Do I amuse you? Asymmetric predictors for humor appreciation and humor production

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\section*{Abstract}
A “sense of humor” can be fractionated into appreciation (enjoying jokes), production fluency (making jokes), and production success (making funny jokes). There is scant research on how appreciation and production relate, and their relation to individual differences. Participants (N = 159) rated the humor of captioned cartoons and created captions for different cartoons. People who wrote funnier captions were less amused by the professionally-captioned cartoons. Production fluency, in contrast, was not related to appreciation. Personality predicted humor appreciation, but not production success. Demographics predicted production success, but not appreciation. Appreciation and production success appear to rely on separable mechanisms and motivations. Our results were also inconsistent with the idea that humor creators are motivated by dominance and humor appreciators by affiliation.

\section*{1. Introduction}
Humor has long been seen as a human quality of fundamental social importance, with the ancient Greeks dividing theatre into comedy and tragedy alone. Perhaps because humor is used to ease social interactions (Chapman, 1973), people who have a good ‘sense of humor’ are perceived to have more socially-desirable traits than those with less of a sense of humor (Cann & Calhoun, 2001). One way that funny people may make a good impression is by reducing social distance during interactions (Gra-...
since the comprehension and appreciation of humor are them-

1 Defined as those who responded with either agreement or neither agreement nor
disagreement with the statement, “Generally sleeps more than 3 h a week” based on
a 5-point Likert scale ranging from disagreement to agreement. Those who responded
with anything less than agreement (scores from 1 to 3) were removed.

English statements. The remaining sample of 159 participants (93 female, 66 male) mostly had English as a first language (N = 112), were around 30 years of age, had been fluent in English for most of their life, and had more than a high school education (for demographic details, see Table 1).

2.2. Procedure

In order to create a tightly-matched set of stimuli for the humor appreciation and humor production tasks, a total of 67 cartoons were selected from The New Yorker magazine (stimuli are available online at http://yorku.ca/mar). The captions for these cartoons were removed to create two sets, the original cartoons and the same cartoons without a caption. The original captioned cartoons served as the humor appreciation stimuli and those without captions served as the humor production stimuli. Participants rated how funny they found half of the cartoons and provided captions for the other half, never providing ratings and captions for the same cartoon. Each cartoon served as a humor appreciation stimulus for one set of participants (original caption included) and as a humor production stimulus for the other set of participants (original caption removed). Humor appreciation and production stimuli were randomly presented to participants. Across the group, all participants saw all cartoons and all cartoons were both rated for funniness and had captions generated for them. When rating original captions, participants were presented with each cartoon and asked “How funny do you find the caption to this cartoon?” with responses recorded using a 7 point scale (1 = Not at all; 3 = Somewhat; 5 = Moderately; 7 = Extremely). When producing funny captions, participants were presented with a cartoon and asked to “Please enter a funny caption for the cartoon above” using a text-entry box (participants were warned in the instructions that after 30 s the survey would close and they would be redirected). After a brief personality measure, the 44-item Big Five Inventory (BFI: John & Srivastava, 1999), along with a demographics questionnaire. Once data collection was complete, a set of four independent judges rated participants’ captions for validity, making judgments as to whether the generated caption was a meaningful response. The number of valid captions produced was our measure of production fluency. Valid captions were then rated for funniness using the same item and 7-point scale that participants had used to rate the original captions. How funny the raters found the captions was our measure of production success.

Table 1

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<tbody>
<tr>
<td>1. Years Fluent in English</td>
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<td>0.08</td>
<td>0.38</td>
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<td>2. Gender</td>
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<td>0.10</td>
<td>–0.04</td>
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<td>3. Age</td>
<td>–</td>
<td>0.16</td>
<td>0.04</td>
<td>0.24</td>
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<td>4. Years of Education</td>
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<td>–0.08</td>
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<td>5. Openness</td>
<td>–</td>
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<td>0.20</td>
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<td>6. Conscientiousness</td>
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<td>0.35</td>
<td>0.42</td>
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<td>7. Extraversion</td>
<td>–</td>
<td>0.21</td>
<td>0.21</td>
<td>–0.02</td>
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<td>0.27</td>
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<td>8. Agreeableness</td>
<td>–</td>
<td>0.44</td>
<td>0.11</td>
<td>0.03</td>
<td>0.09</td>
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<td>9. Emotional Stability</td>
<td>–</td>
<td>0.04</td>
<td>0.00</td>
<td>0.19</td>
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<td>10. Humor Production Fluency</td>
<td>–</td>
<td>0.50</td>
<td>–0.09</td>
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<td>11. Humor Production Success</td>
<td>–</td>
<td>–0.37</td>
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<td>12. Humor Appreciation</td>
<td>–</td>
<td>0.75</td>
<td>0.82</td>
<td>0.7</td>
<td>0.77</td>
<td>–</td>
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Note: Bolded correlations are p < 0.05. The numbering of the columns corresponds to the variable names identified in the first column. * Indicates that the 95% bootstrapped confidence interval does not include 0. ** p < 0.10.

