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Scientists as comedians: The effects of humor on perceptions of scientists and scientific messages

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Abstract

Humor has been recommended for scientists looking to conduct communication activities despite relatively little empirical evidence demonstrating its effectiveness. Here, we examine the social environment of a joke through a two-condition experimental design that manipulates the presence or absence of audience laughter. Specifically, we examine how humor experienced from viewing a video clip of a science comedian embedded in an online survey can have downstream effects on whether people view comedy as a valid source of scientific information. We found that respondents who perceived more humor in the video clip (i.e. those in the condition with audience laughter) had more positive views about comedy as a valid source of scientific information. Interestingly, this relationship was mediated by perceived expertise, not likability, of the scientist engaging in comedy.

Keywords

expertise, humor, laughter, likability, mirth, science humor

Humor is a conduit for public engagement with science (Riesch, 2015). Despite relatively little empirical evidence demonstrating its effectiveness, humor has been recommended for scientists

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looking to conduct public communication and engagement activities (e.g. Baram-Tsabari and Lewenstein, 2017). Research has explored the visual communication of science (e.g. late-night television), showing that humorous messages can shape individuals' cognitive processing, learning, and perceptions of scientific issues (Anderson and Becker, 2018; Becker and Anderson, 2019; Brewer and McKnight, 2015). Another setting for humor—standup comedy—can motivate scientists to participate in communication that results in audience satisfaction (Pinto et al., 2015). Science standup comedy is becoming increasingly popular as evidenced by events such as the D.C. Science Writers Association's Science Comedy Nights in the United States.[1] Other outlets for science comedy include the journal *Science*, which contains a monthly humor column, *Experimental Error*, written by scientist and comedian, Adam Ruben.

Given the promising findings that science on late-night television engages public audiences, and that standup comedy is an effective means for delivering humor, it is tempting to encourage scientists to adopt these techniques as new ways to interact with publics. Yet, we know little about how humorous messages shape perceptions of the scientists who communicate them. How well-liked are the scientists? How do audiences perceive their scientific expertise as they engage in comedic pursuits? And, what do these perceptions of scientists delivering humorous messages mean for how people regard comedy as a valid source of science information? Understanding how audiences perceive the credibility of humorous messages about science and the scientists who deliver those messages is important for defining the role of humor in public engagement with science.

Our study examines the social environment of a joke through an experimental design that manipulates the presence or absence of audience laughter. When there is laughter, people expect and experience humor. We hypothesize that experienced humor will lead to the perception that science comedy is an appropriate source of information about science. Thus, our analysis examines the pathway through which experienced humor, or mirth, influences people's perceptions of standup comedy as a valid source of science information. In other words, we ask how perceived likability and credibility of the standup comic-scientist mediates this relationship. We explore this question using an experiment embedded in an online survey with a sample of undergraduate students from a large southern university in the United States.

1. Laughter and mirth

To consider humor is to understand laughter. People laugh when they want to release tension in a physiological response, make sense of some sort of incongruity or surprise they encounter in a cognitive response, or express feelings of superiority (Meyer, 2000). Laughter exists in social situations and prompts an awareness of the social environment (Platow et al., 2005). Humor is a social entity, with groups of people relying on humor as a primary form of interaction (Fine and De Soucey, 2005). Laughter prompts reflection on whether content is funny, because it highlights that others think it is (Neuendorf and Fennell, 1988). Thus, laughter acts as a heuristic, cueing people to social norms around funny content.

The presence of laughter also increases perceptions that the content of the message being exchanged is humorous. While laughter is not necessary to perceive a message as humorous, it is the "primary indicator of the experience of humor" (Meyer, 2000: 311). Indeed, the presence of canned laughter on television is related to the perception that shows are humorous (Lieberman et al., 2009). While other research has examined effects of different types of humor (e.g. Pinto and Riesch, 2017), we take the perspective that laughter serves as a cue to increase the humor that people perceive:

H1. Respondents exposed to the condition with audience laughter will experience more mirth compared to those in the condition with no audience laughter.

2. Effects of mirth on source perceptions

Once people experience humor, the question arises: How does mirth shape perceptions of the source of that humor? While persuasion researchers have established the importance of likability of the messenger, perceived expertise of science communicators is just as important due to the technical nature of the information being presented (Hendriks et al., 2015). Yet, there is still little research on how humor affects perceptions of a source in the context of science communication. It is likely that a scientist's use of humor shapes perceptions of trustworthiness and credibility.

