

**Sounds Like a Funny Joke:
Effects of Vocal Pitch and Speech Rate on Satire Liking**

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Abstract

Katz (1996, 2005, 2009) has often emphasized the importance of testing effects of irony in its social context. One social context that has not yet received much attention in the literature is the inherently ironic genre of satirical news. To alert their audiences to irony, satirists can use markers, one of which being prosody. However, little is known about whether variations in prosodic features actually promote satire liking. This paper focused on two prosodic features that previous research associated with irony marking: (1) low vocal pitch, and (2) slow speech rate. We conducted two experiments to determine whether a low (vs. high) vocal pitch (Experiment 1; $N = 244$) and a slow (vs. fast) speech rate (Experiment 2; $N = 234$) moderated potential effects of satirical (vs. regular) news exposure on perceived humor, enjoyment and appreciation. Results showed that participants rated satirical news recordings as more humorous than regular news recordings. In both experiments, enjoyment and appreciation of satirical news were mediated by perceived humor, such that there was a suppression effect: while the indirect effect of satirical news exposure on enjoyment and appreciation was positive, the direct effect was negative. Vocal pitch and speech rate did not influence humor ratings. This finding suggests that contextual cues may already sufficiently be at play in signaling the irony in satirical news, therefore supporting Katz's claim (1996, 2005, 2009) that taking social context into account when conducting irony experiments is essential.

Keywords: satirical news; irony; humor; entertainment; prosody.

Public significance statement: People only enjoy and appreciate the inherently ironic genre of satirical news more than regular news when they find the satire funny. Even though previous research suggested that a low vocal pitch and a slow speech rate could draw attention to ironic content, variations in these prosodic characteristics did not influence satire's humor ratings.

Sounds Like a Funny Joke:

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Albert Katz (1996, 2005, 2009) has often and consistently argued for the importance of testing effects of irony in its social context. Work by Katz and colleagues (e.g., Katz et al., 2004; Katz & Pexman, 1997; Pexman et al., 2000) has shown that irony is likelier to be understood as ironic in some social contexts than in others. For instance, whether comments are rated as ironic can depend on the speaker's occupation since some occupations are more associated with the use of irony (e.g., comedians, poets) than others (e.g., judges, doctors; Katz & Pexman, 1997; Pexman et al., 2000). A social context that has not yet received much attention in the irony literature is the genre of satirical news (Skalicky, 2019) – as exemplified by American websites such as *The Onion* (www.theonion.com) and *The Babylon Bee* (www.babylonbee.com).

Satirical news constitutes an inherently ironic genre because it imitates regular news reporting to criticize and make fun of this regular form of news as well as the issues and actors under discussion (e.g., LaMarre et al., 2009; Matthes & Rauchfleisch, 2013). By using genre conventions of regular news reporting (e.g., presentation style, ordering of information, use of interviews) to present humorously fabricated news scenarios, satirical news creates an ironic setting from the outset. For instance, following the start of the 2020 impeachment proceedings against American president Donald Trump, an article from satirical news website *The Onion* headlined “Republican Senators maintain they’ll weigh all evidence before carrying Trump out on shoulders” (2020). While it is unlikely that any group of senators would literally carry a president out on their shoulders, the article moved on to describe what such a procession would look like. The entire article should thus be interpreted ironically, as a critique draped in ironic pretense (Clark & Gerrig, 1984) of Republican senators for not considering both sides in the debate.

In studies on satirical news, characteristics and effects of satirical news are typically compared to the genre of regular news (Becker & Waisanen, 2013). An important difference

between both genres is that, unlike regular news, satirical news is usually intended humorously (Nabi et al., 2007). As a result, satirical news is often found to entertain audiences (Becker & Waisanen, 2013). Media psychologists have argued that entertainment perceptions consist of two distinct but complementary dimensions: enjoyment and appreciation (Oliver & Bartsch, 2010). Whereas enjoyment refers to the pleasure derived from exposure to media content, appreciation refers to the perceived meaningfulness of media content, for instance in terms of cultural or artistic value (Oliver & Bartsch, 2010). Previous research has shown that satirical news tends to be enjoyed more than regular news (Becker & Waisanen, 2013), but effects of satirical news on the entertainment dimension of appreciation are still unclear.