3. Results

3.1. Basic statistics

There was good consensus across raters for both the number of valid captions produced and how funny the captions were. Validity: ICC = .90 (95% CI: .87–.92); Funniness: ICC = .83 (95% CI: .83–.90). See Table 1 for descriptive statistics. Participants on average found the captioned cartoons to be between “somewhat funny” and “moderately funny,” and produced valid captions that raters viewed as less than “somewhat funny” on average (one-sample t(158) = –15.12, p < .001, Cohen’s d = 1.20, µ = 3, 95% CI [.71, .54]). Men and women did not greatly differ in how funny they found the cartoons on average (Men: M = 3.83, SD = 1.04; Women: M = 3.98, SD = 1.12; t(157) = .85, p = .40, d = –0.14), nor the number of valid captions they produced (Men: M = 26.34, SD = 5.53; Women: M = 25.68, SD = 5.21; t(157) = –.77, p = .44, d = .012). Men produced slightly funnier captions than women, but this difference did not pass threshold for statistical significance (Men: M = 2.46, SD = .57; Women: M = 2.31, SD = .48; t(125.27) = –1.71, p = .09, d = .28). Neither humor appreciation (r(157) = .05, p = .96; d = .01) nor the success of humor production varied between the two cartoon subsets (t(157) = 1.27, p = .21; d = .21).

3.2. Relation between humor appreciation and humor production

Our central question was how humor appreciation and humor production relate. Humor appreciation was negatively related to success of humor production, such that those who created funnier captions found the cartoons with original captions to be less funny (r(157) = –.37, p < .001, all correlations in Table 1). Participants who created funnier captions also produced more valid captions, indicating that production fluency and production success (i.e., quantity and quality) are positively related in the case of this type of humor, (r(157) = .50, p < .001). Despite this close association between production fluency and success, however, fluency did not share the same level of negative association with appreciation as the two were only weakly correlated (r(157) = –.09, p = .28). A partial correlation found that the negative association between humor appreciation and the success of humor production remained after controlling for the number of valid captions produced

* All confidence intervals based on 1000 bootstrap resamples.
3.3. Relations among demographics, personality, humor appreciation and humor production

A second goal of this study was to examine how demographic variables and trait personality relate to both humor appreciation and humor production. We tested these alternative models using a Bayesian model selection procedure based on the Bayesian Information Criterion (BIC). Bivariate relationships between all dependent and candidate predictor variables are presented in Table 1. These correlations reveal that production success was associated with the demographic variables of age as well as years of English fluency. Appreciation, in contrast, was associated with the personality variables of openness, conscientiousness, extraversion, and emotional stability. Production fluency was associated with both demographic and personality variables; the correlates of production fluency were English fluency, age, and conscientiousness. In order to better examine whether demographic and personality correlates can help to distinguish production success from appreciation, we undertook a Bayesian model selection analysis. Production fluency, with its mix of personality and demographic correlates, was not tested with respect to this question.

For both humor appreciation and production success, the dependent variable was regressed on the sets of either demographic or personality variables as predictors, and the BIC values were compared between models (demographics in Table 2A, personality traits in Table 2B). For humor appreciation, the personality model ($R^2 = 0.12$; $BIC = 486.40$; $F(5,150) = 4.20, p < .001$) was 13 times more likely given the data than the demographic model ($R^2 = 0.01$; $BIC = 499.49$; $F(4,151) = 0.56, p = .69$). There were no strong demographic predictors of appreciation (all $|r| < 1.12$), but personality did predict in the form of greater openness and extraversion, with emotional stability also approaching threshold for statistical significance.

