Sexual Selection and Humor in Courtship: A Case for Warmth and Extroversion

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Abstract

This investigation examines a sexual selection-based argument regarding humor's role in courtship (i.e., humor production signals intelligence/creativity). Lens model ($n = 100$) analyses suggest that humor production on Facebook profiles were self-reported and perceived to be associated with extroversion, not intelligence. Study 2 ($n = 289$) found that extroversion was associated humor production, but high school and college grade point average and American College Test (ACT) scores were not. In Study 3, pairs of opposite-sex strangers ($n = 102$) interacted for 10–12 min. Males' humor production and females' responsive laughter were both associated with females' dating interest. Both partners' dating interest was associated with simultaneous laughter. Without support for the sexual selection argument, three alternative explanations of humor's role in courtship are discussed.

Introduction

A good sense of humor is one of the most sought out characteristics in a romantic partner (Bressler, Martin, & Balshine, 2006). There has been considerable debate about why and for whom that is the case. Drawing from Miller's (2000, 2001) research, Bressler, Martin, and Balshine (2006) and Kaufman, Kozbelt, Bromley, and Miller (2008) have suggested that humor is a sexually selected trait that is an honest signal of intelligence and creativity, produced by males to be evaluated and appreciated by females. Therefore, humor production should be moderately correlated with creativity and intelligence (Miller, 2000), particularly verbal intelligence (Kaufman et al., 2008). Bressler et al. (2006) and Wilbur and Campbell (2011) extended Miller's arguments by identifying two key sex differences: (i) females should prefer males who produce humor more than males prefer females who produce humor and (ii) to accurately judge males' productive ability and guard against deceit, females should possess more acute humor comprehension skills. As for humor appreciation, Kaufman et al. (2008) propose that females who show greater humor appreciation should be less preferred during mate selection because it is a sign of low mate quality (or desperation). The present multistudy investigation utilizes three measures of humor (i.e., lens model, self-report, and observed) in three contexts (i.e., Facebook, self-reported courtship

behavior, and first-time interactions) to test Miller's (2000, 2001) sexual selection hypotheses.

Sexual Selection

Due to greater investment in procreation and parenting, the female sex limits mating opportunities in many species (Trivers, 1972). For human males, mating can result in reproduction without further involvement in child rearing. Human female reproduction is substantially costlier due to the demands of pregnancy and weaning. This creates pressure for females to choose a mate who will increase the likelihood of survival of the offspring and will provide more paternal investment. Therefore, traits in males that are attractive to females are ones most likely to meet those criteria. When a trait offers benefits to or serves the needs of one sex over the other, given unequal commitments required during reproduction, weaning, and parenting, it should demonstrate a sex difference in display during

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courtship and in desirability in the opposite sex. Evidence showing robust, or at least moderately sized, sex differences supports theories of sexual selection (Kaufman et al., 2008).

One characteristic males might advertise and females might evaluate is humor production. Humor production is defined as the ability to produce humorous communication or actions, and/or to be regarded by others as being witty, funny, or humorous (Thorson & Powell, 1993). Miller (2000, 2001; Kaufman et al., 2008) emphasizes the set of cognitive skills necessary to produce humor, particularly creativity and intelligence. Relying upon sexual signaling theory, Miller (2000) conceives of humor as a sexually selected fitness indicator of the underlying trait of intelligence. Fitness indicators should not be easily counterfeited and should be reliable indicators of the underlying trait (Kaufman et al., 2008; Miller, 2001). Applying the theory of sexual selection to humor, humans prefer a partner with a sense of humor because it signifies good genes, particularly intelligence.

The relationship between intelligence/creativity and humor production is weak or mixed (Storey, 2003). Proponents of the humor–intelligence link (e.g., Kaufman et al., 2008) admit to limited evidence of the association and note there is evidence to the contrary. Kaufman et al. recommend that humor production, creativity, and intelligence should be "modestly intercorrelated" to support sexual selection claims and that humor production should be particularly associated with verbal intelligence, more so than global intelligence (p. 253). For it to signal underlying traits, however, others should also perceive a relationship between humor and intelligence, yet this association has also shown mixed support (e.g., Wilbur & Campbell, 2011). In the context of courtship, humorous male suitors are considered *less* rather than more intelligent (Bressler & Balshine, 2006; Lundy, Tan, & Cunningham, 1998). Senko and Fyffe (2010) also found a negative relationship between perceived humorousness and intelligence when females evaluate males' pickup lines. Weisfeld et al. (2011) reported the association between partners' impressions of their spouses' sense of humor and impressions of their spouses' intelligence in five countries (i.e., United States, China, Russia, Turkey, and United Kingdom). Perceptions of intelligence were weakly related to perceptions of partner's sense of humor in three countries and not associated for two others (i.e., Russia and Turkey). To further test Miller's argument regarding sexual selection and humor production in courtship:

Hypothesis 1a: Humor production will be associated with intelligence, particularly verbal intelligence.
Hypothesis 1b: Humor production will be perceived to be associated with intelligence.

