examples performed worse on a multiple-choice test of the material. Study 2 replicated these findings with a new manipulation and also included an open-ended question test; results revealed that students exposed to the humorous condition again performed worse on their tests compared with students exposed to the standard examples. Findings are discussed as they relate to the potential distracting consequences of humor in the classroom.

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Instructor; humor; cognitive learning

Researchers from various disciplines have devoted considerable energy toward developing an understanding of what teacher behaviors influence student learning. Though variables such as instructor clarity (e.g., Bolkan, Goodboy, & Myers, 2017; Titsworth, Mazer, Goodboy, Bolkan, & Myers, 2015) and the promotion of autonomous motivation (e.g., Deci & Ryan, 2000; Guay, Ratelle, & Chanal, 2008; Reeve, 2002) seem to have robust and consistent positive effects on student success, other teaching behaviors have yet to demonstrate dependable results. Instructor humor is one such behavior. Considering the corpus of literature, results linking instructional humor and student learning have been mixed. And, as Banas, Dunbar, Rodriguez, and Liu (2011) note, to date there are still no clear conclusions regarding how humor works in the classroom.

Despite the lack of clear conclusions, communication scholars have learned some things about the impact of humor in the classroom. For example, researchers have found that the presence of humor is associated with a host of instructional benefits including students' motivation (Gorham & Christophel, 1992), their positive attitudes toward instructors (Gorham &

CONTACT San Bolkan san.bolkan@csulb.edu
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Christophel, 1990), and students' perceptions of instructor sociability (Houser, Cowan, & West, 2007) and credibility (for a review, see Banas et al., 2011). Moreover, humor has been demonstrated to entertain students, alleviate anxiety related to learning, create a positive academic climate (Booth-Butterfield & Booth-Butterfield, 1991), and produce an enjoyable atmosphere for learning (Bolkan & Goodboy, 2015). However, as we mentioned above, despite the seemingly long list of benefits of humor in the classroom, its impact on learning has yet to be demonstrated convincingly. That said, it may be important to further explore this issue considering one of the principle purposes of any instructional behavior, including humor, should be to enhance student learning (Wanzer, Frymier, & Irwin, 2010).

As alluded to, previous experimental research exploring the effect of instructor humor on student learning has produced mixed results. On the one hand, several researchers have found no differences in information acquisition due to humor (e.g., Bryant, Brown, Silberberg, & Elliott, 1981; Gruner, 1967; Houser et al., 2007). On the other hand, scholars have reported positive associations between humor and student learning. However, a close examination of these studies reveals that most are decades old (e.g., Kaplan & Pascoe, 1977), were conducted without manipulation checks and without a concern for possible confounding variables (Garner, 2006; Hackathorn, Garczynski, Blankmeyer, Tennial, & Solomon, 2011; Ziv, 1988), involve incidental as opposed to intentional learning (Zillmann, Williams, Bryant, Boynton, & Wolf, 1980), do not manipulate instructor humor (Hauck & Thomas, 1972), and sometimes do not measure student learning at all (Wakshlag, Day, & Zillmann, 1981). As a whole, then, studies linking instructor humor and student learning are generally inconclusive. Indeed, a meta-analysis by Martin, Preiss, Gayle, and Allen (2006) revealed significant heterogeneity among studies examining the effects of instructor humor on objective tests of student learning. Thus, we contend that continued research exploring humor in the classroom as it is linked to direct measures of cognitive learning (rather than perceived cognitive learning; Hackathorn et al., 2011; Lane, 2017) could provide important contributions to the ongoing scholarly conversation regarding the impact of humor in the classroom.

Instructor humor–student learning link

As mentioned, experimental research exploring the humor–learning link has produced inconsistent results. These varied outcomes might be due to the many approaches researchers have available when operationalizing humor and may stem from the numerous types of humor that exist. To this point, Gorham and Christophel (1990) revealed that there are at least a dozen ways teachers can use humor to achieve their goals (e.g., physical comedy, general or personal anecdotes, comments directed at individuals, the class, or world events, etc.). Indeed, researchers confirm that humor can manifest through various general techniques (i.e., language, logic, identity, and action; Berger, 1976) and can include a variety of specific behaviors ranging from impersonation to using props (Booth-Butterfield & Wanzer, 2016). Moreover, humor effects may differ due to variability in the conceptual level at which it is operationalized (i.e., trait-based humor, as a style of communication, or in response to situational demands, Booth-Butterfield & Wanzer, 2016), and based on both its perceived appropriateness for, and relatedness to, classroom issues (Frymier, Wanzer, & Wojtaszczyk, 2008; Wanzer, Frymier, Wojtaszczyk, & Smith, 2006). Ultimately, then, researchers may have had a difficult time explaining the effects of

humor on student learning with any generalizability because teachers can use humor in many ways. Crucially, whereas some types of humor might be beneficial in academic contexts, others might not.

Although there are several dimensions upon which humor might be examined to determine its effectiveness in the classroom (e.g., related versus unrelated, appropriate versus inappropriate, see Wanzer et al., 2010), one that is often overlooked involves the manner in which humor is used during course lessons. From this standpoint, scholars have concluded that, generally speaking, humor can be utilized in one of two ways: as *contiguous* humor or as *integrated humor*. Contiguous humor is humor that is not tied to the content of an educational message in an integral manner, is separated from an instructional message by time, and can be related or unrelated to core content (Markiewicz, 1974; Vance, 1987). Integrated humor is humor that is embedded in instructional lessons or activities (Vance, 1987), and occurs when humorous information is incorporated into core instructional messages (Markiewicz, 1974).

Considering the information presented above, some researchers argue that the direction of humor's impact on students' information acquisition might be best understood as a function of the placement of humor used in class (Vance, 1987). Specifically, when humor is integrated and used to illustrate course concepts, it has the potential to interfere "with the processing of educational information" because students can become "preoccupied with the pleasant rehearsal of the humorous stimuli" as opposed to focusing on the content of the lesson being taught (Zillmann et al., 1980, p. 171). Conversely, although unrelated to the direct explanation of course concepts, contiguous humor might be beneficial to student learning insofar as it can be used to create an enjoyable classroom climate that attracts student attention and stimulates student enthusiasm (see Pekrun & Linnenbrink-Garcia, 2012). As Zillmann et al. (1980) noted, once attention is gained through external humor, vigilance can remain elevated for the educational aspects of a lesson. In summary, then, though contiguous humor might be beneficial for motivating individuals to engage with their educational environments, integrated humor may function as a source of distraction for students.

Humor as a mechanism to enhance information processing?

As noted above, integrated humor can be used in the classroom to explain course concepts as it relates directly to the information students are expected to acquire. Although we have argued that this type of humor may be detrimental to student learning, an alternative explanation for how and why integrated humor might actually benefit students stems from work on instructional humor processing theory (IHPT; Wanzer et al., 2010). IHPT predicts that humor leads to enhanced information processing as a result of the positive affect experienced in humorous situations. More specifically, the theory suggests that when instructor humor is appropriate and related to course concepts, it creates positive affect that captures students' attention and, in doing so, increases their ability and motivation to elaborate on and deeply process instructional messages. Because of enhanced information processing, IHPT proposes that students should learn more from instruction that incorporates relevant and appropriate humor.