This study adds to the satire literature by disentangling the effects of satirical (vs. regular) news on enjoyment and appreciation. Satirical news has been praised for its playful and creative nature (LaMarre et al., 2009) which could lead to enjoyment, as well as its ability to make the audience both think and think differently about news issues and production (Cao, 2008; LaMarre et al., 2009; Matthes & Rauchfleisch, 2013), which could lead to higher appreciation of the genre compared to regular news. Such entertainment effects, however, may depend on how funny the audience thinks the satire is (Nabi et al., 2007). For this reason, we hypothesized:

H1: Satirical news is (a) enjoyed more and (b) appreciated more than regular news.

H2: Effects of satirical (vs. regular) news on (a) enjoyment and (b) appreciation are mediated by perceived humor.

Prosodic Markers of Irony

Satirists can enhance humor perceptions of satirical news by using markers to alert their audiences to the irony (Burgers & Van Mulken, 2017). In spoken language, common examples of such markers are tag questions (e.g., “This is very normal, *isn't it?*”), interjections (e.g., ugh, hmm, ahh), and the presence of tropes such as metaphor and hyperbole (Burgers & Van Mulken, 2017). Satirists may also more generally adjust their way of speaking to draw attention to the irony (e.g.,

Anolli et al., 2002; Bryant, 2010; Cheang & Pell, 2008; Rockwell, 2000). Valuable progress has been made identifying what such prosodic strategies for irony could be. Because most previous research has focused on other ironic contexts than satirical news such as conversations among friends or family (Rockwell, 2007), we know little about whether variations in prosodic features that signal irony may actually also promote satire liking.

Whereas some scholars propose that, when speakers are ironic, they change their way of speaking to emphasize their shift from non-ironic to ironic in ways that are not specific to irony (Attardo et al., 2003; Bryant & Fox Tree, 2005), other researchers have found specific prosodic patterns for irony use. These patterns are labelled prosodic irony markers. Previous research indicates that languages can be characterized by different prosodic irony markers (Anolli et al., 2002; Cheang & Pell, 2011). Most studies conducted on irony in Germanic languages such as English (Cheang & Pell, 2008; Rockwell, 2000, 2007) and German (Scharrer & Christmann, 2011), however, have linked ironic speech to similar prosodic irony markers: a lower (vs. higher) vocal pitch as well as a slower (vs. faster) speech rate of the particular speaker compared to literal speech (Cheang & Pell, 2008). For this reason, we tested whether vocal pitch (Experiment 1) and speech rate (Experiment 2) influenced audience liking of satirical (vs. regular) news.

Our two experiments were conducted in The Netherlands. Even though, to the best of knowledge, previous research has not yet tested the presence of prosodic markers for verbal irony in Dutch, the Dutch language is similar enough to German phonetically (Müller, 2005) to reasonably assume that irony in Dutch could also be characterized by a low vocal pitch and slow speech rate (see Scharrer & Christmann, 2011). These previously identified prosodic markers of irony may impact satire liking because they could influence perceptions of satirical news as being meant humorously. After all, when irony in satirical news is marked, audience members may be more likely to recognize a humorous incongruity between what satirists literally say and what they mean to say, even if these audience members do not resolve this incongruity completely (Johnson et al.,

2010). By drawing attention to this ironic nature of satirical news, both a low vocal pitch and slow speech rate may thus promote humor perceptions of satirical news compared to regular news. We therefore hypothesized:

H3: Satirical news is perceived as more humorous when (a) vocal pitch is low instead of high, and (b) when speech rate is slow instead of fast.