The sexual selection argument hinges on several key sex differences. Evidence in support of the sexual selection mechanism would occur when sex differences appear. The lack of difference would suggest that both males and females stand to gain similar advantages by possessing a trait. One important sex difference involves preference for humor production in a partner. According to theories of sexual selection, females

should prefer males who produce humor more than males prefer females who produce humor (Bressler et al., 2006; Wilbur & Campbell, 2011). There is some indirect evidence in support of this argument. In mixed sex social environments, male speakers are more likely to elicit laughter from audiences, and females are more likely to laugh as audience members (Provine, 1993). Analyses of laughter in naturally forming couples or groups found that while females laughed as much as males overall, females laughed more than males when paired with a male stranger (Owren & Bachorowski, 2003) and with male friends (Mehu & Dunbar, 2008). This was also found with deaf signers who can see but not hear the vocal laughter of their conversational partners (Provine & Emmorey, 2006). Analyses of singles' ads found that males were more likely to offer humor, and females were more likely to request a humorous partner (Provine, 2000; Wilbur & Campbell, 2011). Furthermore, females evaluate humorous males as being a more desirable relationship partner compared to males' evaluation of humorous females (Bressler & Balshine, 2006; Bressler et al., 2006). These hypotheses follow:

Hypothesis 2a: Males will produce humor more than females.
Hypothesis 2b: Females will be more interested in humor-producing males compared to males' interest in humor-producing females.

Distinctions between humor production, appreciation, and comprehension are of particular importance when applying the theory of sexual selection to humor in courtship. Humor comprehension is the ability to "get" the joke, to see how it is funny, or the ability to recognize if something is a joke (Carrell, 1997). Humor appreciation is defined as someone who laughs a lot, laughs easily, and is a good audience; someone who is mirthful (Martin, 1998). When humor production is interpreted as a sign of underlying mate value, the distinction between humor comprehension and appreciation becomes quite important. Due to disparities in investment in offspring, females should exercise caution when evaluating males' advances. Kaufman et al. (2008) argue that "the optimal humor appreciation system would comprehend many more attempts at humor than it actually finds amusing—it should 'get' many more jokes than it genuinely laughs at . . . . Thus, humor appreciation may be an important part of mate choice [by females], just as humor production is an important part of courtship effort [by males]" (p. 242). Kaufman et al. argue that to accurately judge males' production of humor, females should develop an acute ability to comprehend humor or to discriminate between naturally funny or faked humor. Females' greater ability to judge the humorousness of males' production is critical to Kaufman et al.'s case of humor as a result of sexual selection. Females should be more capable than males when comprehending humor but not necessarily show their appreciation for males' humor. Kaufman et al. (2008) argue that females who show too much appreciation should be regarded as a poor mate choice

because of their lack of discriminating ability between skillful and less skillful displays of humor. Therefore:

Hypothesis 3: Females should possess greater humor comprehension than males.
Hypothesis 4a: Females will show more humor appreciation than males.
Hypothesis 4b: Females who show more humor appreciation will have lower mate value than females who show less humor appreciation.

Study 1

Material and Method

Procedure and Participants

Study 1 utilizes data gathered as part of a larger Brunswik (1956) lens model investigation of personality on Facebook published elsewhere (Hall, Pennington, & Lueders, 2014). One hundred targets were recruited through a combination of students at a large Midwestern university who participated for partial course credit ($n = 28$) and a snowball sample of Facebook users ($n = 72$). The mean age for target participants was 32.3 ($SD = 12.23$, range = 18–62), and female participants accounted for 57% of the sample. The majority of target participants were White (88%), and other race/ethnicities were represented as follows: 5% mixed race, 4% Asian American, 2% African American, and 1% Latino/Hispanic.

Target participants allowed study coordinators to access and download their Facebook profiles. The eight most recent profile pictures, all information available on the About page of the profile, and any wall posts listed as "recent" by Facebook were downloaded. The files were combined to form one pdf for each target. Targets' names were erased and replaced with 'profile owner,' and any identifying information (i.e., contact information and email address) was removed.

Measures

Targets completed an online survey regarding their *humor orientation* (HO; Booth-Butterfield & Booth-Butterfield, 1991; I regularly tell jokes when in groups; People usually laugh when I tell jokes or funny stories). This measure was reliable ($\alpha = .92$). Participants also completed measures of *extroversion* ($\alpha = .88$) and *agreeableness* ($\alpha = .80$; John, Naumann, & Soto, 2008). Five items drawn from John et al.'s measure of openness were selected to measure *intelligence/creativity* (i.e., is original, comes up with new ideas; is ingenious, a deep thinker; is inventive; is sophisticated in art, music, or literature; and has an active imagination). This measure was reliable ($\alpha = .78$).

Target profiles were coded by up to four independent coders. Coders were trained as a group, and the codebook was refined. Reliability was measured using Krippendorf's α MACRO (Hayes & Krippendorf, 2007). Four user-generated cues were chosen as indicators of *humor production*: attempts at humor in photos ($\alpha = .60$), attempts at humor in quotes in the About page ($\alpha = .76$), attempts at humor in status updates ($\alpha = .35$), and laughter (i.e., haha, LoL) in status updates ($\alpha = 1.00$).

