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## Menstrual cycle phases and female receptivity to a courtship solicitation: an evaluation in a nightclub

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### Abstract

Previous research has demonstrated that female behaviors toward men or sexual interest are different across the menstrual cycle. However, women's receptivity to an explicit courtship solicitation still remained in question. In a field experiment, 20-year-old women were approached by 20-year-old male confederates in nightclubs and solicited to dance during the period when slow songs were played. A survey was administered to the women in order to obtain information about the number of days since the onset of previous menses. It was found that women in their fertile phase agreed more favorably to the dance request than women in their luteal phase or in their menstrual phase. © 2009 Elsevier Inc. All rights reserved.

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Several studies have shown that women's preferences for male characteristics change across the menstrual cycle. During the follicular phase of their menstrual cycle (when women are fertile), women showed greater preference for facial masculinity traits (Penton-Voak et al., 1999; Penton-Voak & Perret, 2000), for taller men (Pawlowski & Jasieńska, 2005), for men who expressed dominant behaviors (Gangestad, Simpson, Cousins, Garver-Apgar & Christensen, 2004) or scored high on a questionnaire-based dominance scale (Havlicek, Roberts & Flegr, 2005), for male voice pitch (Puts, 2004), for facial cues of men's testosterone (Roney & Simmons, 2008) or for olfactory cues associated with body symmetry (Thornhill & Gangestad, 1999). Such effects are theoretically explained as a consequence of increased attention to good gene markers during the period of the cycle when conception is possible. Danel and Pawlowski (2006) also found that in the high conception risk phase, women gave higher facial attractiveness scores to male faces than when they were in the luteal phase of their cycle. These researchers, who called this the "rose-tinted spectacle" effect, argued that women's attitudes toward men's facial appearance changed across the menstrual cycle

and could explain these variations in the facial ratings of men.

Further research also has demonstrated that female behaviors toward men or sexual interest is different across the menstrual cycle. Sheldon, Cooper, Geary, Hoard and DeSoto (2006) have found that women reported to be more prone to fantasizing about having sexual intercourse with a man other than their current partner during their fertile phase. Zillmann, Schweitzer and Mundorf (1994) and Slob, Ernste and van der Werff ten Bosch (1991) reported that human females were more interested in—and thought more often about—sex during the follicular phase. Laeng and Falkenberg (2007) found an increase in the mean pupil diameter for sexually significant stimuli during the fertile phase by using an infrared eye-tracking device. This effect was only found with women who did not use oral contraceptives. Grammer, Renninger and Fischer (2004) have found that women who had a relationship and attended discotheques without their partners tended to dress more provocatively if they had higher estradiol levels as they do in their fertile phase. Wilcox et al. (2004) have conducted a survey in which women in a stable sexual relationship and with an intrauterine device or tubal ligation collected daily urine specimens and kept daily records of intercourse and menstrual bleeding during three menstrual cycles. They found that the frequency of their intercourse increased during

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the follicular phase, peaking at ovulation and declining abruptly thereafter. Similarly, Harvey (1987) carried out a longitudinal study which found that female-initiated sexual activities peaked during the ovulatory phase. When Matteo and Rissman (1984) examined the daily sexual activity of sexually active lesbian couples over a 14-week period, they found an increase in sexual activity during the fertile phase independent of interactions with men, type of contraceptive method or fear of pregnancy. They also found a significant peak in sexual encounters and orgasms during this period.

These previous studies have found that women seem to show greater interest in men or sexual stimuli during the fertile phase of their menstrual cycle [see Pawlowski (1999) for review]. However, these studies did not focus on women's behavior, and their receptivity to male courtship solicitation in relation to their menstrual cycle was not directly tested. The various dependent variables tested in these studies included daily reports of sexual interest, sexual fantasies and forming impressions of men presented on a computer screen, and interest in attending social gatherings where women meet men. However, the behavioral response of women to a courtship solicitation made by an unknown man in relation to the phases of their menstrual cycle has never been tested before. This behavioral aspect is important given the fact that it could further our understanding of the effect of physiological internal states on human behavior. Based on previous research, we hypothesized that fertile women would agree more favorably to a man's courtship solicitation during the fertile phase of their menstrual cycle.

## 1. Method

### 1.1. Participants

The participants were 211 single young women (mean=20.12 years, S.D.=1.68) who were chosen at random in three nightclubs on the outskirts of the city of Vannes in France. This medium-sized town (more than 70 000 inhabitants) is located in the west of France on the Atlantic coast of Brittany and draws a young tourist crowd. The experiment was conducted continuously in June–July 2007 for a period of 5 weeks.

