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The eyes have it

Jennifer Ackerman. This is an edited extract from *Sex Sleep Eat Drink Dream: a Day in the Life of Your Body* by Jennifer Ackerman. A new edition was published this week by Scribe.

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That look across the crowded room can tell us so much, says Jennifer Ackerman.

Does a face in the party crowd catch your eye, in the way Tierra del Fuegians use their expression "mamihlapinatapai"? Guinness World Records says the world's most succinct word refers to the act of "looking into each other's eyes, each hoping that the other will initiate what both want to do but neither chooses to commence".

What draws two people together? Scientists have found that face and gaze visually signal mutual interest, health, even good genes. We've been taught not to judge a book by its cover, but Shakespeare was right: one reads in a face many strange matters - identity, expression, even intent. We all do it, probably hundreds of times a day.

Take gaze. We're the only animals whose eyes signal where we look. The whites of our eyes highlight the iris and allow us to make eye contact, telling us instantly the direction of someone's gaze. This enhances "gaze signalling", a key cue for communication and co-operative behaviour. A team at University College, London, found a direct gaze from an unfamiliar attractive face enhances its appeal and activates our brain's dopamine circuits, which are dedicated to predicting reward. If the face looks away, this brain activity diminishes. The heightened dopamine activity is not rooted in the attractiveness of the gazer per se, but in the potential for interaction signalled by eye contact - mamihlapinatapai.

Whether a meaningful glance leads to more intimacy depends on snap judgments we unwittingly make. Who we find attractive, says the latest research, may lie in heartless formulas for seeking healthy partners with good genes. We carry these formulas buried in our minds and respond to signals that promise to fulfill them.

So, what are we looking for? Facial symmetry, for starters. Most of us prefer faces with neat bilateral symmetry, which may signal a strong immune system and the absence of genetic problems.

The masculine or feminine quality of a face is another beacon. A team of Scottish and Japanese scientists recently showed that men and women are attracted to more feminine faces of the opposite sex. In the sculpting of our faces in utero and throughout life, testosterone helps to carve the more chiselled masculine facial features of men; oestrogen helps to shape the softer, rounder features of women. The researchers manipulated photographs of faces by enhancing or diminishing differences between the sexes. Subjects rated more honest and co-operative those male and female faces that had been feminised - rounded, with smaller jaws. Feminised male faces, in particular, seemed to convey to women a "good father" signal.

News of reproductive status may also figure in facial attraction, at least for men. Craig Roberts and a team at England's University of Newcastle reported that men find especially appealing the faces of ovulating women. It had long been thought that women didn't reveal when they were ovulating with any kind of visual signal. But Roberts's team showed that men judged photographs of women's faces taken in their fertile phase to be more alluring than photos of the same women taken in the luteal, or non-ovulating, phase.

"This increase in facial attractiveness is subtle," Roberts says. It involves variations in lip colour and size, pupil dilation, and skin colour and tone. But, he says, in evolutionary terms, even such understated effects can have a substantial impact on reproductive success by raising a woman's profile at a time in her cycle when the probability of conception is highest.

So, a direct gaze, a feminine, symmetrical face, full lips, dilated pupils, then throw in a smile. But something else is going on here. Well below our visual radar and beneath the screen of consciousness

Let
122

are other messages - chemical signals that convey far more than we imagined.

As you wander among guests at a party, consider what you're taking in as social cues. It may seem all talk and visual clues. In social evaluation and attraction, however, smell may be at least an equal partner. "In my lectures, I ask whether the ladies in the audience are turned on by the smell of certain men," says Mel Rosenberg of Tel Aviv University. "Invariably, I receive a positive response."

To determine whether attractiveness of the opposite sex was influenced by smell, a team of British scientists asked 32 young women to rate male faces on aspects of attractiveness, then exposed them to a dab of male underarm sweat. Women found the men significantly more appealing.

Our olfactory system is exquisitely sensitive, capable of distinguishing tens of thousands of odorants in vanishingly small amounts. Women, and particularly those of reproductive age, are better at it than men, say Monell Chemical Senses Centre scientists in Philadelphia. This boost in sensitivity may result from female sex hormones that kick in at puberty, and likely serves to help women detect poisons in food while pregnant and to bond with children and mates.

