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Evidence to Suggest that Copulatory Vocalizations in Women Are Not a Reflexive Consequence of Orgasm

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RUNNING HEAD: Copulatory Vocalizations in Women

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ABSTRACT

The current studies were conducted in order to investigate the phenomenon of copulatory vocalizations and their relationship to orgasm in women. Data were collected from 71 sexually active heterosexual women (M age = 21.68 ± .52) recruited from the local community through opportunity sampling. The studies revealed that orgasm was most frequently reported by women following self-manipulation of the clitoris, manipulation by the partner, oral sex delivered to the woman by a man, and least frequently during vaginal penetration. More detailed examination of responses during intercourse revealed that, while female orgasms were most commonly experienced during foreplay, copulatory vocalizations were reported to be made most often before and simultaneously with male ejaculation. These data together clearly demonstrate a dissociation of the timing of women experiencing orgasm and making copulatory vocalizations and indicate that there is at least an element of these responses that are under conscious control, providing women with an opportunity to manipulate male behavior to their advantage.

Key words: Orgasm; copulatory vocalization; sexual behavior; evolution

INTRODUCTION

During sexual activity, it is most commonly female primates that make vocalizations (Hauser, 1996; Pradhan, Engelhardt, van Schaik & Maestripieri, 2006; Semple, 2001). Such vocalizations may be emitted during the solicitation, copulatory or post ejaculatory phases (Dixson, 1998; Gouzoules, Gust, Donaghey, & St Andre, 1998; Maestripieri & Roney, 2005). The role of these vocalizations remains enigmatic; however, the most parsimonious view is that their immediate function is simply to advertise that sexual activity is occurring within close proximity (e.g., Pradhan et al., 2006). The effects of these advertisements are manifold, and may include the synchronizing of male and female orgasm (Hamilton & Arrowood, 1978), the strengthening of the pair bond (Hamilton & Arrowood, 1978), inciting male-male competition, and increasing the chances of mating with a dominant male (Cox & LeBoeuf, 1977) or multi-matings, increasing the level of sperm competition and reducing the risk of infanticide through uncertainty of paternity (O'Connell & Cowlishaw, 1994). Finally, these vocalizations may just be the result of phylogentic inertia (Henzi, 1996), reflecting the internal state resultant upon female orgasm that has no impact on the behavior of others (Hamilton & Arrowood, 1978).

Within the context of our own species, there could have been a number of potential advantages to ancestral females mating with multiple males. These may include the protection from infanticide gained from uncertainty of paternity and augmented by cryptic ovulation (e.g., Palombit, 2000). There is also the increased physical pleasure associated with sustained clitoral stimulation (Hrdy, 1981). However, mating with multiple males would only have been adaptive for female pre-hominids capable of caring for offspring by themselves. Where paternity is not certain, support from a given male is concomitantly reduced (Tooby & Devore, 1987), thereby increasing the risk of injury or fatality in a species so vulnerable to cephalopelvic disproportion (CPD) and that has such a long period of neonatal helplessness.

Early hominids further had to contend with the difficulties resultant upon the changes in hip architecture (effectively a narrowing) required to achieve full bipedal locomotion (Jaanusson, 1991; Lovejoy, 1988). This also affected the organization of female genitalia, perhaps reducing the likelihood that women would achieve orgasm through vaginal penetration because the stimulation of the appropriate areas during intercourse became only indirect. It is possible to hypothesize that without the risk of CPD, the dominant female strategy would have been to solicit sex from several males as they sought to prolong stimulation. However, with this risk, there was strong pressure to form relationships with a single male. In this circumstance, female orgasm could still have been achieved by the partner male increasing his copulatory effort (Fisher, 1973). Consequently, although evidence from non-human primates suggests that female orgasm did not evolve to cement the pair bond per se, it may have become sequestered to serve this function in modern humans (See Garver-Apgar, Gangestad, Thornhill, Miller, & Olp, 2006; Puts & Dawood, 2006; Thornhill, Gangestad, & Comer, 1995 for further information about the hypothesized evolution and function of female orgasm).

