



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



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### 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.

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### 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 on others is by reducing social distance during interactions (Graham, 1995), perhaps conveying greater social warmth. Individuals who have a sense of humor may also gain health benefits, with humor acting as an important coping mechanism for life’s tribulations (Lefcourt, Davidson, Prkachin, & Mills, 1997). This can lead to decreased stress and improved performance in the workplace (Mesmer-Magnus, Glew, & Viswesvaran, 2012), and is also associated with better immune system functioning (Fry, 1992). In light of the importance of humor for our social interactions and personal wellbeing, the growing research in this area is an exciting and valuable enterprise.

A ‘sense of humor’ can be fractionated into at least two components: (1) understanding humor as intended by others, known as humor comprehension; and (2) creating humor that is understood and appreciated by others, known as humor production (Kohler &

Ruch, 1996). These aspects of humor can be further broken down, with humor comprehension being a prerequisite for humor appreciation—appreciation being the mirth response (laughter, smiling) or how funny a joke is perceived after it has been comprehended. Similarly, humor production also has various components, including at least two separate processes: (1) how many jokes are made, or production fluency; and (2) how funny these jokes are perceived by others, or what we term production success. In order to better understand what a global sense of humor entails, it is important to identify how different components of humor relate. Unfortunately, past empirical research into this question has led to a complex series of somewhat contradictory results.

In a study of school-aged children, Masten (1986) found that (1) humor comprehension and production success were positively associated, that (2) humor comprehension and humor appreciation were positively associated, but that (3) there was no relation between the success of humor production and humor appreciation. A different study also found that humor comprehension and production success were positively related, but employed a measure of success that was not entirely independent from comprehension, potentially confounding the issue (Feingold & Mazzella, 1993). A more recent examination of these questions incorporated a humor comprehension task uncontaminated by issues of production and found that the two were positively related, but this study relied upon a small sample of adults ( $N = 18$ ; Kozbelt & Nishioka, 2010).

Although humor comprehension and production appear to be related, it is not currently clear whether humor appreciation also predicts production success or fluency. This is somewhat curious

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since the comprehension and appreciation of humor are themselves closely related (Goldstein, 1970; Kozbelt & Nishioka, 2010). One study found a positive correlation between humor appreciation and production success, but only when these constructs were measured using self-report; when appreciation and production success (and fluency) were measured behaviorally, there was no relationship between the two (Kohler & Ruch, 1996). In fact, the small number of other studies in this area have also failed to find an association between appreciation and production (Babad, 1974; Fabrizi & Pollio, 1987; Koppel & Sechrest, 1970), even when a relation was observed between humor appreciation and humor comprehension, and between comprehension and production success (Kozbelt & Nishioka, 2010).

In sum, there appear to be replicable positive correlations between humor appreciation and humor comprehension (Byrne, 1956; Goldstein, 1970; Kozbelt & Nishioka, 2010; Wierzbicki & Young, 1978), between humor comprehension and humor production (Attardo, 1994; Feingold & Mazzella, 1993; Kozbelt & Nishioka, 2010; Masten, 1986), but not between humor appreciation and humor production. Given that we often speak of people having a sense of humor in a broad sense, and that humor comprehension and production are related, one would imagine that humor appreciation and production should also be closely related.

The current lack of support for an association between the appreciation and production aspects of humor may be due to both methodological shortcomings of past work and to a lack of control over the type of humor assessed. Humor often depends upon context and there are many ways to be funny. Someone might excel at writing totally hilarious emails, but rarely crack a joke in a gathering. Some people enjoy physical comedy more than satire, and others still only enjoy humor that is disparaging or mean-spirited (Martin, Puhlik-Doris, Larsen, Gray, & Weir, 2003). Most studies of humor have not controlled for these various types of humor within the same sample of participants, nor have they employed behavioral measures of humor, properly separating different aspects of production such as fluency and success, or relied upon appropriate sample sizes. Past studies have primarily been on children (e.g., Masten, 1986) or select populations like comedians (e.g., Greengross, Martin, & Miller, 2012; Siegler, 2004), and often employed small samples (e.g., Kozbelt & Nishioka, 2010). Just as importantly, past work has not typically matched the characteristics of the appreciation and production tasks. Because humor is often context-dependent, examining possible associations between the different aspects of humor should take place within a shared context. At the very least, controlling for the humor context should decrease error or noise in the data allowing for a better visualization of the relationship between appreciation and production. To date, no single study has addressed all of these important design issues, allowing for a proper test of how appreciation and production relate. Here we examine humor in a relatively large sample of the adult population, unselected for profession, controlling for the type of humor assessed across the appreciation and production tasks, and examining both production fluency and production success.

