

The Consuming Instinct

What Darwinian consumption reveals about human nature

Gad Saad

Research Chair in Evolutionary Behavioral Sciences and Darwinian Consumption

John Molson School of Business

Concordia University

1455 de Maisonneuve Blvd. West

Montreal, Canada H3G 1M8

gadsaad@jmsb.concordia.ca

EDITOR'S NOTE. In this engaging talk given last February on a particularly cold and blustery day at Texas Tech University, Professor Gad Saad of Concordia University discusses his work in the area of evolutionary consumption. In making the case for understanding consumerism from a Darwinian perspective, Saad addresses several key tenets from his books *The Consuming Instinct*¹ and *The Evolutionary Bases of Consumption*.² In particular, Saad argues that: (1) many consumption acts can be mapped onto four key Darwinian modules (survival, mating, kin selection, and reciprocal altruism); and, (2) cultural products such as song lyrics and movie plotlines are fossils of the human mind that highlight a shared, biologically based human nature. In this wide-ranging inquiry, Saad summarizes several of his other empirical works, including the effects of conspicuous consumption on men's testosterone levels³ and how the ovulatory cycle in the human female influences consumption.⁴ Overall, Professor Saad contends that an infusion of evolutionary and biologically based perspectives into the discipline of consumer behavior and related government regulatory policies yields myriad benefits, notably greater consilience, more effective practices, an ethos of interdisciplinarity, and methodological pluralism.

Thank you all for being here. So this is actually the title of my book, *The Consuming Instinct*. In this talk I'll be giving you a brief overview of how we apply evolutionary theory to consumer behavior, so let me get into it right away.

So are consumers born or made? Of course, in a sense this is an inappropriate question because ultimately we are an inextricable mix of our genes and our unique environments. If you look at the images of a diverse set of people, you can tell they come from different racial backgrounds, different ethnicities, they have different religions, different cultures—there are endless ways by which we could generate cross-cultural differences. But underneath these cross-cultural differences there is a bedrock of human universals⁵ that

doi: 10.2990/32_1_58

actually makes each individual share a profound biological heritage. And so to use one of E. O. Wilson's observations (p. 167),⁶ "genes hold culture on a leash," and I argue that the genes ultimately hold consumer behavior on a leash. So yes, the environment matters but certainly we cannot ignore the import of biology and evolutionary theory.

Continuing with this theme of do we learn our consumer behaviors or are some of these behaviors innate, I like to use the example of toy preferences because social constructivists love to argue that toys are, if you like, one of the first steps by which we are socialized about our gender roles. Little Johnny learns to play rough with the blue truck, Little Suzy learns to play in a nurturing way with the pink doll and that starts off a cascade of socialization. Let's see if that actually holds up to further scrutiny. If you look at

some of the research in cognitive psychology, kids in the pre-socialization stage, meaning by definition they don't yet have the cognitive capacity to be socialized, will display those sex-specific preferences.^{7,8} Little boys will gaze at typically "male toys" for longer—similar for little girls with sex-specific toys, so by definition this means that they couldn't have been socialized since they don't yet have the cognitive development to be socialized. So that, if you like, is the first nail in the coffin of the social constructivist's theory.

Moving on, there is an endocrinological disorder called congenital adrenal hyperplasia (CAH), which basically masculinizes little girls who suffer from this disorder—they have masculinized morphologies and masculinized behaviors. In fact, little girls who suffer from CAH end up having a reversal of their toy preferences,⁹ again casting doubt on the idea that we are born with blank slates and it's only socialization that then shapes us. If this is not sufficiently convincing, let's look at a comparative psychology approach where you look at other species. If you look at vervet and rhesus monkeys, and look at the toy preferences that infant vervet monkeys and rhesus monkeys display, they are exactly the same in terms of sex-specificity as human infants.^{10,11} And then you can look at something called the digit ratio, which is the ratio of the length of your index finger to your ring finger, which is a putative marker of how much androgen, how much testosterone, you've been exposed to *in utero*. It's a masculinizing agent, and boys are more masculinized than girls. So if you look at boys, young boys and how their digit ratios score, the more masculinized their digit ratios, the more they engage in sex-consistent play behavior.¹² Stemming from completely different research traditions, each of these examples puts into doubt the idea that it's only arbitrary socialization that causes us to prefer the toys that we do as young children. This is one way that you can show how an evolutionary biological approach can systematically disentangle the environment from our biology.

Just to push this point, roughly the same point, with another example, we often hear the question asked: Is beauty socially constructed or are there universal beauty markers? If you look at the photos here, in the left-most case you have what's called the neck elongation ritual. Now that's a very culture-specific beauty ritual. The next one is lip- and ear-plating from

Africa. They find it extremely attractive. Probably out here in the West we wouldn't. In this case we've got the Wodaabe People also in Africa, where it is the men who engage in beautification rituals. Now if we stop the story there, we'd say, "See look, it's all determined by culture—all of these cultural traditions have completely different ways of defining beauty." That's true, but underneath these, there *are* human universals when it comes to beauty—several—one of which is facial symmetry. There is no culture that's ever been uncovered where people who are asymmetric are viewed as more beautiful than people who are symmetric. You can go to the Yanomamö tribe in the Amazon and they'll agree with you. And that's precisely because facial symmetry is a phenotypic marker of good genes, of minimal exposure to developmental injuries. So yes culture matters but biology matters as well.

Evolutionary psychology: The basics

Some of you may not be familiar with some of the important tenets of evolutionary psychology so let me spend a few minutes giving you a primer. The first thing you want to know about evolutionary psychology is that we assume that the mind is a product of natural and sexual selection. In other words, in the same way that all of our organs have gone through selection pressures, resulting in the organs that we have today, the organ that defines our personhood, our brain, is not outside the purview of those evolutionary forces, either. So evolution does not stop at the head; it also affects our brains.

The next one is really important—the domain specificity view of the human mind. Domain specificity refers to the fact that in the same way that each of our organs has evolved to solve specific, adaptive problems, our brains are, if you like, an amalgamation of computational systems, each of which has evolved to solve a different evolutionarily relevant problem—find mate, protect kin, invest in non-kin coalitions, avoid predators, look for nutritious food sources. So each of these survival, or mating, problems—or kin problems—would have resulted in domain-specific computational systems. Now that doesn't mean that domain-general systems don't also exist in our brains, but unlike nonevolutionary psychologists, we certainly look at these domain-specific mechanisms.

The metaphor here I like to use, or actually one that's been around in the literature for many years, is the Swiss army knife model.¹³ The Swiss army knife has many different tools, each of which solves a different problem. Pull out the cork from the wine bottle, cut cheese, and so on—each of which cannot be transferred to another domain. Domain specificity does not refer to topographical modularity, it's not that one domain is here and another domain is there. It refers to a specific problem that we've had to solve in our evolutionary past. So to say that something is due to learning, to culture, to socialization really doesn't explain enough because then the question that begs to be asked is, Why is learning of *that* form? Why is it that in no culture are women not taught to be more indiscriminate in their sexuality than men? No culture has yet been uncovered where that happens. And so it's not enough to simply say that a behavior is due to learning—you have to explain why learning is of that form.

Of course, evolutionary psychologists also argue that the mind is not an empty slate: we are born with certain innate predispositions.¹⁴ For example, take infants that again are too young to have been socialized and if you show them photos of individuals who have high or low facial symmetry, hence they are attractive or not, they will gaze at facial symmetric people for much longer.^{15,16} By definition, they could not have been socialized to have that preference.