As the literature shows, humor can enhance positive evaluations of a target (Kuiper et al., 1995) and the likability of a source (Weinberger and Gulas, 1992). In fact, research on political humor suggests that viewers like politicians who can take and make jokes more than those who choose not to engage with humor (Baumgartner et al., 2018; Becker and Haller, 2014). Evidence for humor's enhancement of credibility of a source is less clear (Weinberger and Gulas, 1992) but there is some indication that humor increases a source's credibility in certain contexts. For example, humor in advertising can enhance source credibility (Sternthal and Craig, 1973). In addition, laughter in late-night talk shows heightens perceptions of humor, which increases credibility (Vraga et al., 2014). Thus, we propose,

H2. Respondents who experience more mirth will find the communicator (a) more likable and (b) more of an expert, relative to those who experience less mirth.

We also examine if source perceptions shape whether people think comedy is a valid source of scientific information. Most research examines the effects of humor on the content or target of a joke. A study of negative parody messages targeted at brands found that when the messenger is believable, viewers are more likely to perceive the brand negatively (Sabri and Michel, 2014). Another study found that exposure to political satire can result in more positive perceptions of the humor target due to greater message scrutiny (Boukes et al., 2015). In a scientific context, sarcastic humor in late-night television or online viral videos can increase elaboration of messages therein and the certainty that global warming is happening (Anderson and Becker, 2018; Becker and Anderson, 2019).

Some research does examine related perceptions beyond the message topic. For instance, liking an individual delivering a humorous message is related to increased perceptions of trust in media (Peifer, 2018). In their study, Vraga et al. (2014) found that laughter increases host credibility and likability, but only host credibility mediated credibility of the television program associated with it. Thus, there is some evidence that credibility shapes perceptions of media content in which the humor is embedded. More research specific to science is needed to understand the dynamics between audiences' perceptions of the humorist and whether they perceive humor to be an acceptable form of science communication. We pose the following research question:

RQ1. Is the relationship between mirth and perception of comedy as a valid source of science communication mediated by (a) likability or (b) expertise of the communicator?

3. Method

A two-condition experiment was administered online via Qualtrics[2] (25 March to 9 April 2019) to undergraduate students at a large public university in the southern United States. Subjects ($N=217$)

were offered extra credit in exchange for participating in the 15-minute survey experiment. After a short pre-test questionnaire measuring concepts including interest in science and factual knowledge, subjects were randomly assigned to view a science comedy video either with existing audience laughter ($n = 107$) or without audience laughter ($n = 110$).

The video features Vince Ebert, a German physicist and comedian.[3] The video content was a standup comedy routine delivered in English and published on YouTube in June 2018. We used an edited 2-minute segment from the publicly available "Science is the Best We Have" video. It is unlikely that our subjects had previously viewed the video; it only had 5502 views on YouTube.[4] Subjects assigned to the condition containing audience laughter saw the clip in its original form, while subjects in the condition without laughter saw the same material with the audience laughter removed. The experimental manipulation was included in the analysis as a dummy variable (*laughter condition*), with the laughter-containing condition coded high.

The videos were embedded in the survey experiment; all suggestions for related videos, ads, and the YouTube logo were removed. Controls were set so that subjects could not scroll through any sections of the video clip and had to remain on the screen for its duration. A manipulation check followed in the post-test portion of the study, as well as questions measuring efficacy, engagement with the video, message credibility and elaboration, and demographics. The manipulation check consisted of a question asking respondents whether the video contained laughter. We found a significant difference in recognizing audience laughter between respondents in the two conditions ($t(196.2) = -10.184$, $p < .001$).

Dependent variable

Perception of comedy as a valid source of science information ($M = 3.98$, $SD = 1.35$, Pearson's $r = .649$, $p < .001$) was measured using two items asking respondents their level of agreement (1 = "strongly disagree," 7 = "strongly agree") with the following statements when thinking back on the video: (1) "The video I watched is a legitimate source of science information," and (2) "Scientists involved in comedy are an appropriate source of information about science" (modified from Peifer (2018)).