According to Michael Stoddart, a University of Tasmania zoologist, humans are among the most highly scented of the apes. But most of our normal, healthy body odour, a musky scent, issues from sebaceous and apocrine glands clustered in our armpits, or axillae, which start to function only at puberty.

Apocrine glands secrete an oily substance that is odourless until the vast populations of micro-organisms living in and around the underarm hair follicles and shafts break it down to produce musky-smelling compounds - among them fatty acids much like those that serve as sex signals in other animals. Why the underarm? Possibly because we walk erect and scents from our sexual organs are not usually perceptible.

Here's a new view of that party crowd. Issuing from the armpits of friends, colleagues, distant acquaintances, are waves of airborne chemicals that may affect your perception, behaviour, mood, even libido and choice of mate. Pheromone - from the Greek pherō, to transfer, and hormon, to excite - was coined half a century ago to describe powerful chemical signals released and received by individuals of the same species. Mice, for instance, send vivid signals in body fluids such as urine, and, according to a new report, in sex hormones secreted from the eyes. These invisible messengers may excite mating, block pregnancy, and accelerate puberty.

The idea that humans participate in such invisible communication has met great scepticism. But the evidence mounts. Among the first came in 1971, when Martha McClintock showed that menstrual cycles of roommates in a Wellesley College dormitory tended to synchronise over time.

Recently McClintock's team discovered that odours from breastfeeding women affect women who aren't lactating - influencing not only the length of their menstrual cycles but also their libido. Exposed to breastfeeding compounds, non-lactating women reported a significant boost in sexual desire.

A little underarm male sweat exposed to the noses of women may influence the latter's perception, mood, and menstrual cycle. George Preti and his Monell Centre colleagues did just this and then monitored their mood and their blood levels of luteinising hormone, which affects the duration of menstrual cycles and the timing of ovulation. Normally the pituitary gland releases this hormone in pulses that increase in size and frequency at the approach of ovulation. The women subjected to male underarm secretions experienced acceleration in the onset of their next hormonal peak.

Preti and his team speculate that early humans may have had little time to spend in the company of mates; the female reproductive system evolved so that it revved up the approach of ovulation when a woman caught a whiff of her man.

And here's news to lift the nostrils: a woman may reveal when she is ovulating not just by her facial features but by her smell. Scientists asked women to wear a T-shirt for three consecutive nights during ovulation and another T-shirt for three nights during the luteal phase. Men judged as more pleasant and sexy the odour of a woman's shirt worn during the fertile phase.

Until lately, how we sensed such subtle pheromones was a black box. Science had believed mammals detected them only with the help of a vomeronasal organ - a specialised olfactory system that does not function effectively in humans. But in 2003, Lawrence Katz, a Duke University neuroscientist, reported that neurons in the body's main olfactory system can detect pheromones. Several studies have since confirmed we don't need a special organ to sense pheromonal vibes; our normal smell machinery may serve nicely to sniff out the chemicals.

Just what other signals are you broadcasting as you buzz through the beehive of a social gathering? Nothing less than your deepest personal identity - and, possibly, your status as an acceptable genetic mate. Like mice, we seem to possess individual odour "signatures" which can be read in great detail by those of the opposite sex and be used in partner selection.

128 106

Women are especially adept at identifying the odour of relatives, their children, and their mates, Rosenberg says. The source of our singular odour is a key set of genes known as the major histocompatibility complex (MHC), which plays a big role in our ability to fight disease. These are the most diverse genes, the better to deal with the multiplicity of bacteria, viruses, and other potentially harmful germs. Women tend to prefer the odour of men whose MHC genes differ from their own. By selecting partners with genes different from our own, we can avoid inbreeding and enhance our children's disease-fighting abilities.

What's remarkable is that women possess an olfactory system so exquisitely sensitive that it allows them to perceive tiny genetic differences. Such scientific revelations may seem ultimate examples of the power of science to "clip an angel's wings, conquer all mysteries by rule and line", as Keats wrote. But I don't find them so. For me, they enhance the mystery.

We think we make our choices wilfully, consciously, through careful contemplation of the options; we think we know all that sways us. But in truth, part of what makes your marrow beat and your blood leap in wordless song may be a deep-down, chemical intuition aimed at protecting your unborn children.

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107

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