### 1.2. Procedure

The experiment was carried out when slow songs were played in the nightclubs (songs with a slow tempo and romantic lyrics were played twice during the night for 15–20 min in order to encourage flirting and encounters). In France, most of the romantic heterosexual encounters take place in nightclubs (Bozon & Héran, 2006). Three 20-year-old male confederates were instructed to ask a participant for a dance. The selection of the confederates was based on an earlier test in which the physical attractiveness of the confederates was rated by 20 young women who were instructed to evaluate the attractiveness of a group of 20 young men who volunteered to act as confederates. The evaluation was

made by using a full-face photo of each target. The women were instructed to evaluate each target on a scale going from 0 (*low physical attractiveness*) to 9 (*high physical attractiveness*). The three confederates with the highest average score for attractiveness and the lowest standard deviation were chosen by the experimenter. The confederates were unaware of the aim of the study. The experimenter simply told them that the study concerned the reasons why a young woman would accept to dance with a young man in a nightclub. After giving his consent, the confederate was given instructions about his role playing. He was instructed to approach a woman who was alone or only accompanied by another woman, or in a group of women. The confederate was clearly informed to avoid soliciting a woman who was accompanied by a man, or who was in group in which a man was present. The same verbal solicitation was made by the three confederates: "Hello. My name's Antoine. Do you want to dance?" This verbal solicitation was used because a previous survey showed that it approximates the formula commonly used in nightclubs (Guéguen, 2007).

If the participant refused, the confederate was instructed to say, "Too bad. Maybe another time?" Then the confederate was instructed to move 2 or 3 m away and to solicit another young woman. This distance was considered to be sufficient for avoiding suspicion since the level of the music was very high, the lighting was dim and it was extremely crowded in the nightclubs when the experiment was carried out. We found no difference in the rate of compliance at the beginning of the experimental session and at the end of the session. If the women had become aware of the nature of our intervention, we could expect that a decline in accepting the request would be observed as the experiment progressed. Such an effect was not observed, which led us to conclude that the participants were unaware of the nature of the intervention.

After each solicitation, a young female confederate who was posted nearby and observed the interaction, approached the participant by saying "Excuse me, I would like to know if you would answer a questionnaire concerning this young man (designating the confederate). We are actually conducting research on dating and romantic relationships and this young man works for us. He was instructed to ask you to dance. Would you mind completing a short survey to give us additional information about yourself?" If the participant agreed (two participants refused and they were excluded from the data analysis), the interviewer asked the participant to move to another area of the nightclub which was calmer and less crowded to answer a short face-to-face survey. The questionnaire dealt with details about age, heterosexual vs. homosexual orientation, the use of oral contraception, number of days since the onset of previous menses, pregnancy, and if she had a serious relationship with a man at the moment.

If the participant accepted the male confederate's solicitation, he was instructed to partially debrief her. She was told that she had participated in an experiment on social

behavior in a nightclub. Then the same young female confederate approached the participant and asked her to answer the questionnaire (five participants refused and they were excluded from the data analysis).

In both cases (accepting/refusing the dance solicitation), the participant was fully debriefed after answering the questionnaire. She was told that she had participated in an experiment on social behavior in which the effect of the menstrual cycle on the behavioral response of young women to a young man's courtship solicitation was measured. A preprinted information form was then given to the participant who was asked to provide information for the experiment (name, age, address, phone number). Information concerning the role of the experimenter and our laboratory web site was also included on the form. This information was given in compliance with the recommendation of the ethical committee of the laboratory which reviewed the project. Each participant was also given a business card with the name and address of the laboratory web site, as well as the personal phone number of the director of the laboratory. To date (the experiment was performed in summer 2007), no participant has phoned to obtain information about this research and some ( $n=16$ ) of the participants have offered to participate as confederates in future research on courtship behavior.

Many studies have found that the menstrual cycle has no effect on pill users when women were asked to judge facial masculinity traits (Penton-Voak & Perret, 2000), body symmetry (Thornhill & Gangestad, 1999) or reaction to sexually significant stimuli (Laeng & Falkenberg, 2007). Effectively, in France, a very large majority of young women use oral contraceptives when they have an affair with a man (87% between the ages of 18 and 25) and stop their oral contraceptives when the relationship is over (Jaspard, 2005;

Mossuz-Lavau, 2002). Individuals having an affair could then be more reluctant to accept to dance with the confederate. We therefore decided to exclude pill users and participants who reported having someone in their life. Based on the responses obtained in the survey, 27 participants were excluded from the analysis because they reported having someone in their life (25 of them were pill users). A group of 16 other participants were excluded because they reported having no one in their life but were pill users. Two participants were excluded because they reported to be homosexuals.