A total of 35 observers, who were strangers to the targets, examined target profiles and then estimated the HO and personality of each target. HO estimates were presented in terms of how the observer saw the target (i.e., "This person regularly tells jokes when in groups"). Observers estimated target personality and intelligence/creativity using the same items as targets, only presented in terms of how the observer saw the target. The evaluation of each target took between and 15 min, resulting in a total of approximately 12–16 hr per person. To prevent fatigue, observers signed up for several time blocks, and after 10 targets were evaluated, observers took a 10-min break. Thirty observers completed all 100 targets, and five dropped out for varying reasons (e.g., time conflicts). Observers were paid US$75 upon completion. All study procedures were institutional review board (IRB) approved.

Results

The lens model technique enabled the possibility of measuring both the associations among humor production (i.e., HO), intelligence, and personality and the perceived associations among humor production, intelligence, and personality. Bivariate correlations between profile owners' HO and intelligence were not significant, $r(99) = .10, p = .34$, therefore Hypothesis 1a was not supported. The relationship between humor and extroversion was significant, $r(99) = .30, p = .002$. Bivariate correlations among strangers' perceptions of profile owners' humor, intelligence, and personality were conducted. Results indicated that the association between perceived HO and perceived intelligence was not significant, $r(99) = .06, p = .56$, therefore, Hypothesis 1b was not supported. The relationship between perceived HO and perceived extroversion was strong, $r(99) = .73, p < .001$, and the relationship between perceived HO and perceived agreeableness, $r(99) = .18, p = .04$, was significant.

Three of the four content analyzed cues measuring humor production were positively associated with profile owners' self-reported HO (Table 1). Profile owner HO was associated with producing humor in several places on a Facebook profile. Observers also believed that all the four cues were associated with target HO. In response to Hypothesis 1b, estimates of targets' intelligence were not related to humor production for three cues, and were negatively associated with intelligence laughing in status updates (e.g., haha and LoL). The production of humor on Facebook profiles was strongly associated with observers' estimates of extroversion for all the four humor production cues. A multivariate analysis of variance (MANOVA) tested predicted sex differences in humor production in target profiles (Hypothesis 2a), but no differences were detected in the omnibus test, $F(4, 85) = 1.81, p = .135$.

Discussion

Results demonstrate that targets' humor production was unrelated to targets' self-reported intelligence (Hypothesis 1a) and unrelated to observers' perceptions of targets' intelligence

Table 1. Lens Model Analysis of Humor Production on Facebook, Associations With Personality and Intelligence (Study 1).

Profile Owner Self-Report					Observer Estimate			
Humor Orientation	Extroversion	Agreeableness	Intelligence	Facebook Cues	Humor Orientation	Extroversion	Agreeableness	Intelligence
.18*	.11	.21*	−.08	Profile picture humor (n = 100)	.38**	.39**	−.12	.01
.20*	.20*	−.06	−.01	Humor quotes (n = 100)	.23**	.18*	−.23	.04
.22*	−.04	−.08	−.03	Status update humor (n = 90)	.51**	.41**	−.10	.11
.08	.04	−.01	−.12	Laughter status update (n = 100)	.18*	.21*	−.08	−.18*

*p < .05. **p < .01.

(Hypothesis 1b). Although targets who produced more humor by self-report were indeed more likely to have humorous pictures, status updates, and quotes on their profile, these three characteristics were unrelated to observers' perceptions of target intelligence. Expressing laughter via status updates (e.g., haha and LoL) was negatively associated with perceptions of intelligence. Extroversion was moderately associated with targets' self-reported humor production and was strongly associated with observers' perceptions of targets' humor production. Observers, who were strangers to the targets, used all three cues of humor production when they estimated targets' humor and extroversion but not when estimating intelligence. Although agreeableness was associated with attempts at humor in Facebook profiles, it was unassociated with targets' self-reported humor production and only weakly associated with observers' estimates of targets' humor production. Finally, results did not support Hypothesis 2a, which predicted sex differences in humor production.

Study 1 shows consistent support that humor production is associated with and is perceived to be associated with extroversion, weakly associated with agreeableness, and unassociated with intelligence. However, the intelligence measure in Study 1 was self-reported and stranger perceived rather than an external, objective measure of intelligence, particularly verbal intelligence. Although social network sites (SNS) are an increasingly common location for identifying romantic partners (i.e., 7% of Americans married in the last 10 years met via a SNS; Cacioppo, Cacioppo, Gonzaga, Ogburn, & VanderWeele, 2013), Facebook is not explicitly a courtship context. Study 2 uses more objective measures of intelligence and verbal ability (i.e., grade point average [GPA]; American College Test [ACT] scores) in relation to humor production, comprehension, and appreciation in courtship as well as self-reported mate value.

