



Statistics? You Must be Joking: The Application and Evaluation of Humor when Teaching Statistics

David L. Neumann, Michelle Hood, and Michelle M. Neumann
School of Psychology, Griffith University

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Abstract

Humor has been promoted as a teaching tool that enhances student engagement and learning. The present report traces the pathway from research to practice by reflecting upon various ways to incorporate humor into the face-to-face teaching of statistics. The use of humor in an introductory university statistics course was evaluated via interviews conducted with a random sample of 38 students. Responses indicated that humor aided teaching by providing amusement, breaking up content, bringing back attention, lightening the mood, increasing motivation, reducing monotony, and providing a mental break. Students that were already motivated and interested in statistics derived less benefit from humor, finding it at times irrelevant and distracting. The selective use of humor is recommended in teaching statistics, particularly for students that hold negative attitudes towards the subject.

1. Introduction

[Lomax and Moosavi \(2002\)](#) considered the role of humor in teaching statistics and asked, “Must they be orthogonal?” Their answer was “no” and they outlined ways in which humor can enhance statistics education. In the same year, [Friedman, Friedman, and Amoo \(2002\)](#) also encouraged teachers to use humor in statistics courses. The recommendations from these authors are of great potential significance. Statistics is one of the most difficult subjects to teach at any level of education. Many students enter statistics courses with negative attitudes ([Tremblay, Gardner, and Heipel, 2000](#)) and uncomfortable levels of statistics anxiety ([Onwuegbuzie, Slate, Paterson, Watson, and Schwartz, 2000](#)). For reasons such as these, various approaches to improve the teaching of statistics have been suggested (e.g., [Cobb, 1992](#); [Moore, 1997](#); [Morgan, 2001](#); [Morris, Joiner, and Scanlon, 2002](#)). In the present article, we consider the use of humor as suggested by [Lomax and Moosavi \(2002\)](#) and [Friedman et al. \(2002\)](#). Following a short review of humor in the statistics classroom, we reflect upon our own experiences with using humor in the face-to-face teaching of a large university statistics course. In tracing the pathway from research to practice, we present results from an evaluation of humor in the classroom.

2. The use of humor in the statistics classroom

2.1 When to use humor in the statistics classroom

[Lomax and Moosavi \(2002\)](#) suggested three ways to incorporate humor when teaching statistics. The first is to begin the class with a humorous piece that is relevant to a topic being taught. For example, the class may

be examining central tendency. The students could be told that a statistician would argue that if a person had their hair on fire and their feet in a bucket of ice that on average they would feel fine! The second place to introduce humor is when reviewing material. The teacher can present a joke or humorous piece and test whether the students recognize the statistical topic central to the joke. On the rules of summation, for instance, [Lomax and Moosavi \(2002\)](#) give example rap poems that contain statistical concepts on this topic. The third place to use humor is to intersperse it during the class as the need arises to lighten up the class or to capture the student's attention. For instance, in examining confidence intervals, students could be asked *how many statisticians does it take to change a light bulb?* The answer is *one, plus or minus three* ([Friedman et al. 2002](#)).

The suggestions of [Friedman et al. \(2002\)](#) expand the opportunities to incorporate humor in the statistics classroom. Whereas [Lomax and Moosavi \(2002\)](#) advocate beginning each class with a piece of humor, [Friedman et al. \(2002\)](#) point out that the entire course could begin with humor. This may encourage the students to see that the teacher is approachable and friendly ([Friedman et al., 2002](#)). A focus group study reinforces this point by finding that the students' positive perception of the teacher's attitude is an important factor that can reduce statistics anxiety ([Pan and Tang, 2005](#)). Student responses to a survey also shows that the perception of the teacher's attitude is associated with general motivation towards the course ([Tremblay et al., 2000](#)). More directly relevant to student attitudes and behavior, [Friedman et al. \(2002\)](#) suggest that humor can be used to address student's anxiety about statistics and to deal with students who talk during class.

In the literature on teaching in other disciplines, other suggestions for the use of humor are found. [Berk \(1996\)](#) describes ten strategies of (a) opening jokes, (b) humorous material on syllabi, (c) humorous questions, (d) humorous examples, (e) humorous problems, (f) game show style review questions for exams, (g) skits and dramatizations, (h) humorous material on exams, (i) cautions and warnings on covers of handouts, and (j) spontaneous humor (see also, [Lundberg and Thurston, 1992](#)). Any of these could be incorporated into the statistics classroom. However, [Lesser and Pearl \(2008\)](#) note that any fun should be presented with structure and purpose. This can be achieved by using thoughtful follow up questions (e.g., why is the item funny?, what topic does it relate to?; [Lesser and Pearl, 2008](#)) or incorporating it with a class activity ([Schacht and Stewart, 1992](#)). [Lesser and Pearl \(2008\)](#) also provide five questions that teachers can use to help structure the lesson plans around fun items (i.e., What is the fun item? What statistical concept is it related to? Where is item to be used? What will you do or say to introduce the item? and What will you do or say after using the item?). These questions could be usefully adapted to the explicit use of humor in the classroom.

Humor may also be used outside of the classroom. [Friedman et al. \(2002\)](#) suggest using humor to deal with questions about examinations and even incorporating it in questions that appear on the exam. Some care should be exercised when using humor during examinations or when discussing upcoming assessment. There can be a chance that those students who are overly anxious may have a negative reaction towards the humor ([Lesser, 2003](#)). [Torok, McMorris, and Lin \(2004\)](#) found that students report that they are less supportive of using humor on tests than in class. However, an experimental study found that humor may facilitate performance in high anxious students when it is included on examinations ([Smith, Ascough, Ettinger and Nelson, 1971](#)).

2.2 Types of humor that can be used in the statistics classroom

Statistics teachers interested in using humor in the classroom should be aware of the many different types of humor that can be used. Some teachers may be more comfortable in using some types than others. [Lomax and Moosavi \(2002\)](#) and [Friedman et al. \(2002\)](#) both provide numerous examples of humor in their articles. The examples they provide take the form of written humor that can either be read by students on course materials or used verbally during class. Jokes, riddles, one-liners, and witticisms are amply provided (e.g., 42.35% of statistics are meaningless; [Friedman et al., 2002](#)). [Lomax and Moosavi \(2002\)](#) also provide example rap poems, short stories, and standard poems, some of which were written by students. To paraphrase one short story relating to the topic of probability, a regular traveler was concerned about the chance of a bomb being on board his planes. Although he calculated that the probability was low, it was not low enough to satisfy him. So, he now always travels with a bomb in his suitcase. This is because he thinks that the probability that there are two bombs on the plane is so small as to be infinitesimal! Another form of humor is to use a class exercise on statistical reasoning based on the analogy of police detective work, which is written in a humorous style ([Zeedyk, 2006](#)). Humor and song may also be used in combination

(e.g., [Lesser, 2002](#)).

