The Double Life of Women

The invisible turns of the reproductive cycle shape the everyday behavior of women and men. A woman's cycle influences not just her preference in a partner, but her personality as well.

By Annie Murphy Paul, published on November 01, 2010 - last reviewed on June 03, 2014

Step into any bar or party and it won't take you long to spot her. She's the woman with the ringing laugh, the daring clothes, the magnetic appeal that has drawn a circle of admirers around her. If the room were a solar system, she would be the sun—and at the outer reaches, you notice, are several other women seated quietly in her shadow.

Why does this woman command all the attention? Psychologists, image experts, and dating advisers propose a host of explanations: It's her extraverted personality, her come-hither look, her approachable persona. But an evolutionary biologist observing the scene would offer a more surprising interpretation, one that may help explain barroom dynamics and much more: It's her "real" time of the month. The belle of the bar is likely reaching peak fertility, while her drabber companions are slogging through a non-fertile phase.

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Not long ago, such an explanation would have been intellectual heresy. Sure, biologists could tell when chimpanzees were ready to mate: Once every 28 days, the genitalia of female chimps swell and turn a dramatic shade of pink. And estrus, as the state of sexual receptivity is known, is

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also readily apparent in less exotic animals, as anyone who's seen a house cat in heat can attest. Every female mammal on earth, it was believed, advertises her period of greatest fertility—except the female human. In woman, estrus was "lost" somewhere in the long meander of evolution. "That's the conventional, traditional view of human estrus," says Randy Thornhill, professor of biology at the University of New Mexico. "But it turns out to be wrong."

Over the past decade, evolutionary biologists and psychologists have uncovered abundant evidence that women do, in fact, provide clues to the timing of ovulation, the moment when an egg is released and ready to be fertilized. Though these changes are far subtler than those in other species, they have a powerful effect on women's perceptions, preferences, and behavior—and the reaction of others to her. Monthly shifts even affect *men's* feelings and actions. Indeed, the invisible but influential turns of the reproductive cycle shape the everyday behavior of us all. "Human ovulation is not an observable event, and men and women have no explicit awareness of it," says Martie Haselton, associate professor of communication studies and psychology at UCLA. "But the effects of the menstrual cycle on human behavior are surprisingly strong."

Take, for example, women's preferences in male partners. We may think that each woman has an unchanging "type"—but it turns out that women prefer quite different kinds of men depending on whether or not they are fertile. In the two days or so of the ovulatory phase—the time when women are most likely to become pregnant—they gravitate toward men with more "masculine" traits. That means a man who sports a leaner, V-shaped body, and a face with a squarer chin, straighter, heavier eyebrows, and thinner lips; one who speaks in a lower-pitched voice, and displays more aggressive, dominant behavior. When a woman is in the follicular or luteal phases—during which the uterus sheds its lining and then builds it up again, and in which she generally cannot become pregnant—she prefers men with softer features, less-defined bodies, higher voices, and a gentler manner.

So pronounced are these preferences that Thornhill and his University of New Mexico colleague Steven Gangestad have proposed that women actually have two sexualities: one when they're ovulating, and another during the rest of the month. These distinct modes emerge out of two competing reproductive goals. "Women want to get the highest-quality genes for their children," says Thornhill, and high genetic quality in a man is indicated by his degree of testosteronization—the extent to which the male hormone testosterone has affected his brain, his face, and the rest of his body.

Once she is pregnant or in the non-fertile part of her cycle, however, a woman's aims do an abrupt about-face: She wants to secure the most generous and stable source of goods for herself and her offspring. Now the nice-guy provider starts to look appealing. "When women are in what we call the extended-sexuality phase, their preferences shift towards men who appear to have a willingness to share resources like food and protection with her and her children," says Thornhill.

The influence of the menstrual cycle on women is apparent not only in

whom they desire but in how they act. Women who are in the ovulatory phase show more interest in erotic materials than women in the luteal or follicular phases; given a choice of movies to watch, they select ones with more romantic or sexual themes. They take more care with their appearance, and they choose more revealing clothes to wear. In 2004, a group of researchers from the University of Vienna digitally analyzed pictures of 351 women going out to Austrian nightclubs and collected a saliva sample from each. Women whose clothes were tight or showed a lot of skin had higher levels of estradiol, a female hormone that is elevated around the time of ovulation.