A standard 28-day model of the human menstrual cycle was used to assign the 169 participants to a group. Eight participants were excluded because they reported more than 28 days since the onset of their last menses. Days 1–5 of the cycle characterized the menstrual phase. Days 6–14 of the cycle characterized the fertile phase. Days 15–28 characterized the luteal phase. Ultimately, the data analysis was performed on 161 participants.

## 2. Results

The percentages and number of participants who accepted to dance with each confederate during the two sessions in which romantic songs were played are shown in Table 1.

Given the fact that the dependent variable measured was a nominal variable (i.e., the number of women who accepted to dance with the confederate) and the predictor variables were nominal too, a binary logistic regression was performed with compliance (agreeing to the request, not agreeing to the request) as the dichotomous dependent variable and confederates (Confederate 1, Confederate 2, Confederate 3),

Table 1  
Compliance to each confederate's request in relation to the women's menstrual phases and the two sessions during which romantic songs were played

	Cycle phase		
	Menstrual (Days 1–5), $n=32$	Fertile (Days 6–14), $n=51$	Luteal (Days 15–28), $n=78$
Percentage of women in each phase ( $N=161$ )	19.9%	31.7%	48.4%
<b>Confederate 1</b>			
First romantic songs session ( $n=26$ )	33.3% (2/6)	50.0% (4/8)	41.7% (5/12)
Second romantic songs session ( $n=29$ )	40.0% (2/5)	66.7% (6/9)	46.7% (7/15)
Total confederate 1 ( $n=55$ )	36.4% (4/11)	58.8% (10/17)	44.4% (12/27)
<b>Confederate 2</b>			
First romantic songs session ( $n=24$ )	25.0% (1/4)	70.0% (7/10)	40.0% (4/10)
Second romantic songs session ( $n=26$ )	50.0% (3/6)	62.5% (5/8)	41.7% (5/12)
Total confederate 2 ( $n=50$ )	40.0% (4/10)	66.7% (12/18)	40.9% (9/22)
<b>Confederate 3</b>			
First romantic songs session ( $n=28$ )	40.0% (2/5)	62.5% (5/8)	26.7% (4/15)
Second romantic songs session ( $n=28$ )	16.7% (1/6)	37.5% (3/8)	35.7% (5/14)
Total confederate 3 ( $n=56$ )	27.3% (3/11)	50.0% (8/16)	31.0% (9/29)
Total first romantic songs session ( $n=78$ )	33.3% (5/15)	61.5% (16/26)	35.1% (13/37)
Total second romantic songs session ( $n=83$ )	35.3% (6/17)	56.0% (14/25)	41.5% (17/41)
Total ( $N=161$ )	34.4% (11/32)	58.8% (30/51)	38.5% (30/78)

The numerator in parentheses is the number of participants who accepted to dance with the confederate and the denominator is the number of participants solicited by the confederate in the phase condition.

cycle phases (menstrual, fertile, luteal) and romantic songs session (first or second session) as covariates. A significant effect of the menstrual phases was found (Wald (2)=6.68,  $p=.04$ ) revealing that the difference between the fertile phase and the menstrual phase was significant ( $B=.949$ ,  $p=.04$ , OR=2.583) and the difference between the fertile phase and the luteal phase was significant ( $B=.908$ ,  $p=.02$ , OR=2.480). No statistical difference was found between participants in the menstrual phase and participants in the luteal phase ( $B=.041$ , ns, OR=1.042). Neither the effect of the other covariates (confederates and songs session) nor the interaction of these covariates with the experimental condition was significant ( $B$  from .166 to  $-.474$ , ns, OR from 1.018 to .622).

### 3. Discussion

In this field experiment, we found an effect of the menstrual cycle on compliance to the courtship request made by the confederates. We found that young women in their fertile phase of the menstrual cycle agreed more favorably to an explicit courtship request than women in their luteal or their menstrual phase. These results are congruent with previous research that found that during the fertile phase of their menstrual cycle, women expressed more verbal interest about sex (Zillman et al., 1994; Slob et al., 1991) or paid more visual attention to sexually significant stimuli (Laeng & Falkenberg, 2007). However, in these previous studies, the women did not interact with men and were not solicited by men to start a courtship relationship with them. To our knowledge, this is the first direct and ecological evidence of the existence of estrus on women's behavioral reaction to a romantic solicitation made by an unknown man. The results could, however, be explained by the fact that women in the menstrual and luteal phases of the cycle are more likely to have cramps or to feel irritable than during the fertile phase. This argument is relevant and needs further experiment in order to evaluate this aspect. However, this argument does not explain why the level of compliance to the survey request made by the female interviewer remains constant in the three phases. As mentioned in the Method section, only two women refused to participate in the survey. Someone who has cramps or feels irritable would certainly be reluctant to accept this type of request. Moreover, such a person is not really motivated to go to a nightclub. Such explanations, however, are speculative, and precaution should be taken with this interpretation given the fact that, in this experiment, no measure of cramps or irritability was done.