[Schacht and Stewart \(1992\)](#) describe the use of cartoons as a means to introduce humor in the statistics classroom. They selected cartoons because they argue that they are easy to control. However, a disadvantage is that it can be difficult to find cartoons that are directly related to statistical concepts. In such cases, they recommend that while the cartoon itself does not itself have to concern a statistical topic (though this would be the ideal) it could be integrated with a statistical activity. For example, they describe a cartoon in which a geeky-looking man is placing an advertisement in the newspaper personals column pleading for his cat to return home. [Schacht and Stewart \(1992\)](#) asked students to generate data on the probability of runaway pets as a link between the cartoon and statistics. They report that in some cases, the students found that the outlandish connection between the cartoon and the statistical topic being studied was humorous in itself.

In a study on the use of humor in classes on biology, educational psychology, and theatre, [Torok et al. \(2004\)](#) surveyed students and found that they reported 11 types of humor used during the courses. These were funny stories, funny comments, jokes, professional humor, puns, cartoons, riddles, sarcasm, sexually-based humor, ethnic-based humor, and aggressive/hostile humor. [Torok et al. \(2004\)](#) found that more than half the students reported that funny stories, funny comments, jokes, and professional humor are constructive when used during class. Interestingly, over one third of students also reported that sarcasm can be an acceptable and effective way to incorporate humor. Sarcasm can be negative in that it has the potential to degrade those that are the target of the sarcasm. It may be that students have a different view of sarcasm in that there are different types of sarcasm, of which some are more appropriate, or that the effectiveness of sarcasm depends on the relationship between the teacher and student ([Torok et al., 2004](#)). Similarly, some jokes may also be tied in with references to sexuality (e.g., *statisticians do it by summation*; [Lomax and Moosavi, 2002](#)) or socially sensitive characteristics of people (e.g., obesity). [Powell and Andresen \(1985\)](#) advise that sexually explicit humor can increase anxiety levels in students. Research also shows that males and female students can perceive humor differently ([Gorham and Christophel, 1990](#)). The way in which the humor is delivered, the students' perception of the teacher, the context of the teaching, and the characteristics of the student are all important factors that influence whether any piece of humor is appropriate or not ([Lesser, 2003](#)).

Recently, [Lesser and Pearl \(2008\)](#) described 20 strategies to incorporate functional fun when teaching statistics. While "fun" is conceptually broader than humor, several of the strategies in [Lesser and Pearl's \(2008\)](#) list of 20 involve elements of humor. These include cartoons, comic strips, jokes, and media bloopers. Quotations, wordplay, movies, music and raps/songs, and videos may also contain humor in some cases. When humor is viewed more broadly than merely telling jokes, there are many different ways to incorporate humor in the statistics classroom.

2.3 Sources of humor and ways to find them

The articles by [Lomax and Moosavi \(2002\)](#) and [Friedman et al. \(2002\)](#) provide many examples of statistical humor and can be used for source material. Their examples of humor were based on material that they had used in their classes and were found on Internet sites, magazines, bumper stickers, textbooks, quotation databases, humor books, and contributions from other teachers who used humor. The reference lists of the articles can be consulted for additional relevant sources and will not be repeated here (see also the sources cited in [Lesser and Pearl, 2008](#)). Teachers may also come across good source material in everyday life (e.g., newspapers, comic strips, video clips) and should be vigilant of these opportunities ([Lesser and Pearl, 2008](#)). The two largest and most frequently cited Internet resources for statistical humor is Gary Ramseyer's First Internet Gallery of Statistical Jokes (www.ilstu.edu/~ggramsey/Gallery.html) and the CAUSEweb digital library (www.CAUSEweb.org). The CAUSEweb digital library was developed by the Consortium for the Advancement of Undergraduate Statistics Education (CAUSE). In the Resources section it contains a category for Fun items. Teachers can browse by the type of item: cartoon, song, joke, quote, poem, or video. Alternatively, teachers can browse the items by statistical concept, such as experiments, summary statistics, graphics, probability, estimation, and testing. In addition, CAUSE has run (and is currently running) an A-Mu-Sing competition to solicit new materials for the archive. Any teacher, student, or practitioner of statistics is eligible to enter and the current competition accepts entries in the categories of jokes/cartoons, poetry, songs, and videos. Statistics-related humor may also be found on other web sites and search engines can be used to search for these resources by using the appropriate search terms. Adding additional search terms can help to narrow the search to a particular statistical topic (e.g., "statistics humor correlation"). Search engines that can search specifically for images (e.g., Google Images) may find statistics-related

cartoons and pictures.

2.4 The effects of humor on student engagement and learning

[Lomax and Moosavi \(2002\)](#) and [Friedman et al. \(2002\)](#) both state that humor can enhance student engagement and learning in statistics classes. [Lomax and Moosavi \(2002\)](#) argue that humor motivates students to learn about statistics, makes lessons more engaging and less lecture-orientated, promotes a deeper level of understanding, and reduces statistics anxiety. Similarly, [Friedman et al. \(2002\)](#) argue that humor can enhance the teacher-student relationship, makes potentially boring subject matter more interesting, reduces stress felt by students during classes and examinations, promotes attendance at classes, creates interest in the course, and improves the ability of students to learn and recall material.