It even appears that ovulating women are more receptive to the advances of men—handsome French men at least. In a study led by psychologist Nicolas Guéguen of the University of South Brittany, 22 percent of women in their fertile phase accepted an attractive man's invitation for a date, while only 8 percent of women who were not ovulating said yes. Perhaps the fertile women were open to a stranger's overtures because they were feeling especially good about themselves; studies by Martie Haselton and others have found that women judge themselves as sexier and more attractive when they are in the ovulatory phase than at other times of the month.

And they may actually *be* more attractive. Women's faces and bodies undergo subtle changes over the course of the menstrual cycle, research reveals. On fertile days, their voices go up in pitch, their breasts become more symmetrical, and their waist-hip ratio is accentuated (the ratio of the circumference of a woman's waist to that of her hips is a marker of general health and fertility). Subjects shown pictures of the same woman taken over the course of a month pick the one from her fertile period as the most attractive, and men offered T-shirts worn by women in different phases say that the one worn during ovulation smells best.

Whether they're responding to biochemical cues like body odor, to changes in women's appearance, or to women's altered attitudes and behaviors, research shows that men act differently according to the menstrual phase of the women they encounter. A study by Thornhill and Gangestad reported that a man with an ovulating female partner is more likely to engage in mate-guarding behaviors, such as paying close attention to her whereabouts and calling her cell phone at random times to see what she's up to. He is also more agreeable in his interactions with her, and more likely to give her gifts.

One of the most arresting studies of male responses to female fertility cues was conducted by Geoffrey Miller, an associate professor of psychology at the University of New Mexico. Miller found that 18 "lap dancers"—strip club workers who perform provocative dances for male customers—who were menstruating earned an average of about $184 per five-hour shift, while those who were ovulating earned about $354—almost twice as much money, offered by clients who were told nothing about the dancers' cycles.

Moreover, dancers taking birth control pills earned about $193 per shift—more than menstruating women, but much less than women in estrus—and their tips showed no variation across the month. "Hormonal

contraception places the female body in a state of pseudo-pregnancy, and it seems that on some level the male customers recognized the women's biological status and responded to it in economic terms," says Miller. Other studies have demonstrated that the pill effectively eliminates the biological and psychological changes associated with estrus, with unexplored effects on women's long-term mate choices.

Modern contraception, then, may be disrupting an adaptation forged over many thousands of years of evolution. But the precise nature of that adaptation remains to be figured out. There are three principal theories, the first of which is known as the "signaling hypothesis": With her tight clothes, alluring scent, and seductive waist-hip ratio, a woman in estrus is sending out a signal not unlike the chimp or the cat in heat. "Obviously, women who didn't attract mates and have sex when they were fertile were not going to leave behind any offspring at all," notes Kim Wallen, a professor of psychology and behavioral neuroendocrinology at Emory University.

Yet there's reason to think that matters are more complicated than that. Rather than a simple exchange of information between the sexes—the woman communicates that she's ready to mate, and the man obliges —something altogether more shrewd and devious seems to be afoot. According to this hypothesis, men and women are engaged in an eons-old co-evolutionary race, in which one sex makes a move and the other matches it.

By identifying a female's fertile phase, a male can maximize his efforts to impregnate her and to keep other males from doing the same. Women, meanwhile, are strongly motivated to conceal the timing of ovulation. If a man isn't sure when his partner is fertile, he can't restrict her movements or limit her interactions. Hidden ovulation also allows females to discreetly mate with different partners, since none of the potential fathers can be sure of the paternity of the offspring. Her efforts at subterfuge, however, are always incomplete. "It's difficult for women to fully conceal all signs of fertility—some of them inevitably leak out," says Martie Haselton. "We call this the 'leaky cues hypothesis.'"

