

Salt, Sugar, Fat

Michael Moss—2013.

Prologue ‘The Company Jewels’

- The company’s Yoplait brand had already transformed traditional unsweetened breakfast yogurt into a dessert like snack. It now had twice as much sugar per serving as Lucky Charms, the company’s cloyingly sweet, marshmallow-filled cereal.
- They called it Go-Gurt, and rolled it out nationally in the weeks before the CEO meeting. (By year’s end, it would hit \$100 million in sales.)
- Together, the two suppliers had the salt, which was processed in dozens of ways to maximize the jolt that taste buds would feel with the very first bite; they had the fats, which delivered the biggest loads of calories and worked more subtly in inducing people to overeat; and they had the sugar, whose raw power in exciting the brain made it perhaps the most formidable ingredient of all, dictating the formulations of products from one side of the grocery store to the other.
- He and other food scientists took comfort in knowing that the grocery store icons they had invented in a more innocent era—the soda and chips and TV dinners—had been imagined as occasional fare. It was society that had changed, changed so dramatically that these snacks and convenience foods had become a daily—even hourly—habit, a staple of the American diet.
- To make a new soda guaranteed to create a craving requires the high math of regression analysis and intricate charts to plot what industry insiders call the “bliss point,” or the precise amount sugar or fat or salt that will send consumers over the moon. At a laboratory in White Plains, New York, industry scientists who perform this alchemy walked me, step by step, through the process of engineering a new soda so that I could see the creation of bliss firsthand.
- To understand how the industry deploys fat in creating allure, I traveled to Madison, Wisconsin, home of Oscar Mayer and of the man who invented the prepackaged whole meals called Lunchables, a colossus among convenience foods that radically changed the eating habits of millions of American kids. He went into his cabinets to pull out the company records that weighed the pros and cons of using real pepperoni versus pepperoni flavor and described the allure of fat-laden meat and cheese in cuddly terms like “product delivery cues.”
- Lunchables, for one, are a marketing powerhouse, specifically designed to exploit the guilt of working moms and the desire of kids for a little empowerment. These ready-to-eat meals typically include pieces of meat, cheese, crackers, and candy, allowing kids to assemble them in whatever combination they desire. Food marketers wield pinpoint psychological targeting, and they didn’t disappoint on the Lunchables ads: The ads stressed that lunch was a time for them, not their parents.
- The average American now consumes as much as 33 pounds of cheese a year.
- They’ve discovered that the brain lights up for sugar the same way does for cocaine, and this knowledge is useful, not only in formulating foods. The world’s biggest ice cream maker, Unilever.
- Sugar not only sweetens, it replaces more costly ingredients –like tomatoes in ketchup—to add bulk and texture. For little added expense, a variety of fats can be slipped into food formulas to stimulate overeating and improve mouth feel. And salt, barely more expensive than water, has miraculous powers to boost the appeal of processed food.

Part one sugar.

Chapter one “Exploiting the Biology of the Child”