Study 2

Material and Method

Procedure and Participants

Participants were recruited from introductory communication courses at a large Midwestern university. Selecting from several study options, participants completed an online survey instrument about "humor in courtship" in return for partial course credit. After consenting, participants completed measures of humor, personality, mate value, scholastic achievement, and demographics. The procedure was IRB approved. Two hundred eighty nine undergraduates aged 18–38 (*M* = 19.62, *SD* = 2.72; *n* = 200 female) participated. Eighty percent were White, 7% were Asian or Asian American, 6% were African American, and 3% were Latino/Hispanic. The remaining participants did not report race or ethnicity. All participants were self-reported to be heterosexual.

Measures

Participants responded to all the questions in response to the following prompt: "For the following questions, consider how you behave when you meet people you might be interested in. You might be attracted to them or interested in developing a relationship with them. For each question, try to think about how you generally behave in that circumstance." All responses were measured on a 7-point Likert-type scale. To test hypotheses related to humor production, comprehension, and appreciation, three existing humor inventories were consulted (i.e., Craik, Lampert, & Nelson, 1996; Thorson & Powell, 1993; Wilbur & Campbell, 2011). In addition, 13 new items were written to reflect the conceptual definitions of each concept. In total, 61 items were included. To test the factor structure of these 61 items, exploratory factor analysis with principle factor analysis and promax rotation was conducted. Upon consulting the pattern matrix and the elbow of the scree plot, the first four factors were selected for analysis. These four factors explained 53% of the variance and had large eigenvalues: 13.47, 5.98, 4.10, and 3.18.

Humor production was measured using 8 items from Thorson and Powell's (1993) measure. Two factors of humor comprehension emerged. *Discerning humor comprehension* was measured by 3 items reflecting understanding of a joke but a lack of outward response (i.e., "I sometimes get the joke, but I just don't think it is funny"; "I enjoy a good joke, but won't necessarily laugh out loud"; "I have a choosy sense of humor, I only laugh when it is really funny"). This measure was composed of all new items. *General humor comprehension* was

Table 2. Means, *SD*, Correlations, and Reliabilities (Study 2).

| | Males = 89 | | Females = 200 | | | | | | | | | | | |
	Mean	SD	Mean	SD	1	2	3	4	5	6	7	8	9	10	11
1. Extroversion	4.62	0.92	4.74	1.05	**.85**	.45**	.29**	.21	.40**	.30**	**.03**	.37**	.12	.29	.17
2. Agreeableness	5.09	0.73	5.35	0.88	.36**	**.80**	.20	.46**	.28**	.16	.26*	.10	.09	.25	−.17
3. Status	4.90	0.98	4.89	1.00	.24**	.02	**.72**	.29**	.56**	.49**	.35**	.16	.27*	.12	.03
4. Warmth	5.61	0.89	5.89	0.73	.14	.44**	.36**	**.88**	.37**	.42**	.68**	.22*	.20	.05	.16
5. Vitality	5.01	0.83	4.88	1.04	.37**	.04	.50**	.31**	**.78**	.64**	.42**	.27*	.23*	.14	.02
6. Passionate	4.91	0.82	5.18	0.90	.29**	.08	.39**	.37**	.59**	**.81**	.41**	.26*	.33**	.28	−.22*
7. Committed	5.72	0.89	5.85	0.82	.22**	.26**	.26**	.61**	.22**	.50**	**.77**	.08	.21*	0.11	.05
8. Humor production	5.35	0.81	5.33	1.06	.35**	.14	.14	.17*	.24**	.28**	.15	**.91**	.44**	.24*	.28*
9. Discerning sense of humor	5.33	0.91	5.08	1.11	.19**	.06	.15	.11	.15	.25**	.08	.50**	**.66**	−.20	.06
10. Humor comprehension	4.70	1.31	4.50	1.45	.22**	.19*	−.14	.00	.01	.08	.02	−.29	.22*	**.87**	−.29**
11. Humor appreciation	4.14	1.06	4.32	1.19	.29**	.31**	.02	.23**	.09	.24**	.13	.48**	.40**	.17*	**.89**

Note. Males above the diagonal, females below the diagonal, and reliabilities on the diagonal.
*$p < .05$. **$p < .01$.

measured by 3 new items, which were all reverse scored (i.e., "I am sometimes the person in a group who doesn't get the joke"; "I sometimes have to ask 'Are you joking?' because I can't tell if someone is being funny or not"; "Other people often have tell me they were joking because I couldn't tell"). *Humor appreciation* reflected a sense of humor that enjoyed humor without concern for its objective humorousness. This measure was composed of 3 items drawn from Craik, Lampert, and Nelson (1996; e.g., "Laughs at everything"; Laughs without discriminating between more or less clever remarks") and 2 new items (i.e., "I laugh at the weakest jokes"; "I laugh easily, it doesn't really have to be funny").