For humor production the demographics model ($R^2 = 0.12$; $BIC = 250.47$; $F(4,151) = 5.24, p < .001$) was 18.3 times more likely than the personality model ($R^2 = 0.04$; $BIC = 268.72$; $F(5,150) = 1.39, p = .23$). The demographics model suggested that age and English fluency were good predictors of producing funny captions, with the former just falling on the threshold for statistical significance. With respect to personality, extraversion was a negative predictor of humor production success, unlike humor appreciation where this trait was a positive predictor.

Two further analyses were undertaken to explore the negative association observed between humor appreciation and the success of humor production. First, we examined the robustness of this negative association by conducting a set of multiple regressions. The first included all of the demographic and personality variables as predictors of production success, the second additionally included humor appreciation. When all demographic and personality variables were entered into the model, the model was significant ($R^2, 146) = 2.75, p = .005, R^2 = .14; BIC = 271.58$) and only English fluency was a unique predictor ($b = .01, \beta = .20, t(146) = 2.40, p = .02$). The addition of humor appreciation improved the model's predictive accuracy by a Bayes Factor of 20.98 ($R^2, 10,145) = 5.54, p = .001, R^2 = .01; BIC = 250.60$), and appreciation was a unique negative predictor of production success, controlling for all of the demographic and personality variables ($b = -.19, \beta = -.39, t(145) = -5.13, p = .001$). This analysis demonstrates that there is strong evidence for the model including humor appreciation over the model without it (Raftery, 1995) and that the negative association between appreciation and success of humor production is robust. In this model, age and English fluency were also unique predictors (Age: $b = .01, \beta = .17, t(145) = 2.13, p = .04$; English Fluency: $b = .01, \beta = .15, t(145) = 1.99, p = .048$).

A separate, but related question, is whether any of the demographic and personality variables can account for the negative association between appreciation and production success. Only trait extraversion was correlated with both constructs, being positively correlated with appreciation and negatively correlated with production success. This makes it a good candidate for a possible mediator of the negative association between appreciation and production success. A bootstrapped mediation analyses was undertaken to examine whether extraversion could account for this association (Preacher & Hayes, 2004). There was little evidence of mediation with the 95% confidence interval for the indirect effect including 0 (bootstrapped 95% CI: -.03 to .01).

4. Discussion

We explored the relations among humor appreciation and humor production within an individual differences framework.
using a diverse sample of participants and identical stimuli for the humor appreciation and humor production tasks. In doing so, we found that humor appreciation and successful humor production are in fact negatively related: the funnier a person was, the less funny they found the jokes written by others (in this case, professional humorists). Exploring a nomothetic network of demographic and trait variables helped to shed some light on this negative association. Another aspect of humor production, the number of jokes made, was not strongly related to humor appreciation.

At the bivariate level, demographics in the form of increasing age and better English fluency predicted humor production success but not humor appreciation (see also Masten, 1986; Thorson & Powell, 1993). In contrast, almost all personality traits (save Agreeableness) predicted humor appreciation, but these were poor predictors of humor production. In a direct model comparison, personality accounted for 12% of the variance in how funny the cartoons were perceived to be by participants, but only 4% of the variance in how funny their created captions were perceived by others. Extraversion, in particular, distinguished itself as a differential predictor, with greater extraversion positively associated with appreciation but negatively associated with successful production. This finding is consistent with past research on professional comedians, who were found to be less extraverted than members of the general population (Greengross & Miller, 2009). Extraversion, however, could not account for the negative association between appreciation and production success. Importantly, this negative association was found to be robust, persisting even after taking into account all of the demographic and personality variables. As a whole, the pattern of results suggest that different cognitive and behavioral tendencies underlie humor appreciation in comparison to successful humor production. This also implies that humor production and appreciation may engage different cognitive mechanisms or be driven by different motivations. Moreover, although making many jokes is closely related to the ability to make funny jokes, the two aspects of production are separable in that they are differentially related to humor appreciation and individual difference variables. Given that lay discourse speaks of a 'sense of humor,' conveying the idea that humor is a unitary concept, our data argue that this may be inaccurate and that humor is more heterogeneous than previously thought. In fact, when speaking of someone's sense of humor we are likely referring to either their tendency to make funny jokes or to appreciate them, but not a composite of both abilities. Future work should investigate whether the term 'sense of humor' is more closely allied with successful humor production, production fluency, humor appreciation, humor comprehension, or some other aspect of humor.