With regard to the nature of the vocalizations themselves, it is clear that the transition from rapid, labored breathing to distinctive often loud vocalizations still serve a communicatory function (Hamilton & Arrowood, 1978). Therefore, in view of the relative paucity of data in humans, the current studies were conducted in order to examine the nature of human copulatory vocalizations in more detail. The research was conducted using female self-reports of the timing and frequency of their copulatory vocalizations and the context in which they were made.

METHOD

Participants

A total of 20 women participated in Phase 1 of the study (questionnaire development and piloting). A total of 71 sexually active heterosexual women that had previously experienced an orgasm completed Phase 2, which involved completing the finalized questionnaire. Participants were between 18 and 48 years ($M = 21.68 \pm .52$). Of these, 49 of these were in what they described as a committed relationship with a mean duration of 20.92 months (range, 1-264 months).

Procedure

Informal exploratory discussions were held with a group of five female participants. Women were prompted to discuss the possible frequency with which women have orgasms, timing relative to partner orgasm, the sexual activities during which they occur, sounds women make during sex, and the effect of noise making on partner, etc. Following these discussions, 22 questions were developed relating to women's personal experience of orgasm and copulatory vocalizations. A second sample of five women then completed the prototype questionnaire and were invited to make comments on each question in order to facilitate further development. Lastly, a structured questionnaire using a variety of response methods, including visual analogue scales, was then created and shown to two further pilot samples. The final questionnaire was distributed to 71 women. Participants for both phases were recruited from the local community through opportunity sampling.

Measures

The questionnaire consisted of;

Autobiographical questions

Questions to do with age, relationship status, sexual history, answered using numerical responses (e.g., how many sexual partners have you had?).

Methods by which orgasm is achieved

Questions to do with the overall frequency of orgasm, the methods by which orgasm were achieved (self-masturbation when alone, masturbation by partner, oral sex delivered by the partner, manual stimulation by self during intercourse, manual stimulation by partner during intercourse, penetration itself, and "other") answered using percentage estimates.

When orgasm was achieved

Estimates of the incidence of orgasm achieved during the different stages of sexual activity with a partner (i.e. during foreplay, during intercourse before your partner orgasms, during intercourse at the same time as your partner orgasms, during intercourse after your partner orgasms, during afterplay) answered using percentage estimates.

Frequency of copulatory vocalizations

Questions to do with how often participants reported making a variety of noises (i.e., silence, moan/groan, scream/shriek/squeal, words [e.g., partner's name, "yes", etc.], instructional commands [e.g., "more"]) during sex, measured on a 10 cm visual analogue scales (i.e., "never" one the left hand extreme, "always" at the other).

Intensity of copulatory vocalizations

Questions to do with intensity of vocalizations (silence, moan/groan, scream/shriek/squeal, words [e.g., partner's name, "yes", etc.] and instructional commands [e.g., "more"]) during various stages of a copulatory bout, answered using a 10-point scale.

Use of copulatory vocalizations

Questions to do with how often noises were made during sex even when they knew they were not going to orgasm were recorded (percentage frequency), whether copulatory vocalizations were deliberately used to "speed things up" (i.e., encourage their partner's climax and thus terminate intercourse), answered as a "yes" or "no".

Reasons for tactical use of copulatory vocalizations

Questions to do with the female's perception of the effect that their copulatory vocalizations had on their sexual partner (e.g., boost their ego, hasten partner's ejaculation), answered on a 10 cm visual analogue scale. Questions to do with possible reasons (discomfort/pain, time limitations, boredom, fatigue, and "other") for the use of these vocalizations to terminate their partner's copulatory effort, rated on a 10-point scale.

Consequences of intercourse

Questions to do with effect of intercourse on immediate appetite for further sexual activity and how intercourse made the participant feel were recorded on a 10 cm visual analogue scale. Responses to questions to do with the importance of the participant having an orgasm as a result of sexual activity with a partner and the importance of the partner having an orgasm were also recorded in this way (i.e., 10 cm visual analogue scale) as was their rating of the likelihood of remaining in a relationship where their partner failed to bring them to orgasm but was otherwise completely satisfactory.

Finally, participants were asked to provide open-ended additional comments which were used to assist interpretation of the data.