This is a really important point, it's really the crux of evolutionary theory. Basically it argues that scientific explanations are made at two epistemological levels—at the proximate level, and at the ultimate level.^{17,18,19} Proximate explanations in science explain the how and what of a mechanism. How does something operate? What are the factors that affect it? That's where much of science operates. The ultimate explanation, first, it doesn't mean ultimate in the superior sense, that it's "ultimate." A lot of my colleagues, when they don't know about this distinction, they assume that's what it means. Ultimate means in the Darwinian sense. If you unfold the causality of the explanation, it's the ultimate Darwinian "why"—why did we evolve that morphological feature, that emotional system, that cognitive system?

To make it tangible, I love to use this example to show the power of the difference between proximate and ultimate explanations. Take pregnancy sickness, for example. Pregnancy sickness is a very predictable,

universal, physiological mechanism that women go through when they're pregnant. People usually call it morning sickness, but the more general term is pregnancy sickness because it doesn't have to happen in the morning. There are endless proximate questions I can ask about pregnancy sickness. How do fluctuations in a woman's hormonal levels affect the severity of her pregnancy symptoms? That's a very valid proximate question. It's a *how* question. It's a *what* question. The ultimate question is, *why* would women have evolved this physiological response—is it an adaptation to something? Is it an evolutionary solution to some evolutionarily recurrent problem that women would have faced in our ancestral past? And the answer turns out to be, yes.

During the first trimester of gestation, there's something called organogenesis, which is exactly when the main organs are forming *in utero*. During that time, if a woman is exposed to pathogens, they could really wreck havoc on that developmental process. Now the main source of those pathogens are food pathogens, are teratogens, and therefore the mechanism of pregnancy sickness is an adaptation against that very real biological threat.^{20,21,22} So you feel nausea, you have aversions toward certain foods that typically are very high in their likelihood of having pathogens, you have cravings for other foods that serve as solutions against possible exposure to pathogens. Pickles for example—pickling is a means of solving microbial exposure. Pregnancy sickness starts at exactly the point of organogenesis and it ends at exactly when organogenesis finishes.

So you say okay, that's great, that's a very nice theoretical explanation—but who cares? What are the practical applications? Well, there again, there are very profound practical applications. If a woman goes to her OB/GYN, her physician, complaining of pregnancy sickness symptoms, the physician would likely prescribe pills that attenuate those symptoms, right? From an evolutionary perspective that's the perfectly incorrect thing to do. As a matter of fact, research shows that the more a woman experiences pregnancy sickness, the less likely she is to have a miscarriage.²³ The more pregnancy sickness she experiences, the better the health outcome of the child.²⁴ So all other things considered, it is an adaptive mechanism to experience pregnancy sickness, notwithstanding the fact that, you know, if a woman is giving a talk, she

may not want to be rushing out to throw up every 5 minutes. But again that shows you how proximate and ultimate explanations are not conflicting with one another: they are complementary. Once you've tackled the problem at both levels, you now have a full understanding of the phenomenon. And that is exactly what I try to do in my work in consumer behavior, whereas most of my colleagues have done great work at the proximate level, I've been doing a lot at the ultimate level.

Darwinian modules

I've recently argued in my work that there are four key Darwinian modules on which we could map much of our consumption. There's the survival module—survival is natural selection. All of the adaptations that confer a survival advantage to an organism would be under the survival module. If you look at these images, one is an example of camouflaging. You have an insect there that looks exactly like the background leaf. That's an evolved adaptation that solves a very real problem of, I don't want to be someone else's dinner. On the other hand, organisms face the survival problem of finding dinner for themselves. So the right-hand photo represents the classic Darwinian finch example where you have different finches on different evolutionary micro-niches that have evolved slightly different beaks precisely because the food sources in each of these patches are somewhat different in terms of how you access them. Both of these examples are of survival adaptations.

Now there are other adaptations that don't confer any survival advantage. The classic example, of which there are many, is the peacock's tail. The peacock would not have evolved his large, cumbersome, conspicuous tail through natural selection because, as a matter of fact, having that big tail reduces his survival. It increases the likelihood of predators finding him and it decreases the likelihood of his being able to avoid them because it's more difficult to take flight. It evolves through a parallel process that Darwin called sexual selection. Those are adaptations that confer mating or reproductive advantage. So, we've got the peacock's tail here, assisting with intersexual wooing. By impressing the ladies to mate with me, that's the means by which I extend my genes. Here we've got

intrasexual rivalry, the evolution of these big horns that the butting rams use. They fight it out and then the winner will get the spoils of the battle, which is basically sexual access to all of the females.

For the rest of the talk I will show how we can map many consummatory acts into these different basic Darwinian modules. We've got survival, we've got reproduction, then we've got kin selection.²⁵ Kin selection is the evolutionary mechanism that explains kin-based altruism. Why would I jump into a river to save a brother, a son, a nephew? The reason is that ultimately they share genes with me. So if you realize that the unit of selection of evolution is the gene, not the organism, then you can understand how kin-based altruism can evolve. And then reciprocity refers to non-kin based altruism. Yes we can explain why I jump into the river to save my brother or my son but why do I jump into the river to save anyone in the audience here, who might be very good friends but who are not my kin? The argument here is that part of human sociality is to engage in these reciprocal arrangements²⁶ because they serve as an insurance policy. Evolutionarily speaking, if I bring down the bison, I will share it with your family, even though you are not my kin—with the promise that in the future if we're starving and you bring down the bison, you will share it with me. So there's tit for tat. And of course many primates, not just primates but many species, engage in these forms of reciprocal arrangements. In the primate context, a classic example would be reciprocal grooming. In the consumer context, gift giving would be another example.

Consumer examples

So there are four modules: survival, reproduction, kin, and reciprocity. Let's now look at some consumer examples in each of these four modules, beginning with survival. Here we've got the hummingbird. The hummingbird has such a fast metabolic rate that it needs to ingest roughly 1.5 to 3 times its body weight *per day* just so that it doesn't starve that day. So it gorges. Now, buffets, as we've had in this hotel twice today, for breakfast and for lunch, buffets cater to the same Darwinian pull, but of course humans don't have the metabolic rate of hummingbirds so we end up falling prey to this Darwinian pull—and put on weight.

To give you another example of how gorging manifests itself in the human context, there was a classic study where the number and distribution of colors of M&Ms were manipulated.²⁷ Objectively, the coloring is odorless and tasteless; objectively, there are no differences in taste between the various conditions. Yet people end up consuming more when exposed to greater variety. Their brains are visually tricked to eat more precisely because of what is known as the “variety effect,” which has also been shown using single versus multiple flavors of yogurt,²⁸ and by manipulating the number of pasta shapes in an offering.²⁹ Now, the evolutionary reason is quite simple: number one, our bodies actually need to sample a multitude of nutritional sources, but secondly if we only eat one source of food and if that source is contaminated by food pathogens, then that’s a real problem. So you’re diversifying your risk of being exposed to pathogens by sampling from multiple sources. This was a mechanism first proposed by Paul Rozin, a food psychologist at the University of Pennsylvania. And so here, even though objectively speaking people should not be succumbing to the variety effect, they do because it is such an alluring Darwinian pull to do so.