Method

Design and Materials

We conducted two experiments to examine whether potential effects of satirical (vs. regular) news exposure on enjoyment and appreciation depended on vocal pitch (Experiment 1) and speech rate (Experiment 2). Both experiments had a 2 (genre: satirical news vs. regular news) by 2 (Experiment 1: high vs. low vocal pitch; Experiment 2: fast vs. slow speech rate) between-subjects design. Participants for both experiments were recruited online in the Netherlands in May 2017 through the personal networks of several students, under supervision by the first author.

In the satirical news conditions, participants listened to an audio recording of an article from *De Speld*, a Dutch equivalent to *The Onion*. In Experiment 1, the article mocked a speech delivered by Dutch prime minister Mark Rutte at the United Nations' (UN) General Assembly. In Experiment 2, the article mocked a statement made by Rutte in a debate about dividend-tax reforms. Both articles were entirely ironic: while they mimicked regular news reporting, the news scenarios were purposely fake to convey an opinion on the topic. In the regular news conditions, participants listened to an audio recording of a factual report of these events, taken from *ANP*, the largest news agency in the Netherlands. In each experiment, both articles were recorded by the same young male speaker. Participants were kept unaware of the article source because source knowledge and liking can influence irony perceptions (Ellithorpe et al., 2014; Katz & Pexman, 1997).

In Experiment 1, vocal pitch was manipulated by adjusting the speaker's average pitch in Audacity (2018), an open-source audio-editing program. We followed the manipulation of

Chattopadhyay et al. (2003) who found that 120 Hz (low pitch) and 140 Hz (high pitch) were within the lower and upper bounds of acceptable vocal pitch for adult male speakers.

In Experiment 2, speech rate was manipulated by modifying the articulation rates in Audacity (2018). Previous research suggested that the average articulation rate of Dutch speakers is five syllables per second (Verhoeven et al., 2004). Our manipulations deviated one standard deviation (i.e., 0.5) from this mean. The fast versions were characterized by an average articulation rate of 5.5 syllables per second, and the slow versions by 4.5 syllables per second.

Procedure

Both experiments were approved by the ethical review board of the first author's institution. Before completing the survey, participants in each study were asked to provide informed consent to the collection and analysis of personal data for the purpose of the study. While participants next listened to one of the four recordings, a timer on the page recorded the number of seconds spent on the page as an indication of listening time. We measured attention by asking participants to list three keywords that summarized the content of the recording. Finally, dependent and demographic variables were measured, and participants were debriefed.

Participants

In Experiment 1, a total of 258 participants completed the survey. Inspection of the data revealed that fourteen participants had not listened to the recording until the end and/or had filled out incorrect or nonsensical keywords. Of the remaining 244 participants, 148 were female (60.66%). Their average age was 31.59 years ($SD = 14.66$, range = 17-71 years). A majority of participants (65.98%) had a university background.

In Experiment 2, a total of 243 participants completed the survey. After checking for listening time and key words, nine participants were excluded from the dataset. Of the remaining 234 participants, 129 were female (55.13%). The average age was 32.92 years ($SD = 15.73$, range = 18-78 years). A large majority had a university background (83.76%).

Measures

Perceived humor

Perceived humor was measured using the perceived-humor scale by Nabi et al. (2007).

Participants indicated on a 7-point Likert scale (1 = *strongly disagree*, 7 = *strongly agree*) how (a) funny, (b) humorous, and (c) amusing they found the recording (Experiment 1: Cronbach's $\alpha = .92$; $M = 2.92$, $SD = 1.70$; Experiment 2: Cronbach's $\alpha = .89$; $M = 2.80$, $SD = 1.47$).