In another spin of the evolutionary wheel, men have evolved to recognize the signs women let slip. "Human males can detect estrus—not as well as male wombats, but at rates reliably higher than chance," says Thornhill. Research published earlier this year by psychologists Saul Miller and Jon Maner of Florida State University reported that men's testosterone levels spiked after smelling a T-shirt worn by an ovulating woman.

A third hypothesis is trickiest of all. It proposes that the pattern of changes in women that accompany the menstrual cycle is itself a marker of youth and reproductive health (in addition to a sign of transitory fertility), so women have evolved to display cyclical changes, whether they are truly fertile or not.

The effects of the menstrual cycle aren't confined to dating and mating. Female gonadal hormones "not only influence ovulation and reproductive behavior but also affect cognitive functions, affective state, vulnerability to drugs of abuse, and pain sensitivity," notes psychiatrist and neuroscientist Karen Berman of the National Institute of Mental Health. Women who take

stimulants such as amphetamine and cocaine, for example, will be more strongly affected by the drugs if they're in the follicular (pre-ovulatory) phase of their menstrual cycle. Women tend to consume more calories, especially from sweets, when they're in the luteal phase. And women seem to take more risks, and experience more pleasure when those risks pay off, during fertile days of the month.

An unpublished study by economists Matthew Pearson and Burkhard Schipper found that in a series of sealed-bid auctions set up by the experimenters, women bid significantly higher amounts at times when they were more likely to conceive. Pearson and Schipper, both professors at the University of California, Davis, speculate that women are "predisposed by hormones to generally behave more riskily during the fertile phase of their menstrual cycle"—a tendency that originally functioned "to increase the probability of conception, quality of offspring, and genetic variety," but which now extends into other domains of life.

Even as these monthly shifts affect women's everyday experience, they may also have larger consequences—for the conduct of scientific investigations, for example. For decades scientists have been puzzled over inconsistencies in the reports of research on gender differences. A review of experimental pain studies, for instance, found that women felt more intense pain, at lower thresholds, than men—but only about two-thirds of the time. Psychologists Jeffrey Sherman and Linda LeResche of the University of Washington suggest that this may be because experimenters were ignoring a crucial variable. "Few studies on sex differences before 1995 recorded the time in the menstrual cycle when experimental manipulations took place, or accounted for the variability associated with female reproductive hormones during the cycle," write Sherman and LeResche. More recent investigations have begun taking the menstrual cycle into account when evaluating women's perceptions and responses, and have found that women are more sensitive to pain during phases when estrogen levels are low.

The monthly revolutions of women's reproductive cycles may also help account for their heightened vulnerability to psychological disorders like depression and anxiety. Before puberty, psychiatric conditions are far more common in boys than in girls. But once the reproductive years begin, women become the more susceptible sex, and it's believed that sex hormones account for much of this difference. Estrogen and progesterone, which rise to their highest levels when women are ovulating, have anxiety-reducing effects, and the subsequent drop in the levels of these hormones may leave women more sensitive to stress than men. Although higher levels of estrogen and progesterone generally give reproductive-age women some protection against psychotic illnesses like schizophrenia, the monthly hormonal "withdrawal" they experience seems to make them more vulnerable to mood disorders such as anxiety and depression.

All this talk of shifting moods and monthly changes may well raise a concern: Will such research reinforce old stereotypes of women as hysterical, irrational, at the mercy of their hormones? Quite the opposite, says Geoffrey Miller. "The traditional and rather patronizing male view was that women are fickle, that their preferences are random and arbitrary," he says. "Now it turns out that what looked like fickleness is actually deeply

adaptive, and is shared with the females of most animal species. There is a deep logic to the shifts in female desire."

This logic operates below our conscious awareness, of course: Many generations of humans have faithfully followed it without knowing a thing about evolutionary theory. But once we do learn about the effects of the menstrual cycle on our perceptions and behavior, we can put that knowledge to good use. Women can keep a journal of their fluctuating moods and desires over the course of a month, matching up the entries with their cycles to identify a pattern; according to Miller, many female evolutionary biologists keep such diaries.