In the next example we’ve got grizzly bears that have to gorge on a lot of fatty salmon if they hope to survive the period of hibernation. And, of course, we pick the juicy burgers and we’re more than happy to gorge on that fatty food. The Atkins diet was very popular for many years because it actually prescribed a behavior that was perfectly consistent with our evolved gustatory preferences. It didn’t say, “Eat all you can eat raw celery.” It said, “You can eat fatty burger patties, steaks and eggs and bacon and, guess what? You’re actually going to lose weight.” Now, of course, what the Atkins diet doesn’t tell you is that some of your cholesterol metrics didn’t fare too well, but from a strictly commercial perspective, it worked well because it was consistent with what our evolved gustatory preferences were expecting. If you look at the top restaurants in the world,³⁰ they’re top restaurants not so much because they’ve got Justin Timberlake as an endorser; they do very well because they provide us with exactly what we want, which is fatty foods—fatty and tasty foods.

The previous examples refer to human universals of food preferences, but even cross-cultural differences in

food preferences are oftentimes due to biological reasons. So evolutionary psychology is not only about demonstrating human universalities, but it’s also capable of explaining why one culture does X and another culture does Y. And so that again shows how evolutionary psychologists are well aware of the importance of culture. They don’t negate the importance of culture. And this is the example I like to use: it’s known as Darwinian gastronomy, developed by a neuroscientist from Cornell University.^{31,32} What he wanted to do was look at culinary traditions across cultures to see why these cultures would have evolved to have these different traditions. If you were a cultural psychologist or a cultural anthropologist, you would have simply stopped your investigation at highlighting differences—the French eat this, and the Malaysians eat that, we’re done. The bigger question is *why*? Well, he showed that how much meat a particular culinary tradition has, how much vegetables, how much salt consumption, how much spices are used, how much pickling is done, is perfectly correlated with the amount of food pathogens that would likely have existed historically within those particular cultural settings.^{33,34,35} In other words, culinary traditions are a cultural adaptation to a biological problem. So culture doesn’t exist outside of biology, it exists *because* of biology—nurture by nature.

Going on with a few other examples from survival, there’s a theory in evolutionary psychology known as prospect-refuge theory, which basically argues that humans tend to have certain innate preferences when it comes to certain types of landscapes.^{36,37} Typically, the landscapes that are preferred are those that are found in the African savannah—ones that provide us a prospect from which we can look out, but then have refuge. In other words, be able to see without being seen. And the argument there is, these landscapes protect us from all sorts of environmental dangers, whether it be predators or other individuals who are part of out-groups. So it turns out that this idea of prospect-refuge, this innate preference that we have for environments that adhere to prospect-refuge, can be applied to all sorts of design issues.³⁸ How do you design cafés? Well, this café here adheres to prospect-refuge theory. There are all sorts of nooks and crannies in which I can hide and then look at what people are doing when they are passing by. The classic cafeteria in a high school does not adhere to prospect-refuge, so if

you opened up a café that looked too open and exposed, certainly in Montreal where I come from, you're going to go bankrupt very quickly.

Now, you can push this example to urban design. This street is very much congruent with what's called our biophilic instinct, or innate love of nature. This one is not. Here is a playground that is very much consistent with our biophilic instinct, and here's a playground that is not. Richard Louv, the bestselling author, has coined this very poignant term—"nature deficit disorder." He basically argues that children today are so minimally exposed to natural settings that it actually ends up having quite a profound effect on some of their psychological and health-related outcomes.

Mating, reproduction, sexuality

I've given you a bit of background about issues dealing with survival, let's move to mating, reproduction, sexuality. Here we've got an analogous behavior, meaning a behavior that's evolved independently across two species (on the other hand, homologous behaviors across species would point to a common ancestry). Now, why are these two linked together? It must be that this bird is doing some sort of dancing—this guy's doing some hip-hop dancing. Well, this guy is attracting the ladies by showing I am the top dancer. That is exactly what the red-capped manakin does. As a matter of fact, a Cornell ornithologist by the name of Kim Bostwick was able to finally break down his dance. It's so quick that you have to break it down by 1/500th per frame to be able to capture it. Well, this bird does the original Michael Jackson moonwalk. Michael Jackson's estate has to be paying this guy a lot of royalties because the moves that he pulls are simply astonishing. The females will stand around, the guys will start engaging in all these vigorous dance moves, and then the best dancer wins. Now, how do you apply this in the human context? A recent study published in *Nature* where researchers showed that in the human context the best dancers also have the greatest body symmetry.³⁹ In other words, there is a convergence between the behavioral mechanism—how well I danced—and the phenotypic signal, my symmetry. You would never have been able to uncover this

astonishing finding if you had not come from an evolutionary perspective.

In the second case, here we have the Satin Bowerbird, who builds this bower. Now, a bower serves no functional purpose—it's not a nest. It's not where you rear your young. It serves no other purpose other than artistic expression. It is one of the few animals other than the human animal where the females are picking males on their artistic ability. He [the male bird] basically is saying, "look how creative I am!" And in different areas of the world this class of birds will attack human females on their head to steal ornaments so they can then put them in the bower, so they can get lucky with their ladies. Now in this architectural design [photo of mansion] you don't need 53 bedrooms, but this certainly serves as a very honest signal of status. And so these architectural designs are ultimately part of the mating ritual.

I'll give you a few other interesting examples. This is a study I did a few years ago.³ As you might imagine, the media was much interested in this research. I argued in some of my books that consumers use conspicuous consumption as a form of sexual signaling. So the Maserati is akin to the peacock's tail. Now, if that's true then what we should find is that if you ask men to drive a fancy car, a Porsche (we actually used a Porsche, and as I like to tell people when describing this research, imagine trying to get a granting agency to release money so that you can rent a Porsche for a weekend in downtown Montreal, and tell them, "no, no, it's truly for science..."). We had young males either drive a Porsche or a beaten up old sedan in one of two environments, either in downtown Montreal where everybody can see you doing it, or on a semi-deserted highway. And the dependent measure was that at the end of each driving condition (it was a within-subjects design, meaning the same individual went through all four conditions), we collected salivary assays so that we could then measure testosterone levels. The reason we care about testosterone in this case is that we know in many types of ritualized combats, not just in the human context but for other species as well, if two males fight, the winner has a rise in testosterone and the loser has a drop. Well, putting a young male in a Porsche is akin to infusing him immediately with very high status. And if that's true, then the endocrinological system should respond accordingly, and that is exactly what we found. You put the young males in the Porsche and their

testosterone levels go completely haywire. What we found surprising was that it didn't matter whether it was in a public or private setting. We thought it would be a lot higher in the public setting. It turned out, that didn't matter. Put the guy in the Porsche and his T-levels shoot through the roof.

Along the same lines, there was a related study done a few years ago by some colleagues of mine from Britain.⁴⁰ You take the same man and you put him either in a Ford Fiesta or a very expensive Bentley and you do the same with a woman and then you solicit opposite sex ratings. So you ask women to rate how physically attractive the guy is—you're not asking them what you think their status is. Of course, his physical attractiveness should be the same in both cases since his morphology doesn't change. Well, the guy on the left (in the Ford Fiesta) is very unattractive and the guy on the right (in the Bentley) is stunningly handsome. Of course, in the case of evaluating women, men didn't care about this manipulation. Their evaluations of women were completely independent of which car they were seen in. A similar study was conducted by Shuler and McCord.⁴¹

This idea of sexual signaling is found in endless domains of risk-taking. Here you have what's called the Vanuatu land diving ritual, a rite of passage in the Pacific where these guys, in order to become accepted into manhood, have to jump off these platforms of 80 to 100 feet tied to vine ropes perfectly calibrated so that as they dive head first it will stop them a few inches before their head splatters on the ground. And it has to be calibrated to the humidity of the season, and to their weight, so that it doesn't snap. So all of these calculations have to be done carefully, otherwise you're going to die a really horrific death. So that's a very honest sexual signal. That's what's known in biology as a "costly signal." Only the truly courageous guys would pass through this ritual. If all it took was to do 10 jumping jacks or 5 push-ups, then women would not be able to sort the losers from the winners. But this Vanuatu ritual, boy does it sort the really courageous ones from the less courageous. And all of these other physically risky behaviors such as bouldering, cliff diving, big wave surfing, and BASE jumping, have one thing in common across any culture that's ever been studied—it's always men who are much more likely to engage in them.