Although we found that extraversion was differentially related to humor appreciation and production success, this trait did not mediate the relationship. Therefore, there are likely to be additional constructs that account for this negative association. One possibility alluded to in the introduction is that there might be asymmetric motivational concerns for humor appreciation and humor production. Being effective at humor production might signal competence and dominance, whereas being a good humor appreciator might signal submissiveness, affiliation, or group-focused behavior. These concepts also map well onto similar constructs in the psychological literature, such as the two-factor model of warmth/competence (Fiske, Cuddy, & Glick, 2007) or the orthogonal relationship between experience and agency (Gray, Gray, & Wegner, 2007). Such conceptions emphasize that people are perceived along two independent dimensions, emphasizing competence (dominant, agentic) and warmth (experiential, trustworthy) respectively. A possible explanation for the negative association between humor appreciation and humor production observed here is that humor appreciation emphasizes warmth, or experience, whereas humor production emphasizes competence, or agency. At least half of this putative pattern of relationships appears to be borne out by some past research, with adolescents who are seen as more skilled in humor production by their peers being more likely to be popular and the leaders of their groups; these same children are also more likely to be seen as possessing initiative by their teachers (Masten, 1986; Ziv, 1984). In contrast, however, our current data do not provide support for this pattern of associations. Of the Big Five personality factors, extraversion and openness are considered the core aspects of agency (DeYoung, Weisberg, Quilty, & Peterson, 2013; Digman, 1997) but neither trait was a strong positive predictor of humor production. Extraversion, in fact, was negatively correlated with humor production in the present sample. Further, agreeableness is closely tied to affiliative tendencies (DeYoung et al., 2013), yet this trait was not correlated with humor appreciation. Thus, a simple division based on agency and affiliation does not provide a good explanation of the observed differences between humor appreciation and humor production.

In conclusion, we have demonstrated that the relationship between humor appreciation and production relate. For instance, men tend to prefer partners who are good humor appreciators, whereas women seem to prefer partners who are good humor producers (Bressler, Martin, & Balshine, 2006). Those higher in empathy find cartoons funnier (Samson, 2012) and women reliably score higher than men on empathy measures (e.g., Baron-Cohen & Wheelwright, 2004). As it turns out, men also self-report engaging in humor production more so than women (Thorson & Powell, 1993). Thus, the gender and societal roles that men and women find themselves in may moderate the relative importance of humor appreciation and production. This being said, we did not find strong evidence to support these differences in our sample. Although the means were in the predicted directions, with women exhibiting higher appreciation than men and men producing funnier captions than women, the effects were small in magnitude and statistically nonsignificant (d = -.14 and d = .28, respectively). This could be due to aspects of our sample, a feature of the type of comedy we investigated (cartoon captioning), or a demonstration that the self-reports of differential humor appreciation and production by men and women do not replicate when task-based measures of humor are employed (e.g., Babad, 1974).

A clear limitation of this work is that our results may not generalize to other forms of humor other than cartoons with a clear linguistic component. There exist many other types of humor that were not examined in this study and different associations between the aspects of humor may well exist for these other types. A second limitation, inherent to much work on humor production, is that we required participants to produce humor in response to cartoons we provided for them while also introducing a time constraint. Some participants might well have produced funnier jokes, or more jokes, under more naturalistic and spontaneous circumstances. Future work should strive to employ more ecologically valid ways of examining humor production and appreciation. A third limitation is that we did not include a measure of intelligence or general ability in our study. One possibility is that individual differences in intelligence may account for the inverse relationship between humor production and humor appreciation. More intelligent people may be better able to produce funny jokes and also be more discerning about what they find funny. Although we cannot explore this possibility unequivocally in our own data, we did ask for self-reports of years of education and these can serve as a proxy for crystallized intelligence. In our data, education did not correlate strongly with either humor production or appreciation (both rs < .11).

In conclusion, we have demonstrated that the relationship between humor appreciation and production is complex. It is not
simply the case that people who like to make jokes also tend to
find jokes funny, nor that personality factors can accurately predict
who is funny and who is not. Instead, our results demonstrate that
for at least one type of humor, there is a negative association be-
tween appreciation and successful production, accompanied by
asymmetric associations with a number of different individual
differences.

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