The sentiments of [Lomax and Moosavi \(2002\)](#) and [Friedman et al. \(2002\)](#) are echoed by other teachers of statistics and other disciplines and by empirical research. Studies have shown that humor relieves stress as reflected in student ratings [Berk, 1996](#) and teachers' reports ([White, 2001](#)). Humor may also reduce statistics anxiety ([Wilson, 1999](#), cited in [Onwuegbuzie and Wilson, 2003](#)), reduce test anxiety (e.g., [Berk, 1999](#); see [McMorris, Boothroyd and Pietrangelo, 1997](#) for a review), and boosts self-esteem ([Berk, 1996](#)) as shown by student surveys. From personal experience and reviews of related research it has been argued that humor may also create an enjoyable learning environment ([Schacht and Stewart, 1992](#)), make a course more interesting ([Trefts and Blakeslee, 2000](#)) and reduce boredom ([Friedman, Halpern and Salb, 1999](#); [Schacht and Stewart, 1992](#); [Trefts and Blakeslee, 2000](#)). Student evaluations and self-reports also suggest that humor can increase perceptions of teacher credibility ([Frymier and Thompson, 1992](#)), increase liking for that teacher ([Torok et al., 2004](#)), and improve student evaluations of the effectiveness of male teachers ([Bryant, Comisky, Crane, and Zilman, 1980](#)). In terms of learning benefits, students taught with the use of humor have performed better in an examination than students taught without the use of humor ([Ziv, 1988](#); see [Cornett 1986](#) for a discussion). Student self reports also indicate that humor improves the ability to learn material ([Berk, 1996](#)). Experimental research has also shown that humor results in better performance in solving problems ([Klavir and Gorodetsky, 2001](#)), and examination test performance ([Ziv, 1988](#)), and results in longer retention of information ([Kaplan and Pascoe, 1977](#); see also [Korobkin, 1988](#); [Powell and Andresen, 1985](#)).

[Schacht and Stewart \(1992\)](#) state that for humor to have a positive pedagogical effect, it must relate to the topic at hand, not mock or make fun of anyone in the classroom, and there should not be too much of it. Similarly, [Edwards and Gibboney \(1992\)](#) and [Lesser and Pearl \(2008\)](#) suggest that humor or other types of fun in the classroom will be particularly effective if it helps to make a point or clarify a concept: that is, if it is relevant to the subject material. These viewpoints reflect the distinction in the use of humor to clarify a topic being taught versus the use of humor as a tool merely to increase student enjoyment and reduce boredom during classes. Given that many students perceive statistics classes to be boring and of little relevance to their studies, the use of humor for its own sake may help to improve the motivation in these students to attend class and engage with the material.

2.5 Summary

The articles by [Lomax and Moosavi \(2002\)](#) and [Friedman et al. \(2002\)](#), along with others (e.g., [Berk and Nanda, 1998](#); [Forte, 1995](#); [Lesser and Pearl, 2008](#); [Schacht and Stewart, 1992](#)), are extremely useful resources for teachers who wish to introduce humor into the statistics classroom. Humor can be used from the start of the course and used regularly during classes and on assessment items, although it is important that it is not overused. Various types of humor can be used, thus encouraging teachers to incorporate the type of humor that best suits their personality or teaching style. For example, the teacher that is not confident in telling humorous stories may be better able to use props such as humorous cartoons. In all cases, the teacher should be careful if the humor is potentially offensive (e.g., sarcasm) or used during times of high stress (e.g., during examinations). There is a wealth of sources for humor, both in print and on the Internet (e.g., [CAUSEweb](#)). The application of these resources in the classroom can potentially improve student engagement and learning, and increase positive perceptions of the teacher. It should also be noted that while the use of humor can make it more enjoyable to learn about statistics, fun can also be incorporated into teaching by using a variety of other methods such as celebration days, food, games, magic, poems, and striking examples among others ([Lesser and Pearl, 2008](#)).

3. A case example on how humor has been used in an introductory statistics course

After reading the articles by [Lomax and Moosavi \(2002\)](#) and [Friedman et al. \(2002\)](#), the first author sought to incorporate humor into a first year psychology research methods and statistics course. The author initially experimented with various approaches to introduce humor, although the delivery has evolved to increasingly incorporate audiovisual aids. The effectiveness of the humor has been found to be related to not only how inherently funny the joke is, but also the type of humor used, how it is delivered, and the context of its delivery. According to [Berk \(2002\)](#), laughter is likely to be greater with larger classes in crowded classrooms than with smaller classes in larger rooms. Our experiences support this conclusion in that the larger the class, the more likely the humor will elicit laughter.

3.1 Description of the course and teaching context

The course that we examine in this case example provides students with an introduction to the application of statistics in psychological research and practice. The core topics include research approaches, graphical descriptive statistics (e.g., histogram, boxplot), numerical descriptive statistics (e.g., mean, standard deviation, median, and quartiles), bivariate correlation and regression, probability, sampling distributions of the mean, confidence intervals of the mean, and hypothesis testing using t-tests and related nonparametric tests. The course is taught across 13 weeks of a semester in a weekly 2 hour lecture and 1 or 2 hour (depending on the semester of offer) practical classes. The teacher uses audiovisual aids during the lectures (e.g., computer-based presentation of lecture slides). The SPSS statistical software package is used.

The course enjoys enrolments of 200 to 225 students in each semester. Demographic information about the students obtained from a survey previously conducted by the school indicates that the students are mostly aged from 17 to 19 years (60%). A further 20% are aged between 20 to 24 years, and 20% are aged 25 years and older. Most students are female (84%). Most are also single with no children (68%), while the rest are in a relationship with no children (12%) or in a relationship or single with children (20%). A few are primary income earners (11%) and have carer responsibilities (16%). A minority reported having a disability (6%). The vast majority are domestic students (96%).

3.2 How humor has been used in the course

[Lomax and Moosavi \(2002\)](#) and [Friedman et al. \(2002\)](#) provide numerous examples of jokes, riddles, and humorous short stories. The first author has used many of these during the face-to-face teaching. It has been found that short jokes and riddles are generally more effective than long stories. This may be because short jokes and riddles are more unexpected and causes less interruption to the flow of the lecture content. The poems and rap songs described by [Lomax and Moosavi \(2002\)](#) have not yet been used in the course, largely because they are less consistent with the teaching style that is used.

Given the potential to use electronic multimedia (e.g., showing slides, videos) in the presentation of lecture materials, there is considerable scope to incorporate visual aids when introducing humor. The joke can be told visually at the click of a button. However, text-based jokes and riddles presented visually during classes were found to have less impact than when spoken. This may reflect that this medium is less effective in the delivery of the punch line. Students may notice the joke at different times, read at different rates, or may feel more self-conscious if they want to laugh and no-one else in the lecture room is doing so.