Continuing with this idea of testosterone and risk-taking and it being a male-based behavioral strategy, I recently published a study with some of my graduate students where we looked at digit ratios, which are a mark of testosterone. Using digit calipers, we measured people's digit ratios and administered a psychometric scale that measures risk-taking across many different domains: health risk, ethical risk, physical risk, financial risk, and so on.⁴² We wanted to see whether individuals who had more masculinized digit ratios, hence they would have been exposed to greater testosterone *in utero*, would score higher on risk-taking scales. And that's exactly what we found—and we found it only for men, not for women, which is exactly what we predicted. So there's a morphological feature that is correlated to testosterone, which is linked to behavior—risk taking.

For those of you who might be thinking, well so far we've only been talking about sexual signaling on the male side of the equation, of course women do engage in endless forms of sexual signaling, although they might use different cues to achieve the same goals of ameliorating their lot in the mating market. In other species, when females (in this case chimps, but this happens for many other species as well) are in estrus they will exhibit very conspicuous signals, whether it be a visual signal (enlarged and engorged genitalia), or olfactory signals (they actually smell intoxicating to males), there are all sorts of ways by which females can signal their sexual receptivity. In the human context, women also engage in this type of signaling, although it is somewhat more subtle than engorged genitalia. In this case what happens is that women dress more provocatively at the maximally fertile period of their menstrual cycles. So I did some work with one of my doctoral students, Eric Stenstrom, where we had women keep track of their behaviors, preferences, and desires for 35 contiguous days.⁴ The reason why 35 is important is because the average menstrual cycle is 28 days, so by 35 days you're pretty much capturing most women's natural variations in terms of their menstrual cycles.

Every single day we asked them a large number of very detailed questions about everything you can imagine. For purposes of this discussion, I'll only talk about beautification practices. What we found, exactly as we predicted from an evolutionary perspective, is that women were much more likely to be engaging in

beautification practices—and a wide range of beautification practices (sexy clothes, clothes that show a lot of skin, time spent beautifying, wearing a skirt, wearing nice clothes, and so on)—at the maximally fertile stage of their cycle, as opposed to other stages where they're not fertile.^{43,44} They don't do this consciously, they don't have an ovulatory chart and say, "Oh gee, look, I'm ovulating, let me dress provocatively today." But they certainly have the evolved hormonal mechanisms that would guide them in that direction, or where they feel more bloated and less sexy during another time period. For it to be a valid mechanism doesn't mean it has to be within conscious awareness. On a related note, female strippers will garner larger tips when they are maximally fertile.⁴⁵

Kin and reciprocity

I've given you some examples from survival and some from mating. Let's go to kin and reciprocity. Remember, kin involves altruistic acts that people engage in with family members, who are genetically related to them, and reciprocity are altruistic acts with non-kin. I did a study recently with some Israeli colleagues where we looked at gift-giving practices at Israeli weddings.⁴⁶ At Israeli weddings usually the guests just give monetary sums—\$125, for instance. So it's not that you give a coffee machine or a Rolex watch. Everybody just signs checks or gives cash. And the bride and groom keep track of these lists. So my colleagues had access to the data from 30 weddings. What we wanted to study here was whether the genetic relatedness between the giver and recipient predicts the size of the gift. I already did some research with one of my former doctoral students Tripat Gill where we've established that in a different context.⁴⁷ People are extremely well-calibrated in terms of how they mete out their investments in line with the genetic relatedness between themselves and the recipient of the gift.

People who have a genetic relatedness coefficient of .50 means that, on average, they share 50 percent of their genes with me; .25 on average means they share a quarter of their genes. So my grandparents would be 25 percent, my children or my siblings would be 50 percent. My first cousins would be 12.5 percent, my second cousins 6.25 percent. What you find with the

size of the monetary gift is exactly that. It's perfectly aligned with genetic relatedness with one small caveat: relatives who are more genetically related give more money than relatives who are less genetically related, but interestingly no genetic relatedness, zero—meaning, your close friends—actually give greater sums than more distant kin, which is exactly what you'd expect from the reciprocity model. Non-kin alliances and friendships matter in the human context. That's why I remember you when it's your birthday and I invite you out to dinner, and then you reciprocate when it's my birthday. From a strict economic perspective, why don't we skip that ritual since I'm going to invite you for \$50, you're going to reciprocate for \$50 and we're going to wind up at the same place. But the fact that we have to remember that obligation helps oil and strengthen our friendship. So the same way that other primates will engage in reciprocal grooming, that gift giving ritual is the way that we're engaging in reciprocal behavior.

The next item adds a whole layer of complexity to this story. If you look at grandparents, your four grandparents are, on average, of the same genetic relatedness to you. But that's not the full story. Not only does genetic relatedness matter, but genetic *assuredness* matters as well. Your maternal grandmother is assured of her genetic lineage—there's no such thing as maternity uncertainty. But there is such a thing as paternity uncertainty that actually drives a lot of the sexual dimorphism between the two sexes. Men sometimes aren't sure who their children are, not women. So the maternal grandmother is assured of her genetic lineage, the paternal grandfather has two generations of paternity uncertainty, and the two other grandparents are in the middle. And so you would expect the maternal grandmother to invest the most in her grandchildren, the paternal grandfather to invest the least, and the two others to invest in the middle. This has been found in many cultures and in many different ways,^{48,49} so we wanted to test it in the context of Israeli gift giving, which by the way the Middle East largely consists of patriarchal societies but we're showing a matrilineal effect.

Well, on average, the size of the gift on the maternal side of the bride and groom (\$260) is significantly larger than the size of the gift on the paternal side (\$225). The maternal side of the family gives a lot more than the paternal side. You'd be very hard pressed to posit this hypothesis, and even propose such a research

question, had you not been coming from an evolutionary perspective. That's one of the key benefits of evolutionary theory, that it allows you to uncover dynamics that would have been otherwise invisible.

Evolution in daily life

Evolutionary theory is everywhere in your daily life. Every day little snippets happen that point to a particular evolutionary mechanism, so let me point you to one from my personal life. When my wife was pregnant with our first child, you get your customary ultrasound images in the first trimester and you put them proudly on the fridge and you look at them and you say, "I am fertility!" If you look at these [ultrasound] images, they could be amoebas, they could be extraterrestrials, they could be *in utero* organisms from other species, nevermind the human species. Yet my mother-in-law passes by the image, stops arrestingly and says, "Oh my God Gad, the baby looks exactly like you." The question is, why would she have that reaction, and what does it have to do with evolutionary theory? Well, there's a lot of research that shows when a child is born, the custom across all cultures is for people to say, "Oh my God, the baby looks exactly like the father"—and, especially so, the mother's side of the family because that serves as an insurance policy against cuckoldry.⁵⁰ So it's a cultural norm, but the cultural norm is rooted in the biological reality. Now, I always joke with my daughter, even though she doesn't understand at this point (she's only 4) that I made her famous already in the annals of science because this is an example of this phenomenon not when the baby is out but could be the first such example *in utero*.