- On average, we consume 71 pounds of calorie sweeteners each year. That’s 22 teaspoons of sugar, per person, per day.
- Their yearly consumption has nearly doubled in the past decades to 14 gallons a person (to see sweet drinks).
- A place called the Monell Chemical Senses Center in Philadelphia. It is located a few blocks west of the Amtrak station, in a bland five story brick building easily overlooked in the architectural wasteland of the district known as University City—except for “Eddy,” the giant sculpture that stands guarding the entrance. Eddy is a ten-foot-high fragment of a face, and he perfectly captures the obsessions of those inside: He is all nose and mouth.
- The stickiest subject at Monell, however, is not sugar. It’s money. Taxpayers fund about half of the center’s \$17.5 million annual budget through federal grants, but much of the rest of its operation comes from the food industry, including the big manufacturers, as well as several tobacco companies. A large golden plaque in the lobby pays homage to PepsiCo, CocaCola, Kraft, Nestle, Philip Morris, among others. It’s an odd arrangement, for sure, one that evokes past efforts by the tobacco industry to buy “research” that put cigarettes in a favorable light. At Monell, the industry funding buys companies a privileged access to the center and its labs.
- Twice as many kids as adults chose the sweetest and saltiest solutions. (This was the first scientific proof of what parents, watching their kids lunge for the sugar bowl at the breakfast table, ahead knew instinctively.) The difference among adults was less striking but still significant: more African-Americans choose the sweetest and the saltiest solutions.
- Tatyana’s bliss point for the pudding was 24 percent sugar, twice the level of sweetness that most adults can handle in pudding. As far as children go, she was on the lower side; some go as high as 36 percent.
- Mennella has become convinced that our bliss point for sugar—and all foods, for that matter—is shaped by our earliest experiences. But as babies grow into youngsters, the opportunity for food companies to influence our taste grows as well. For Mennella, this is troubling. It’s not that food companies are teaching children to like sweetness; rather, they are teaching children what foods should taste like. And increasingly, this curriculum has been all about sugar.
- Two thirds of sugar and Americans diet was now coming from processed foods.
- Sweetened drinks made his rats more hungry, not less.
- The diet soda turned out to be something of a wash, or at best a small help in losing weight. And lost a quarter pound and drinking the diet soda. For women, there was no statistically significant change.
- With regular soda, both sexes gained weight: an average of nearly a pound and a half in just three weeks.
- One of the biggest risks in letting children drink soda is that it leads them to expect – and want – more sweetness in all of their drinks.
- The United States, however, remains the most obese country in the world. And where the rates of obesity appear to be reaching a plateau among adults at 35 percent, they are still climbing among the group that is most vulnerable to the food industry’s products: children. The most recent data,

from 2006 to 2008, shows that obesity among kids aged six to eleven jumped from 15 to 20 percent.

Chapter two “How Do You Get People to Crave?”

- In 2004, Dr Pepper decided to go outside the company for help. It turned to a man named Howard Moskowitz, whose success in delivering mega-sellers had turned him a food industry legend. Trained in mathematics and experimental psychology, Moskowitz runs a consulting firm in White Plains, New York, where he has established a long track record of triumphs in consumer goods, from credit cards to point-and-shoot cameras to computer games. Much of his success stems from his ability to group consumers into segments, with different emotional needs, and target them with precision.
- The military has long been in a peculiar bind when it comes to food: how to get soldiers to eat more rations, not less, when they are out in the field, running operations. “The problem in the military is the same as in nursing homes,” said Herb Meiselman, one of Moskowitz’s former colleagues at the Army labs. “When you go into combat, you reduce your eating, and if you do that for too long, you lose body weight.
- **The biggest hits-be** they Coca-Cola or Doritos or Kraft’s Velveeta Cheesy Skillet dinner kits—owe their success to formulas that pique the taste buds enough to be alluring but don’t have a distinct overriding single flavor that says to the brain: Enough already!
- This is a novel concept at the time. The American consumer was viewed as a singular target, uncomplicated by variation, and every food company making every grocery product was focused on finding the one perfect formulation. Moskowitz, in a bold stroke, convinced General Foods that it should be selling not one but all three of these roasts—a breakthrough that the executive in charge of fixing Maxwell House at the time, John Ruff, told me saved the brand. “We actually reversed a loss to a win against Folgers,” He said.
- After... months and months, he had a mountain of data about how the American people feel about spaghetti sauce.... Did he look for the most popular brand, variety of spaghetti sauce? No,... instead he looked at the data and he said, “Let’s see if we can group all these different data points into clusters. Let’s see if they congregate around certain ideas.” And sure enough, if you sit down and you analyze all this data on spaghetti sauce, you realize that all Americans fall into one of three groups. There are people who like their spaghetti sauce plain. There are people who like their spaghetti sauce spicy. And there are people who like it extra chunky. And of those three facts, the third one was the most significant, because at the time, in the early 1980s, if you went to a supermarket, you would not find extra chunky spaghetti sauce. And Prego turned to Howard, and they said, “Are you telling me that one third of Americans crave extra chunky spaghetti sauce. And yet no one is servicing their needs?” And he said, “Yes.” And Prego then went back and completely reformulated their spaghetti sauce and came out with a line of extra chunky that immediately and completely took over the spaghetti sauce business in this country. And over the next ten years, they made \$600 million off their line of extra chunky sauces. And everyone else in the industry looked at what Howard had done, and they said, “Oh my god. We’ve been thinking all wrong.” And that’s when you started to get seven different kinds of vinegar and fourteen different kinds of mustard and seventy-one different kinds of olive oil. And then eventually even Ragu hired Howard,... and today with Ragu] there are thirty-six in six varieties. Cheese. Light. Robusto. Rich and Hearty. Old World Traditional. Extra Chunky Garden. That’s Howard’s doing.