Cartoons provide a better means to present statistics related humor visually. Cartoons may be divided into two types. The first are comic strip type cartoons that are composed of several panels that lead up to a punch line. The second are single panel cartoons that may contain text that delivers the punch line. An example of a single panel cartoon relevant to inferring cause-effect from correlations consists of a picture of child and his mother on a plane. The plane is evidently experiencing turbulence and the child exclaims "I wish they wouldn't switch on the fasten seatbelts sign. Every time they do, it gets bumpy!" Similar to the visual presentation of jokes and riddles, comic strip cartoons have been found to vary in effectiveness in eliciting laughter from students. Rather than students laughing as a whole, trickles of laughter are usually observed. Although to a lesser extent, single panel cartoons can sometimes be hit-and-miss depending on whether all students read the punch line at the same time. The issue of timing in the delivery of the punch line has been addressed somewhat by the first author by explaining and saying the words in the cartoon. Cartoons have

also been used in the first title slide as a humorous way to begin the lecture.

In the first authors' experience, if visually presented humor is used, it is most effective if it merely consists of a humorous picture with no text. However, as alluded to by Schacht and Stewart (1992) with regard to cartoon use, it is difficult to make such humor relevant to the topic being taught. In such cases, the humor has necessarily been incidental rather than central to the statistical topic. Nevertheless, these applications have been among the most effective methods used, even more effective than verbally presented jokes and riddles. In the target course, the first author has made extensive use of humorous or cute pictures involving animals, such as cats and dogs. Because there is less discussion of the use of humorous cartoons and pictures in the existing literature, some examples that have been used by the first author are given below:

- Introducing the first statistical formulas can often be a daunting experience for non-mathematical students. Students were encouraged to be brave when dealing with formula by showing a picture of a squirrel “undressing” its fur to show the S of the Superman suit.
- To introduce the box-and-whisker plot, students are told that the name is literal and are shown a picture of a box-and-whisker plot. As the orientation of the plot is vertical, a comment is made that many students may not be able to imagine the whiskers. The next slide thus shows the plot flipped horizontally. It is further commented that some students may still not be able to visualize it. So, the next slide shows the horizontal plot overlaid on the nose of a cute kitten.
- When the normal distribution is first shown, students are told that it is often described as a bell curve. Students are told that “just in case you cannot see the link here, take a look at this” and a picture of a bell is shown.
- The mean of a population is symbolized by μ and students are told that it is pronounced as “mu”. Students are told that they should not confuse the pronunciation with “moo” and are shown a funny picture of a cow with sunglasses with a word bubble coming out of its mouth saying “mu”.
- Many applications of statistics require comparisons between different groups. For example, in comparing age groups, a young child is shown with a dog giving her a big lick on the face.
- Outliers are an important statistical concept. Teaching of this concept includes a discussion of whether outliers represent a real observation or error due to measurement or data entry. To reinforce the point that the observed outlier can be a real data point, students are shown pictures of animals and people that have unusual characteristics, yet are real (e.g., a teenager with the longest tongue in the world and an extremely large rabbit).
- When talking about an upcoming examination, students are shown a cartoon that shows a student participating in an exam, but who is pulling something out of his pocket. The caption reads “Midway through the exam, Allen pulls out a bigger brain”.
- In many classes, data related to particular topics is used. This presents the opportunity to present funny pictures that have some, if only a tenuous, relationship to the topic. For instance, when the data relates to advertising, students are shown examples of funny advertisements. When the data relates to quality control of potato chips, students are told that the data set relates to “something that can be made out of potatoes, but not this ...” and are shown a picture of a Mr. Potato Head. When the data relates to the effects of alcohol on motor performance, students are shown a picture of a cat that appears passed out with a cigarette in its mouth or a picture of a squirrel drinking beer from a beer can through a straw. In discussing statistics related to driving behavior, there are many humorous pictures related to this topic. Pictures that have been shown include a car driving away from a petrol station with the petrol pump hose hanging from the petrol tank, an accident in which a car has finished with the front wheels on a boat and the back wheels on the dock, and a person who parallel parked a car in a supermarket parking space. These pictures can be introduced as “how many times have we seen this!”
- Unrelated whimsical pictures are interspersed on some occasions when the statistical content is quite heavy. The most effective seems to be pictures of animals, particularly cats, such as when they are showing funny expressions like “bored”, “scared”, “shocked”, “creepy”, a cat with a hat made from a melon on its head, and a cat experiencing a “bad hair day”.

A vital component to the use of a single funny picture during the lecture is in the delivery. The first author has found that it is important to gain the students' full attention so that they are viewing the projection area at the time the picture is presented. A short lead-in comment can be used to achieve this. For instance, in one example when data on the fat content in hotdogs is used, students are told that “the data relates to hotdogs, but not these types of hotdogs” and are shown funny pictures of dogs and puppies dressed up as hotdogs. The main aim of such delivery is to make the delivery of the humor immediate and spontaneous.

Pictures can be effective in such circumstances because the source of the humor is instantaneous and easily interpreted.

3.3 Summary

Printed statistical humor sourced from [Friedman et al. \(2002\)](#) and [Lomax and Moosavi \(2002\)](#) as well as from the Internet provided material to incorporate humor into the course used in the case example. Humorous material was selected that was appropriate to the statistical topic being taught or related to the data that was being examined. In our experience, jokes, riddles, and humorous stories are best delivered verbally. Visual presentation of humor is more effective if humorous pictures are used in which the humor is relatively instantaneous. It is more difficult to use humorous pictures in a way that is relevant to the topic being taught. However, students seem to appreciate the humor for its own sake even if there is only a tenuous relationship to the topic.

4. Evaluation of the use of humor in an introductory statistics course

The claimed benefits of using humor in teaching statistics are many. However, in reviewing the literature, many of the claims are based on the teachers' own experiences. There are fewer studies that have sought feedback from students in a systematic way or used an experimental approach to examine the effectiveness of humor on test performance (see Section 2.4 for a brief review of such studies).