Based on the conclusions promoted by IHPT, we might expect instructional humor to positively influence student learning. However, although IHPT has been successfully used

to frame instructor humor research (e.g., Goodboy, Booth-Butterfield, Bolkan, & Griffin, 2015), studies invoking this theory have yet to measure differences in students' information processing and humor's subsequent connection to students' ability to retain or transfer this information. The absence of conclusive evidence, then, raises the question of whether or not the use of related and appropriate humor leads to improved learning as a result of enhanced information processing. From an alternative standpoint, it could be the case that humor serves as a distractor when it is used to teach core course concepts (Zillmann et al., 1980). To explain: some research has found humorous examples to be more memorable, unique, and distinct (e.g., Hauck & Thomas, 1972; Kaplan & Pascoe, 1977; Schmidt, 1994), and that humor can impact the attention and positive affect related to the information being presented (Eisend, 2009). Thus, it could be the case that the increased memorability of related humor has a downside because the attention students pay to humorous messages may, in fact, detract from the attention students might otherwise pay to the content of their lessons.

In support of this argument, Vance (1987) notes that laughter "or even a moderate mirthful reaction may distract the learner" and "attempts by learners to pleasurably repeat or commit humorous jokes to memory would likely prolong such distracting effects" (p. 83). Schmidt (1994) would support this conclusion and has argued humorous information "receives both increased attention and rehearsal relative to nonhumorous material" (p. 953). That said, considering that situation-specific encoding of information tends to lead to less transferrable knowledge (e.g., Gentner, Loewenstein, & Thompson, 2004), it could be the case that instructors who incorporate humor into the explanation of their lessons might simply help students remember the humor used in class and not the concepts being explained. In other words, the provision of integrated humorous content might lead students to focus on the distinct or memorable surface traits of the information being provided instead of concentrating on the underlying meaning of their lessons. Studies of humor in various communication contexts provide support for this position. For example, Hollander (1995) examined the attention people paid to entertainment news sources and found that this attention was negatively related to actual political knowledge. Similarly, using an experimental design to examine humorous entertainment media and its effect on political knowledge as it compared with more traditional news media, Kim and Vishak (2008) found that traditional news media sources led to greater free recall of factual statements compared with entertainment media. Moreover, traditional media led to greater scores on a test of recognition related to factual issues compared with entertainment media. To summarize their findings the authors noted, "entertainment media were found to be less effective in acquiring political information" (p. 353) compared with traditional news sources.

According to Kim and Vishak (2008), the reason entertaining media may be less educational compared with traditional media is because people exposed to entertainment media tend to build general affective models of the material (i.e., affective learning) instead of storing more cognitively oriented factual information (i.e., cognitive learning). In a meta-analysis of humor in advertising, Eisend (2009) found similar results insofar as the data revealed that humor was found to impact attention and positive affect, but did not associate with comprehension and recall. Admittedly, media and advertising contexts contain differing informational exigencies when compared with classroom learning scenarios. However, despite the limited transferability of results from these contexts, findings

from these studies support the need to explore whether or not humorous instruction has the potential to thwart student learning.

Hypothesis

Though experimental studies of humor and student learning exist, most of these studies have failed to distinguish between contiguous and integrated humor (Garner, 2006; Hackathorn et al., 2011; Houser et al., 2007). Crucially, although contiguous humor might be beneficial in the classroom (see Vance, 1987; Zillmann et al., 1980), we contend that integrated humor might ultimately distract students from the core content of their lessons. Based on this rationale, the following hypothesis was created to help guide our study:

> H: Students exposed to a lesson explained with humorous examples will perform worse on a test of retention and transfer compared with students exposed to an identical lesson explained with serious examples.

Study 1

Participants and procedure

After obtaining approval from the institutional review board, 87 students (29 men and 58 women) were recruited to take part in this study from one upper and one lower division communication class taught by a single instructor (the second author) at a university in the South; students were provided with minimal extra credit in return for their participation. Participants' ages ranged from 18 to 24 ($M = 19.9$, $SD = 1.2$). Twenty-six students reported being in their first year of college, 26 students reported being their second year, 23 students reported being in their third year, and 12 students reported being in their fourth year.

Students who agreed to participate in this study were exposed to the experimental materials in a regular classroom setting and were told that they would (1) read a brief lesson, (2) answer a few questions about their perceptions of the lesson, and (3) take a test on the information provided in the lesson. Students were randomly assigned to one of the two study conditions (i.e., humorous or standard/serious). Both lessons focused on ideas from protection motivation theory (e.g., Rogers, 1983) and were discussed in the context of giving advice to others with specific attention paid to the notions of self-efficacy and response efficacy. Although we recognize that students experience their educational lessons through various media when they learn (e.g., face-to-face, written, digital), we chose to use written communication as the instructional medium in this study to eliminate differences in the presentation of information (including immediacy levels between the humorous and standard/serious lessons) and to allow students to encounter the information at their own pace.

The bulk of each lesson was identical; only the examples used to explain the concepts were changed (see Appendices 1 and 2). In this study, our humor manipulation might best be described by Berger (1976) as an instance of the humor techniques stemming from language (i.e., exaggeration) and logic (i.e., absurdity) and written to function as related humor (i.e., a humorous story or general anecdote used as an example to explain course content; Frymier et al., 2008; Gorham & Christophel, 1990; Wanzer et al., 2006),

which scholars argue reflects an appropriate use of humor in the classroom (Booth-Butterfield & Wanzer, 2016; Frymier et al., 2008; Wanzer et al., 2006). The humorous lesson contained 579 words ($n = 45$), the standard lesson contained 519 ($n = 42$). Students first read the lesson and then moved on to answer questions regarding their perceptions of the information provided. Students were given 10 minutes to complete this step. Next, students were directed to a distractor task that asked them to solve a variety of math and logic problems. Again, students were given 10 minutes to complete this step. After students engaged with the distractor task, they were asked to respond to five multiple-choice questions relating to the lesson they had just read. As in previous steps, students were given 10 minutes for this portion of the study.

Instrumentation

As a manipulation check, we assessed the extent to which students found the lessons to be humorous (or not). Specifically, students were asked to respond to a three-item semantic differential based on work by Kaplan and Pascoe (1977) with responses ranging from (1) to (7). Items were anchored with "Not funny"/"Funny," "Humorless"/"Humorous," and "Serious"/"Comical" ($M = 3.27$, $SD = 2.06$, $\alpha = .97$).

In this study, it was crucial to measure students' perceptions of the messages they were exposed to in order to hold constant variables known to influence student learning. Thus, we asked students to indicate their perceptions of each lesson including the extent to which they perceived them to be concrete and interesting. These two variables were chosen because they have been shown to influence performance in tests of reading comprehension (see Sadoski, Goetz, & Fritz, 1993a). In addition to perceptions of being concrete and interesting, we wanted to hold constant the extent to which the lessons were perceived to be clear. Clarity in this study was operationalized as perceptions of the lessons overwhelming students' working memories and as perceptions of the content being incoherent. Although there are a variety of ways for lessons to be clear, these constructs have particular application in the current context and with the methodology employed in this project (see Bolkan, 2017).

The measure of concreteness was adapted from the work of Sadoski and colleagues (Sadoski et al., 1993a, 1993b; Sadoski & Quast, 1990; Sadoski, Goetz, & Rodriguez, 2000) and consisted of three semantic differentials with response options ranging from (1) to (7). The semantic differentials were anchored with "Very hard for me to form images from this lesson in my mind"/"Very easy for me to form images from this lesson in my mind," "No mental pictures associated with this lesson"/"Very vivid mental pictures associated with this lesson," and "I could not see/visualize the information presented in this lesson"/"I could see/visualize the information presented in this lesson" ($M = 5.92$, $SD = 1.12$, $\alpha = .88$).

