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ANNALS OF EATING

Brain Candy

Fast food is killing us. Can it be fixed?

by Malcolm Gladwell

1.

In 1954, a man named Ray Kroc, who made his living selling the five-spindle Multimixer milkshake machine, began hearing about a hamburger stand in San Bernardino, California. This particular restaurant, he was told, had no fewer than eight of his machines in operation, meaning that it could make forty shakes simultaneously. Kroc was astounded. He flew from Chicago to Los Angeles, and drove to San Bernardino, sixty miles away, where he found a small octagonal building on a corner lot. He sat in his car and watched as the workers showed up for the morning shift. They were in starched white shirts and paper hats, and moved with a purposeful discipline. As lunchtime approached, customers began streaming into the parking lot, lining up for bags of hamburgers. Kroc approached a strawberry blonde in a yellow convertible.

"How often do you come here?" he asked.

"Anytime I am in the neighborhood," she replied, and, Kroc would say later, "it was not her sex appeal but the obvious relish with which she devoured the hamburger that made my pulse begin to hammer with excitement." He came back the next morning, and this time set up inside the kitchen, watching the griddle man, the food preparers, and, above all, the French-fry operation, because it was the French fries that truly captured his imagination. They were made from top-quality oblong Idaho russets, eight ounces apiece, deep-fried to a golden brown, and salted with a shaker that, as he put it, kept going like a Salvation Army girl's tambourine. They were crispy on the outside and buttery soft on the inside, and that day Kroc had a vision of a chain of restaurants, just like the one in San Bernardino, selling golden fries from one end of the country to the other. He asked the two

brothers who owned the hamburger stand if he could buy their franchise rights. They said yes. Their names were Mac and Dick McDonald.

Ray Kroc was the great visionary of American fast food, the one who brought the lessons of the manufacturing world to the restaurant business. Before the fifties, it was impossible, in most American towns, to buy fries of consistent quality. Ray Kroc was the man who changed that. "The french fry," he once wrote, "would become almost sacrosanct for me, its preparation a ritual to be followed religiously." A potato that has too great a percentage of water--and potatoes, even the standard Idaho russet burbank, vary widely in their water content--will come out soggy at the end of the frying process. It was Kroc, back in the fifties, who sent out field men, armed with hydrometers, to make sure that all his suppliers were

producing potatoes in the optimal solids range of twenty to twenty-three per cent. Freshly harvested potatoes, furthermore, are rich in sugars, and if you slice them up and deep-fry them the sugars will caramelize and brown the outside of the fry long before the inside is cooked. To make a crisp French fry, a potato has to be stored at a warm temperature for several weeks in order to convert those sugars to starch. Here Kroc led the way as well, mastering the art of "curing" potatoes by storing them under a giant fan in the basement of his first restaurant, outside Chicago.

Perhaps his most enduring achievement, though, was the so-called potato computer--developed for McDonald's by a former electrical engineer for Motorola named Louis Martino--which precisely calibrated the optimal cooking time for a batch of fries. (The key: when a batch of cold raw potatoes is dumped into a vat of cooking oil, the temperature of the fat will drop and then slowly rise. Once the oil has risen three degrees, the fries are ready.) Previously, making high-quality French fries had been an art. The potato computer, the hydrometer, and the curing bins made it a science. By

the time Kroc was finished, he had figured out how to turn potatoes into an inexpensive snack that would always be hot, salty, flavorful, and crisp, no matter where or when you bought it.

This was the first fast-food revolution--the mass production of food that had reliable mass appeal. But today, as the McDonald's franchise approaches its fiftieth anniversary, it is clear that fast food needs a second revolution. As many Americans now die every year from obesity-related illnesses--heart disease and complications of diabetes--as from smoking, and the fast-food toll grows heavier every year. In the fine new book "Fast Food Nation," the journalist Eric Schlosser writes of McDonald's and Burger King in the tone usually reserved for chemical companies, sweatshops, and arms dealers, and, as shocking as that seems at first, it is perfectly appropriate. Ray Kroc's French fries are killing us. Can fast food be fixed?