An additional strategy for exploring how these aspects of humor relate to one another, and better understanding their individual functions, is to examine how they each relate to a variety of other individual differences. In past work, for example, individuals high in trait empathy were also high in humor appreciation, rating jokes as more funny (especially those requiring mental inference; Samson, 2012). This finding highlights the role of properly interpreting the social context during humor appreciation and illustrates the importance of examining individual differences. The Big Five personality traits are also likely to be important factors to consider, since those higher in humor appreciation are perceived to be more extraverted and open to experience (Cann & Calhoun, 2001). A

good deal less is known about the individual differences associated with humor production, unfortunately. People higher in independently-measured creativity (Brodzinsky & Rubien, 1976) and verbal intelligence (Feingold & Mazzella, 1993) are more successful at humor production, but much remains to be discovered, especially with regards to differences in personality. A second aim of this study was to explore the individual differences associated with both appreciation and production in the hopes of illuminating any relation between these processes.

Although the positive associations between comprehension and appreciation, and between comprehension and production appear to support the idea that appreciation and production should be positively related, there are other possibilities. In fact, there are three possible predictions regarding the association between humor appreciation and humor production. First, appreciation and production may be positively related, in that funny people are more likely to find amusement in other people's humor. This pattern would fall most naturally out of previous theoretical positions on humor, as described above (Feingold, 1983). Second, there may be no relation between appreciation and production. This would indicate that enjoying humor and producing it are the products of distinct (and unrelated) cognitive and motivational processes, and that the lay concept of a unitary sense of humor is inaccurate. Although this lack of association has been previously reported, the necessary controls for stimulus and participant characteristics were absent, making these null results difficult to interpret. Lastly, humor appreciation and production may be negatively correlated. We would expect this result if the motivational pressures underlying humor production and appreciation are in opposition. Theoretically, one might tell jokes to demonstrate competence or dominance (see Masten, 1986), whereas appreciating jokes might signal affiliation and/or deference to others. Such a result might be reflected in differential associations between the personality dimensions and humor appreciation and production. It might also be the case that the different aspects of humor production, fluency and success, have different associations with humor appreciation.

The current study examines how humor appreciation and humor production relate in a relatively large sample of participants, controlling for the humor context, and with the same group of participants performing both the humor appreciation and production tasks. An additional aim of this study is to examine these two processes within a nomothetic network of trait personality and individual differences to better understand their nature and relationship.

## 2. Method

### 2.1. Participants

Participants were recruited from all over the world via an advertisement on the online service Amazon Mechanical Turk (<http://www.mTurk.com>). From an initial sample of 298 who completed the entire survey, a total of 118 participants were removed for the following reasons: reporting less than 10 years of English fluency ( $N = 44$ ), having less than 10 years of education ( $N = 32$ ), and those for whom there was evidence of inattentive responding<sup>1</sup> ( $N = 42$ ). Of the remaining 180 participants, 21 were removed from the final analysis because they produced fewer than 6 valid captions across the cartoon set; valid captions were identified based on independent rater assessments of whether the captions were meaningful

<sup>1</sup> 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.

**Table 1**  
Bivariate correlations among measures of humor appreciation (12), humor production (10,11), demographic (1–4) and personality (–9) variables.

	1	2	3	4	5	6	7	8	9	10	11	12
1. Years Fluent in English	–	0.08	<b>0.38</b> <sup>^</sup>	0.06	0.08	0.15	–0.01	0.00	–0.01	<b>0.30</b> <sup>^</sup>	<b>0.28</b> <sup>^</sup>	–0.07
2. Gender		–	0.10	–0.04	–0.02	0.13 <sup>+</sup>	0.06	0.09	–0.04	0.07	0.15	–0.07
3. Age			–	0.16 <sup>^</sup>	0.04	<b>0.24</b> <sup>^</sup>	–0.12	–0.04	0.05	<b>0.16</b> <sup>^</sup>	<b>0.26</b> <sup>^</sup>	0.03
4. Years of Education				–	0.03	–0.03	–0.08	–0.03	–0.09	–0.07	0.09	–0.01
5. Openness					–	<b>0.28</b> <sup>^</sup>	<b>0.22</b> <sup>^</sup>	<b>0.20</b> <sup>^</sup>	0.09	0.08	0.07	<b>0.22</b> <sup>^</sup>
6. Conscientiousness						–	<b>0.35</b> <sup>^</sup>	<b>0.43</b> <sup>^</sup>	<b>0.44</b> <sup>^</sup>	<b>0.21</b> <sup>^</sup>	0.08	<b>0.19</b> <sup>^</sup>
7. Extraversion							–	<b>0.21</b> <sup>^</sup>	<b>0.21</b> <sup>^</sup>	–0.02	–0.14 <sup>+</sup>	<b>0.27</b> <sup>^</sup>
8. Agreeableness								–	<b>0.44</b> <sup>^</sup>	0.11	0.03	0.09
9. Emotional Stability									–	0.04	0.00	<b>0.19</b> <sup>^</sup>
10. Humor Production Fluency										–	<b>0.50</b> <sup>^</sup>	–0.09
11. Humor Production Success											–	<b>–0.37</b> <sup>^</sup>
12. Humor Appreciation												–
Min.	10	–	18	12	1.4	2.33	1	2.33	1.25	6	1.31	1.53
Max.	57	–	57	25	4.9	5	5	5	5	33.25	3.44	6.74
Mean	24.09	–	28.78	15.87	3.64	3.68	3.2	3.73	3.23	25.96	2.37	3.92
SD	10.2	–	8.32	2.76	0.57	0.63	0.73	0.54	0.69	5.34	0.52	1.09
Cronbach's alpha	–	–	–	–	0.75	0.8	0.82	0.7	0.77	–	–	–