The measure of student interest was also adapted from the work of Sadoski (Sadoski et al., 1993a, 1993b) and consisted of three semantic differentials with response options ranging from (1) to (7). The semantic differentials were anchored with "Not interesting to me"/"Very interesting to me," "Did not capture my attention"/"Did capture my attention," and "Boring"/"Exciting" ($M = 4.71$, $SD = 1.41$, $\alpha = .93$).

Students' perceptions of working memory overload and coherence were measured using the subscales from Bolkan's (2017) clarity indicators scale. Both variables were measured

using a 7-point Likert scale ranging from (1) *strongly disagree* to (7) *strongly agree*. Examples of items from the measure of working memory overload include "The amount of information presented in this lesson was overwhelming," and "There was so much to learn during this lesson that I had a hard time keeping up" ($M = 2.08$, $SD = 1.22$, $\alpha = .89$). Examples of items from the measure of coherence include "In this lesson, I received information that was not essential to learning the main ideas" and "There was a lot of unnecessary information in this lesson" ($M = 1.99$, $SD = 1.14$, $\alpha = .89$).

Finally, as a test of their cognitive learning, students were given a multiple-choice test on the lesson. The multiple-choice test consisted of five items that assessed students' learning which we defined as the ability to retain and transfer information from the lesson provided (Anderson & Krathwohl, 2001). According to Anderson and Krathwohl's revised taxonomy of educational objectives, retention and transfer are considered "two of the most important educational goals" (p. 63) in academia and indicate that students have acquired knowledge and have thus learned information at some level. Each item had four possible choices; correct answers were scored as 1, and incorrect answers were scored as 0. Test scores were coded to reflect the percentage of correct responses provided ($M = 56.03$, $SD = 31.63$, *KR-20* = .67).

Results

Manipulation check

First, we checked whether or not our humor manipulation was successful. As anticipated, students exposed to the humorous lesson found the information to be more humorous ($M = 4.61$, $SD = 1.81$) compared with students exposed to the standard/serious lesson ($M = 1.83$, $SD = 1.16$; $t(75.75) = -8.56$, $p < .01$, $d = 1.84$).

Exam scores

Students' test scores were examined using a hierarchical regression analysis. The first block was utilized to control for the impact of perceived concreteness, interestingness, working memory overload, and a lack of coherence. The humorous condition was entered into the second block and was indicator-coded as 1 for the humorous lesson and 0 for the standard lesson to estimate mean differences between test score percentages. Pertaining to our hypothesis, results indicated that students who were exposed to the humorous condition scored lower on their average exam scores compared with students exposed to the standard condition (see Table 1). Specifically, an examination of the unstandardized coefficient for students' test scores indicates that students exposed to the humorous lesson scored on average 13.5% lower than their classmates who were exposed to the standard/serious material.

Discussion

This study tested whether a lesson with integrated humor would be detrimental to student learning. In line with our hypothesis, results revealed that students exposed to a lesson with integrated humor performed worse on a test of retention and transfer than students who were exposed to a serious lesson. This result was confirmed while controlling for variance explained by students' perceptions of their lessons being concrete, interesting,

Table 1. Regression models (Study 1)—predicting multiple-choice question scores.

Model	Coefficient	*SE*	*t*	*p*	LLCI	ULCI
1 $F(4, 80) = 2.35$, $p = .06$, $R^2 = .11$						
Constant	49.40	25.87	1.99	.05	−.09	98.88
Concrete	−.98	3.75	−.26	.80	−8.44	6.49
Interesting	4.30	2.79	1.54	.13	−1.25	9.86
Overload	2.80	3.33	.84	.40	−3.82	9.42
Coherence	−7.10	3.43	−2.07	<.05	−13.92	−.28
2 $F(5, 79) = 2.75$, $p < .05$, $R^2 = .15$						
Constant	50.09	24.42	2.05	<.05	1.49	98.68
Concrete	−.61	3.69	−.17	.87	−7.95	6.73
Interesting	5.02	2.76	1.82	.07	−.47	10.52
Overload	2.10	3.29	.64	.53	−4.44	8.64
Coherence	−6.09	3.40	−1.79	.08	−12.85	.69
Humor Condition	−13.51	6.76	−2.00	<.05	−26.96	−.06

Note: Coefficients are unstandardized. Exam scores are percentages ranging from 0 to 100.

overwhelming, and incoherent. These results suggest that when instructors incorporate humor into their educational messages, they potentially depress students' ability to retain and transfer the ideas being presented.

The findings reported in this study provide initial evidence that humorous examples might detract from student learning. However, among other things, it could be the case that the particular examples used in the manipulation were ill-suited for learning, the timed nature of the lesson somehow influenced student learning, or the student population was particularly distractible for one reason or another. As Kline (2013) noted, less than 1% of published studies in the behavioral sciences feature a replication study even though replication allows researchers to more confidently generalize their findings beyond an initial sample. Or as Kaufman and Tatum (2017) recently advocated, "without replication, our field runs the risk of generalizing findings and forwarding knowledge claims built on an unstable, unreproducible foundation. As such, over the next five years, *empirical replication* is one of the greatest needs for instructional communication research" (p. 480). Thus, we deemed it necessary to conduct a replication study to test the effects of integrated humor on student learning using (1) a new student population, (2) a new lesson, (3) a new learning environment, and (4) a new test of retention and transfer. Moreover, to add to the breadth of our assessment, we included open-ended questions that asked students to recall and explain the core concepts from the lessons.

Study 2

Participants and procedure

After obtaining approval from the institutional review board, 93 students (39 men and 54 women) were recruited to take part in this study from lower and upper division communication courses at universities on the West and East Coasts. Students were provided with minimal extra credit in return for their participation. Participants' ages ranged from 18 to 45 ($M = 23.3$, $SD = 5.4$). Six students reported being in their first year of college, 10 students were in their second year, 12 students reported being in their third year, 43 students reported being in their fourth year, and 22 students reported being in their fifth year or beyond.

Students who agreed to participate in this study were directed to an online platform where they were told that they would (1) read a brief lesson, (2) answer a few questions about their perceptions of the lesson, and (3) take a test on the information in the lesson. Students were randomly assigned to one of the two study conditions (i.e., humorous or standard/serious). Both lessons focused on the importance of teacher clarity (Bolkan, 2017) with special attention given to the ideas of coherence and fluency. The bulk of each lesson was identical; only the examples used to explain the concepts were changed (see Appendices 3 and 4). As in Study 1, the humorous examples used in Study 2 might best be described by Berger (1976) as utilizing the techniques of language and logic to create humor through absurd exaggeration. The humorous lesson contained 524 words ($n = 52$), the standard lesson contained 520 ($n = 41$). Students read the lesson at their own pace and, once they were finished, moved on to answer questions regarding their perceptions of the information provided. Next, to ensure that a period of time elapsed between being exposed to the lesson and taking their tests, students were directed to a distractor task which consisted of seven math and logic problems. After students engaged with the distractor task, they were asked to respond to four open-ended questions pertaining to the lesson. Finally, students responded to five multiple-choice questions (presented one at a time) relating to the lesson they had read.

Instrumentation

The second study included the same variables used to examine students' perceptions of their lessons present in Study 1. These included measures of humor ($M = 3.67$, $SD = 1.94$, $\alpha = .95$), concreteness ($M = 5.62$, $SD = 1.36$, $\alpha = .93$), student interest ($M = 4.75$, $SD = 1.53$, $\alpha = .94$), working memory overload ($M = 2.03$, $SD = 1.12$, $\alpha = .93$), and coherence ($M = 2.40$, $SD = 1.54$, $\alpha = .96$).