2.

Fast-food French fries are made from a baking potato like an Idaho russet, or any other variety that is mealy, or starchy, rather than waxy. The potatoes are harvested, cured, washed, peeled, sliced, and then blanched--cooked enough so that the insides

have a fluffy texture but not so much that the fry gets soft and breaks. Blanching is followed by drying, and drying by a thirty-second deep fry, to give the potatoes a crisp shell. Then the fries are frozen until the moment of service, when they are deep-fried again, this time for somewhere around three minutes. Depending on the fast-food chain involved, there are other steps interspersed in this process. McDonald's fries, for example, are briefly dipped in a sugar solution, which gives them their golden-brown color; Burger King fries are dipped in a starch batter, which is what gives those fries their distinctive hard shell and audible crunch. But the result is similar. The potato that is first harvested in the field is roughly eighty per cent water. The process of creating a French fry consists, essentially, of removing as much of that water as possible--through blanching, drying, and deep-frying--and replacing it with fat.

Elisabeth Rozin, in her book "The Primal Cheeseburger," points out that the idea of enriching carbohydrates with fat is nothing new. It's a standard part of the cuisine of almost every culture. Bread is buttered; macaroni comes with cheese; dumplings are fried;

potatoes are scalloped, baked with milk and cheese, cooked in the dripping of roasting meat, mixed with mayonnaise in a salad, or pan-fried in butterfat as latkes. But, as Rozin argues, deep-frying is in many ways the ideal method of adding fat to carbohydrates. If you put butter on a mashed potato, for instance, the result is texturally unexciting: it simply creates a mush. Pan-frying results in uneven browning and crispness. But when a potato is deep-fried the heat of the oil turns the water inside the potato into steam, which causes the hard granules of starch inside the potato to swell and soften: that's why the inside of the fry is fluffy and light. At the same time, the outward migration of the steam limits the amount of oil that seeps into the interior, preventing the fry from getting greasy and concentrating the oil on the surface, where it turns the outer layer of the potato brown and crisp. "What we have with the french fry," Rozin writes, "is a near perfect enactment of the enriching of a starch food with oil or fat."

This is the trouble with the French fry. The fact that it is cooked in fat makes it unhealthy. But the contrast that deep-frying creates between its interior and its exterior--between the

golden shell and the pillowy whiteness beneath--is what makes it so irresistible. The average American now eats a staggering thirty pounds of French fries a year, up from four pounds when Ray Kroc was first figuring out how to mass-produce a crisp fry. Meanwhile, fries themselves have become less healthful. Ray Kroc, in the early days of McDonald's, was a fan of a hot-dog stand on the North Side of Chicago called Sam's, which used what was then called the Chicago method of cooking fries. Sam's cooked its fries in animal fat, and Kroc followed suit, prescribing for his franchises a specially formulated beef tallow called Formula 47 (in reference to the forty-seven-cent McDonald's "All-American meal" of the era: fifteen-cent hamburger, twelve-cent fries, twenty-cent shake). Among aficionados, there is general agreement that those early McDonald's fries were the finest mass-market fries ever made: the beef tallow gave them an unsurpassed rich, buttery taste. But in 1990, in the face of public concern about the health risks of cholesterol in animal-based cooking oil, McDonald's and the other major fast-food houses switched to vegetable oil. That wasn't an improvement, however. In the course of making vegetable oil suitable for deep frying, it is subjected to a chemical process called hydrogenation,

which creates a new substance called a trans unsaturated fat. In the hierarchy of fats, polyunsaturated fats--the kind found in regular vegetable oils--are the good kind; they lower your cholesterol. Saturated fats are the bad kind. But trans fats are worse: they wreak havoc with the body's ability to regulate cholesterol.

According to a recent study involving some eighty thousand women, for every five-per-cent increase in the amount of saturated fats that a woman consumes, her risk of heart disease increases by seventeen per cent. But only a two-per-cent increase in trans fats will increase her heart-disease risk by ninety-three per cent. Walter Willett, an epidemiologist at Harvard--who helped design the study--estimates that the consumption of trans fats in the United States probably causes about thirty thousand premature deaths a year.