Enjoyment

Enjoyment was measured using Oliver and Bartsch's (2010) enjoyment scale. Participants indicated on a 7-point Likert scale (1 = *strongly disagree*, 7 = *strongly agree*) whether they considered the recording to be (a) fun, (b) entertaining, and (c) enjoyable (Experiment 1: Cronbach's $\alpha = .88$; $M = 3.36$, $SD = 1.46$; Experiment 2: Cronbach's $\alpha = .86$; $M = 3.17$, $SD = 1.34$).

Appreciation

Appreciation was measured using Oliver and Bartsch's (2010) appreciation-meaningfulness scale. Participants indicated on a 7-point Likert scale (1 = *strongly disagree*, 7 = *strongly agree*) how much the recording was (a) thought-provoking, (b) meaningful, and (c) moving (Experiment 1: Cronbach's $\alpha = .79$; $M = 2.82$, $SD = 1.16$; Experiment 2: Cronbach's $\alpha = .71$; $M = 2.91$, $SD = 1.04$).

Results

Because analyses with and without relevant covariates showed the same level of support for the hypotheses, we only report the analyses without covariates in this paper. Please find the covariate measures and results with them included (Online Appendix A) on our Open Science Framework (OSF) page: <https://osf.io/ydr9f/>, as well as a table with descriptive statistics (Online Appendix B), and the datasets, syntax files, outputs, and correlation matrices for both experiments.

Effects of Satirical vs. Regular News

H1 predicted that satirical news would score higher in terms of enjoyment and appreciation than regular news. To test *H1*, we conducted a MANOVA with perceived humor, enjoyment, and

appreciation as dependent variables, and genre and the speech manipulations as independent variables. In Experiment 1, we found a significant multivariate effect of satirical (vs. regular) news exposure on entertainment perceptions (Wilks' $\lambda = 0.65$, $F(3, 238) = 43.07$, $p < 0.001$, $\eta_p^2 = 0.35$). Results indicated that satirical news was perceived as more humorous than regular news ($F(1, 240) = 108.50$, $p < .001$, $r = .56$) and that satirical news was enjoyed more ($F(1, 240) = 38.44$, $p < .001$, $r = .38$) but not appreciated more than regular news ($F(1, 240) = 0.27$, $p = .60$). In Experiment 2, we also found a significant multivariate effect of satirical (vs. regular) news exposure on entertainment perceptions (Wilks' $\lambda = 0.83$, $F(3, 228) = 15.33$, $p < 0.001$, $\eta_p^2 = 0.17$). Perceived humor was again higher for satirical news than regular news ($F(1, 230) = 20.96$, $p < .001$, $r = .29$), but we found no significant effect on enjoyment ($F(1, 230) = 2.41$, $p = .12$). Moreover, satirical news was, contrary to our predictions, appreciated *less* than regular news ($F(1, 230) = 14.10$, $p < .001$, $r = -.49$). The results thus provided partial evidence in support of *H1a* but contradicting evidence for *H1b*.

H2 predicted an indirect effect of perceived humor. In both experiments, we ran two PROCESS mediation models (model 4, with 10,000 bootstrap samples; Hayes, 2017), one with enjoyment as dependent variable and one with appreciation as the dependent variable. Results from both experiments indicated the presence of mediation effects. Satirical (vs. regular) news exposure had a significant positive effect on perceived humor (Experiment 1: 95% CI [1.53, 2.24]; Experiment 2: 95% CI [0.47, 1.20]), and perceived humor, in turn, had a significant positive effect on enjoyment (Experiment 1: 95% CI [0.71, 0.84]; Experiment 2: 95% CI [0.65, 0.81]) as well as on appreciation (Experiment 1: 95% CI [0.12, 0.32]; Experiment 2: 95% CI [0.06, 0.25]).