That is Howard's gift to the American people.... He fundamentally changed the way the food industry thinks about making you happy.

- The largest ingredient, after tomatoes, is sugar. A mere half cup of Prego traditional, for instance, has more than 2 teaspoons of sugar, as much as 2+ Oreo cookies, a tube of Go Gurt or some of Pepperidge Farm apple turnovers that Campbell's also makes.
- Because what Moskowitz found is that hunger is a poor driver of cravings. We rarely get in the situation where our body and brain are depleted of nutrients and are actually in need of replenishment. Rather, he discovered, we are driven to eat by other forces in our lives. Some of these are emotional needs, while others reflect the pillars of processed food: first and foremost taste, followed by aroma, appearance, and texture. As disparate as these pillars may seem, one ingredient—sugar—can do it all.
- When I say is, let's base it on science, he said. "Let's make twenty or thirty or forty variations. When you do that. You'll see that we like some of the variations more and like others less. And you can build a mathematical model that shows you exactly the relation between what's under your control and how consumers respond. Bingo. You engineer the product."

Chapter three "Convenience with a Capital 'C'"

- Some food creations happened in a flash. Most take months. This one took years. From 1947 to 1950 (pudding).
- Tang had one other little-known attribute that contributed to its block buster status in the United States, albeit in a peculiar way. NASA, the space program, needed a drink that would add little bulk to the digestion, given the toilet constraints in space. Real orange juice had too much bulky fiber in its pulp. Tang, however, was perfect—what technologists call a low residual food.

Chapter four "Is It Cereal or Candy?"

- The typical American child in 1979 would watch more than 20,000 commercials between the ages of two and 11 – and more than half of those ads were pitching sweetened cereals, candies, snacks and soft drinks.
- This followed Kellogg's earlier move to drop the word sugar from two of its own 50-percent-plus mega-sellers: Sugar Frosted Flakes became Frosted Flakes, and sugar smacks turned into Honey smacks.

Chapter five "I Want to See a Lot of Body Bags"

- It focused on getting Coke into the hands of people, especially kids, when they were most vulnerable to persuasion—those moments when they were happy. That is how Coke came to be partners with America's favorite pastime. "The story they always tell at Coke," Dunn said, "is Mr. Woodruff saying, 'When I was a kid, my father took me to my first baseball game, and there was nothing more sacred to me than that moment with my father. And what did I have to drink? I had an ice-cold Coke, which became part of that sacred moment.' "The idea was to be in all those places where these special moments of your life took place," Dunn continued. "Coke wanted to be part of those moments. That was, if not the most brilliant marketing strategy of all time, probably one of the best two or three. You not only had the imagery, it's like somebody was in their own television commercial. You're in the moment, you're drinking the product, you have

that emotional context that sets it. And Coke really came to have a very high share of those experiences. It was about having a ubiquitous presence. Inside Coke, it is called tile ubiquity strategy.’ In simple terms, Mr. Woodruff’s words for that were: put the product within an arm’s reach of desire.