McDonald's and the other fast-food houses aren't the only purveyors of trans fats, of course; trans fats are in crackers and potato chips and cookies and any number of other processed foods. Still, a lot of us get a great deal of our trans fats from French fries, and to read the medical evidence on trans fats is to wonder at the odd

selectivity of the outrage that consumers and the legal profession direct at corporate behavior. McDonald's and Burger King and Wendy's have switched to a product, without disclosing its risks, that may cost human lives. What is the difference between this and the kind of thing over which consumers sue companies every day?

3.

The French-fry problem ought to have a simple solution: cook fries in oil that isn't so dangerous. Oils that are rich in monounsaturated fats, like canola oil, aren't nearly as bad for you as saturated fats, and are generally stable enough for deep-frying. It's also possible to "fix" animal fats so that they aren't so problematic. For example, K. C. Hayes, a nutritionist at Brandeis University, has helped develop an oil called Appetize. It's largely beef tallow, which gives it a big taste advantage over vegetable shortening, and makes it stable enough for deep-frying. But it has been processed to remove the cholesterol, and has been blended with pure corn oil, in a combination that Hayes says removes much of the heart-disease risk.

Perhaps the most elegant solution would be for

McDonald's and the other chains to cook their fries in something like Olestra, a fat substitute developed by Procter & Gamble. Ordinary fats are built out of a molecular structure known as a triglyceride: it's a microscopic tree, with a trunk made of glycerol and three branches made of fatty acids. Our bodies can't absorb triglycerides, so in the digestive process each of the branches is broken off by enzymes and absorbed separately. In the production of Olestra, the glycerol trunk of a fat is replaced with a sugar, which has room for not three but eight fatty acids. And our enzymes are unable to break down a fat tree with eight branches--so the Olestra molecule can't be absorbed by the body at all. "Olestra" is as much a process as a compound: you can create an "Olestra" version of any given fat. Potato chips, for instance, tend to be fried in cottonseed oil, because of its distinctively clean taste. Frito-Lay's no-fat Wow! chips are made with an Olestra version of cottonseed oil, which behaves just like regular cottonseed oil except that it's never digested. A regular serving of potato chips has a hundred and fifty calories, ninety of which are fat calories from the cooking oil. A serving of Wow! chips has seventy-five calories and no fat. If Procter & Gamble were to seek F.D.A. approval for the use of Olestra in

commercial deep-frying (which it has not yet done), it could make an Olestra version of the old McDonald's Formula 47, which would deliver every nuance of the old buttery, meaty tallow at a fraction of the calories.

Olestra, it must be said, does have some drawbacks--in particular, a reputation for what is delicately called "gastrointestinal distress." The F.D.A. has required all Olestra products to carry a somewhat daunting label saying that they may cause "cramping and loose stools." Not surprisingly, sales have been disappointing, and Olestra has never won the full acceptance of the nutrition community. Most of this concern, however, appears to be overstated. Procter & Gamble has done randomized, double-blind studies--one of which involved more than three thousand people over six weeks--and found that people eating typical amounts of Olestra-based chips don't have significantly more gastrointestinal problems than people eating normal chips. Diarrhea is such a common problem in America--nearly a third of adults have at least one episode each month--that even F.D.A. regulators now appear to be convinced that in many of the complaints

they received Olestra was unfairly blamed for a problem that was probably caused by something else. The agency has promised Procter & Gamble that the warning label will be reviewed.

Perhaps the best way to put the Olestra controversy into perspective is to compare it to fibre. Fibre is vegetable matter that goes right through you: it's not absorbed by the gastrointestinal tract. Nutritionists tell us to eat it because it helps us lose weight and it lowers cholesterol--even though if you eat too many baked beans or too many bowls of oat bran you will suffer the consequences. Do we put warning labels on boxes of oat bran? No, because the benefits of fibre clearly outweigh its drawbacks. Research has suggested that Olestra, like fibre, helps people lose weight and lowers cholesterol; too much Olestra, like too much fibre, may cause problems. (Actually, too much Olestra may not be as troublesome as too much bran. According to Procter & Gamble, eating a large amount of Olestra--forty grams--causes no more problems than eating a small bowl--twenty grams--of wheat bran.) If we had Olestra fries, then, they shouldn't be eaten for breakfast, lunch, and dinner.