So, again, I wouldn't have been able to explain this phenomenon as well as I've been able to without evolutionary theory, although my mother-in-law remains unconvinced. She says, "I don't want to hear about your scientific theories" and still points to the ultrasound image. "Look, it's the exact same profile as you in the image." So she still insists that there's incredible phenotypic similarity.

Along the same lines, a study was done a few years ago where they went to men and women and said, if there was a new service in hospitals that was mandatory for every child who comes in, DNA

paternity testing, what is your attitude towards that?⁵¹ And what do you think happens? Women say, I don't like it that much—and men say "good idea." Now that difference in attitudes, if most of my consumer psychology colleagues were to propose attitudinal theories, they would come up with all sorts of theories that have nothing to do with reality. That sex difference is strictly rooted in the evolutionary calculus tied to paternity uncertainty.

A variety of products have been studied by scholars from an evolutionary perspective—perfumes,⁵² flowers,⁵³ engagement rings,⁵⁴ clothing,^{55,56,57} hair styles,^{58,59} plastic surgery,⁶⁰ cosmetics,^{61,62,63} high heels,⁶⁴ etc. There's almost never a week that goes by where I don't get some media request to comment on the evolutionary explanation for why women wear high heels. With cosmetics, there are some very interesting evolutionary explanations for why red is an intoxicating cue to men.⁶⁵ Valentine's Day is associated with red, much lingerie is red, a lot of cosmetics are red. Actually, lipstick in French is *rouge à lèvres*, which means "red for lips," so even the generic term for lipstick has the word for red associated with it. If you look at perfume, if I were to ask each of you to smell four different perfumes and then have you tell me which of the four is most attractive to you, it turns out what drives that preference is its congruity with something called the major histocompatibility complex.⁶⁶ That's a set of genes that we all have that serve as a signal of our unique immunological profile. We tend to prefer perfumes that are consistent with that set of genes, the MHC. When we choose mates, we tend to choose mates that are maximally dissimilar to us along the MHC because the more dissimilar they are to us, that means the more our offspring will have maximal immunological defenses.⁶⁷ But the bottom line is that something as simple as perfume preferences turns out to be very much rooted in physiological realities. That doesn't mean that advertising doesn't matter, but it certainly means that we also have to look at the biological and physiological roots of consumer choices.

Cultural products: Fossils of the mind

I've given you a sense of the four Darwinian modules, let's switch gears now. In my books I talk about cultural products being fossils of the human

mind. What do I mean by that? Well, the currency of paleontologists' research includes skeletal remains, fossils and so on, and then using these remains they are able to reconstruct the phylogenetic history of a species. Of course, the human mind consists of organic matter and doesn't fossilize—but what does fossilize are the cultural products that human minds leave behind. So I could look at ancient Greek tragedies that were written 3,500 years ago in a completely different context by different people in a different era and the key narrative in those Greek tragedies will be equally poignant to people here in Lubbock. They'll talk about sibling rivalry, about romantic jealousy, about status seeking, about paternity uncertainty—all of the things that are in today's soap operas, all of the things that are in today's song lyrics. So you could do a content analysis of cultural products that will ultimately show you that there are certain universal themes that transcend all cultures.^{1,2,68}

Song lyrics are a fantastic way to demonstrate some of these evolutionarily based mating preferences.^{69,70} Typically, the things that men will sing about and the things that women will sing about are perfectly congruent with what we know about their sex-specific mating preferences. And, if anyone in the room were to comment, "Well, this only applies to American pop culture"—no. You could take Arabic songs, you could take Hindi songs, you could take Urdu songs. You could take troubadours of the twelfth century, as a recent study has done,⁷¹ and you will find that it is roughly the same themes. What are some of those themes? Women will denigrate men who have low status. Gwen Guthrie, a soul singer from the 1980s, said "Ain't nothing going on but the rent / You've got to have a j-o-b if you want to be with me." Marlena Shaw, once her man is showing that he's not capable of keeping a job, that he's apathetic, that he's lazy, her song is "Go Away Little Boy." He's demoted from being a man to becoming a little boy. There are no songs that say, "Hey Linda, you're not working hard enough, you're not showing drive, I'm not going to have sex with you tonight." But there are endless songs in the other direction.

Of course, men are almost exclusively the ones who signal high resources. So almost every hip-hop song that you can think of has roughly the same content: I've got the Maserati, I've got the Lexus, I'll give you whatever you want. There are any number of songs

with the exact same title: "Money In the Bank." So the things that men and women sing about are quite indicative of universal mating preferences. To push that point even further, there was a study done a few years ago by a consulting firm (Agenda, Inc.) where they tracked the number of brand mentions (how many times a brand is mentioned in a song): almost all the brand mentions were for luxury items, more than half of cars—and almost exclusively males are the ones doing this, not females.

I'll give you a few other examples. Romance novels are almost exclusively consumed by women, around the world, hard core pornography is almost exclusively consumed by men. There's no culture we know of where that phenomenon doesn't exist in exactly that form. If you want to know about the archetype of female preferences when it comes to the ideal male, read any one of a selection of different romance novels.⁷² The archetype is roughly that he's a neurosurgeon who's also a Count who's 6 foot 2 inches tall, who wrestles alligators and has six-pack abs, who jumps off of buildings and is a reckless risk-taker who ultimately can only be tamed by the love of one good woman. A few years ago a company decided they didn't want to promulgate these supposed sexist, tired stereotypes. So they came up with a new male archetype, one who is more metrosexual, who is more sensitive, who cries more, who is more in touch with his emotions. Guess what happened to that project? It failed. Products that are inconsistent with the basic tenets of human nature are not going to work. Only marketers who think that the brain is a blank slate that is infinitely malleable could actually believe in such stuff.

Now with hardcore pornography, some really interesting research has been done on that. Across cultures, the most common mating system is what's known as a polygynous mating system: one man, multiple women. Roughly 85 percent of documented cultures have polygynous mating. Most of the others have institutionalized monogamy, and extraordinarily few cultures have what's called polyandry where there's one woman and multiple mates.⁷³ A typical example of the latter case is what's known as fraternal Tibetan polyandry, where the woman who is sharing multiple men is doing the sharing with brothers for reasons related to kin selection. But the most common mating arrangement is polygynous—for example, harems are

an extreme example of a polygynous mating system. A king, a sultan, an emperor has a harem of women. Now if that's what's at the root of male psychology, to have mating access to endless women, then let's see what happens in the context of pornographic movies. Do we see more depictions in porno movies of polygynous arrangements, one man having sex with multiple women, or do we see more polyandrous depictions, one woman with multiple men?

Well, surprisingly, a very exhaustive content analysis by a researcher at Brunel University found that polyandrous depictions were much more common.⁷⁴ That's a little strange. If men have polygynous tendencies, as in "I want to be with multiple women," why would such a commercially successful product demonstrate the opposite—polyandrous depictions? It turns out that the reason is due to something called sperm competition. We know from animal husbandry that when a rancher is trying to get his stud to mate with a female, one of the ways he might get him to be motivated is to show another male having sex, and that will literally get the rise out of him because of sperm competition. So you might say, well okay, that sounds like an interesting theoretical story, but how do you prove that? Kilgallon and Simmons⁷⁵ actually tested this. The study is extraordinary in terms of what they found. They had men take one of two images home, either one that depicted a polyandrous sex act—one woman, multiple men—or not, and then the men returned with the fruits of their manual labor, so to say, which was then analyzed. They found that the sperm that was collected subsequent to the viewing of polyandrous photos had much greater motility, which is exactly what you would expect if the sperm competition hypothesis were operative. That's a truly mind-blowing finding and certainly one that you never could have dreamt of envisioning were you not aware of some of these evolutionary realities.