- In early 1985, he tried in vain for weeks to land an interview with a Coke executive, Charlie Frenette. Who wouldn’t return his calls? Undeterred, he got a sympathetic secretary to tell him when Frenette was traveling next, and Dunn flew to Atlanta and boarded the same flight. “He was up in first class,” Dunn said. “I was in coach. When they turned the seat belt lights off, I walked up and said, ‘Hi Charlie, how are you doing? I’ve been having a hard time getting in to see you, so I thought the best thing would be for us to spend a few minutes on the plane.’ And he looked at with me this kind of look—oh, really—and said, ‘I’m kind of busy. I have a big call. I’ll see if I have any time at the end of the flight.’ “Dunn still didn’t get an interview, but he did get a test. Just before landing, Frenette had him come up to first class, where he asked him to critique a presentation he’d prepared for the Denny’s restaurant chain. “Next thing I knew, he had hired me,” Dunn said. “And what’s funny about that, we got to be good friends, and he would tell that story to sales people all the time.
- 60% of supermarket purchase decisions are completely unplanned.
- The snack that Dunn was proposing to sell: carrots. Plain, fresh carrots. No added sugar. No creamy sauce or dips. No salt. Just baby carrots that are peeled, washed, bagged, and then sold into the deadly dull produce aisle. Carrots were the flip side of Coke. They weren’t selling because of the way they were being sold. To fix this, Dunn said, would require unleashing the proven techniques of processed food marketing.
- “We act like a snack, not a vegetable,” he told the investors. “We exploit the rules of junk food to fuel the baby carrot conversation. We are pro-junk food behavior but anti-junk food establishment.”
- In describing this new line of work, Dunn would tell me he was doing penance for his years at Coca-Cola—or, as he put it, “I’m paying my karmic debt.” That day in Santa Monica, however, the men from Madison were thinking about sales. They had come all the way from Chicago to hear this pitch, and they loved it. They had already agreed to buy one of the two biggest farm producers of baby carrots in the country, and they’d hired Dunn to run the whole operation. Now, after his pitch, they were relieved. Dunn had figured out that using the industry’s own marketing ploys would work better than anything else. He drew from the bag of tricks that he mastered in his twenty years at Coca-Cola, where he learned one of the most critical rules in processed food: The selling of food matters as much as the food itself if not more.

Chapter six “A Burst of Fruity Aroma”

- General Foods was not the first to recognize the marketing potential of fruit concentrate in processed foods, but it used this super-sugar to great effect in one of its biggest moneymakers: a “fruit drink” called Capri Sun, which Philip Morris acquired in 1991 for \$155 million. Five years later, in what Geoffrey Bible praised as a “staggering” achievement, the drink reached \$230 million in annual sales, with a volume that was rising a spectacular 26 percent each year. A portion of this success was due to some technical heroics in the factory, where engineers figured out how to retool the manufacturing process to cycle more quickly through the drink’s twenty-one

flavors, which greatly enhanced productivity and the bottom line. But there was more to it than that. Like Kool-Aid and Tang, Capri Sun was sweetened mainly by high-fructose corn syrup, but it also now contained juice concentrate, which allowed the drink's label to boast, for the first time, "Natural fruit drink. No artificial ingredients." This was a huge selling point for moms who, as a result, felt more comfortable adding the drink to their kids' school lunches and snacks. I asked Capri Sun's former brand manager, Paul Halladay, whether the drink's formula could have been altered to avoid using the fruit concentrate without changing the taste. "Yes, you could do that," he told me. "It was not a major part of the sweetener. But Capri Sun has always had some fruit concentrate. It helps with the validity of the 'natural' in the advertising to have the natural in there."