Academic achievement. Participants reported on four measures of academic achievement: cumulative high school GPA (*n* = 289, *M* = 3.56, *SD* = .45), overall ACT score (*n* = 256, *M* = 25.52, *SD* = 3.70), verbal ACT score (*n* = 236, *M* = 26.26, *SD* = 5.16), and cumulative college GPA (*n* = 177, *M* = 3.15, *SD* = .60). Those not reporting college GPA were first-semester freshman, and 19% stated that they had not taken or could not remember their ACT scores. *Extroversion* and *agreeableness* were measured using the Big Five scale (John et al., 2008).

The *mate value* measure required participants to self-report the degree to which they possess qualities compared to others of their same sex (1 = *I score much lower on this characteristic* to 7 = *I score much higher on this characteristic*; Fletcher, Simpson, Thomas, & Giles, 1999). This measure of mate value has five subdimensions: status (e.g., "Has a nice house or apartment"), warmth (e.g., "A good listener in general"), vitality (e.g., "Sexy"), passionate in romantic relationships (e.g., "Passionate in romantic relationships"), and committed in romantic relationships (e.g., "Committed in romantic relationships"). The original measure of passion in relationships included a single item regarding a sense of humor. This item was removed so as not to conflate other humor measures with mate value (Table 2).

Results

To text Hypothesis 1a, ordinary least square regression was conducted. Each humor construct was treated as a criterion variable individually. Measures of intelligence, personality, and sex were treated as independent variables, and control variables were age and race/ethnicity (White = 1). Humor production was positively associated with extroversion, $B = .25$, $SE = .06$, $\beta = .25$, $t(287) = 4.38$, $p < .001$, $R^2 \Delta = .18$, but unrelated to measures of intelligence and sex. Results do not support Hypothesis 1a or Hypothesis 2a.

A discerning comprehension of humor was negatively associated with extroversion, $B = -.29$, $SE = .08$, $\beta = -.24$, $t(287) = 3.82$, $p < .001$, $R^2 \Delta = .06$, and negatively associated with agreeableness, $B = -.23$, $SE = .09$, $\beta = -.16$, $t(287) = 2.59$, $p = .010$, $R^2 \Delta = .02$, and unrelated to measures of intelligence and sex. General humor comprehension was associated with extroversion, $B = .48$, $SE = .15$, $\beta = .29$, $t(287) = 3.13$, $p = .002$, $R^2 \Delta = .08$, and with overall ACT score, $B = .12$, $SE = .06$, $\beta = .32$, $t(287) = 2.16$, $p = .03$, $R^2 \Delta = .03$, but unrelated to sex. The absence of sex differences in both measures of humor comprehension does not support Hypothesis 3.

Humor appreciation was positively associated with extroversion, $B = .16$, $SE = .04$, $\beta = .22$, $t(287) = 3.76$, $p < .001$, $R^2 \Delta = .05$, agreeableness, $B = .13$, $SE = .06$, $\beta = .15$, $t(287) = 2.24$, $p = .026$, $R^2 \Delta = .02$, but unrelated to measures of intelligence and sex. A lack of sex difference in appreciation does not support Hypothesis 4a.

To test Hypothesis 4b, which predicted that humor appreciation would be negatively associated with mate value in women, regression analyses were conducted with only female participants (*n* = 200). Humor appreciation was positively associated with warmth in a relationship, $B = .27$, $SE = .06$, $\beta = .27$, $t(194) = 2.99$, $p = .003$, and passion in a relationship, $B = .31$, $SE = .07$, $\beta = .24$, $t(194) = 3.30$, $p = .001$, $R^2 \Delta = .11$. Results do not support Hypothesis 4b, which anticipated a negative relationship between humor appreciation and mate value in females.

Discussion

Neither Hypothesis 1a nor Hypothesis 2a was supported: Humor production in a courtship context was unrelated to measures of intelligence and verbal ability as measured by high school and college GPA and ACT scores and showed no sex difference. Factor analyses found that humor comprehension was constituted by two separate factors. The first reflected an ability to get the joke without laughing at it (i.e., being choosy), and the second was someone who generally gets the joke. Neither discerning humor comprehension nor general humor comprehension showed sex differences, which did not support Hypothesis 3. No sex differences were found in humor appreciation, which did not support Hypothesis 4a. Finally, humor appreciation was explored in relation to mate value (Hypothesis 4b), but there was no evidence that humor appreciation was negatively associated with self-perceived mate value. Rather, it was positively associated with warmth and passion in a relationship in females.

Although Study 2 provided evidence supporting the relationship between humor and extroversion and the absence of a relationship between humor and intelligence, it was based upon self-reports of humor production, appreciation, and mate value. Self-reported measures of humor are weakly associated with behavioral measures of joke production and laughter (Kohler & Ruch, 1996). Self-reported desirability is not a direct measure of mate value in a courtship-specific context. Study 3 used observational data from recorded interactions of opposite-sex, heterosexual, and single strangers to further test hypotheses.