If you look at what I call "dark side" consumption acts, phenomena that create deleterious consequences, like pornographic addiction, pathological gambling, excessive risk-taking, excessive sun tanning,⁷⁶ eating disorders, and compulsive buying, the first thing you'll note is that they are extraordinarily robust in their sex-specificity. The first three are much more likely to show males as sufferers, the second three are much more likely to feature women. There is no culture where that's not going to be true. As a matter of fact, with

eating disorders the classic argument is that it's media depictions that cause eating disorders. Women are exposed to images of the feminine ideal, which causes them to feel insecure, and that promotes eating disorders. Well, if that were true, you'd have to explain why Hippocrates, the founder of modern medicine some 2,500 years ago, documented cases of eating disorders in exactly the same epidemiological reality as today, except they didn't have the media images that we do. In other words, across cultures and time periods it's women who suffer from eating disorders. I won't get into some of the biological reasons for this, but I'll point out that each of these phenomena is a manifestation of an adaptive process that has gone haywire, that is now over-active, that has misfired.

Darwinizing consumer research

So what are some benefits of Darwinizing consumer research? Number one, evolutionary theory allows us to augment explanatory power by recognizing that the brain is a domain-specific organ. It also allows us to differentiate between ultimate and proximate explanations, and it allows us to posit new hypotheses and uncover new research questions that would have been completely invisible to us were we not coming at this with an evolutionary lens. Evolutionary theory promotes methodological pluralism. It encourages increased interdisciplinarity, and it creates greater consilience. Consilience, a term that was reinvigorated, reintroduced to the lexicon really, by E. O. Wilson, refers to the unity of knowledge.⁷⁷ So physics, chemistry, and biology are consilient disciplines—critical sociology and postmodernism are not. One set of fields has very organized meta-theories that help you organize science under a coherent tree of knowledge, and others don't. We should all seek to make our fields more consilient.

In terms of methodological pluralism, Sternberg and Grigorenko⁷⁸—Sternberg used to be the president of the American Psychological Association, he's a Yale psychologist—they said that psychology in particular, but this can be applied to all the social sciences, suffers from methodological fixation and what they call field fixation. If you're a priming guy, you're a priming guy; if you're an fMRI guy, you do primarily that. So you have methodological fixation, but then you also have

field fixation—e.g., “I am a cognitive psychologist who does information processing using reaction time methodology.” Evolutionary theory allows you to escape such fixations. I’ll give you an example. Let’s take men’s waist-to-hip ratio preferences. We know that men have a preference for a female waist-to-hip ratio of roughly .70 because .70, the hourglass figure, is actually a very accurate marker of nubility and fertility.⁷⁹ So you could take that preference around the world and men would roughly agree that they prefer .70. Now let’s see how evolutionary psychologists have tested this idea. This, by the way, goes to the very heart of the criticism that evolutionary psychologists sit around and spin a bunch of “just so” stories. It’s the exact opposite, actually. The evidentiary threshold that evolutionary psychologists put themselves through before they feel one way or another about a hypothesis is actually much, much higher than most other researchers.

Sticking with the waist-to-hip ratio example, this is a finding that has been replicated across many cultures. Take art pieces spanning thousands of years, sculptures from Egyptian art, from ancient Greek art, from Indian art, from African art, and you can perform an analysis of the waist-to-hip ratios. Spanning numerous cultures and millennia, you come close to that .70 ratio. You can take pre- and post-operative cosmetic surgeries and show that the post-operative ones, around the world, try to mimic the preferred waist-to-hip ratio cue. A study I did a few years ago coded the waist-to-hip ratios that online female escorts advertise for themselves from around the world.⁸⁰ The Internet affords us the ability to do cross-cultural research with tremendous ease at times. In 48 cultures, the waist-to-hip ratio was very close to .70. Paper and pencil tests have been used, fMRI has been used to study this,⁸¹ eye-tracking has been used,⁸² and congenitally blind men have been shown haptically, by touch, to have a preference of .70.⁸³ How many methodologies were used here, across how many cultures, to arrive at the same conclusion? And yet people in the social sciences will argue that evolutionary theory just involves spinning stories about different phenomenon. I don’t know if there’s been a study in mainstream psychology that’s been as robust as this collective knowledge.

Going back to the idea that evolutionary psychology promotes greater interdisciplinarity⁸⁴ and consilience, I argue in my books that the way we could

take consumer behavior and make it into a consilient field is by Darwinizing it—that would be the meta-framework that would help you organize everything.

Let me end with a quote by Kenrick and Simpson⁸⁵ (p.14) who asked this of social psychology, but it equally applies to consumer behavior, “Why are the minitheories in one chapter of a social psychology text often discontinuous with minitheories presented in other chapters? Why does such an important field in the social and behavioral sciences—one that studies so many significant topics that are vital to understanding human behavior—not have a metatheory, one capable of tying different research areas and disparate findings together?” Well, that meta theory is evolutionary theory. So whether you’re in consumer behavior, or communications, or sociology, or political science, it doesn’t matter—any field that involves biological agents has to have an infusion of evolutionary theory within it in order for it to be consilient.

Note

Gad Saad is Professor of Marketing and Research Chair in Evolutionary Behavioral Sciences and Darwinian Consumption in the John Molson School of Business at Concordia University in Montreal. He serves as an advisory fellow to the Center for Inquiry and associate editor for *Evolutionary Psychology*. Gad writes a popular blog for *Psychology Today* called *Homo Consumericus*, which can be found at: <http://www.psychologytoday.com/blog/homo-consumericus>.

References

1. Gad Saad, *The Consuming Instinct: What Juicy Burgers, Ferraris, Pornography, and Gift Giving Reveal About Human Nature* (Amherst, NY: Prometheus Books, 2011).
2. Gad Saad, *The Evolutionary Bases of Consumption* (Mahwah, NJ: Lawrence Erlbaum, 2007).
3. Gad Saad and John G. Vongas, “The effect of conspicuous consumption on men’s testosterone levels,” *Organizational Behavior and Human Decision Processes*, 2009, 110: 80–92.
4. Gad Saad and Eric Stenstrom, “Calories, beauty, and ovulation: The effects of the menstrual cycle on food and appearance-related consumption,” *Journal of Consumer Psychology*, 2012, 22: 102–113.
5. Donald E. Brown, *Human Universals* (New York: McGraw-Hill, 1991).