Concerning the measures of student learning, we included four open-ended questions in addition to the multiple-choice test. To remove the possibility that answer stems from the multiple-choice items might influence the results, open-ended questions were provided to students before they took the multiple-choice test. The first two open-ended questions asked students to list the two main ideas being discussed in the lesson. The second two questions asked students to briefly explain how each of the ideas might impact a person's ability to communicate clearly. Combined, the first two questions were scored as a 2 if students wrote down both "fluency" and "coherence" and were scored a 1 if only one of these responses was provided. If neither "fluency" nor "coherence" was present, students scored a 0. The second two questions were scored similarly using the definition of coherence as reducing the provision of unnecessary information and fluency as communicating in a simple, concrete, and straightforward manner. All questions were scored by the first author while blind to the conditions of each response. Scores for the open-ended questions represent the percentage of correct responses provided ($M = 60.22$, $SD = 33.22$, $KR\text{-}20 = .65$).

In addition to the open-ended questions, students were given a multiple-choice test as it related to the lesson. The multiple-choice test consisted of five items with four possible choices, correct answers were scored as 1, and incorrect answers were scored as 0. The test scores were coded to reflect the percentage of correct responses provided ($M = 66.24$, $SD = 33.62$, $KR\text{-}20 = .76$).

Results

Manipulation check

Our first step toward analyzing the data included checking that our humor manipulation worked. Results indicated that the manipulation was successful. As anticipated, results revealed that students exposed to the humorous lesson found the information to be more humorous ($M = 4.73$, $SD = 1.68$) compared with students exposed to the standard lesson ($M = 2.33$, $SD = 1.34$; $t(91) = -7.47$, $p < .01$, $d = 1.56$).

Exam scores

Differences in students' exam scores (open-ended and multiple-choice) were investigated using hierarchical regression analyses with the humorous condition indicator coded as 1 and the standard condition coded as 0 to reflect the mean difference in test scores across conditions. In each analysis, the first block included the covariates (concreteness, interestingness, short-term memory overload, and lack of coherence), and the second block included the experimental condition. Pertaining to the open-ended test, results revealed that students exposed to the humorous condition scored approximately 17% lower on this exam compared with students exposed to the standard/serious lesson (see Table 2). Pertaining to the multiple-choice test, results revealed that students exposed to the humorous condition scored approximately 14% lower on this test compared with students exposed to the standard/serious lesson (see Table 3).

The determination of a successful replication based on whether a second study achieves statistical significance is not sufficient (Rosenthal, 1990). Instead, Braver, Thoemmes, and Rosenthal (2014) offer a method to obtain more convincing evidence of replication using the continuously cumulative meta-analytic approach (CCMA). Braver et al. (2014) recommend that

> after an original study obtains significance, the proper course for the subsequent attempt is to pool its result with Study 1 and look for differences in effect sizes using either significance tests and the *Q* statistic, the descriptive *I*-square measure, or some other descriptive index of heterogeneity (p. 338).

Thus, we compared our effect sizes between Study 1 and Study 2 using CCMA and found homogeneity between the effects ($Q = .01$, $p = .94$; $I^2 = .00$). The effect sizes between Study

Table 2. Regression models (Study 2)—predicting open-ended question scores.

Model	Coefficient	*SE*	*t*	*p*	LLCI	ULCI
1 $F(4, 88) = 5.42$, $p < .01$, $R^2 = .20$						
Constant	15.77	18.07	.87	.39	−20.13	51.67
Concrete	5.03	2.99	1.68	.10	−.91	10.96
Interest	5.04	2.63	1.92	.06	−.19	10.26
Overload	−2.75	3.43	−.80	.42	−9.56	4.06
Coherence	−.86	2.50	−.35	.73	−5.82	4.10
2 $F(5, 87) = 6.03$, $p < .01$, $R^2 = .26$						
Constant	20.57	17.57	1.17	.25	−14.36	55.49
Concrete	6.13	2.92	2.10	<.05	.32	11.94
Interest	4.79	2.55	1.88	.06	−.27	9.85
Overload	−4.30	3.37	−1.28	.21	−10.99	2.39
Coherence	.28	2.46	.11	.91	−4.60	5.16
Humor Condition	−16.89	6.38	−2.65	<.05	−29.56	−4.22

Note: Coefficients are unstandardized. Exam scores are percentages ranging from 0 to 100.

Table 3. Regression models (Study 2)—predicting multiple-choice question scores.

Model		Coefficient	*SE*	*t*	*p*	LLCI	ULCI
1 $F(4, 88) = 5.86$, $p < .01$, $R^2 = .21$							
	Constant	63.25	18.14	3.49	<.01	27.21	99.29
	Concrete	3.31	3.00	1.10	.27	−2.65	9.27
	Interest	1.51	2.64	.57	.57	−3.74	6.75
	Overload	−10.78	3.44	−3.13	<.01	−17.61	−3.94
	Coherence	−.35	2.51	−.14	.89	−5.33	4.63
2 $F(5, 87) = 5.81$, $p < .01$, $R^2 = .25$							
	Constant	67.22	17.87	3.76	<.01	31.71	102.73
	Concrete	4.23	2.97	1.42	.16	−1.68	10.13
	Interest	1.31	2.59	.51	.61	−3.83	6.45
	Overload	−12.06	3.42	−3.52	<.01	−18.86	−5.26
	Coherence	.60	2.50	.24	.81	−4.37	5.56
	Humor Condition	−13.99	6.48	−2.16	<.05	−26.87	−1.11

Note: Coefficients are unstandardized. Exam scores are percentages ranging from 0 to 100.

1 and Study 2 were nearly identical in independent samples. Therefore, using a different lesson than in Study 1, with a different population of students, and different tests of cognitive learning, we replicated our results in Study 2.

Discussion

Similar to the results reported in Study 1, results from our second study revealed that students who were exposed to a lesson containing integrated humor performed worse on open-ended and multiple-choice tests of retention and transfer compared with students who were presented with a serious lesson. These results were confirmed while holding constant students' perceptions of their lessons being concrete, interesting, overwhelming, and incoherent.

General discussion

Results from both of our studies reveal that students who were exposed to humorous examples scored lower on tests of those concepts than students exposed to serious examples. These findings are in line with research in related academic fields where scholars have found that serious sources of information lead to better information acquisition compared with humorous sources (Kim & Vishak, 2008). As we argued in the literature review, these results might stem from the idea that integrated humor (presented in the form of explanatory examples) distracts students from learning core educational concepts because the humorous information used to illustrate class lessons might be more memorable than the ideas being taught. This conclusion has support from the work of scholars who have found that humorous information tends to be remembered by students but does not to lead to general increases in information acquisition (Bryant et al., 1981; Kaplan & Pascoe, 1977). Because humorous examples tend to be more memorable (Schmidt, 1994), it could be the case that integrated humor serves as a distraction for students (Vance, 1987) and may even provide a source of confusion regarding the essential aspects of class lessons (e.g., Weaver, Zillmann, & Bryant, 1988).

As Pekrun and Linnenbrink-Garcia (2012) argue, "emotions consume cognitive resources (i.e., resources of the working memory) by focusing attention on the object of emotion" (p. 264). Thus, using humorous examples to explain course lessons might

produce task-irrelevant thinking because these examples contain superfluous information that competes for students' attention. This explanation has its roots in the research on analogical transfer. As we mentioned in the literature review, situation-specific encoding of information tends to lead to less transferrable knowledge (e.g., Gentner et al., 2004). Thus, although humor can increase the attention individuals pay to various sources of information (Eisend, 2009), when it is used to explain class concepts this attention might actually be misdirected. Specifically, humorous examples might lead students to focus on and remember the humor used in the examples at the expense of the underlying concepts being explained.