[Zeedyk \(2006\)](#) provide an example of an empirical study in which second and third year undergraduate psychology students were given a class exercise on statistical reasoning that was based on the analogy of police detective work. A handout was used that was written in a humorous style. The initiative was shown to improve performance on an assignment for students that were given the handout in comparison to students that did not have access to the handout. Another example of an empirical investigation is provided by a study by [Berk and Nanda \(2006\)](#) in a graduate biostatistics course. Using a pretest-posttest control group design, the researchers examined the effects of humorous directions and humorous items in an examination on exam performance. Exams that included humorous directions were associated with significantly higher performance, although the effects of humor may have been limited due to low anxiety levels and overall high test performance across the students. [Garner \(2006\)](#) inserted humor in three lecture videos on statistics. Students that viewed these videos were shown to recall more information on a subsequent assessment than students that viewed identical videos, but without the humor inserts. In addition, students that viewed the lecture videos with the humor inserts subjectively rated the quality of the teacher, the effectiveness in the communication of the information, and the opinion of the lesson as higher than students that were not exposed to the humor inserts.

[Torok et al. \(2004\)](#) notes the difficulties in empirical investigations of humor. By necessity, there must be a treatment group that receives humor and a control group that does not receive humor. [Torok et al. \(2004\)](#) noted that there are few teachers that would not want to use humor during a class. We felt the same way. Moreover, there are some inconsistencies in opinions on the effects of humor on student experiences. While humor has been said to be helpful in understanding and retaining material (e.g., [Cornett, 1986](#)), other authors suggest that it may be less helpful ([Schacht and Stewart, 1992](#)). There is also the possibility that there exists considerable individual variability in the effects of humor.

For reasons such as these, we decided to evaluate the effects of humor during teaching by focusing on student experiences ([Earley, 2007](#)). A stratified random sample of students from the course was contacted for interview. The student's responses were coded to identify major themes. The advantage of using semi-structured interviews was that it promoted flexibility on the student's part by giving them opportunities to express their experiences in greater depth, due to the open-ended nature of questions ([Neuman, 2006](#)). It also allowed us to examine individual differences in the perception of humor and its perceived effectiveness in improving student engagement and learning.

4.1 Participants

Students from two semesters who enrolled in an introductory statistics course (1003PSY) in an undergraduate program at Griffith University, Gold Coast, were the selection pool. In each semester, 20

students were randomly selected, providing a target sample size of 40. A stratified random sample was obtained by first grouping students according to their grades (high distinction, distinction, credit, pass, fail) and randomly selecting students from each respective grade so that they were proportional to the selection pool. The resulting target sample was thus representative of the full range of abilities. Students were initially telephoned and invited to participate in the interview conducted at a later date. Neither of the first two authors took part in this process nor did they know which students were contacted or which consented to participate. This ensured anonymity and was expected to result in more honest evaluations by the students selected because the authors were involved in the students program of study.

The number of students in the final sample was 38. In obtaining this final sample, 50 students had to be selected from the class. Five of these students could not be contacted due to out of date or incorrect contact details from the student records. A further five students declined to participate (one each with a high distinction, distinction, and credit grade and two with a pass grade). Of the 40 students who originally consented to participate, one student who had received a fail grade could not be subsequently contacted and another student who had received a pass grade subsequently withdrew. The 27 female (71%) and 9 male (29%) students in the final sample was comparable to the gender proportion in the entire class of students (77% female and 23% male). The mean age of the students in the sample was 23.97 years, $SD = 7.33$, $CI_{95} = 21.56$ to 26.38 . Eight students had previously completed a diploma ($n = 4$), certificate ($n = 3$), or degree ($n = 1$) program and the remaining students had no prior post-secondary level qualification. The students reported attending most lectures in the course (91%, $SD = 13.14$, $CI_{95} = 86.89 - 95.53$). Students received a café voucher valued at AUD\$7.00 in appreciation for their participation.

4.2 Interview procedure

A copy of the project information sheet and consent form was mailed to students after the initial contact. The interview was subsequently done via telephone. To ensure confidentiality and objectivity, all responses were coded and the interviewer was unknown to the students and had not been involved with any other courses in the program.

The interview lasted approximately 20 minutes. The students were asked for permission to digitally record the interview so that it could be transcribed at a later time to which all students agreed. The interview was begun by asking questions in a semi-structured format regarding the use of humor during the course. Students were first reminded of some of the ways in which humor was used. Next, they were asked "What are your thoughts on the use of humor in the course?" Elaboration and clarification were asked of students where relevant. The interviewer asked additional questions of "Did it help you engage with the material?" "How?"; "Did it help motivate you to learn about statistics?"; "What were some positive aspects to it?"; and "What were some negative aspects to it?" Each of these questions was asked once each to all students. The interview finished by asking students questions about other non-humor related aspects of the course and demographic information was also obtained.

4.3 Data coding

The student responses were transcribed verbatim from the digital recordings by the third author and assigned a participant identification code. A research assistant, who had not been involved in the interview process, examined the resulting 117 unique statements and grouped them into themes and assigned each theme a preliminary label. This first pass through the statements resulted in 12 categories, including a category each for general positive and negative statements. Statements that were irrelevant to the use of humor (e.g., comments on course administration) were discarded. Next, the first author examined the statements in each category and evaluated the degree of consistency across the statements in each category and determined whether any statements should be moved to a different category. The first author and research assistant had agreement on 87% of the coded responses. Following discussion, there was 100% agreement on the categorizations. The main sources of disagreement concerned the categorization of statements into the categories subsequently labeled Reduces monotony versus Helped maintain attention and the categories subsequently labeled Broke up content and Provided a mental break. In terms of the former two categories, it was agreed that statements that contained the key words "monotony", "boredom", "mundane" and their derivatives would be categorized as Reduces Monotony and statements that contained the key words "attention", "concentration", "interest" and their derivatives or synonyms would be categorized as Helped maintain attention. For example, the statement "if you are constantly getting hit with

the equation, facts and materials you might just drift off so it makes you pay attention" was categorized as Helped maintain attention. For the latter two categories, it was decided that the statement about having a "break" had to be specific to the student him or herself (e.g., "They gave us a bit of a break - a wake up call") or was a comment related to a distraction (e.g., "they just provided a bit of a distraction for a while") to be categorized as Provided a mental break. Statements that were specific to a break in the content (e.g., "break up the theory") were categorized as Broke up content. The less specific statement "it breaks it up a bit" was also categorized as Broke up content in the final analysis

In the next stage, the first author examined each category and (a) devised a label that was representative of the statements, (b) constructed a definition, and (c) selected example statements that were representative of the category. The results of this analysis were presented to the second author who checked the fit between each statement and the category it was placed in as well as the labels, definitions, and example statements. There was 95% agreement on the categorizations that were made and this reached 100% agreement following discussion. The main source of disagreement was with four statements that had been tentatively assigned to a category labeled Icebreaker activity. Due to the small number of statements in this category and the potential ambiguous coding of the statements, it was decided to move two statements ("ice break to the content that got a bit heavy at times"; an "icebreaker like when there is dry content") to another category (lightened the mood), and to discard the remaining two statements ("I guess they were a bit of a talking point and a bit of an ice-breaker"; "When people laugh they often then chat to their friends") because they were not considered sufficient in number to form a category on their own.