In fact, fast-food houses probably shouldn't use hundred-per-cent Olestra; they should cook their fries in a blend, using the Olestra to displace the most dangerous trans and saturated fats. But these are minor details. The point is that it is entirely possible, right now, to make a delicious French fry that does not carry with it a death sentence. A French fry can be much more than a delivery vehicle for fat.

4.

Is it really that simple, though? Consider the cautionary tale of the efforts of a group of food scientists at Auburn University, in Alabama, more than a decade ago to come up with a better hamburger. The Auburn team wanted to create a leaner beef that tasted as good as regular ground beef. They couldn't just remove the fat, because that would leave the meat dry and mealy. They wanted to replace the fat. "If you look at ground beef, it contains moisture, fat, and protein," says Dale Huffman, one of the scientists who spearheaded the Auburn project. "Protein is relatively constant in all beef, at about twenty per cent. The traditional McDonald's ground beef is around twenty per cent fat. The remainder is water. So you have an inverse ratio of water and fat. If you reduce fat, you need to increase water." The goal of

the Auburn scientists was to cut about two-thirds of the fat from normal ground beef, which meant that they needed to find something to add to the beef that would hold an equivalent amount of water--and continue to retain that water even as the beef was being grilled. Their choice? Seaweed, or, more precisely, carrageenan. "It's been in use for centuries," Huffman explains. "It's the stuff that keeps the suspension in chocolate milk--otherwise the chocolate would settle at the bottom. It has tremendous water-holding ability. There's a loose bond between the carrageenan and the moisture." They also selected some basic flavor enhancers, designed to make up for the lost fat "taste." The result was a beef patty that was roughly three-quarters water, twenty per cent protein, five per cent or so fat, and a quarter of a per cent seaweed. They called it AU Lean.

It didn't take the Auburn scientists long to realize that they had created something special. They installed a test kitchen in their laboratory, got hold of a McDonald's grill, and began doing blind taste comparisons of AU Lean burgers and traditional twenty-per-cent-fat burgers. Time after time, the AU Lean burgers won. Next, they took their invention

into the field. They recruited a hundred families and supplied them with three kinds of ground beef for home cooking over consecutive three-week intervals--regular "market" ground beef with twenty per cent fat, ground beef with five percent fat, and AU Lean. The families were asked to rate the different kinds of beef, without knowing which was which. Again, the AU Lean won hands down--trumping the other two on "likability," "tenderness," "flavorfulness," and "juiciness."

What the Auburn team showed was that, even though people love the taste and feel of fat--and naturally gravitate toward high-fat food--they can be fooled into thinking that there is a lot of fat in something when there isn't. Adam Drewnowski, a nutritionist at the University of Washington, has found a similar effect with cookies. He did blind taste tests of normal and reduced-calorie brownies, biscotti, and chocolate-chip, oatmeal, and peanut-butter cookies. If you cut the sugar content of any of those cookies by twenty-five per cent, he found, people like the cookies much less. But if you cut the fat by twenty-five per cent they barely notice. "People are very finely attuned to how much sugar

there is in a liquid or a solid," Drewnowski says. "For fat, there's no sensory break point. Fat comes in so many guises and so many textures it is very difficult to perceive how much is there." This doesn't mean we are oblivious of fat levels, of course. Huffman says that when his group tried to lower the fat in AU Lean below five per cent, people didn't like it anymore. But, within the relatively broad range of between five and twenty-five per cent, you can add water and some flavoring and most people can't tell the difference.