In addition to distraction, an alternative explanation for the findings reported in this paper might come from the feelings-as-information theory (Schwarz, 2012). According to Schwarz (1990), affective states "influence the choice of processing strategies" because they "inform us about the nature of the situation in which they are experienced" (p. 527). Specifically, Schwarz states that whereas negative affective states signal problems and foster effortful and analytic processing, positive affective states signal a tranquil environment and therefore foster less effortful and more heuristic information processing. Viewed through the lens of feelings-as-information then, students who were exposed to funny examples in this study may have enjoyed them more and therefore paid less attention to their course lessons by relaxing their minds and avoiding analytical thinking. Similar conclusions come from the study of entertaining information sources compared with more serious sources. As Kim and Vishak (2008) note, people exposed to entertainment media tend to build general models of the material they are learning instead of storing more specific, factual information.

Conclusions from the feelings-as-information theory are bolstered by investigations from researchers in fields outside of communication studies who have found positive affect does not influence information processing in ways that would lead to enhanced elaboration (Pekrun & Linnenbrink-Garcia, 2012; Pintrich, 2003). For example, in an examination of mood and argument strength, Bless, Bohner, Schwarz, and Strack (1990) concluded that people in good moods are less likely to engage in message elaboration. Confirming this result, Bless, Mackie, and Schwarz (1992) argued that people in a good mood have been repeatedly found to process information less elaborately and are less likely to engage in systematic or central route processing compared with people in negative or neutral moods. In summary, researchers have largely noted a trend that when in a positive mood people tend toward general information processing with a reliance on heuristics as opposed to more focused, detail-oriented analyses (Pekrun & Linnenbrink-Garcia, 2012).

Can humor be beneficial?

Whatever the explanation, it seems to be the case that integrated humor can cause deficits in student learning. This conclusion appears to run counter to previous claims that argue humor is beneficial in the classroom. In truth, however, this contradiction might simply be the result of the way humor has been variously operationalized. Whereas (as this study suggests) integrated humor might lead to decrements in student learning, research has shown that contiguous humor can be beneficial in the classroom. This is because when used in a contiguous manner, the positive affect associated with classroom humor may operate as a general motivator that leads to long-term learning benefits (see Bolkan &

Goodboy, 2015). Ultimately, this argument suggests that humor does not enhance students' information acquisition per se, but rather serves to create a positive learning environment that motivates students to become engaged with their educational opportunities. Indeed, Pekrun and Linnenbrink-Garcia (2012) argue that enjoyment stemming from contiguous humor may be beneficial in the classroom insofar as this experience has been shown to reduce irrelevant thinking in academic contexts (Pekrun & Linnenbrink-Garcia, 2012). As Vance notes (1987), the positive effects of contiguous humor in the classroom might occur because this type of humor can arouse students without distracting them from the course content.

Limitations and future directions

One limitation of this study includes its reliance on a written medium for presenting the lessons to students. Although written communication plays a major role in instruction, a typical teacher also spends significant time engaged in other instructional activities such as lecturing or providing information through multimedia outlets. That said, despite the benefits associated with a written manipulation (e.g., eliminating differences in the presentation of information), future research projects should determine the impact of integrated humor on student learning as it relates to some of the other instructional activities students encounter in their educational experiences. For example, it is likely that students process humor differently in face-to-face learning scenarios compared with written scenarios, and thus future researchers may consider how the medium in which humor is communicated changes its impact on learning.

A second limitation of this study includes its short duration. Because the lesson was brief, it can be argued that this investigation does not approximate what students actually experience in a regular classroom environment. Despite the potentially reduced ecological validity, the shorter manipulation was well suited for a controlled experiment that allowed for the isolation of a specific cause and its effect. Still, future researchers may want to determine how the results from this project might change if students were exposed to a longer lesson, experienced more (or different types of) humor, and/or were tested after more time elapsed between the lesson and the subsequent test of student learning.

Another limitation of this study includes the fact that we investigated the effects of integrated humor on student learning without concern for moderating variables. That said, it is unlikely that humor (integrated or not) has uniform effects on student learning (see Wanzer & Frymier, 1999, for example). Thus, future researchers should consider examining how student characteristics (e.g., sense of humor, expertise, self-control) and various teaching behaviors (e.g., clarity, confirmation, caring) interact with humor to determine boundary conditions that might qualify the outcomes reported in this paper. Though the results from this project provide evidence that integrated humor can be detrimental to learning, this conclusion is not likely to hold for all students under all teaching conditions.

Finally, future researchers may find it beneficial to study how various types of humor might differentially impact instructional outcomes. In this study, we examined what might be described by Berger (1976) as humor based on language (i.e., exaggeration) and logic (i.e., absurdity). However, there are a variety of other techniques instructors might use to impart humor when delivering their lessons. For example, in addition to humor based on language and logic, Berger argues that, from a general standpoint, humor can

also function based on identity and action. More specifically, humor might occur through a variety of mechanisms (e.g., slapstick, imitation, coincidence, satire), and the various forms of humor may impact the way students process information in important ways. As researchers move forward with their study of humor, it may behoove us as a discipline to focus on the variety of ways humor can be enacted in the classroom instead of consolidating all forms of humorous instruction into a single category.

Implications for teaching and learning

Based on the results of this study, and considering that there are a variety of ways instructors can be humorous in the classroom (see Booth-Butterfield & Wanzer, 2016; Gorham & Christophel, 1990), instructors might be wise to be strategic in their implementation of such behaviors. From the general standpoint of humor placement, results from this study indicate that instructors should be wary of using integrated humor as examples (in particular, through the use of exaggeration, Berger, 1976) to explain class concepts. As we found in this study, students who learn course concepts through humorous examples might not acquire the underlying information as well as students exposed to serious examples. Having said that, it is important to note that instead of being a nominal variable, integration may be better represented as an ordinal variable with several levels of instructional embeddedness. Thus, it may be important for instructors (and, indeed, for future researchers) to consider how various levels of integration may differentially impact student learning in the classroom.

Though our results showed that integrated humor led to detriments in student learning, instructors might find success when using contiguous humor in class to reduce student boredom and increase their motivation to engage with educational activities (Bolkan & Goodboy, 2015). This type of humor might be employed when instructors use class time to lighten the mood without using humor to directly teach class concepts. Bearing in mind college instructors meet with their students for dozens of hours each term, they should find they have plenty of time to teach their course lessons and also incorporate humor into their classes without interfering with the elucidation of actual course concepts.

Moreover, as we mentioned in our recommendations for future directions, it is also important for practitioners to remember that various other forms of humor exist. As such, we might be wise to follow the advice provided by researchers who have discovered that some forms of humor may be more or less effective than others. For example, humor that is inappropriate or offensive (e.g., disparaging toward students or social groups, covering topics such as sex or drugs; Wanzer et al., 2006) has been shown to be unrelated to indicators of student satisfaction such as positive affect toward a course and positive affect toward an instructor (Wanzer et al., 2010). It is also important to note that when thinking about how to utilize humor in the classroom, instructors need to appreciate that it might be possible to provide too much of a good thing and that they can overload students with too much humor in the classroom (Ziv, 1988).