4.4 Results and discussion

The labels, definitions, and example statements for the nine identified categories are shown in [Table 1](#). The category with the most statements was amusement with 53% of the sample providing relevant comments. Although a teacher does not necessarily design classes with the aim to amuse students, the fact that humor helped to keep students entertained is a positive. Key terms in this category were "funny", "laugh", and "amusing". Additional student comments were that the humorous pictures were "abstract and weird", "a good idea", and "I can't remember the actual pictures, but I remember it being humorous". An important component to the use of humor is in the timing. One student commented that the teacher "was quite sneaky with them and knew that they were coming up", likely referring to the fact that they were sometimes introduced at unexpected times. It is noteworthy that a second statistics course that the students take uses considerably less humor. One student who was completing the second course noted that "in our stats 2 course everyone was saying we needed more pictures to keep us entertained, so obviously they have a good impact on keeping things a bit more fun".

The second category of statements was labeled *lightened the mood* and 47% of the sample contributed statements for this category. The category reflected that humor lightened the mood of the lectures and helped to reduce anxiety and stress in students. The benefit to the mood was reflected in a statement "it brought you back down from being so serious" and "you can switch from serious mode to fun mode for a bit". Several students also specifically cited the benefit of humor on negative mood states such as "it just lightened it rather than being anxious during the whole class; you have a bit of comic relief", "it just provided a good little light hearted joke to lighten everyone up and if you were worrying about what you were learning it helped ease that worry", and "they eased my anxiety".

The next category, labeled as helped maintain attention was endorsed by 45% of the students. Unlike the previous two categories, this category captured the cognitive benefits of the humor. The comments reflected that humor helped students maintain concentration throughout the lecture because "it motivated me to pay attention", "helps you want to continue", and "because you didn't want to miss out on the funny bits so you concentrate a little bit harder just in case they came up". As the last comment indicates, a key feature to the use of humor in helping students to sustain attention is their unpredictability in that "they made you pay attention because you didn't know when they were going to pop up". For some students, the benefits were particularly evident when their attention had drifted away from the lecture. In such cases, the use of humor "worked well to get everyone's attention back to the lecture if you were drifting off or not concentrating", "sometimes when you are tired you might lose concentration; it just brings you back", and "they revitalized the whole class".

It is interesting that several students noted that the use of humor helped to sustain attention throughout the lecture. In a somewhat contrasting viewpoint, 34% of students made statements that contributed to the

category labeled provided a mental break. This category reflected that humor provided relief from continuous concentration in that “you get to relax for a moment before concentrating again”. These comments seemed to reflect what happened during the actual piece of humor, whereas the previous category reflected how humor increased concentration because students would anticipate the humor or it would reorient them back to the lecture content. The present category reflected that during the humorous piece, the students were given a “break from the routine”, “a bit of a refresher”, and “you can switch off and let your mind rest then get back to it”. However, there may also be some negative aspects to this in that humor can be distracting. As one student put it, “it might distract a few people who are easily distracted and who might not listen to the next slide”. From these comments it would seem important that the teacher who uses humor ensures that the class has settled and has refocused on the content before proceeding with the lesson.

The next two largest categories showed some relationship between them. These were the categories labeled *reduced monotony* and *broke up content* in which 24% and 18% of students contributed statements for. The first category reflected that the humor reduced the monotonous nature and general boredom that some students found during the lectures. It was noted that a “bit of humor just helps get through the lecture time and just breaks the monotony” and “it took away the boringness of stats”. The main focus of this category was that the use of humor broke up the monotony associated with the lectures. The other category, broke up content, was related in that the humor broke up the lecture, but it seemed to be focused more on statistical concepts and theory than with general monotony. For instance, students commented that the use of humor helped to “break up the theory” and that “statistics is pretty dense so not so much hitting you with facts and equations and that sort of the thing”. Humor may have thus allowed the lecture content to be divided into smaller, more manageable sections and in this way it may aid learning.

Table 1. *The labels, definitions, percent of sample that contributed statements, and representative comments for the final categories resulting from the qualitative data coding methods.*

Label	Definition	Percent	Example statements
Amusement	Humor provided entertainment and made students laugh during the classes	53%	It's a good way to make it more fun Made it more enjoyable
Lightened the mood	Humor lightened the mood of the lecture and helped reduce anxiety and stress in students	47%	It lightens the mood rather than just theory, theory, theory It just lightens it rather than being anxious during the whole class you have a bit of comic relief
Helped maintain attention	Humor enhanced attention to the content and brought students back on task if they were losing concentration	45%	If you are constantly getting hit with the equation, facts and materials you might just drift off so it makes you pay attention I think it was good because sometimes when you are tired you might lose concentration; it just brings you back
Provided a mental break	Humor temporarily took the students mind away from statistics and provided a mental break	34%	You can switch off let your mind rest then get back to it They were a bit of a break from the routine and gave you a bit of a refresher
Reduces monotony	Humor reduced the monotony and boredom associated with the lectures	24%	It took away the boringness of stats
Broke up content	Humor broke up the content into more manageable amounts of information	18%	It kept you going when you were a bit bored or anything like that Statistics is pretty dense so not so much hitting you with facts and equations and that sort of thing Break up the theory
Relevance of humor	The impact of humor was influenced by the relevance it had to the statistical concept being taught	18%	Some of the humorous things were relevant to what the example was so that helped a lot to I thought they were a bit irrelevant – like I rather they go and do the material we have to learn
Helped learning	Humor aided student learning	16%	It helped you remember for the exams – the concepts Helps you to learn a bit more
Motivated to stay and attend class	Humor acted as incentive for students to attend and remain in class	11%	I could be conned into turning up to every lecture just to see the funny pictures It motivated me to stay longer until the end of the lecture

Table 1

The next category was labeled *relevance of humor* and 18% of students provided comments that were included in this category. The category reflected the relevance of the humorous pieces to the statistical topic being taught. However, two divergent viewpoints emerged. Two students noted that the humor was “relevant

to what we were learning" and "some of the humorous things were relevant to what the example was so that helped a lot too". However, five students had the opposite view in that the humor "wasn't really stats based", "something not really related to statistics", and "I think that they were off topic". The differing viewpoints probably reflect that some of the humorous pieces were relevant to the topic being taught, whereas other pieces were less relevant. Different students may have recalled different examples when giving these comments.