RESULTS

Data were analyzed using analysis of variance (ANOVA) with orthogonal contrasts to perform pairwise comparisons. Further correlational analyses were conducted using Pearson's *r*. Fig. 1 shows the percentage of women who reported experiencing orgasm when engaged in a variety of sexual activities. One hundred percent of women sampled reported experiencing orgasm. However, not all methods were universally employed i.e. a substantial number of women reported that they or their partner did not manually stimulate them whilst they were being penetrated and reports of "other" were too low to be analyzed. ANOVA revealed a significant main effect of the frequency of orgasm resulting from a variety of methods, $F(3, 210) = 4.20$, $p = .007$. These were self masturbation ($M = 58.92 \pm 4.86$),

masturbation by the partner (M = 61.11 $\pm$ 3.92), oral sex delivered by the partner (M = 55.53 $\pm$ 4.16), and penetration (M = 42.22 $\pm$ 4.09). Planned comparisons revealed no significant difference between the frequency of orgasm resulting from self or partner masturbation, self masturbation or oral sex, or between partner masturbation and oral sex. Significant differences were, however, found between the frequency of orgasm resulting from self masturbation compared to penetration, $F(1, 70) = 5.85$, $p = .018$, partner masturbation compared to penetration, $F(1, 70) = 9.99$, $p = .002$, and oral sex compared to penetration, $F(1, 70) = 4.20$, $p = .03$.

Insert Fig. 1 about here

ANOVA further revealed a significant main effect of the timing of female orgasm during sexual activity with a partner, $F(4, 272) = 14.02$, $p < .001$. These data are shown in Table 1. Planned comparisons revealed significant differences between the percentage of female orgasms reported during foreplay and during intercourse before a partner's orgasm, $F(1, 68) = 4.71$, $p = .033$, foreplay and during intercourse at the same time as a partner's orgasm, $F(1, 68) = 30.95$, $p < .001$, foreplay and during intercourse after a partner's orgasm, $F(1, 68) = 22.75$, $p < .001$, foreplay and during afterplay, $F(1, 68) = 46.39$, $p < .001$.

Insert Table 1 about here

Significant differences were also revealed between the percentage of orgasms reported during intercourse before a partner's orgasm and during intercourse at the same time as a partner's orgasm, $F(1, 68) = 9.95$, $p < .002$, during intercourse before a partner's orgasm and during intercourse after a partner's orgasm, $F(1, 68) = 5.07$, $p = .028$, and during intercourse before a partner's orgasm and afterplay, $F(1, 68) = 11.34$, $p = .001$. No significant differences were found between the percentage of orgasm reported to be achieved during intercourse at the same time as the partner's orgasm and intercourse after a partner's orgasm,

during intercourse at the same time as the partner's orgasm and afterplay, and intercourse after the partner's orgasm and afterplay.

ANOVA also revealed a significant main effect of timing of vocalization, $F(4, 272) = 30.52$, $p < .001$. These effects were found to be due to significant differences between vocalizations made during foreplay and vocalizations made during intercourse before their partner's orgasm, $F(1, 68) = 12.89$, $p < .001$, vocalizations made during intercourse after their partner's orgasm, $F(1, 68) = 13.81$, $p < .001$, and vocalizations made during afterplay, $F(1, 68) = 38.92$, $p < .001$. There were also differences between vocalizations made during intercourse before their partner's orgasm and during intercourse after their partner's orgasm, $F(1, 68) = 49.28$, $p < .001$, and during afterplay, $F(1, 68) = 75.15$, $p < .001$. Further effects were due to differences between vocalizations made during intercourse at the same time as their partner's orgasm and during intercourse after their partner's orgasm, $F(1, 68) = 31.07$, $p < .001$, and during afterplay, $F(1, 68) = 43.06$, $p < .001$. Finally, differences were revealed between vocalizations made during sex after their partner's orgasm and vocalizations made during afterplay, $F(1, 68) = 6.49$, $p < .05$. No other comparisons/contrasts were significant.

These analyses together indicate that there is a different pattern of reported incidence of orgasm and vocalization. Therefore, a series of correlations were performed, which are shown in Table 2. Briefly, these analyses further demonstrate the asynchrony between orgasm and vocalization during actual intercourse, although they were correlated during fore- and afterplay. These observations were further supported by responses to the question "what percentage of time do you make noise during sex, even when you are not going to have an orgasm?" where 25.3% of females reported making these noises when they were not going to orgasm over 90% of the time, 56.2% over 70% of the time, and 79.1% over 50% of the time.