Study 3

Materials and Method

Procedure and Participants

Study 3 utilizes data from a study of nonverbal behavior published elsewhere (Hall & Xing, 2015). *Participants* were 51 pairs of single (i.e., not in a committed romantic relationship or a "serious dating" relationship), heterosexual students recruited from introductory communication courses at a large Midwestern university. Participants received partial class credit for participating in the study worth less than .5% of their final grade. Procedures were IRB approved. Participants were primarily White (78%), and other races/ethnicities were represented: 7% Asian American, 7% Hispanic/Latino, 6% African American, and 2% Native American. Mean age was 19.2 years ($SD = 2.1$, range 18–30; *mode* = 19).

Interaction Procedure

One male participant and one female participant were scheduled to arrive at the interaction lab for the same 20-min time period. Upon arrival, participants were led to separate rooms and gave written consent to be audio- and video-recorded.

When both participants had arrived, they were brought to the same room and introduced. The interaction lab had two chairs facing one another at a distance of approximately 3 feet. Two digital, wall-mounted cameras recorded the interaction. After being introduced, the participants were read study instructions. They were told the purpose of the study was to better understand how people form first impressions and that they would be interacting for about 10 min. To help facilitate and standardize the conversation, a set of prescreened question cards were provided. Each participant chose 5 of the 10 cards and took turns asking each other the questions. Participants were instructed that the goal of the interaction was to have a conversation, so they did not need to ask all the questions on the cards. They were encouraged to go on tangents and ask their own questions. Participants were asked to keep talking until the researcher returned.

Postinteraction Procedure

After at least 10 min but no more than 12 min had passed, participants were interrupted by the researcher and put in separate rooms. Without consulting each other, both completed a postinteraction questionnaire. Participants were asked if they had met their interaction partner previously and none indicated that they had. *Dating interest* was measured using 4 items. Two items were adapted from Grammer and Eibl-Eibesfeldt (1990; i.e., "I would go on a date with him/her," "I would give my phone number to my partner if I were asked for it") and 2 items were created (i.e., "I would like to meet this person again," "I would like to talk to this person again"). The measure was reliable ($\propto = .86$).

Measures: Humor Production and Appreciation

Coders were trained individually and as a group for 15 hr by coding videos from pilot data to standardize codebook use. After training, coders independently coded the videos. Reliability was calculated using Hayes and Krippendorff's (2007) α MACRO. Behaviors were counted for each minute of the interaction. *Humor production* was operationalized as attempts at humor during the conversation ($\propto = .67$). Type of humor was not differentiated. *Humor appreciation* was measured in two ways: laughter in response to humorous attempt ($\propto = .90$; Mehu & Dunbar, 2008) and simultaneous laughing (Grammer & Eibl-Eibesfeldt, 1990; $\propto = .75$).

Results

To test Hypothesis 2a and Hypothesis 4a, two paired samples *t*-tests were conducted. Hypothesis 2a was not supported: males attempted more humor per minute, $M = .20$, $SD = .20$, than females, $M = .14$, $SD = .17$, but this difference was not significant, $t = 1.77$, $p = .08$. In support of Hypothesis 4a, females laughed at more of males' humor attempts, $M = .10$, $SD = .14$, than males laughed at females' humor attempts, $M = .05$, $SD = .09$, $t = 2.13$, $p = .038$.

When data are collected from conversational partners, participants' responses are related (Kenny, Kashy, & Cook, 2006). One partner's humor production and the other partner's laughter are dependent upon one another; they are nonindependent. As recommended by Kenny et al. (2006) for distinguishable dyads, the Actor-Partner Independence Model (APIM) and structural equation modeling were used to estimate one's own production and appreciation of humor with one's own dating interest (actor effect) and with one's partner's dating interest (partner effect) using Mplus 7.0 (Muthen & Muthen, 1998/2007). By correlating the error terms of the variables, the APIM accounts for shared variance of the dyad. The actor effects demonstrate whether one's own humor production or appreciation is associated with one's own dating interest. Partner effects test whether one's own humor production or appreciation is associated with partners' dating interest. Dyads were considered distinguishable by sex. As recommended by Kenny et al. (2006), when significant effects were identified for males or females, they were fixed to be equivalent. If model fit was unchanged, as determined by a χ^2 test, then paths were considered equivalent. If model fit worsened, paths were considered distinct and sex differences were reported.

Humor production was not associated with dating interest in conversational partner for males, $\beta = -.004$, $SE = .078$, $p = .96$, or for females, $\beta = .032$, $SE = .070$, $p = .64$. Humor appreciation showed different results. The number of humor attempts that a female laughed at was positively associated with her dating interest in her male partner, $\beta = .168$, $SE = .075$, $p = .024$, $R^2 = .092$. The same was not found for males, $\beta = -.068$, $SE = .160$, $p = .67$. Yet, this difference was not significant, $\chi^2 = 1.64$, $df = 1$, $p > .05$. The partner effects demonstrated a complementary pattern of results. Namely, humor production by males was associated with females' dating interest, $\beta = .124$, $SE = .050$, $p = .019$, $R^2 = .079$. Humor production by females was not associated with males' dating interest, $\beta = -.063$, $SE = .091$, $p = .486$. This difference was significant, $\chi^2 = 3.896$, $df = 1$, $p < .05$. Humor appreciation by males was unrelated to dating interest by females, $\beta = -.011$, $SE = .123$, $p = .93$. Humor appreciation by females was unrelated to dating interest by males, $\beta = -.007$, $SE = .111$, $p = .95$. Finally, humor appreciation, measured through simultaneous laughter, was positively associated with females' dating interest, $\beta = .083$, $SE = .037$, $p = .012$, $R^2 = .22$, and males' dating interest, $\beta = .066$, $SE = .029$, $p = .024$, $R^2 = .13$. This effect was greater for female dating interest, $\chi^2 = 10.077$, $df = 1$, $p < .001$.