Antecedent variables

Mirth ($M = 4.44$, $SD = 1.59$, Cronbach's alpha = .933) was an averaged index of three items measured on 7-point semantic differential scales. Respondents were asked to describe the video using three pairs of words: "not humorous-humorous," "not funny-funny," and "not amusing-amusing."

Perceived likability ($M = 5.23$, $SD = 1.24$, Cronbach's alpha = .929) was measured using a modified version of the Reysen (2005) Likability Scale. Respondents indicated their level of agreement (1 = "strongly disagree," 7 = "strongly agree") with the following statements: "This person seems . . ." (1) "friendly," (2) "likable," (3) "warm," and (4) "approachable."

Perceived expertise ($M = 5.35$, $SD = 1.13$, Cronbach's alpha = .898) was measured using four items from the expertise dimension of the Muenster Epistemic Trustworthiness Inventory (Hendriks et al., 2015). Respondents were asked how much they agreed (1 = "strongly disagree," 7 = "strongly agree") with the following statements: "This person seems . . ." (1) "professional," (2) "competent," (3) "qualified," and (4) "well-educated."

Data analysis

Before conducting regression analysis, we examined descriptive statistics and inter-item correlations for all variables in the model (Tables 1 and 2).

Table 1. Descriptive statistics for variables in the model.

		Dependent variable*	Mirth	Perceived likability	Perceived expertise
Laughter ($X = 1$)	Mean	4.17	5.05	5.54	5.39
	SD	1.34	1.44	1.10	1.11
No laughter ($X = 0$)	Mean	3.72	3.78	4.89	5.28
	SD	1.35	1.48	1.27	1.14
	Mean	3.94	4.4	5.21	5.33
	SD	1.36	1.6	1.23	1.13

SD: standard deviation.
*Perception of comedy as a valid source of science communication.

Table 2. Inter-item correlations between variables in the model ($N = 215$).

	(1)	(2)	(3)	(4)
(1) Dependent variable*				
(2) Laughter condition	.166 (.014)			
(3) Mirth	.380 (<.001)	.402 (<.001)		
(4) Perceived likability	.434 (<.001)	.262 (<.001)	.478 (<.001)	
(5) Perceived expertise	.441 (<.001)	.048 (.484)	.367 (<.001)	.701 (<.001)

*Perception of comedy as a valid source of science communication.
Values in parentheses are *p*-values.

We used a mediation model (Model 81) in the PROCESS 3.0 macro for SPSS (Hayes and Matthes, 2009) to address our hypotheses and research question. Percentile bootstrap confidence intervals were estimated using 10,000 bootstrap samples.

4. Results

Our first hypothesis proposed that respondents in the laughter condition would experience higher mirth relative to those in the condition without laughter. We find support for H1 ($B = 1.26$, $SE = .199$, $p < .001$; Table 3). In addition to the regression model, we used analysis of variance (ANOVA) and found a significant difference between the means of mirth in the no laughter ($M = 3.78$, $SE = .139$, 95% confidence interval (CI) [3.50, 4.05]) and laughter groups ($M = 5.05$, $SD = .142$, 95% CI [4.77, 5.33]).

Addressing H2, we found that mirth positively predicted likability ($B = .346$, $SE = .051$, $p < .001$) and expertise ($B = .294$, $SE = .049$, $p < .001$) of the scientist. We also found that perceived expertise ($B = .321$, $SE = .103$, $p = .002$), not likability ($B = .152$, $SE = .100$, $p = .127$), mediated the relationship between mirth and perceptions of comedy for science communication (RQ1; Figure 1).

The significant relationships in the model can be expressed as the following equations, using X to refer to the *laughter condition*, MIRTH for *perceived humor*, LIKE for *perceived likability*, EXPERT for *perceived expertise*, and Y to refer to the dependent variable, *perception of comedy as a valid source of science information*:

Table 3. Zero-order correlation of control and antecedent variables with perception of comedy as a valid source of science communication and unstandardized regression coefficients for conceptual model shown in Figure 1 ($N = 215$).