6. Edward O. Wilson, *On Human Nature* (Cambridge, MA: Harvard University Press, 1978).
7. Gerianne M. Alexander, Teresa Wilcox, and Rebecca Woods, "Sex differences in infants' visual interest in toys," *Archives of Sexual Behavior*, 2009, 38: 427–433.
8. Vasanti Jadv, Melissa Hines, and Susan Golombok, "Infants' preferences for toys, colors, and shapes: Sex differences and similarities," *Archives of Sexual Behavior*, 2010, 39: 1261–1273.
9. Sheri A. Berenbaum and Melissa Hines, "Early androgens are related to childhood sex-typed toy preferences," *Psychological Science*, 1992, 3: 203–206.
10. Gerianne M. Alexander and Melissa Hines, "Sex differences in response to children's toys in nonhuman primates (*Cercopithecus aethiops sabaues*)," *Evolution and Human Behavior*, 2002, 23: 467–479.
11. Janice M. Hassett, Erin R. Siebert, and Kim Wallen, "Sex differences in rhesus monkey toy preferences parallel those of children," *Hormones and Behavior*, 2008, 54: 359–364.
12. Johannes Hönekopp and Christine Thierfelder, "Relationships between digit ratio (2D:4D) and sex-typed play behavior in preschool children," *Personality and Individual Differences*, 2009, 47: 706–710.
13. Leda Cosmides and John Tooby, "Beyond intuition and instinct blindness: Toward an evolutionarily rigorous cognitive science," *Cognition*, 1994, 50: 41–77.
14. Steven Pinker, *The Blank Slate: The Modern Denial of Human Nature* (New York: Viking Press, 2002).
15. Judith H. Langlois, Lori A. Roggman, and Loretta A. Reiser-Danner, "Infants' differential social responses to attractive and unattractive faces," *Developmental Psychology*, 1990, 26, 153–159.
16. Alan Slater, Charlotte Von der Schulenburg, Elizabeth Brown, Marion Badenoch, George Butterworth, Sonia Parsons, and Curtis Samuels, "Newborn infants prefer attractive faces," *Infant Behavior & Development*, 1998, 21: 345–354.
17. Ernst Mayr, "Cause and effect in biology: Kinds of causes, predictability, and teleology are viewed by a practicing biologist," *Science*, 1961, 134: 1501–1506.
18. Thomas C. Scott-Phillips, Thomas E. Dickins, and Stuart A. West, "Evolutionary theory and the ultimate-proximate distinction in the human behavioral sciences," *Perspectives on Psychological Science*, 2011, 6: 38–47.
19. Niko Tinbergen, "On aims and methods of ethology," *Zeitschrift für Tierpsychologie*, 1963, 20: 410–433.
20. Samuel M. Flaxman and Paul W. Sherman, "Morning sickness: Adaptive cause or nonadaptive consequence of embryo viability?" *American Naturalist*, 2008, 172: 54–62.
21. Gillian V. Pepper and S. Craig Roberts, "Rates of nausea and vomiting in pregnancy and dietary characteristics across populations," *Proceedings of the Royal Society B: Biological Sciences*, 2006, 273, 2675–2679.
22. Margie Profet, "Pregnancy sickness as adaptation: A deterrent to maternal ingestion of teratogens," in *The Adapted Mind: Evolutionary Psychology and the Generation of Culture*, Jerome H. Barkow, Leda Cosmides, and John Tooby, eds. (New York: Oxford University Press, 1992), pp. 327–365.
23. Paul W. Sherman and Samuel M. Flaxman, "Nausea and vomiting of pregnancy in an evolutionary perspective," *American Journal of Obstetrics and Gynecology*, 2002, 186 (Suppl. 2): S190–S197.
24. Samuel M. Flaxman and Paul W. Sherman, "Morning sickness: A mechanism for protecting mother and embryo," *Quarterly Review of Biology*, 2000, 75: 113–148.
25. William D. Hamilton, "The genetical evolution of social behaviour (I and II)," *Journal of Theoretical Biology*, 1964, 7: 1–52.
26. Robert L. Trivers, "The evolution of reciprocal altruism," *Quarterly Review of Biology*, 1971, 46: 35–57.
27. Barbara E. Kahn and Brian Wansink, "The influence of assortment structure on perceived variety and consumption quantities," *Journal of Consumer Research*, 2004, 30, 519–533.
28. Barbara J. Rolls, E.A. Rowe, E.T. Rolls, Breda Kingston, Angela Megson, and Rachel Gunary, "Variety in a meal enhances food intake in man," *Physiology & Behavior*, 1981, 26: 215–221.
29. Barbara J. Rolls, E.A. Rowe, and E.T. Rolls, "How sensory properties of foods affect human feeding behavior," *Physiology & Behavior*, 1982, 29: 409–417.
30. Restaurants & Institutions, *Top 400 Restaurant Chains*, 2008, 118(10): 30.
31. Jennifer Billing and Paul W. Sherman, "Antimicrobial functions of spices: Why some like it hot," *Quarterly Review of Biology*, 1998, 73: 3–49.
32. Paul W. Sherman and Jennifer Billing, "Darwinian gastronomy: Why we use spices," *Bioscience*, 1999, 49: 453–463.
33. Joseph Henrich and Natalie Henrich, "The evolution of cultural adaptations: Fijian food taboos protect against dangerous marine toxins," *Proceedings of the Royal Society B: Biological Sciences*, 2010, 1701: 3715–3724.
34. Yohsuke Ohtsubo, "Adaptive ingredients against food

The Consuming Instinct

spoilage in Japanese cuisine,” *International Journal of Food Sciences and Nutrition*, 2009, 60: 677–687.

35. Paul W. Sherman and Geoffrey A. Hash, “Why vegetable recipes are not very spicy,” *Evolution and Human Behavior*, 2001, 22: 147–163.

36. John H. Falk and John D. Balling, “Evolutionary influence on human landscape preference,” *Environment and Behavior*, 2010, 42: 479–493.

37. Gordon H. Orians and Judith H. Heerwagen, “Evolved responses to landscapes,” in *The Adapted Mind: Evolutionary Psychology and the Generation of Culture*, Jerome H. Barkow, Leda Cosmides, and John Tooby, eds. (New York: Oxford University Press, 1992), pp. 555–580.

38. Yannick Joye, Karolien Poels, and Kim Willems, “‘Evolutionary store atmospherics’ — Designing with evolution in mind,” in *Evolutionary Psychology in the Business Sciences*, Gad Saad, ed. (Heidelberg, Germany: Springer Publishers, 2011), pp. 289–318.

39. William M. Brown, Lee Cronk, Keith Grochow, Amy Jacobson, C. Karen Liu, Zoran Popovic, and Robert L. Trivers, “Dance reveals symmetry especially in young men,” *Nature*, 2005, 438: 1148–1150.

40. Michael J. Dunn and Robert Searle, “Effect of manipulated prestige-car ownership on both sex attractiveness ratings,” *British Journal of Psychology*, 2010, 101: 69–80.

41. Gregory A. Shuler and David M. McCord, “Determinants of male attractiveness: ‘Hotness’ ratings as a function of perceived resources,” *American Journal of Psychological Research*, 2010, 6: 10–23.

42. Eric Stenstrom, Gad Saad, Marcelo V. Nepomuceno, and Zack Mendenhall, “Testosterone and domain-specific risk: Digit ratios (2D:4D and rel2) as predictors of recreational, financial, and social risk-taking behaviors,” *Personality and Individual Differences*, 2011, 51: 412–416.

43. Kristina M. Durante, Vldas Griskevicius, Sarah E. Hill, Carin Perilloux, and Norman P. Li, “Ovulation, female competition, and product choice: Hormonal influences on consumer behavior,” *Journal of Consumer Research*, 2011, 37: 921–934.

44. Martie G. Haselton, Mina Mortezaie, Elizabeth G. Pillsworth, April Bleske-Rechek, and David A. Frederick, “Ovulatory shifts in human female ornamentation: Near ovulation, women dress to impress,” *Hormones and Behavior*, 2007, 51: 40–45.

45. Geoffrey Miller, Joshua M. Tybur, and Brent D. Jordan, “Ovulatory cycle effects on tip earnings by lap dancers: Economic evidence for human estrus?” *Evolution and Human Behavior*, 2007, 28: 375–381.

46. Sigal Tifferet, Gad Saad, Mali Meiri, and Nir Ido, “Gift-giving at Israeli weddings as a function of genetic relatedness

and maternal lineage,” *NorthEastern Evolutionary Psychology Society Conference*, Plymouth State University, Plymouth, NH, April 27–29, 2012.

47. Gad Saad and Tripat Gill, “An evolutionary psychology perspective on gift giving among young adults,” *Psychology & Marketing*, 2003, 20: 765–784.