Conclusions and contributions

In this paper, we studied integrated humor to determine the impact of humorous explanations on student learning. Based on our results, we argue that humor used to illustrate

course concepts can be detrimental insofar as it might distract students from their underlying lessons. However, based on past research (e.g., Bolkan & Goodboy, 2015), we propose that contiguous humor might create a positive learning environment that potentially motivates students to pay attention to their lessons. Thus, we conclude that instructors should be wary of the many ways humor can be employed in the classroom, and we caution that they should be strategic in the implementation of humor when they teach. Specifically, while the provision of general humor can create an enjoyable atmosphere that might get students engaged in their lessons, when it comes to explaining course concepts, instructors should be careful not integrate humor in a manner that competes for students' attention.

Notes on contributors

San Bolkan (Ph.D., University of Texas at Austin, 2007) is an Associate Professor in the Department of Communication Studies at California State University, Long Beach.

Darrin J. Griffin (Ph.D., University at Buffalo, State University of New York, 2014) is an Assistant Professor in the Department of Communication at the University of Alabama, Tuscaloosa.

Alan K. Goodboy (Ph.D., West Virginia University, 2007) is an Associate Professor in the Department of Communication Studies at West Virginia University.

References

Anderson, L. W., & Krathwohl, D. R. (Eds.) (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives*. (Abr. ed., pp. 63–91). New York, NY: Addison Wesley Longman.

Banas, J. A., Dunbar, N., Rodriguez, D., & Liu, S.-J. (2011). A review of humor in educational settings: Four decades of research. *Communication Education*, *60*, 115–144. doi:10.1080/03634523.2010.496867

Berger, A. A. (1976). Anatomy of the joke. *Journal of Communication*, *26*, 113–115. doi:10.1111/j.1460-2466.1976.tb01913.x

Bless, H., Bohner, G., Schwarz, N., & Strack, F. (1990). Mood and persuasion: A cognitive response analysis. *Personality and Social Psychology Bulletin*, *16*, 331–345. doi:10.1177/0146167290162013

Bless, H., Mackie, D. M., & Schwarz, N. (1992). Mood effects on attitude judgments: Independent effects of mood before and after message elaboration. *Journal of Personality and Social Psychology*, *63*, 585–595. doi:10.1037//0022-3514.63.4.585

Bolkan, S. (2017). Development and validation of the clarity indicators scale. *Communication Education*, *66*, 19–36. doi:10.1080/03634523.2016.1202994

Bolkan, S., & Goodboy, A. K. (2015). Exploratory theoretical tests of the instructor humor- student learning link. *Communication Education*, *64*, 45–64. doi:10.1080/03634523.2014.978793

Bolkan, S., Goodboy, A. K., & Myers, S. A. (2017). Conditional processes of effective instructor communication and increases in students' cognitive learning. *Communication Education*, *66*, 129–147. doi:10.1080/03634523.2016.1241889

Booth-Butterfield, S., & Booth-Butterfield, M. (1991). Individual differences in the communication of humorous messages. *Southern Communication Journal*, *56*, 205–218. doi:10.1080/10417949109372831

Booth-Butterfield, M., & Wanzer, M. B. (2016). Humor enactment in learning environments. In P. L. Witt (Ed.), *Handbooks of communication science: Communication and learning* (Vol. 16, pp. 211–239). Berlin, Germany: De Gruyter Mouton.

Braver, S. L., Thoemmes, F. J., & Rosenthal, R. (2014). Continuously cumulating meta-analysis and replicability. *Perspectives on Psychological Science*, *9*, 333–342. doi:10.1177/1745691614529796

Bryant, J., Brown, D., Silberberg, A. R., & Elliott, S. M. (1981). Effects of humorous illustrations in college textbooks. *Human Communication Research*, *8*, 43–57. doi:10.1111/j.1468-2958.1981.tb00655.x

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry: An International Journal for the Advancement of Psychological Theory*, *11*, 227–268. doi:10.1207/S15327965PLI1104_01

Eisend, M. (2009). A meta-analysis of humor in advertising. *Journal of the Academy of Marketing Science*, *37*, 191–203. doi:10.1007/s11747-008-0096-y

Frymier, A. B., Wanzer, M. B., & Wojtaszczyk, A. M. (2008). Assessing students' perceptions of inappropriate and appropriate teacher humor. *Communication Education*, *57*, 266–288. doi:10.1080/03634520701687183

Garner, R. L. (2006). Humor in pedagogy: How ha-ha can lead to aha!. *College Teaching*, *54*, 177–180. doi:10.3200/CTCH.54.1.177-180

Gentner, D., Loewenstein, J., & Thompson, L. (2004). Analogical encoding: Facilitating knowledge transfer and integration. *Proceedings of the Twenty-sixth Annual Meeting of the Cognitive Science Society*.

Goodboy, A. K., Booth-Butterfield, M., Bolkan, S., & Griffin, D. J. (2015). The role of instructor humor and students' educational orientations in student learning, extra effort, participation, and out-of-class communication. *Communication Quarterly*, *63*, 44–61. doi:10.1080/01463373.2014.965840

Gorham, J., & Christophel, D. M. (1990). The relationship of teachers' use of humor in the classroom to immediacy and student learning. *Communication Education*, *39*, 46–62. doi:10.1080/03634529009378786

Gorham, J., & Christophel, D. M. (1992). Students' perceptions of teacher behaviors as motivating and demotivating factors in college classes. *Communication Quarterly*, *40*, 239–252. doi:10.1080/01463379209369839

Gruner, C. R. (1967). Effect of humor on speaker ethos and audience information gain. *Journal of Communication*, *17*, 228–233. doi:10.1111/j.1460-2466.1967.tb01181.x

Guay, F., Ratelle, C. F., & Chanal, J. (2008). Optimal learning in optimal contexts: The role of self-determination in education. *Canadian Psychology/Psychologie Canadienne*, *49*, 233–240. doi:10.1037/a0012758

Hackathorn, J., Garczynski, A. M., Blankmeyer, K., Tennial, R. D., & Solomon, E. D. (2011). All kidding aside: Humor increases learning at knowledge and comprehension levels. *Journal of the Scholarship of Teaching and Learning*, *11*, 116–123.

Hauck, W. E., & Thomas, J. W. (1972). The relationship of humor to intelligence, creativity, and intentional and incidental learning. *The Journal of Experimental Education*, *40*, 52–55. doi:10.1080/00220973.1972.11011352

Hollander, B. A. (1995). The new news and the 1992 presidential campaign: Perceived vs. Actual political knowledge. *Journalism and Mass Communication Quarterly*, *72*, 786–798. doi:10.1177/107769909507200403

Houser, M. L., Cowan, R. L., & West, D. A. (2007). Investigating a new education frontier: Instructor communication behavior in CD-ROM texts – do traditionally positive behaviors translate into this new environment? *Communication Quarterly*, *55*, 19–38. doi:10.1080/01463370600998319

Kaplan, R. M., & Pascoe, G. C. (1977). Humorous lectures and humorous examples: Some effects upon comprehension and retention. *Journal of Educational Psychology*, *69*, 61–65. doi:10.1037/0022-0663.69.1.61

Kaufman, R., & Tatum, N. T. (2017). Do we know what we think we know? On the importance of replication in instructional communication research. *Communication Education*, *66*, 479–481. doi:10.1080/03634523.2017.1342849

Kim, Y. M., & Vishak, J. (2008). Just laugh! You don't need to remember: The effects of entertainment media on political information acquisition and information processing in political judgment. *Journal of Communication*, *58*, 338–360. doi:10.1111/j.1460-2466.2008.00388.x

Kline, R. B. (2013). *Beyond significance testing: Statistics reform in the behavioral sciences* (2nd ed.). Washington, DC: American Psychological Association.