		Mirth			Perceived likability			Perceived expertise			Perception of comedy for science communication	
		B (*SE*)	Sig.		*B* (*SE*)	Sig.		*B* (*SE*)	Sig.		*B* (*SE*)	Sig.
Intercept		3.78 (.139)	<.001		3.58 (.219)	<.001		4.17 (.211)	<.001		.599 (.407)	.143
Laughter condition	$b \rightarrow$	1.26 (.199)	<.001	$c \rightarrow$	.210 (.161)	.195	$d \rightarrow$	–.261 (.156)	.095	$a \rightarrow$	.104 (.181)	.567
Mirth		–	–	$f \rightarrow$	.346 (.051)	<.001	$g \rightarrow$	.294 (.049)	<.001	$e \rightarrow$	.180 (.062)	.004
Perceived likability		–	–		–	–		–	–	$h \rightarrow$	.152 (.100)	.127
Perceived expertise		–	–		–	–		–	–	$i \rightarrow$	.321 (.103)	.002
Model R^2		.158	<.001		.235	<.001		.146	<.001		.265	<.001

SE: standard error.

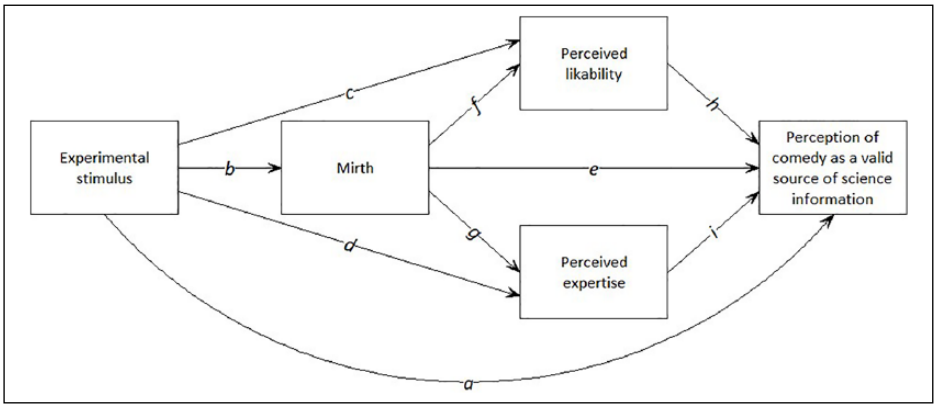

Figure 1. Conceptual model showing potential relationships between variables of interest.

$$MIRTH = 3.78 + 1.26X$$
$$LIKE = 3.58 + .346MIRTH$$
$$EXPERT = 4.17 + .294MIRTH$$
$$Y = .599 + .180MIRTH + .321EXPERT$$

While we find no significant direct effect of the experiment on Y, the stimulus influenced mirth such that individuals exposed to laughter, relative to those in the control condition, were estimated, on average, to score 1.26 units higher on mirth. The path coefficients, f and g, indicate that among respondents in the same experimental condition, those who differ by 1 unit in mirth are estimated, on average, to differ by .346 and .294 units on perceived likability and expertise, respectively. These give us some sense of the size of the observed effects.

There are also two indirect effects of interest that are significantly different from zero. The first is the indirect relationship of the experimental conditions on perceptions of comedy through mirth. This indirect effect is $be = (1.26)(.180) = .227$. In other words, those who saw the video with laughter scored, on average, .227 units higher on Y as a result of the effect of the stimulus on mirth, which, in turn, affected the dependent variable.

The other relevant indirect effect is that of the stimulus on the outcome through mirth and perceived expertise: $bgi = (1.26)(.294)(.321) = .119$. In this case, participants in the laughter condition were estimated to score, on average, .119 units higher on Y as a result of the effect of the stimulus on mirth and subsequently that of mirth on perceived expertise, which, in turn, influenced perceptions of comedy.

5. Discussion

Our goal was to examine how funny portrayals of science impact perceptions of scientists and comedy as a valid source of science communication. In doing so, our study fills an important gap in the literature; we offer insight into how people perceive scientists and scientific messages when they are delivered in a humorous context. This has important implications for understanding how funny science communication impacts not just public understanding of science, but people's views of scientists and science more generally.

Before we discuss the findings, we note some limitations. First, our sample consisted of undergraduate students. This prevents us from making inferences to the general US adult population. However, this sample was appropriate for addressing the causal mechanisms proposed in our research question and hypotheses. That the effect sizes were relatively small is likely also a function of our sample. We hypothesize that replicating this experiment using a sample representative of the adult population of the United States is likely to yield larger effect sizes. College students are likely to show less variation in some key variables relative to the general population and, as a result, the effects we found might be attenuated. Thus, we recommend that future studies employ a quota or probability sample.