The category labeled *helped learning* contained statements from 16% of the students. While the above categories may also be expected to benefit student learning (e.g., helping concentration, reducing boredom), this category contained statements that were specific to humor helping students to learn and remember the material. For instance, students commented that "it helped you remember for the exams - the concepts", "probably helps you learn a bit more", and it helped to "make sense of what you've got already". Although small, this category is consistent with the view that humor can improve student learning and recall of material.

The final category contained statements from 11% of students and it was labeled *motivated to stay and attend class*. The key component of this category was the impact of humor on student motivation and acting as an incentive for students to attend class. Some students noted that "I go to the lectures just to see the funny pictures" and "it motivated me to stay longer until the end of the lecture". Class attendance, while strongly recommended, was not compulsory for the students in the course. It would thus appear that the use of humor can provide an extra incentive to attend class and thus benefit student learning.

To further examine the responses made by students, a table was constructed that showed the distribution of positive and negative statements (see [Table 2](#)). The statements were grouped according to whether they were concerned with affective issues (i.e., amusement, lightening mood, motivation) or cognitive issues (i.e., learning, attention, mental break, reducing monotony, and breaking up content). As shown in [Table 2](#), the majority of students made only positive statements related to affective and cognitive issues (68%). However, some students that commented positively on affective issues also gave both positive and negative feedback or negative feedback only (both 10.5%) on cognitive issues. Two students (5%) contributed positive statements on cognitive issues but gave both positive and negative statements on affective issues. Finally, two students (5%) made only negative statements in relation to affective issues and both negative and positive statements in relation to cognitive issues. From the cross-tabulation of responses, it would thus appear that the majority of students provided only positive feedback. However, a substantial number (32%) provided negative feedback on either affective issues, cognitive issues, or both.

Table 2. A contingency table showing the distribution of positive and negative cognitive and affective statements made by each student.

		Statements related to cognitive issues			
		Positive	Negative	Positive and Negative	Total
Statements related to affective issues	Positive	26	4	4	34
	Negative	0	0	2	2
	Positive and Negative	2	0	0	2
	Total	28	4	6	38

[Table 2](#)

Note: Cognitive issues were statements categorized as Helped learning, Helped maintain attention, Provided a mental break, Reduces monotony, Broke up content, and Relevance of humor. Affective issues were statements categorized as Amusement, Lightened the mood, and Motivated to stay and attend class.

Responses to the question of *would you recommend that they be used in the future?* were also examined. In the sample, 92% of the sample responded "yes", two students (5% of total sample) responded "no", and one student (3% of sample) responded "impartial". One of the students who responded "no" elaborated by stating "I didn't like them. I didn't think that they were relevant to the course so I didn't think it was very good. I think for other people it might have been [good]. Because I'm very interested in statistics anyway it

was just off the topic and no relevance at all, but I didn't mind it for other people who aren't so interested in statistics". The other student elaborated that "Because I thought that they were a bit irrelevant - like I rather they go and do the material we have to learn". The student that responded "impartial" also highlighted the relevance of the humor and stated that "It wasn't really relevant. I was impartial to them I guess". Of the students who had responded "yes", two additional students had commented that they were not always relevant to statistics. Two further students commented that they "may be overused a bit - using too many during lectures" and another student said "It can be quite distracting because I find that when people laugh they often then chat to their friends so the lecture can take a bit to settle down again". From these responses it would seem that while there is an overwhelming majority of students who recommend the use of humor in the statistics classroom, not all students do so. Students who are already interested and motivated in learning about statistics appear less likely to recommend the use of humor on the basis that it can be distracting. Moreover, humor was perceived less positively when it was not relevant to the material being taught.

The results of the evaluation are generally positive in the effects of the use of humor when teaching statistics at university. Potential limitations of the evaluation approach used were the wording, order of the questions, and the relative balance of positive and negative questions employed during the interview. The initial question that students were asked ("What are your thoughts on the use of humor in the course") was followed up by questions that were worded in a way that may have been biased towards eliciting positive responses. It is recommended that future research use wording such as "Was it helpful or not helpful" in place of "Did it help". Moreover, the direct questions asking students to comment on positive and negative experiences always began with the question on positive experiences. A potentially less biased approach would be to ask half the student sample to comment on positive experiences first, followed by negative experiences. The remaining students in the sample would comment on negative experiences first and positive experiences second. Finally, the follow up questions included four questions that focused on positive aspects to the use of humor and only one question that focus on negative aspects of humor. A more even distribution of positive and negative questions may provide less possible bias.

4.5 Summary

The student responses indicated that while there was not a unanimous view that the use of humor during face-to-face teaching of statistics is positive, the vast majority of students cited benefits to its use. Students indicated that humor made the lectures more entertaining and helped their learning by breaking up the content, bringing back attention, reducing monotony, and providing a mental break. Humor also had affective benefits by lightening the mood and increasing motivation. Humor was more effective when it was made relevant to the topic being taught. Humor had fewer benefits for students who were already highly motivated and interested in studying statistics as they found it at times irrelevant and distracting. These differing viewpoints are important because they highlight the interaction between the humor that is used and the nature of the students in the course.