What's more, people appear to be more sensitive to the volume of food they consume than to its calorie content. Barbara Rolls, a nutritionist at Penn State, has demonstrated this principle with satiety studies. She feeds one group of people a high-volume snack and another group a low-volume snack. Even though the two snacks have the same calorie count, she finds that people who eat the high-volume snack feel more satisfied. "People tend to eat a constant weight or volume of food in a given day, not a constant portion of calories," she says. Eating AU Lean, in short, isn't going to leave you with a craving for more calories; you'll feel just as full.

For anyone looking to improve the quality of fast food, all this is heartening

news. It means that you should be able to put low-fat cheese and low-fat mayonnaise in a Big Mac without anyone's complaining. It also means that there's no particular reason to use twenty-percent-fat ground beef in a fast-food burger. In 1990, using just this argument, the Auburn team suggested to McDonald's that it make a Big Mac out of AU Lean. Shortly thereafter, McDonald's came out with the McLean Deluxe. Other fast-food houses scrambled to follow suit. Nutritionists were delighted. And fast food appeared on the verge of a revolution.

Only, it wasn't. The McLean was a flop, and four years later it was off the market. What happened? Part of the problem appears to have been that McDonald's rushed the burger to market before many of the production kinks had been worked out. More important, though, was the psychological handicap the burger faced. People liked AU Lean in blind taste tests because they didn't know it was AU Lean; they were fooled into thinking it was regular ground beef. But nobody was fooled when it came to the McLean Deluxe. It was sold as the healthy choice--and who goes to McDonald's for health food?

Leann Birch, a developmental psychologist at Penn State, has looked at the impact of these sorts of expectations on children. In one experiment, she took a large group of kids and fed them a big lunch. Then she turned them loose in a room with lots of junk food. "What we see is that some kids eat almost nothing," she says. "But other kids really chow down, and one of the things that predicts how much they eat is the extent to which parents have restricted their access to high-fat, high-sugar food in the past: the more the kids have been restricted, the more they eat." Birch explains the results two ways. First, restricting food makes kids think not in terms of their own hunger but in terms of the presence and absence of food. As she puts it, "The kid is essentially saying, 'If the food's here I better get it while I can, whether or not I'm hungry.' We see these five-year-old kids eating as much as four hundred calories." Birch's second finding, though, is more important. Because the children on restricted diets had been told that junk food was bad for them, they clearly thought that it had to taste good. When it comes to junk food, we seem to follow an implicit script that powerfully biases the way we feel about food. We like fries not in spite of the fact that

they're unhealthy but because of it.

That is sobering news for those interested in improving the American diet. For years, the nutrition movement in this country has made transparency one of its principal goals: it has assumed that the best way to help people improve their diets is to tell them precisely what's in their food, to label certain foods good and certain foods bad. But transparency can backfire, because sometimes nothing is more deadly for our taste buds than the knowledge that what we are eating is good for us. McDonald's should never have called its new offering the McLean Deluxe, in other words. They should have called it the Burger Supreme or the Monster Burger, and then buried the news about reduced calories and fat in the tiniest type on the remotest corner of their Web site. And if we were to cook fries in some high-tech, healthful cooking oil--whether Olestrized beef tallow or something else with a minimum of trans and saturated fats--the worst thing we could do would be to market them as healthy fries. They will not taste nearly as good if we do. They have to be marketed as better fries, as Classic Fries, as fries that bring back the rich tallowy taste of the original McDonald's.

What, after all, was Ray Kroc's biggest triumph? A case could be made for the field men with their hydrometers, or the potato-curing techniques, or the potato computer, which turned the making of French fries from an art into a science. But we should not forget Ronald McDonald, the clown who made the McDonald's name irresistible to legions of small children. Kroc understood that taste comprises not merely the food on our plate but also the associations and assumptions and prejudices we bring to the table--that half the battle in making kids happy with their meal was calling what they were eating a Happy Meal. The marketing of healthful fast food will require the same degree of subtlety and sophistication. The nutrition movement keeps looking for a crusader--someone who will bring about better public education and tougher government regulations. But we need much more than that. We need another Ray Kroc.

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