- "Kraft has always taken pride in labeling its products clearly and accurately and in a manner that is not misleading to consumers," a company spokeswoman told me. "The nutritional information resulting from the addition of real fruit juice and use of the natural claim was in keeping with the labeling regulations." But Capri Sun's use of "natural" in its marketing would come under fire in 2007, when a Florida grandmother named Linda Rex picked up a case for a young relative visiting from Ireland. "When I saw 'All Natural' on the label, that sounded healthier than soda," she said. "But when I got home and got out my glasses, I threw it in the garbage, when I realized it contained high-fructose corn syrup and was nearly identical to soda." Some of Capri Sun's flavors, in fact, were higher in sugar than soda. Wild Cherry, for instance, had 28 grams of sugar—more than six teaspoons—in each 6.76-ounce pouch. Coke, in its larger 12-ounce can, has 39 grams—28 percent less per ounce. Working with an attorney for the Center for Science in the Public Interest, Rex sued Kraft for deceptive marketing.

Part two Fat.

Chapter seven "That Gooney, Sticky Mouthfeel"

- A hunk of cheddar cheese is one third fat, along with protein, salt and a little sugar, and even that statistic understates the force that fat brings to food. Two thirds of calories in that cheese are delivered by the fat.
- At the same time, however, the dairy industry figured out a way to soften this blow to their business by putting the phrases "low-fat" and "2 percent" on milk in which a little of the fat had been removed. The popularity of this defatted milk grew so fast that it now outsells all other types of milk, including skim, which has no fat at all. But there is a marketing scheme at work in this: The "2 percent" labeling may lead you to believe that 98 percent of the fat is removed, but in truth the fat content of whole milk is only a tad higher, at 3 percent. Consumer groups who urge people to drink 1 percent or nonfat milk have fought unsuccessfully over the years to have the 2 percent claim barred as deceptive.
- My point, back when I did my studies, was that in these mixtures of sugar and fat you find in so many products, most of the calories come from fat. I had this disagreement years ago with researchers who were working on the hypothesis that obesity is caused by carbohydrates, which is what sugar is. They were using things like Snickers bars and chocolate M&Ms and thinking, 'A-ha, sweet foods, carbohydrates.' And my point was, yes, they are sweet, and there is sugar in them. But they are not carbohydrate foods—60 to 70 to 80 percent of their calories was coming from fat. The fat was invisible, even to the investigators themselves."

Chapter eight “Liquid Gold”

- Americans now eat as much as 33 pounds or more of cheese and pseudo-cheese products a year, triple the amount we consumed in the early 1970s.
- The nutritional math, when it comes to cheese, is staggering too. Depending on the specific product, 33 pounds of cheese delivers as many as 60,000 calories, which is enough energy, on its own, to sustain an adult for a month. Those 33 pounds also have as many as 3,100 grams of saturated fat, or more than half a year’s recommended maximum intake. Cheese has become the single largest source of saturated fat in the American diet. Though it is hardly the only culprit. Day in and day out, Americans on average are exceeding the recommended maximum of fat by more than 50 percent.
- 1 pound of cheese takes a gallon of milk off the dairy industry’s hands.
- The storage fees alone were running upwards of \$1 million a day. It grew so large, in fact, that the government began secreting it away in caverns and a vast, abandoned limestone mine near Kansas City, where the Washington Post’s agriculture reporter described an astonishing scene: deep beneath the ground here, in more bags, barrels and boxes than the mind can imagine, the awesome triumphs of the prestigious American milk cow breast enshrined in a dark, cool and costly comfort.
- And yet, the food industry’s rush to embrace cheese – the fattiest of all fat-based products.

Chapter nine “Lunchtime Is All Yours”