Note: Bolded correlations are  $p < .05$ . The numbering of the columns corresponds to the variable names identified in the first column.

<sup>^</sup> Indicates that the 95% bootstrapped confidence interval does not include 0.

<sup>+</sup>  $p < .10$ .

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 moved to the next item). After performing the appreciation and production tasks participants completed 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.

## 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). Please 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  $d = 1.20$ ,  $\mu = 3$ , 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:  $M = 25.68$ ,  $SD = 5.21$ ;  $t(157) = -.77$ ,  $p = .44$ ,  $d = 0.12$ ). Men produced slightly funnier captions than women, but this difference did not pass threshold for statistical significance (Men:  $M = 2.46$ ,  $SD = .57$ ; Women:  $M = 2.31$ ,  $SD = .48$ ;  $t(125.27) = -1.71$ ,  $p = .09$ ,  $d = 0.28$ ). Neither humor appreciation ( $t(157) = 0.05$ ,  $p = .96$ ;  $d = 0.01$ ) nor the success of humor production varied between the two cartoon subsets ( $t(157) = 1.27$ ,  $p = .21$ ;  $d = 0.21$ ).

### 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

<sup>2</sup> All confidence intervals based on 1000 bootstrap resamples.

( $r(156) = -.38, p < .001$ ). It does not appear to be case, in other words, that those who wrote funny captions focused their energy on writing fewer, but funnier, captions.

### 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  $|t|s < 1.12$ ), 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 ( $F(9, 146) = 2.75, p = .005, R^2 = .14$ ;  $BIC = 271.58$ ) 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 ( $F(10, 145) = 5.54, p < .001, R^2 = .28$ ;  $BIC = 250.60$ ), 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

**Table 2A**

Models for demographic variables predicting humor production and humor appreciation. Bolded p values are significant at  $p < .05$ .

	Production					Appreciation				
	B	$\beta$	t	p	Partial $R^2$	B	$\beta$	t	p	Partial $R^2$
(Intercept)	1.46	–	5.18	<b>0.00</b>	0.16	4.20	–	6.68	<b>0.00</b>	0.29
English Fluency	0.01	0.20	2.44	<b>0.02</b>	0.03	–0.01	–0.1	–1.11	0.27	0.01
Gender	0.13	0.12	1.60	0.11	0.01	–0.15	–0.07	–0.85	0.40	0.00
Age	0.01	0.16	1.96	0.05	0.02	0.01	0.08	0.91	0.36	0.01
Education	0.01	0.06	0.75	0.46	0.00	–0.01	–0.02	–0.22	0.82	0.00

**Table 2B**

Models for personality variables predicting humor production and humor appreciation. Bolded p values are significant at  $p < .05$ .

	Production					Appreciation				
	B	$\beta$	t	p	Partial $R^2$	B	$\beta$	t	p	Partial $R^2$
(Intercept)	2.18	–	0.38	5.75	0.21	1.27	–	0.76	1.67	0.02
Openness	0.07	0.07	0.86	0.39	0.00	0.32	0.17	2.04	<b>0.04</b>	0.02
Conscientiousness	0.12	0.14	1.41	0.16	0.01	0.07	0.04	0.45	0.65	0.00
Extraversion	–0.14	–0.20	–2.30	<b>0.02</b>	0.03	0.31	0.21	2.51	<b>0.01</b>	0.04
Agreeableness	0.02	0.02	0.17	0.87	0.00	–0.14	–0.07	–0.80	0.43	0.00
Emotional Stability	–0.03	–0.03	–0.36	0.72	0.00	0.23	0.14	1.62	0.11	0.02

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 past work, gender differences also seem to play a role in how 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  $r_s < |.1|$ ).

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 between appreciation and successful production, accompanied by asymmetric associations with a number of different individual differences.

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