In fact, the PROCESS results showed a suppression effect: when perceived humor was included as a potential mediator, we found a *negative direct effect* of satirical news on enjoyment (Experiment 1: 95% CI [-0.64, -0.17]; Experiment 2: 95% CI [-0.57, -0.12]) and appreciation (Experiment 1: 95% CI [-0.84, -0.16]; Experiment 2: 95% CI [-0.90, -0.36]), but a *positive indirect effect* of satirical news on enjoyment (Experiment 1: 95% CI [1.17, 1.76]; Experiment 2: 95% CI

[0.36, 0.91]) and appreciation (Experiment 1: 95% CI [0.20, 0.64]; Experiment 2: 95% CI [0.04, 0.24]) via perceived humor. *H2* was therefore supported by the data. Figure 1 provides a visual overview of the data. Figure 2 represents mediation diagrams that summarize these results.

Vocal Pitch as a Potential Irony Marker

H3a predicted that vocal pitch would moderate the effect of satirical (vs. regular) news exposure on perceived humor. *H3a* was tested using the same MANOVA as the one we used to test *H1*. First, we found a significant multivariate main effect of vocal pitch on entertainment perceptions (Wilks' $\lambda = 0.95$, $F(3, 238) = 4.02$, $p < 0.01$, $\eta_p^2 = 0.05$). Results revealed that a high (vs. low) vocal pitch had a marginally significant positive effect on perceived humor ($F(1, 240) = 2.84$, $p = .09$, $r = .13$), a significant positive direct effect on enjoyment ($F(1, 240) = 9.66$, $p < .01$, $r = .21$) and a marginally significant positive direct effect on appreciation ($F(1, 240) = 3.32$, $p = .07$, $r = .23$). However, we did not find a significant multivariate effect of the interaction between satirical (vs. regular) news exposure and vocal pitch (Wilks' $\lambda = 1.00$, $F(3, 238) = 0.20$, $p = .90$). For this reason, our data did not support *H3a*.

Speech Rate as a Potential Irony Marker

H3b predicted that speech rate would moderate the effect of satirical (vs. regular) news exposure on perceived humor. *H3b* was also tested using the same MANOVA as used for *H1*. This time, no significant multivariate effects were found of both speech rate (Wilks' $\lambda = 0.98$, $F(3, 228) = 1.26$, $p = .29$) and the interaction with satirical (vs. regular) news exposure on entertainment perceptions (Wilks' $\lambda = 0.98$, $F(3, 228) = 1.20$, $p = .31$). *H3b* was thus not supported by our data.

General Discussion

The purpose of this research was to examine whether previously identified phonological markers of irony could influence satire liking. A first objective was to examine whether satirical news has a positive effect on different dimensions of entertainment perceptions. Based on research indicating that entertainment perceptions are a multilayered concept (Oliver & Bartsch, 2010), we

predicted that satirical news would be enjoyed more (*H1a*) and appreciated more (*H1b*) than regular news, and that perceived humor would mediate this effect (*H2*). Results showed that, while in both experiments the satirical news recordings were perceived as funnier than the regular news recordings, findings with regard to enjoyment and appreciation differed across experiments. Satirical news was only enjoyed more than regular news in Experiment 1. By contrast, satirical news was appreciated less than regular news, but only in Experiment 2. Furthermore, perceived humor mediated these effects (both Experiments).

The inconsistency in findings with regard to the direct effects on enjoyment and appreciation could be explained by differences in content between our experiments (Oliver & Bartsch, 2010). One important way in which the stimulus materials differed was topical focus. We know from previous research that the enjoyment of potentially “threatening” humor such as satire can increase with more psychological distance for instance as the result of events happening further away (McGraw et al., 2014). Enjoyment scores of satirical news may have been higher in the first experiment because the first experiment focused on international politics which is more distant than domestic politics, which was the focus of the second experiment. By contrast, given that appreciation refers to the meaningfulness of entertainment experiences (Oliver & Bartsch, 2010), a reason why participants appreciated regular news more than satirical news in the second experiment could be that they simply have appreciated having learned new information about a topic in the more personally-relevant context of domestic politics. Future research could therefore study the interaction between topical focus and type of entertainment response.