Lane, D. R. (2017). Raising new questions and restoring our focus on authentic student learning. *Communication Education*, *66*, 120–122. doi:10.1080/03634523.2016.1243794

Markiewicz, D. (1974). Effects of humor on persuasion. *Sociometry*, *37*, 407–422. doi:10.2307/2786391

Martin, D. M., Preiss, R. W., Gayle, B. M., & Allen, M. (2006). A meta-analytic assessment of the effect of humorous lectures on learning. In B. M. Gayle, R. W. Preiss, N. Burrell, & M. Allen (Eds.), *Classroom communication and instructional processes: Advances through meta-analysis* (pp. 295–313). Mahwah, NJ: Erlbaum.

Pekrun, R., & Linnenbrink-Garcia, L. (2012). Academic emotions and student engagement. In S. L. Christenson, A. L. Reschly, & C. White (Eds.), *Handbook of research on student engagement* (pp. 259–282). New York, NY: Springer.

Pintrich, P. R. (2003). Motivation and classroom learning. In W. M. Reynolds, & G. E. Miller (Eds.), *Handbook of educational psychology* (pp. 103–122). New York, NY: Wiley.

Reeve, J. (2002). Self-determination theory applied to educational settings. In E. L. Deci, & R. M. Ryan (Eds.), *Handbook of self-determination research* (pp. 183–203). Rochester, NY: University of Rochester Press.

Rogers, R. W. (1983). Cognitive and physiological processes in fear appeals and attitude change: A revised theory of protection motivation. In J. T. Cacioppo, & R. Petty (Eds.), *Social psychophysiology: A sourcebook* (pp. 153–177). New York, NY: Guilford.

Rosenthal, R. (1990). Replication in behavioral research. In J. W. Neulip (Ed.), *Handbook of replication research in the behavioral and social sciences* (pp. 1–30). Corta Madera, CA: Select Press.

Sadoski, M., Goetz, E. T., & Fritz, J. B. (1993a). A causal model of sentence recall: Effects of familiarity, concreteness, comprehensibility, and interestingness. *Journal of Reading Behavior*, *25*, 5–16. doi:10.1080/10862969309547799

Sadoski, M., Goetz, E. T., & Fritz, J. B. (1993b). Impact of concreteness on comprehensibility, interest, and memory for text: Implications for dual coding theory and text design. *Journal of Educational Psychology*, *85*, 291–304. doi:10.1037/0022-0663.85.2.291

Sadoski, M., Goetz, E. T., & Rodriguez, M. (2000). Engaging texts: Effects of concreteness on comprehensibility, interest, and recall in four text types. *Journal of Educational Psychology*, *92*, 85–95. doi:10.1037/0022-0663.92.1.85

Sadoski, M. A., & Quast, Z. (1990). Reader response and long-term recall for journalistic text: The roles of imagery, affect, and importance. *Reading Research Quarterly*, *25*, 256–272. doi:10.2307/747691

Schmidt, S. R. (1994). Effects of humor on sentence memory. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *20*, 953–967. doi:10.1037/0278-7393.20.4.953

Schwarz, N. (1990). Feelings as information: Informational and motivational functions of affective states. In E. T. Higgins, & R. Sorrentino (Eds.), *Handbook of motivation and cognition: Foundations of social behavior* (pp. 527–561). New York, NY: Guilford.

Schwarz, N. (2012). Feelings-as-information theory. In P. A. M. Van Lange, A. W. Kruglanski, & E. T. Higgins (Eds.), *Handbook of theories of social psychology* (Vol. 1, pp. 289–308). Thousand Oaks, CA: Sage.

Titsworth, S., Mazer, J. P., Goodboy, A. K., Bolkan, S., & Myers, S. A. (2015). Two meta-analyses exploring the relationship between teacher clarity and student learning. *Communication Education*, *64*, 385–418. doi:10.1080/03634523.2015.1041998

Vance, C. M. (1987). A comparative study on the use of humor in the design of instruction. *Instructional Science*, *16*, 79–100. doi:10.1007/BF00120007

Wakshlag, J. J., Day, K. D., & Zillmann, D. (1981). Selective exposure to educational television programs as a function of differently paced humorous inserts. *Journal of Educational Psychology*, *73*, 27–32. doi:10.1037/0022-0663.73.1.27

Wanzer, M. B., & Frymier, A. B. (1999). The relationship between student perceptions of instructor humor and students' reports of learning. *Communication Education*, *48*, 48–62. doi:10.1080/03634529909379152

Wanzer, M. B., Frymier, A. B., & Irwin, J. (2010). An explanation of the relationship between instructor humor and student learning: Instructional humor processing theory. *Communication Education*, *59*, 1–18. doi:10.1080/03634520903367238

Wanzer, M. B., Frymier, A. B., Wojtaszczyk, A. M., & Smith, T. (2006). Appropriate and inappropriate uses of humor by teachers. *Communication Education*, *55*, 178–196. doi:10.1080/03634520600566132

Weaver, J., Zillmann, D., & Bryant, J. (1988). Effects of humorous distortions on children's learning from educational television: Further evidence. *Communication Education*, *37*, 181–187. doi:10.1080/03634528809378717

Zillmann, D., Williams, B. R., Bryant, J., Boynton, K. R., & Wolf, M. A. (1980). Acquisition of information from educational television programs as a function of differently paced humorous inserts. *Journal of Educational Psychology*, *72*, 170–180. doi:10.1037/0022-0663.72.2.170

Ziv, A. (1988). Teaching and learning with humor: Experiment and replication. *Journal of Experimental Education*, *57*, 5–15.

Appendices

Appendix 1 (Humorous Lesson—Study 1)

"Advice and problem-solving"

According to scholars, when people are offered a solution to a problem, they can either react adaptively by taking your advice, or maladaptively by avoiding thinking about the problem and ignoring your advice. Researchers who study behavior change generally argue that two variables known to influence the direction of this reaction include individuals' perceptions of their self-efficacy and their perceptions of the response efficacy. Self-efficacy refers to a person's belief that he or she can engage in the behaviors necessary to solve a problem, and response efficacy refers to the perceived effectiveness of a behavior for solving a problem. Essentially, when you provide someone with a solution to a problem, the more a person believes that he or she can engage in adaptive behaviors (i.e., self-efficacy) and the more he or she believes that adaptive behaviors will lead to desired results (i.e., response efficacy), the more likely he or she will be to engage in these behaviors.

Let me give you an example. Imagine we are hiking and come across a grizzly bear. Instead of being friendly and cuddly, it looks menacing and is out for blood. As we see our lives flash before our eyes, I want you to imagine I told you that the best way to make sure the bear does not harm us is for *you* to stab it in the heart as it charges us. Imagine I hand you a knife and tell you that when it charges, you should let me run away to safety and when the bear turns to you, you should let it fall on you and you should use its weight to sink the knife into its heart. What do you think about that plan? Would you try it? I doubt it. And why not? Because, what I am asking you to do is crazy. I want you to patiently wait for the bear to charge and jump on top of you with claws and fangs and hair and eyes while you hold the knife perfectly straight aimed at its heart? No way! Although stabbing a bear in the heart might work to stop the bear, you probably do not think you can do what I am asking. When a person does not believe that he or she can do what is being recommended to solve a problem, that person is not likely to engage in the recommended behavior: this is the idea of self-efficacy.

Okay, so what if instead I told you that in order to stop the attack you need to pick up a small stick, point it at the bear, and sing Sisqo's *Thong Song* to the best of your ability—this is the only way to save our lives. Would you do what I recommended now? My guess is that you would probably not. Although you *can* do what I am recommending, you know that pointing a stick at a bear and singing a song about thongs is not going to stop it from harming us. If you do not think that a plan will solve a problem, you are not likely to try it: this is the idea of response efficacy.