A second limitation is the relative subtlety of the video. Vince Ebert is not a well-known scientist or comedian, nor does he fit the image of what one might think of when considering science comedy. In other words, had Ebert been more well-known, the stimulus might have resonated more with our participants and offered stronger effects. This limitation, however, is also an advantage—it is likely that participants did not have previous experience with or opinions of Ebert. Another limitation concerns participants' attention to the video. We cannot guarantee that every respondent paid full attention to the video. However, 91.2% of respondents correctly indicated that they noticed a stage while 92.6% correctly recalled that there was no emcee, giving us confidence that respondents attended to the video.

The main contribution of our study is the downstream effects of mirth on attitudes about the communicating scientist and the message. The humorous message was there for all participants, but for those who saw the message in conjunction with laughter, their reports of perceived mirth were greater. Therefore, laughter encouraged funniness, which led to downstream effects. Furthermore, our study suggests that when people perceive a scientific message as more humorous, their perceptions of the scientist change. At least in our controlled experiment, a scientist's perceived likability and expertise received a boost when viewers found the message funnier. This adds to the literature showing that funny people are more well-liked (Vraga et al., 2014), but also provides important insight into the lesser known influence of the relative effects of humor on source credibility. Our study sheds light on what happens once those likable and credible perceptions are formed, and such downstream effects have yet to be explored. Notably, it is the expertise perception—and not likeability—that contributes to the perception the message is a valid source of information. The incongruity theory of humor focuses on the cognitive—over physiological, emotional, or social—aspects of how someone responds to a funny message. In the science communication context, greater experienced humor may trigger a cognitive response to the intellectual demands of understanding a sophisticated joke. It is this pressure for comprehension that may lead to a person perceiving more expertise on the part of the scientist. Our results suggest that laughter serves as a social cue, but it may be the cognitive demands of understanding a science joke that leads to perceived expertise.

Our study also shows that this cognitive trigger of perceived expertise is important for developing the attitude that a relatively more humorous message is a valid source of scientific information. Expertise is closely related to credibility and is important when audiences make decisions about technical information. Our findings suggest that credibility leads people to believe a scientific message is valid if it is humorous.

This has important implications for guiding practitioners in using humor. Finding social contexts for the use of humor in science communication is important, as they help deliver the cue that something is funny. Those might be in-person gatherings that are traditionally oriented toward humor, such as standup comedy nights, or similar messages shared via online video on social media platforms (Pinto et al., 2015). Our findings also warrant consideration of using humor in settings oriented toward more formal science communication, such as lectures. Funny messages do

not appear to harm a scientist's credibility, rather they can enhance one's perceived expertise. That credibility is an important part of considering humor or comedy as a legitimate source of scientific information. Of course, there are ethical implications to using a psychological mechanism like humor to increase credibility rather than relying on rational judgments of information consumers. While humor is a positive experience for both the messenger and the recipient, science communicators should consider audience perspectives when deciding whether and how much humor to use. They should also explore complementing humorous messages with more serious sentiments to allow for a range of psychological responses among message recipients.

Our study paints a positive picture for humor and its role in shaping perceptions of scientists and the messages they deliver. While we offer preliminary evidence that supplements existing work in science communication, future work should extend these results to other scientific contexts and topics, as well as to other types of humor. For instance, would humor effects work similarly for other contentious issues, such as among parents making decisions about vaccinations? Or, how would humor shape the experiences of individuals who have recently experienced a health crisis? Future research should continue to examine how funny messages influence people's perceptions of science and its communicators to inform the practice of using humor to communicate and engage audiences with scientific issues. In addition, scholarship could examine how other individual traits (e.g. need for humor) might interact with audience laughter to influence responses to funny content. Collaborative projects between practitioners and researchers around how best to employ science humor are likely to prove fruitful.

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Notes

1. See https://dcswa.org/science-comedy-night/
2. Qualtrics is an online survey platform that allows for the building, customization, and sharing of surveys for data collection.
3. See https://www.youtube.com/user/vinceebert/
4. For comparison, a video trending on YouTube (a music video of "Hot Girl Summer" by Nicki Minaj and Ty Dolla $ign) on 4 September 2019 had been viewed around 5.5 million times since it was posted the previous day.

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