The second objective of our two experiments was to examine whether two phonological features that have been previously identified as irony markers – a low vocal pitch (*H3a*) and a slow speech rate (*H3b*; Anolli et al., 2002; Cheang & Pell, 2008; Rockwell, 2000) – could promote humorous responses to the inherently ironic genre of satirical news. Our results did not support this hypothesis. One factor that may explain the absence of the predicted interaction effects is the

influence that a combination of prosodic irony markers could have together. While we only studied the effects of two prosodic features in isolation, previous research has mostly looked at the combined presence of different phonological features (e.g., Anolli et al., 2002; Cheang & Pell, 2008; Rockwell, 2000). We recommend that future studies focus on such combinations.

Another reason why no effects of potential prosodic markers of irony were found on perceived humor of satirical news may be that irony can be indicated by a multitude of prosodic cues rather than one specific pattern. A promising avenue for future research on this topic could be the construct of prosodic contrast (Attardo et al., 2003; Bryant, 2010; Bryant & Fox Tree, 2005), which refers to the phenomenon in which speakers adjust their way of speaking to more generally draw attention to what they are saying. It is important to note that this type of communicative behavior not unique to irony (Bryant & Fox Tree, 2005). Future research on ironic prosody could therefore also focus on testing effects of prosodic contrast on satire perceptions.

Our findings demonstrated that participants in both experiments rated satirical news as more humorous than regular news despite having had no access to source information and regardless of whether the irony was phonologically marked. This suggests that participants already sufficiently relied on contextual cues to recognize that the news reporting they were exposed to was meant humorously rather than seriously. Based on work by Katz and colleagues (Katz et al., 2004; Katz & Pexman, 1997; Pexman et al., 2000), we hypothesize that most instances of satirical news are, at least, characterized by one contextual cue that has also been shown to signal ironic interpretations: an unlikely context (Kreuz & Roberts, 1995). This means that the unlikelihood of the satire's literal meaning may signal ironic content, especially since this literal meaning is often pushed to the edge of absurdity. Future research could test this unlikely-context hypothesis.

Finally, a limitation of the experiments reported in this paper is that, on average, participants in both experiments were highly educated. Because previous research has shown that effects of satirical news can differ between higher and lower educated participants (e.g., Cao, 2008), it would

be worthwhile to conduct a conceptual replication of these experiments in a broader sample. Moreover, since the current paper focused on affective outcome variables (perceived humor, enjoyment and appreciation), future research could also include cognitive dependent variables, such as comprehension and perceived complexity (e.g., LaMarre et al., 2009; Skalicky, 2019).

In conclusion, we have shown that, while satirical news was not appreciated more than regular news, perceived humor was a necessary condition for the inherently ironic genre of satirical news to be enjoyed more. Moreover, a low vocal pitch and a slow speech rate did not seem to influence humor ratings, even though these phonological features have been associated with irony marking in previous research (Cheang & Pell, 2008; Rockwell, 2000). By showing that participants were able to recognize whether an article was serious or satirical regardless of prosodic cues, this paper highlights the importance of examining the role of social context in irony research in general (Katz, 1996, 2005, 2009) and in satirical news research in particular.