Insert Table 2 about here

With regard to the reasons females gave for making copulatory vocalization, 66% reported using these to speed up their partner's ejaculation. This was done to relieve discomfort/pain, boredom, and fatigue in equal proportion, as well as because of time limitations. Importantly, 92% of participants felt very strongly that these vocalizations boosted their partner's self-esteem and 87% reported using them for this purpose. To further emphasize the secondary nature of a female's orgasm in their motivation towards engaging in sexual intercourse, 68% of females responded positively (i.e., > 5 cm approximate mid point on the 10 cm visual analogue scale used) to the question asking whether they would stay with an otherwise satisfactory partner, even if they never reached orgasm with them.

DISCUSSION

There have been several studies examining the physiological and psychological effects of female orgasm; however, there have been very few detailed studies concerned with the precise role of copulatory vocalizations in humans. The current studies were conducted in view of this. Findings were that all women in this study made copulatory vocalizations and that at least some of these were under conscious control.

One hundred percent of females sampled had experienced orgasm. However, these orgasms were not equally distributed across all sexual practices reported. Orgasm was most frequently experienced as the result of self manipulation, manipulation by the partner, oral sex delivered by the male to the female, and least often experienced as the consequence of vaginal penetration per se. These data, therefore, indicate that clitoral stimulation is of primary importance in this context.

Within sexual encounters themselves, females reported experiencing orgasm most frequently during foreplay and to a lesser extent during intercourse prior to male ejaculation, with the incidence decreasing still further at the point of male orgasm and after this event. High levels of vocalization were also seen during foreplay. In direct contrast with the pattern

seen for the incidence of orgasm, the intensity of vocalizations increased prior to the male orgasm and coincident with this. Once male orgasm had been achieved, however, lower levels of female vocalization were reported.

Together, these data clearly illustrate that human female orgasm and copulatory vocalizations are dissociated during sexual intercourse. This indicates that at least some of these vocalizations are under conscious rather than unconscious control, giving rise to the possibility that copulatory vocalizations in women fall into one of at least three categories. These are reflexive, honest or dishonest signals of their state of arousal. To reinforce the point concerning conscious control, nearly 80% of females reported making copulatory vocalizations even when they knew they were not going to orgasm themselves. As such, the expression of these vocalizations can and probably is used to manipulate the behavior of the partner and in particular to influence the timing of his orgasm.

This maneuvring of male behavior not only ensures the delivery of his ejaculate, but may also serve to end male copulatory effort under circumstances when the female is, for example, suffering discomfort or pain, boredom, fatigue, or simply does not have enough time for the encounter to last longer. Females appear to be fully conscious of the positive effects that their copulatory vocalizations have on male self-esteem and a very high percentage reported using them for this purpose.

Further advantages of the female being able to manipulate the presence / absence / timing of the male orgasm may include the reduction of her risk of incurring physical damage from roughness, abrasion, and ensuing infection. One of the effects of female copulatory vocalizations may be to promote male self-esteem, which may strengthen the pair bond, decreases the risk of emotional infidelity and abandonment, resulting in continued access to resources and protection.

These data were remarkably consistent with findings reported in non-human primates, where, for example, in Barbary macaques (*Macaca sylvanus*) the likelihood of male ejaculation is related to the intensity and speed of female vocalizations during copulation (Todt, Hammerschmidt, Ansorge, & Fischer, 1995; Todt & Pohl, 1984) and this appears to be independent of the male's copulatory effort (Pfefferle, Brauch, Heistermann, Hodges, & Fischer, 2008). These data were consistent with the proposal that male ejaculation is influenced by female copulatory vocalizations rather than vice versa and points towards the evolutionary origin of human female vocalizations in the context in our polygynandrous "past" rather than our pseudo-monogamous present (Pradhan et al., 2006).

In conclusion, current findings clearly demonstrate that at least one component of female copulatory vocalizations is not a reflexive consequence of orgasm which gives women the important advantage of being able to manipulate male ejaculatory behavior.