Because female humor appreciation—through laughter—was dependent upon the number of attempts at humor the male made, one additional analysis was conducted. Female laughter was divided by male humor production, creating a ratio of male attempt-to-female laughs. This ratio was unassociated with male dating interest, $\beta = .21$, $SE = .69$, $p = .36$, and female dating interest, $\beta = -.065$, $SE = .41$, $p = .75$. Female laughing at a higher or lower portion of humorous attempts (i.e., being less or more discriminating) was unrelated to dating interest.

Discussion

Study 3 confirmed the results of Study 2 by demonstrating that there was no sex difference in humor production (Hypothesis 2a). However, there was evidence in support of Hypothesis 2b in that the more attempts at humor a male made and the more of those attempts a female laughed at, the more interested in dating the female was. This relationship was not found for males. Results also supported Hypothesis 4a in that females showed more humor appreciation (i.e., more laughs) than did males, confirming other observational studies (Owren & Bachorowski, 2003; Provine & Emmory, 2006). However, when partners laughed at the same time, both males and females were more interested in dating one another (Grammer & Eibl-Eibesfeldt, 1990). Results do not support Hypothesis 4b, which predicted that females who show more humor appreciation would have lower mate value than females who show less humor appreciation. When humor appreciation was measured by laughter in response to attempts at humor, results indicated that males' dating interest in females was unrelated to females' humor appreciation. Furthermore, the attempt to laugh ratio demonstrated that a female having a more discriminating humor appreciation was not considered more attractive by a male nor was it indicative of her attraction to him.

General Discussion

Miller (2000, 2001) and others (e.g., Bressler et al., 2006) suggest that humor production is an honest signal of underlying creativity and intelligence. To effectively serve as such a signal, humor production should moderately correlate with intelligence and creativity, and this link should be found in others' perceptions of the humor producer. Study 1 found no evidence that humor production (i.e., HO) showed any association with underlying intelligence or perceived intelligence. Rather, humorous behavior on Facebook was consistently perceived to be associated with profile owners' extroversion. This association was accurate: profile owners who scored higher on HO were indeed more extraverted. Study 2 confirmed these results by demonstrating that self-reported humor production (Thorson & Powell, 1993) was associated with extroversion but not associated with college or high school GPA, overall ACT scores, and verbal scores on the ACT. The lack of a humor–intelligence association supports past courtship research (e.g., Bressler & Balshine, 2006; Lundy et al., 1998; Senko & Fyffe, 2010) and is consistent with Martin's (1998) systematic review of the literature; humor production is not associated with intelligence but is related to extroversion.

The sexual selection argument predicted sex differences in humor production and humor appreciation in courtship contexts (Kaufman et al., 2008; Miller, 2000). Study 1 found no sex difference in self-reported HO (i.e., the ability to create humor) or the four indicators of humor production in users' Facebook profiles. Study 2 found no sex difference in humor production, humor appreciation, and two measures of humor comprehension. Despite the argument that males should

possess a more skillful ability to produce humor and females a more skillful ability to comprehend humor, no such differences appeared in self-report measures.

The present investigation also explored associations among humor production, humor appreciation, and mate value. Study 2 failed to find the predicted negative relationship between humor appreciation and mate value in females (Kaufman et al., 2008). Rather it revealed a positive association with self-reported warmth and passion in a romantic relationship, which supports prior research that being responsive to humor is a sign of warmth and relational connection (Li et al., 2009; Owren & Bachorowski, 2003). Females who were selective and choosey in humor comprehension were introverted and disagreeable in personality, which suggests that humor comprehension without appreciation (i.e., being very choosy) might adversely serve a female wishing to attract a partner. This evidence directly runs against the argument that a discerning comprehension of humor would be to females' advantage in the mating market.

Study 3 found that males who produced more humor conversed with females who were more interested in dating. Yet, there was no support for the argument that females who showed more humor appreciation would have lower mate value compared to females who show less humor appreciation. Rather, males' dating interest in females was unrelated to females' humor appreciation. The portion of males' attempts at humor laughed at by females was also unrelated to dating interest. It was not the case that very selective (i.e., laugh at few or no attempts) or very appreciative females (i.e., laughed at all attempts) had higher or lower mate value from the perspective of males.