48. Harald A. Euler and Barbara Weitzel, “Discriminative grandparental solicitude as reproductive strategy,” *Human Nature*, 1996, 7: 39–59.

49. Alexander Pashos and Donald H. McBurney, “Kin relationships and the caregiving biases of grandparents, aunts, and uncles: A two-generational questionnaire study,” *Human Nature*, 2008, 19: 311–330.

50. Martin Daly and Margo Wilson, “Whom are newborn babies said to resemble?” *Ethology and Sociobiology*, 1982, 3: 69–78.

51. Lisa S. Hayward and Sievert Rohwer, “Sex differences in attitudes toward paternity testing,” *Evolution and Human Behavior*, 2004, 25: 242–248.

52. S. Craig Roberts and Jan Havlicek, “Evolutionary psychology and perfume design,” in *Applied Evolutionary Psychology*, S. Craig Roberts, ed. (New York: Oxford University Press, 2012), pp. 330–348.

53. Jeannette Haviland-Jones, Holly Hale Rosario, Patricia Wilson, and Terry R. McGuire, “An environmental approach to positive emotion: Flowers,” *Evolutionary Psychology*, 2005, 3: 104–132.

54. Lee Cronk and Bria Dunham, “Amounts spent on engagement rings reflect aspects of male and female mate quality,” *Human Nature*, 2007, 18: 329–333.

55. Nigel Barber, “Women’s dress fashions as a function of reproductive strategy,” *Sex Roles*, 1999, 40: 459–471.

56. Russell A. Hill, Sophie Donovan, and Nicola F. Koyama, “Female sexual advertisement reflects resource availability in twentieth-century UK society,” *Human Nature*, 2005, 16: 266–277.

57. John Marshall Townsend and Gary D. Levy, “Effects of potential partners’ costume and physical attractiveness on sexuality and partner selection,” *Journal of Psychology*, 1990, 124: 371–389.

58. Verlin B. Hinsz, David C. Matz, and Rebecca A. Patience, “Does women’s hair signal reproductive potential?” *Journal of Experimental Social Psychology*, 2001, 37: 166–172.

59. Norbert Mesko and Tames Bereczkei, “Hairstyle as an adaptive means of displaying phenotypic quality,” *Human Nature*, 2004, 15: 251–270.

60. Devendra Singh and Patrick K. Randall, “Beauty is in the

- eye of the plastic surgeon: Waist-hip ratio (WHR) and women's attractiveness," *Personality and Individual Differences*, 2007, 43: 329–340.
61. Nancy L. Etcoff, Shannon Stock, Lauren E. Haley, Sarah A. Vickery, and David M. House, "Cosmetics as a feature of the extended human phenotype: Modulation of the perception of biologically important facial signals," *PLoS One*, 2011, 6: e25656, <http://dx.doi.org/10.1371/journal.pone.0025656>
62. Richard Russell, "A sex difference in facial contrast and its exaggeration by cosmetics," *Perception*, 2009, 38: 1211–1219.
63. Nadine Samson, Bernhard Fink, and Paul J. Matts, "Visible skin condition and perception of human facial appearance," *International Journal of Cosmetic Science*, 2010, 32: 167–184.
64. Euclid O. Smith, "High heels and evolution: Natural selection, sexual selection and high heels," *Psychology, Evolution & Gender*, 1999, 1: 245–277.
65. Andrew J. Elliot and Daniela Niesta, "Romantic red: Red enhances men's attraction to women," *Journal of Personality and Social Psychology*, 2008, 95: 1150–1164.
66. Manfred Milinski and Claus Wedekind, "Evidence for MHC-correlated perfume preferences in humans," *Behavioral Ecology*, 2001, 12: 140–149.
67. Jan Havlicek and S. Craig Roberts, "MHC-correlated mate choice in humans: A review," *Psychoneuroendocrinology*, 2008, 34: 497–512.
68. Gad Saad, "Nothing in popular culture makes sense except in the light of evolution," *Review of General Psychology*, 2012, 16: 109–120.
69. Dawn R. Hobbs and Gordon G. Gallup, Jr., "Songs as a medium for embedded reproductive messages," *Evolutionary Psychology*, 2011, 9: 390–416.
70. Gad Saad, "Song lyrics as windows to our evolved human nature," in *The Evolutionary Review: Art, Science, Culture*, Vol. 2, Alice Andrews and Joseph Carroll, eds. (Albany, NY: SUNY Press, 2011), pp. 127–133.
71. Don A. Monson, "Why is *la Belle Dame sans Merci*? Evolutionary psychology and the troubadours," *Neophilologist*, 2011, 95: 523–541.
72. Anthony Cox and Maryanne Fisher, "The Texas billionaire's pregnant bride: An evolutionary interpretation of romance fiction titles," *Journal of Social, Evolutionary, and Cultural Psychology*, 2009, 3: 386–401.
73. Joseph Henrich, Robert Boyd, and Peter J. Richerson, "The puzzle of monogamous marriage," *Philosophical Transactions of the Royal Society B: Biological Sciences*, 2012, 367: 657–669.
74. Nicholas Pound, "Male interest in visual cues of sperm competition risk," *Evolution and Human Behavior*, 2002, 23: 443–466.
75. Sarah J. Kilgallon and Leigh W. Simmons, "Image content influences men's semen quality," *Biology Letters*, 2005, 1: 253–255.
76. Gad Saad and Albert Peng, "Applying Darwinian principles in designing effective intervention strategies: The case of sun tanning," *Psychology & Marketing*, 2006, 23: 617–638.
77. Edward O. Wilson, *Consilience: The Unity of Knowledge* (London: Abacus, 1998).
78. Robert J. Sternberg and Elena L. Grigorenko, "Unified psychology," *American Psychologist*, 2001, 56: 1069–1079.
79. Devendra Singh, "Female mate value at a glance: Relationship of waist-to-hip ratio to health, fecundity and attractiveness," *Neuroendocrinology Letters*, 2002, 23: 81–91.
80. Gad Saad, "Advertised waist-to-hip ratios of online female escorts: An evolutionary perspective," *International Journal of e-Collaboration*, 2008, 4: 40–50.
81. Steven M. Platek and Devendra Singh, "Optimal waist-to-hip ratios in women activate neural reward centers in men," *PLoS One*, 2010, 5: e9042, <http://dx.doi.org/10.1371/journal.pone.0009042>
82. Barnaby J. Dixson, Gina M. Grimshaw, Wayne L. Linklater, and Alan F. Dixson, "Eye-tracking of men's preferences for waist-to-hip ratio and breast size of women," *Archives of Sexual Behavior*, 2011, 40: 43–50.
83. Johan C. Karremans, Willem E. Frankenhuys, and Sander Arons, "Blind men prefer a low waist-to-hip ratio," *Evolution and Human Behavior*, 2010, 31: 182–186.
84. Justin R. Garcia, Glenn Geher, Benjamin Crosier, Gad Saad, Daniel Gambacorta, Laura Johnsen, and Elissa Prankitas, "The interdisciplinarity of evolutionary approaches to human behavior: A key to survival in the Ivory archipelago," *Futures*, 2011, 43: 749–761.
85. Douglas T. Kenrick and Jeffrey A. Simpson, "Why social psychology and evolutionary psychology need one another," in *Evolutionary Social Psychology*, Jeffrey A. Simpson and Douglas T. Kenrick, eds. (Mahwah, NJ: Lawrence Erlbaum, 1997), pp. 1–20.

Copyright of Politics & the Life Sciences is the property of Association for Politics & the Life Sciences and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.