As this example demonstrates, the more a person believes that he or she can enact the plan (self-efficacy), and the more a person believes that a plan will lead to desired outcomes (response efficacy), the more likely he or she is to try to do what is being recommended to solve a problem.

Appendix 2 (Standard Lesson—Study 1)

"Advice and problem-solving"

According to scholars, when people are offered a solution to a problem, they can either react adaptively by taking your advice, or maladaptively by avoiding thinking about the problem and ignoring your advice. Researchers who study behavior change generally argue that two variables known to influence the direction of this reaction include individuals' perceptions of their self-efficacy and their perceptions of the response efficacy. Self-efficacy refers to a person's belief that he or she can engage in the behaviors necessary to solve a problem, and response efficacy refers to the perceived effectiveness of a behavior for solving a problem. Essentially, when you provide someone with a solution to a problem, the more a person believes that he or she can engage in adaptive behaviors (i.e., self-efficacy) and the more he or she believes that adaptive behaviors will lead to desired results (i.e., response efficacy), the more likely he or she will be to engage in these behaviors.

Let me give you an example. Take smoking for instance. Most people know that smoking is bad and causes all sorts of health problems. That said, we might want to help people stop smoking, and to do this we might create a billboard to be placed on the freeway. Imagine a billboard with an advertisement on it suggesting that all a person has to do to stop smoking is adopt a 3-year sobriety program that requires 4 hours of meditation a day, every day, without missing any sessions. Do you think smokers who saw this sign would try to stop smoking by using this advice? Probably not. And, why not? Although this plan might work to stop a person from smoking, it asks way too much of a person and, ultimately, it is too hard to do. Thus, if a person does not believe that he or she can personally do what is being recommended to solve a problem, that person is not likely to engage in the recommended behavior: this is the idea of self-efficacy.

Okay, so what if instead of the 3-year sobriety program the billboard mentioned that to avoid the health problems associated with smoking, people can simply think positive thoughts about health while smoking cigarettes—this is because doing so will offset the negative effects of the tar and nicotine. Is this plan any better? Based on what the billboard says now, do you think people would do what is being recommended? My guess is that they would not. And why not? Because, although people can do what the billboard is recommending, they know that thinking positive thoughts about smoking is not going to stop the smoke from being harmful. If you do not think that a plan will solve a problem, you are not likely to try it: this is the idea of response efficacy.

As this example demonstrates, the more a person believes that he or she can enact the plan (self-efficacy), and the more a person believes that a plan will lead to desired outcomes (response efficacy), the more likely he or she is to try to do what is being recommended to solve a problem.

Appendix 3 (Humorous Lesson—Study 2)

"Presenting information clearly"

According to scholars, when people want to communicate clearly, they have to make sure they present information in a manner that is easy to understand. Although there might be a variety of ways to do this, researchers who study clear communication generally argue that there are specific variables known to influence perceptions of clarity. Two of these variables include coherence and fluency. Coherence refers to the idea of only providing necessary information, and fluency refers to the idea of providing information in a simple, concrete, and straightforward manner. Essentially, when you communicate with others, the less "extra" information you present (i.e., coherence), and the more you present information in a familiar and uncomplicated manner (i.e., fluency), the more likely your communication will be considered clear.

Let me give you an example. Take teaching for instance. Most people know that some teachers are bad and that their poor communication can cause problems in the classroom. That said, we might want to help teachers communicate clearly and to do this we might tell them about the importance of coherence. Imagine a teacher who presents a lesson on weightlifting and muscle

formation. In this lesson, the teacher could simply talk about facts related to how muscles develop. Alternatively, the teacher might include extra, unnecessary information, such as sounds of people groaning loudly while lifting weights in the background of the lesson and interesting (but unrelated) statistics about the number of muscular grandparents who exist in the local community who have started a street gang and who threaten the teacher with their dirty looks. Do you think students who listen to this lesson would learn more with the additional sounds of sweaty people grunting and information about old people who are abnormally muscular for their age? It turns out they do not. And, why not? Because, although this stuff might be interesting, it draws students' attention to unimportant information thus detracting from the lesson and making it hard to remember the core aspects of what is being taught. As this example about creepy muscular grandparents illustrates, if a person wants to be clear, it is important that they only provide necessary information while communicating: this is the idea of coherence.

Okay, so what if, instead of adding extra information, the teacher spoke in a manner that was abstract and convoluted. For instance, imagine that instead of talking about lifting heavy objects, the teacher described weightlifting as "the ability for old sweat-soaked people to use their fragile, wrinkly arms to move objects with substantial mass across varied distances repetitively and with increasing resistance as they look you deep in the eyes and breathe heavily." Is this technical manner of communicating very clear? No, it is not. And why not? Because, although some motivated or especially capable people might be able to understand the abstract and convoluted description, for most of us it is easier to think about things in simple terms (i.e., "old sweaty people lifting weights"). As this example demonstrates, when people speak in a manner that is not straightforward and is abstract in nature, it makes their communication much less clear: this is the idea of fluency.

Appendix 4 (Standard Lesson—Study 2)

"Presenting information clearly"

According to scholars, when people want to communicate clearly, they have to make sure they present information in a manner that is easy to understand. Although there might be a variety of ways to do this, researchers who study clear communication generally argue that there are specific variables known to influence perceptions of clarity. Two of these variables include *coherence* and *fluency*. Coherence refers to the idea of only providing necessary information, and fluency refers to the idea of providing information in a simple, concrete, and straightforward manner. Essentially, when you communicate with others, the less "extra" information you present (i.e., coherence), and the more you present information in a familiar and uncomplicated manner (i.e., fluency), the more likely your communication will be considered clear.

Let me give you an example. Take teaching for instance. Most people know that some teachers are bad and that their poor communication can cause problems in the classroom. That said, we might want to help teachers communicate clearly, and to do this we might tell them about the importance of coherence. Imagine a teacher who presents a lesson on the physical properties of lightning formation. In this lesson, the teacher could simply talk about the facts related to how lightning forms through the physical processes involved in thunderstorms. Alternatively, the teacher might include extra, but unnecessary information, such as the sound of thunder in the background of the lesson and interesting (but unrelated) statistics about the number of people who are struck and harmed by lightning or killed by lightning each year. Do you think that students who listen to this lesson would learn more with the addition of the sounds of thunder in the background and with information about people being struck by lightning included in the lesson? It turns out they do not. And, why not? Because, although this stuff might be interesting, it draws students' attention to unimportant information thus detracting from the lesson and making it hard to remember the core aspects of what is being taught. As this example about the properties of lightning formation illustrates, if a person wants to be clear, it is important that they only provide necessary information while communicating: this is the idea of coherence.

Okay, so what if, instead of adding extra information, the teacher spoke in a manner that was abstract and convoluted. For instance, imagine that instead of talking about lightning strikes, the

teacher described these occurrences as "electrostatic discharges occurring in the atmosphere, usually between thunderclouds and the ground, which are generally associated with a wide range of electromagnetic radiation, including but not limited to radio-frequency pulses." Is this technical manner of communicating very clear? No, it is not. And why not? Because, although some motivated or especially capable people might be able to understand the abstract and convoluted description, for most of us it is easier to think about things in simple terms (i.e., "lightning formation"). As this example demonstrates, when people speak in a manner that is not straightforward and that is abstract in nature, it makes their communication much less clear: this is the idea of fluency.