Gordon Gallup, an evolutionary psychologist at SUNY Albany, suggests that women use knowledge of their monthly cycles to plan important events. "If you have a first date coming up, or even a job interview, try to time it to coincide with your most fertile period," he advises. "The initial impression you make may be affected by the stage of your menstrual cycle." By the same token, says Gallup, if you're in a line of work in which your income depends on snap evaluations by others—a waitress, say, or a lap dancer—taking birth control pills "is like shooting yourself in the foot," since you miss out on the bountiful tips garnered by women in estrus.

Psychologist Kim Wallen notes that women can also use knowledge of their menstrual cycles to manage their sexuality. "Research shows that women are more likely to take social risks around the time of ovulation," he says. "Women who know that's the case can choose not to put themselves in risky situations, such as drinking too much at a bar or party, at that time of the month." And if a woman should feel attracted to a man who would make an inappropriate partner, says Wallen, she can restrain her impulse, knowing that soon enough her preferences will shift and her desire will wane. "The adolescent male doesn't have that option," he points out. "If he lusts after someone today, he'll still be lusting after her next week and next month."

A familiarity with the changes associated with estrus can even help us make sense of our feelings about long-term romantic partners. Women who experience an attraction to men other than their husbands or boyfriends need not conclude that there's anything amiss in their relationships, says Martie Haselton. "If a woman understands the evolutionary underpinnings of these impulses, she can reassure herself that these feelings don't mean that she doesn't love her partner or isn't 'meant' to be with him," she says. "The goal she's trying to achieve—to have a stable, loving, monogamous relationship—is not the goal that evolution has built her to act upon."

Although we can consciously choose to resist evolution's dictates, says Haselton, "the fingerprints of evolution are all over the behavior we engage in today."

A Pregnant Pause

Forget decorating the nursery. Gestating a fetus brings out far more adaptive concerns and behaviors in women.

If the phases of the menstrual cycle produce distinctive behaviors in

women, so too do the nine months of pregnancy. During gestation, evolution's aim is to protect mother and fetus from disease, infection, and contamination. A pregnant woman is vulnerable to such dangers, especially during her first trimester, because her immune system is suppressed to prevent it from attacking the fetus as a foreign body.

Daniel Fessler, an anthropologist at the University of California, Los Angeles, has studied a suite of such protective behaviors that accompany pregnancy. Women in the critical first trimester report more intense feelings of disgust than do women who are farther along in their pregnancies. Such sensitivity likely "compensates" for women's increased vulnerability by prompting them to avoid potential sources of illness.

For the same reason, Fessler has found, women make different dietary choices when they are pregnant. The food cravings and aversions, odor sensitivity, and nausea that many women develop during pregnancy all help protect the fetus from dietary pathogens. Meat is a principal source of such dangerous organisms, Fessler notes, so it's no surprise that it's high on pregnant women's list of foods to avoid. Women may even spurn meat during some phases of their menstrual cycle, leading Fessler to a bold theory: Our male ancestors ate more meat than their female counterparts, leading them to become our species' principal hunters, leading in turn to the gender-based division of labor that we still largely practice today.

There is evidence that pregnancy leads women to treat people, and not just nutrients, in particular ways. Benedict Jones, a professor of psychology at the University of Aberdeen in Scotland, showed pictures to 115 pregnant women and 857 nonpregnant controls. The women were asked to pick which of two faces they preferred in the photographs; one set had been digitally manipulated to look healthy, the other to look diseased. Women who were pregnant showed a stronger preference for the healthy-looking faces—evidence, Jones argues, that pregnant women are unconsciously motivated to avoid people who may be carrying infectious diseases that could disrupt fetal development.

In our ancestral past, the individuals bearing illnesses to which we lack immunity were more likely to be strangers, people outside our clan or tribe. In a 2007 experiment, Fessler found that "ethnocentrism"—the tendency to prefer the members of one's own group—peaked among women in their first trimester of pregnancy. Shown an essay by an American praising the United States, and an essay critical of the U.S. written by a foreigner, women early in their pregnancies reported stronger pro-American feelings.