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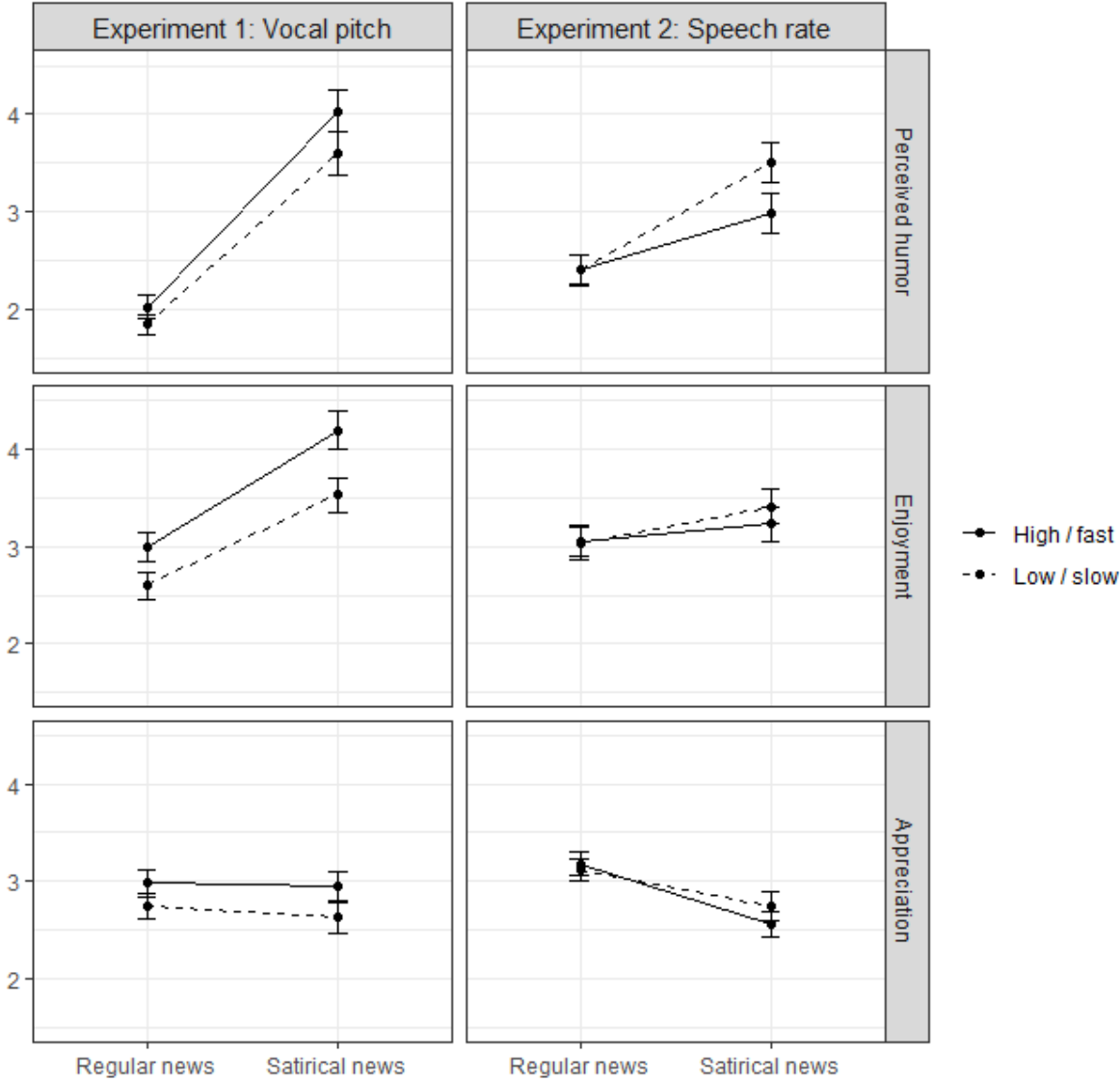
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Figure 1