This behavioral effect of the female cycle is important given the fact that it again tends to prove that biological factors such as hormonal fluctuations have an effect on the female response to a courtship approach instituted by a man. Previous research has found that fluctuating hormonal levels affect human sexuality. When examining daily reports of women's sexual activity, Wilcox et al. (2004), Harvey (1987)

and Matteo and Rissman (1984) found an increase in sexual activity during the fertile phase. This effect is compatible with an evolutionary viewpoint. It is logical that a greater desire to engage in sexual activity occurs during the period when the woman's fecundity is maximal. Thus, in the same way, it is logical that women are more receptive to a courtship request made by men during this period of maximum fecundity. However, given the nature of our methodology, we can speculate that cognitive factors may be influenced by hormonal fluctuations. Effectively, in our experiment, compliance to the confederate's request was not found in the same proportion depending on the women's menstrual phases. Thus, in this experiment, the effect cannot be explained by variations in women's interest in male physical characteristics in relation to their menstrual phases. It has been found that during their fertile phase, women show greater preferences for facial masculinity traits (Penton-Voak et al., 1999; Penton-Voak & Perret, 2000), for taller men (Pawłowski & Jasińska, 2005) or for olfactory cues associated with body symmetry (Thornhill & Gangestad, 1999). It has also been found that during their fertile phase, women express greater interest for certain male behaviors. Gangestad et al. (2004) have found that during their fertile phase, women preferred men who expressed dominant behaviors. In this experiment, the same confederates were used and the interest shown for each of them varied in relation to the women's menstrual phase. However, the facial traits, the body symmetry and the men's height remained constant in our experiment, because different partners were not proposed to the women. Thus, according to Harvey (1987), it is possible that variations in a woman's behavior toward the same confederates can be explained by variations in the cognitive processes caused by hormonal fluctuations. A recent study by Danel and Pawłowski (2006) has found that, in their high conception risk phase, women give higher facial attractiveness scores to a male face than in the luteal phase of their cycle. These authors suggest that the proximal mechanism related to different evaluations of male attractiveness by women in different phases of the menstrual cycle could be influenced by variations in hormonal levels. During the fertile phase, a woman increases her chances of conceiving. Therefore, in order to increase this chance, it would be necessary for her to change her attitude toward a man. By increasing the rating of a man's facial attractiveness during the fertile phase, the probability that conception will occur would be higher because a good-looking man is more attractive for intercourse. It is possible that this effect on the assessment of the confederate's facial attractiveness found by Danel and Pawłowski (2006) was activated during the fertile phase of the women in our experiment. If the confederate becomes more physically attractive during the fertile phase, the probability that a woman would accept to dance with him would also increase. Facial attractiveness was not measured in this experiment, but given the results found by Danel and Pawłowski (2006), it will be interesting in future studies to explore the link between the perception of

the physical attractiveness of a man in relation to the woman's menstrual cycle and the receptivity to a courtship request made during these different phases.

Effectively, this study has some limitations. Given the difficulty of using a hormone marker test such as saliva, blood or urine in a nightclub, we relied on self-report as the measure used to calculate the menstrual cycle phases. Hence, the analysis was based on the days since the last menses reported by the subject, but the accuracy of this information was not verified here. Future studies could identify these different menstrual phases more precisely. A follow-up interview/telephone call with the participant could be used to determine the actual starting date of the subsequent cycle, and the menstrual phase at the time of the study could then be calculated. Using hormone markers the following morning with volunteers would also be worthwhile to determine these different phases with precision. A second limitation is that our study did not identify the mechanisms that influence the level of compliance to the confederate's request in relation to their menstrual phase. It will be important in future studies to examine the level of compliance depending on whether or not the woman has a relationship with a man. It will be important to examine the cognitive changes associated with this courtship solicitation in relation to the menstrual phase. We do not know here whether the fertile phase led the women to perceive the confederates to be more sexy or more physically attractive, or if their compliance to the request was explained by a greater desire to begin a relationship or to have sexual intercourse with the confederate. Further studies in which the role of the level of the confederate's physical attractiveness or the sexual interest aroused by the confederate could help us to understand the behavioral effect found in this experiment.

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