5. Conclusions on the use of humor in teaching statistics

The articles by [Lomax and Moosavi \(2002\)](#) and [Friedman et al. \(2002\)](#) are an excellent inspiration for teachers who wish to incorporate humor into the statistics classroom. We have attempted to apply their strategies in addition to developing our own, such as the use of visually presented humor, in a large first year statistics course. The present results and those of others (e.g., [Cornett, 1986](#); [Ziv, 1988](#)) indicate that there are significant benefits to the use of humor in terms of student learning and engagement. Students also favor teachers who display humor over teachers who are less humorous ([Torok et al., 2004](#)). Due to the fact that many students have a perception that statistics is anxiety provoking, boring, and of little relevance, any teaching technique that can help increase student engagement should be considered by statistics teachers.

Prior studies that have investigated the use of humor in teaching statistics has tended to focus on the learning benefits associated with humor (e.g., [Berk and Nanda, 2006](#); [Garner, 2006](#); [Zeedyk, 2006](#)). The student reports obtained in the present study support these experimental studies. The category of *helped learning* shows that students perceive a direct learning benefit from the use of humor. Moreover, additional themes that emerged might suggest some of the mechanisms by which the improved learning occurs. The category of *helped maintain attention* suggests that humor encourages students to sustain their attention for longer throughout the class. In addition, the category of *reduces monotony* indicates that humor makes a lecture less boring and more engaging. If students are not attending to the lecture, little learning can occur.

Research has shown that student attention is high during the first several minutes of a lecture, but subsequently drops and stays flat for much of the lecture, only picking up again towards the end of the lecture (see [Bligh, 2001](#)). The results of the present study suggest that the use of humor may delay the drop in attention following the start of the lecture and return attention back to its initial high levels at later points in the lecture.

Two additional themes relevant to student learning also emerged in the present study and to our knowledge have not yet been identified in prior research. The theme *provided a mental break* suggested that humorous items can provide a free period in which students can take a pause from the content component of the lecture and mentally refresh themselves. It can be difficult to sustain attention for long periods of time and so the ability to have a “breather” before refocusing on the lecture is important for later retention of information. The theme of *broke up the content* suggests that the humorous items provided a demarcation point that segregated the lecture into smaller, more manageable amounts of information. It may have allowed students the opportunity to consolidate the material that they were learning and to mentally prepare for the next topic. Further research is required to determine the contribution that having a mental break and breaking up the content has on learning in statistics.

The use of humor also had affective benefits as shown by the themes of *amusement* and *lightened the mood*. These findings are consistent with prior research showing that humor can relieve stress ([Berk, 1996](#); [White, 2001](#)), reduce statistics anxiety ([Wilson, 1999](#), cited in [Onwuegbuzie and Wilson, 2003](#)), reduce test anxiety ([Berk, 1999](#)), and create an enjoyable learning environment ([Schacht and Stewart, 1992](#)). The affective benefits would appear to be particularly beneficial in the cohort of students examined in the present study. This is because the statistics course that the students were taking was a compulsory course in their program of study. In addition, our experience showed that many students begin the course with high levels of anxiety and low interest. The fact that *amusement* and *lightened the mood* were the two themes that were most common among students suggests that in the present cohort of students, the humor had its greatest effect in increasing the enjoyment of the lectures and learning of the course material. In such cases, the use of humor and other means to introduce fun (see [Lesser and Pearl, 2008](#)) would be expected to improve student engagement.

An unexpected theme that emerged from the interviews was *motivated to stay and attend class*. Although only a relatively small proportion of the students made comments that were classified into this theme, it may be an important factor that influences student learning. Prior research has shown a positive association between attendance at lectures and subsequent performance on assessment (e.g., [Hammen and Kelland, 1994](#); [Riggs and Blanco, 1994](#); [Sade and Stroud, 1982](#)). Given that attendance at lectures is not a compulsory requirement in the course in the present study, it would appear that using humor has a positive benefit in ensuring that students are exposed to the course content.

Teachers should take note of the context in which they operate and the types of students that they teach. These factors can be important to the appropriate use of humor and how much humor is used or whether it should be used at all. In the present study, the inclusion of humor during face-to-face teaching was overwhelmingly perceived to be positive, but there remained a small selection of students who did not find humor to benefit their learning. These students tended to be already highly motivated to do well in statistics or already have a high level of interest in the subject. A similar outcome was observed when the inclusion of humor during an examination was studied by [Smith et al. \(1971\)](#). It was found that humor enhanced the recall of information among students with high anxiety. However, students with less anxiety and high motivation reported that the humorous material distracted them and impaired their concentration. In programs such as the social sciences, statistics is usually a compulsory course and research shows that many students report high levels of anxiety and low motivation to study statistics ([Onwuegbuzie and Wilson, 2003](#)). Thus, the use of humor during statistics courses in these disciplines may be more effective than in pure mathematics disciplines.

Teachers should also recognize that humor is one of many techniques that can be used in the classroom to help student learning. [Wilson \(1999\)](#), cited in [Onwuegbuzie and Wilson, 2003](#)) employed various strategies in the statistics classroom, including the use of humor, using real-life data sets, and addressing statistics anxiety. Data collected from two focus groups and an analysis of 86 responses from students to the question of what the teacher did to reduce anxiety in the class showed the interpersonal style of the teacher (e.g., having a positive attitude, encouraging students, being supportive, being calm) as important in addressing anxiety in the classroom. The teacher's interpersonal style was rated as more important than specific

teaching behaviors, such as giving individual help, breaking down material into smaller steps, giving activities to students, and the use of humor. Although this study was primarily concerned with statistics anxiety, it does illustrate that the use of humor should be seen as part of a range of techniques that teachers can use to facilitate engagement and learning in students. Future research could similarly apply a comparative methodology, for example, by asking students to rank order the importance of specific teaching strategies (e.g., humor, teacher attitude, provision of review questions) for learning. In this way, the relative benefits of humor versus other teaching strategies can be determined. It would also help contextualize the use of humor among the broader issues that impact student engagement and learning in the statistics classroom.

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David L. Neumann
School of Psychology
Griffith University, Gold Coast Campus
Griffith University QLD 4222, Australia
D.Neumann@griffith.edu.au

Michelle Hood
School of Psychology
Griffith University, Gold Coast Campus
Griffith University QLD 4222, Australia
michelle.hood@griffith.edu.au

Michelle M. Neumann
School of Psychology
Griffith University, Gold Coast Campus
Griffith University QLD 4222, Australia
Michelle.Neumann@student.griffith.edu.au