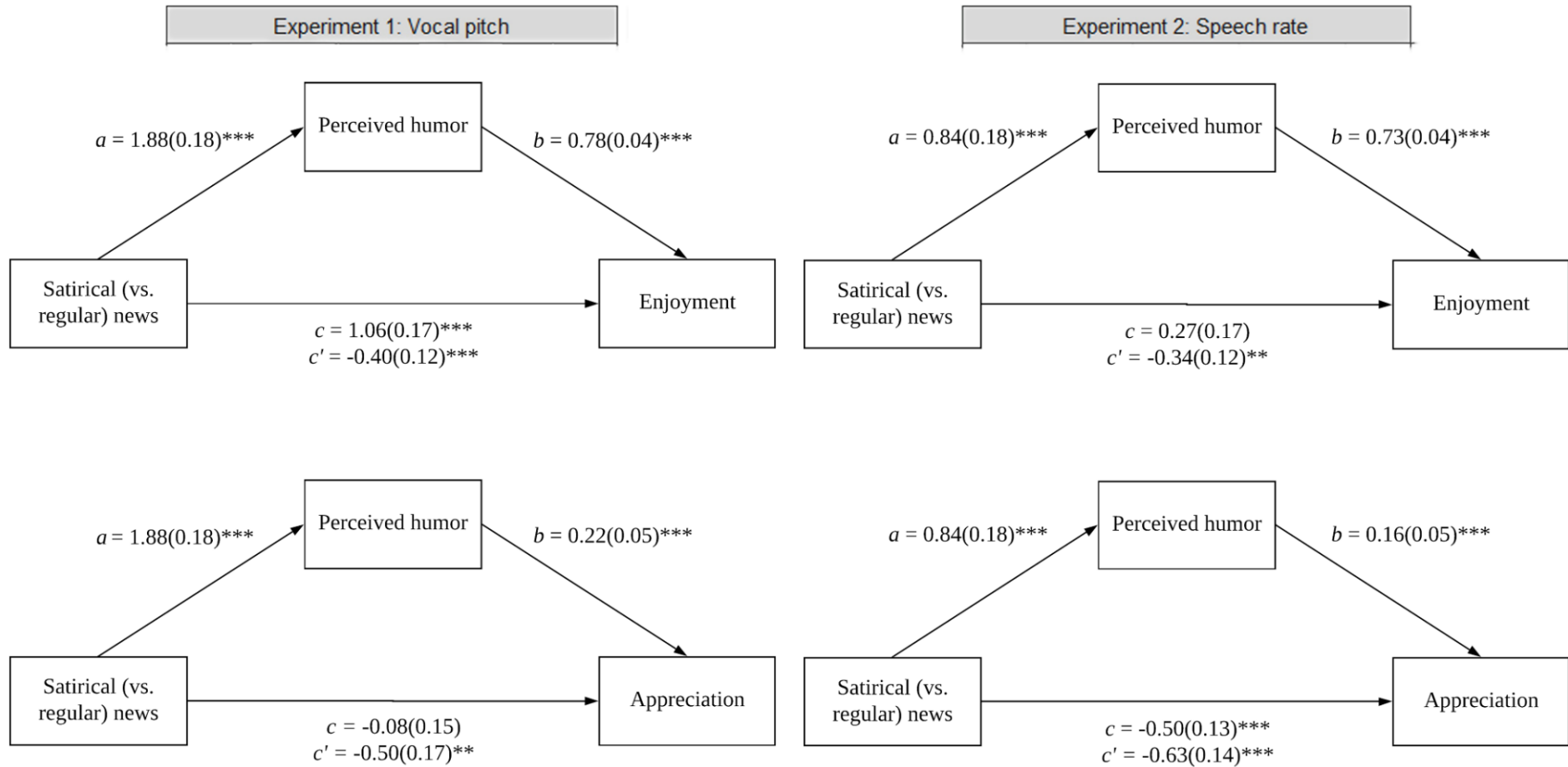
Line plots depicting the variable means over conditions



Note. Dependent variables were measured by means of a 7-point Likert scale, with higher scores indicating more perceived humor, enjoyment, and appreciation; Error bars represent 95% confidence intervals.

Figure 2

Unstandardized regression coefficients for the effects of satirical (vs. regular) news exposure on enjoyment and appreciation



Note. Standard errors are shown in parentheses; a = effect of X (predictor) on M (mediator); b = effect of M on Y (outcome); c = total effect of X on Y; c' = direct effect of X on Y; see Hayes (2017) for more information on how to read mediation diagrams; * $p < .05$; ** $p < .01$; *** $p < .001$.