Alternative Explanations

Two hypotheses were supported, but only in Study 3: females appreciated males' humor more than males appreciated females' humor, and females who appreciated males' attempts at humor were more interested in dating than males who appreciated females' attempts at humor. All other hypotheses drawn from the humor production as intelligence argument were not supported across all three studies. Are there alternative explanations of the results?

Consistent with past reviews of research (e.g., Martin, 1998), the present research suggests that humor production is strongly associated with extroversion, and perceptually associated with extroversion and warmth. The production of humor may not be a reliable indicator of intelligence, but it might be an indicator of these other desirable traits. Displaying social facility and warmth through humor production may be a useful mating strategy because those traits are highly valued by both sexes (Kenrick, Groth, Trost, & Sadalla, 1993), particularly for long-term relationships (Didonato, Bedminster, & Machel, 2013).

The present investigation failed to find sex differences in humor production (Study 1–3), and only found a sex difference in humor appreciation in face-to-face interactions between opposite-sex, heterosexual strangers (Study 3). Consistent with past research (e.g., Mehu & Dunbar, 2008; Provine, 1993), females laughed at male speakers more than males laughed at female speakers. More laughter by females, however, does not appear to be a result of more humor production by males. Compared to producing humor, "laughter is involuntary and hard to fake, providing an uncensored, honest account about what people really think about each other" (Provine, 2012, p. 55). A man might actively attempt to make a woman laugh not because his humor is an honest signal of his intelligence, but because her response is honest signal of her liking (see also Li et al., 2009). The sex difference in laughing in mixed sex interactions may be a product of strategic attempts by a male to get a female to reveal the degree to which she is attracted or interested. During courtship, females often evaluate the degree to which males are likeable, and males try to engender that likeability through humorous banter or behavior, but not necessarily through making comments or telling stories that are objectively funny (Provine, 1993). The results of the present investigation suggest that this strategy may indeed be quite effective—more humor production by males is associated with female partners' dating interest, and females' laughter in response to males' humor attempts is an indicator of females' dating interest.

The final explanation for the results of the present investigation treats sharing humor as valuable in its own right, not for what it signals or reveals. Mutual laughter was associated with both male and female dating interest—although more strongly so for females—echoing the results of Grammer and Eibl-Eibesfeldt (1990) who used a design similar to Study 3. A general sense of humor (i.e., loves to laugh) is both offered by and requested in a romantic partner of both sexes (Wilbur & Campbell, 2011). In long-term romantic relationships, Hall's (2013) mediation analyses between humor style and relationship satisfaction suggested that the primary value of humor in relationships is its ability to share positive emotions or to amuse oneself and one's partner through laughter and good cheer. Therefore, sharing humor may function in a manner very similar to having an agreeable and warm personality yielding a higher probability of relationship success. Kenrick et al. (1993) argues that a tendency to choose partners who were "easy to get along with, then, would have been adaptive to the extent that it would have resulted in higher probabilities of pair permanence and offspring survival" (p. 966). Hall (2013) suggests that humor "is prized during mate selection and valued in romantic partners because a good sense of humor signals that future interactions with this person are likely to be easier and will include more laughter and fun" (p. 288). The present study found that mutual laughter was particularly important for predicting dating interest, which suggests that shared laughter might be a pathway toward developing a more long-lasting relationship.

One challenge to the present investigation is the lack of sufficient measurement of humor comprehension. Although Study 2 explored sex differences in comprehension through self-report, Study 3 was unable to distinguish humor

appreciation from humor comprehension through observation of behavior. Simply, people laugh at jokes they do not fully comprehend and comprehend jokes they do not laugh at. Therefore, laughter, even in response to jokes, is not a clear indicator of true appreciation (i.e., it was really funny) or comprehension (i.e., I really got the joke). Instead, laughter—by speaker and audience alike—signals playfulness, a lack of seriousness, confirmation, or irony (Owren & Bachorowski, 2003; Storey, 2003). It is even questionable whether individuals can distinguish *why* they laugh when they do. Individuals are not able to control true laughter; laughing takes much longer to produce than a simulated ha-ha response, suggesting it is under weak voluntary control (Provine, 2012).

The present investigation suggests that sex differences in humor appreciation are most likely to occur when measured by responsive laughing during face-to-face, opposite-sex interactions (Study 3), rather than by self-report (Study 2). Perhaps during the first stages of courtship, attempts at humor by males and laughter by females are part of a culturally informed courtship script. Masculinity and femininity are associated with a husbands-joke and wives-laugh sex difference in more traditional marriages (Honeycutt & Brown, 1998). Humor production during courtship could be interpreted as a sign of dominance and laughter in response to a sign of submissiveness (Owren & Bachorowski, 2003; Weiss et al., 2011). Accounting for gender (i.e., masculinity/femininity) or gender ideology (e.g., ambivalent sexism) within individuals might better account for this particular sex difference during courtship. In as much that some females prefer more masculine males and some males prefer more feminine females, they may display and reinforce humor behaviors (i.e., production by males; laughter by females) to fit those gender roles. Perhaps flirting by joking around by males is particularly attractive to traditional females, and females serving as a responsive audience are most attractive to traditional males.

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