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Table 1

	Foreplay	Intercourse before partner's orgasm	Intercourse at same time as partner's orgasm	Intercourse after partner's orgasm	Afterplay
Orgasm **M ± SEM**	36.55±3.13	24.86±3.10[1]	13.20±1.96[1,2]	14.83±2.38[1,2]	10.58±1.98[1,2]
Vocalization **M ± SEM**	4.80±.24	5.72±.27[1]	5.41±.34[1]	3.54±.30[1,2,3]	2.67±.26[1,2,3,4]

1 = $p < .05$ vs foreplay; 2 = $p < .05$ vs intercourse before partner's orgasm; 3= $p < .05$ vs intercourse at the same time as partner's orgasm; 4 = $p < .05$ vs intercourse after partner's orgasm

Table 2

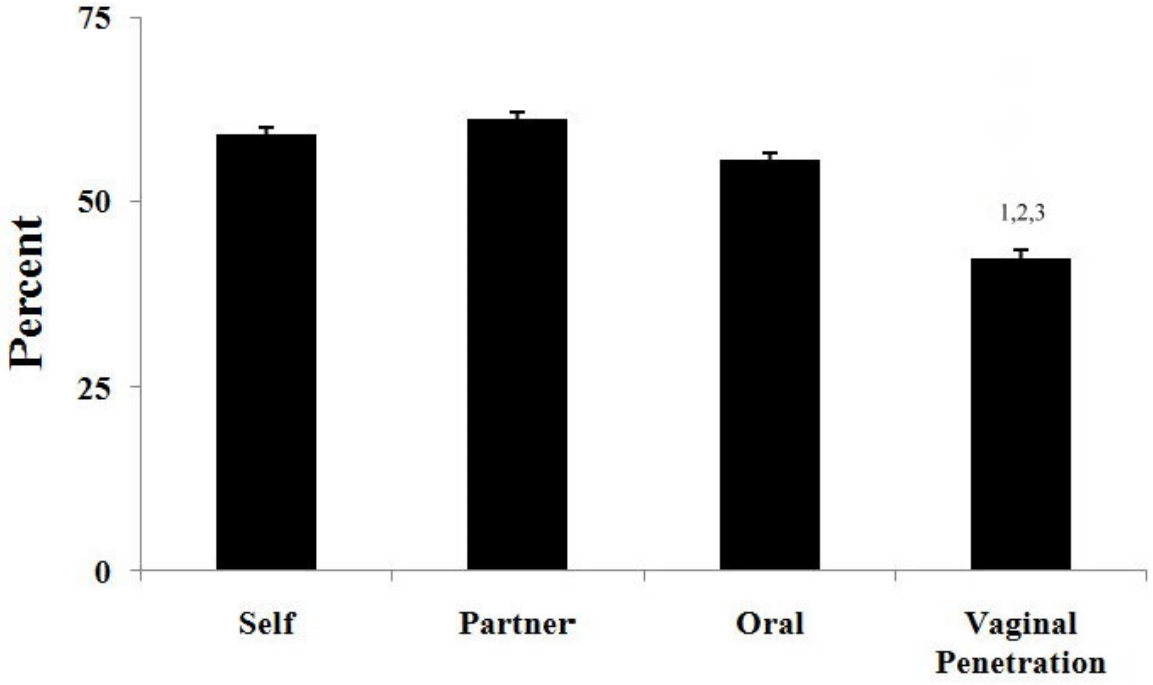
		Vocalization During				
		Foreplay	**Intercourse before partner's orgasm**	**Intercourse at same time as partner's orgasm**	**Intercourse after partner's orgasm**	**Afterplay**
Orgasm During	**Foreplay**	.39*	.11	.04	-.05	.05
	Intercourse before partner's orgasm	-.18	-.15	-.10	-.20	-.26*
	Intercourse at same time as partner's orgasm	-.08	-.01	.07	.20	-.15
	Intercourse after partner's orgasm	-.13	.08	.13	.21	.05
	Afterplay	-.10	-.03	-.12	-.05	.42*

Figure and table captions

Figure 1: Frequency of orgasm achieved through various methods. Data are expressed as means ± SEM.

Table 1: Frequency of reported orgasm and copulatory vocalization during various stages of sexual intercourse.

Table 2: Correlations between reported timings of womens' orgasm and vocalization.



1 = $p < .05$ vs self; 2 = $p < .05$ vs partner; 3 = $p < .05$ vs oral

Figure 1