- 14,000 newly hatched products show up every year in the grocery store.
- (Lunchables) They would help turn the trays into a processed food colossus, one that would break industry records by soaring to nearly \$1 billion in annual sales. The little trays, by transforming bologna into a product kids were suddenly clamoring for, would also accomplish one of Drane’s own goals, which was to save the jobs of the Oscar Mayer workers who made the fat-laden meats that were running afoul of the public concern for its health.
- The trays created an entirely new category of food, one that exposed Americans, especially young kids, to the thrills of fast food that heretofore were the purview of restaurant chains like McDonald’s and Burger King.
- A single slice of beef bologna, for instance, has 3.5 grams of saturated fat, along with 330 milligrams of sodium, nearly a quarter of a day’s recommended maximum for most American adults.
- As they talked, he realized the most pressing issue was not fat, it was time. Working moms and busy moms strove to provide healthy food, of course, and thus sales of lower-fat turkey were rising. But day in and day out, finding time to prepare any sort of food for their kids was increasingly difficult. The mothers spoke at length about the morning crush, that nightmarish dash to get breakfast on the table and lunch packed and shoes tied and kids out the door. He summed up their remarks for me like this: “It’s awful. I am scrambling around. My kids are asking me for stuff. I’m trying to get myself ready to go to the office. I go to pack these lunches, and I don’t know what I’ve got. They want them to be special, and I want to take care of them and, by the way, I like to take care of myself, but I might not have stuff in inventory.”
- There was no way bread could stay fresh for the two months their product need to sit in warehouses or grocery coolers.

- Then the question became. What shape should the cheese be? Through tests on consumers, they discovered that cheese sliced into little rounds was a bit more exciting than squares. In their likability matrix, the rounds came in at 80 on a scale of 100, while the squares mustered only a 70. But they also needed to keep their production costs as low as possible, or the retail price would have to be set beyond what people would be willing to pay. Square cheese was easier to cut than round, so they went with that. They looked at everything through the matrix of shrinking the production costs any way they could without hurting the flavor or texture too much. They could use the processed cheese made by Kraft, which was already cheaper than regular cheese, or they could knock another two cents off the per unit price by using a lesser product called “cheese food,” which had scored poorly in the taste tests. Likewise, they compared things like real pepperoni to pepperoni flavoring, a cardboard tray cover to a printed, clear film.
- The testing, which went on for months, surpassed Oscar Mayer’s highest hopes. Not only did the people in the experiment go for the trays after being exposed to the advertising, the familiarity of the contents, however plain they were, proved to be a foundational theorem in processed foods. Which Drane calls “the weirdness factor”: If a new product is too unusual. Shoppers get scared. “I use the term, ‘80 percent familiar,’ “Drane told me. ‘If you’ve got a new thing, it better be 80 percent familiar, or you’ll have people scratching their heads wondering what the hell it is.’”
- Projected to lose \$6 million in 1991, the trays instead broke even, in the next year, they earned \$8 million.
- “She added five “reasons to avoid” the new Lunchable: The sugar, at 37 grams, nearly matched that in a 12-ounce can of Coke; the \$3 price tag far exceeded the cost of her homemade PB&J and fresh fruit; the packaging was not reusable; the bread was not 100 percent whole-grain; and the ingredients included “artificial colors, flavors and something called ‘carauba wax’—I use wax on my floors and car—not for food for my children.’”
- “This disconnect between moms hating the idea of cold raw pizza and the kids loving it had to do with their distinct approaches to eating in general. Adults use their mouths when they eat, tasting whatever it is they are eating. By contrast, kids tend to use their eyes, judging the food—initially at least—by how it looks. In a Lunchables with cold raw pizza, they say nothing but fun. And to amp up the fun quotient, Drane’s team didn’t lay out the pizza in slices, as if it had been cut from a pie. They put it into the trays unassembled, in order to maximize the fun. The crust went into one compartment, the cheese, pepperoni, and sauce into others. That way, the kids got to make their own pizza right at school, while their schoolmates looked in envy.

Chapter ten “The Message the Government Conveys”

- In fact, the biggest deliverers of saturated fat – the type of fat doctors worry about – are cheese and red meats.
- Together, cheese and pizza contributed more than 14% of the saturated fat being consumed. Second on the list was red meat in its various forms, which accounted for more than 13% of the fat in our diet. In third place – and a bit less than 6% – were all those grain-based dessert like chocolate cake and cookies.
- The dollars for marketing beef added up to more than \$80 million a year, and over the years, the total money raised has topped \$2 billion. That is, essentially, \$2 billion for selling America on more beef, compared with the \$6.5 million the USDA’s nutrition center gets each year to nudge

Americans in the other direction—of cutting back, not only on fat but on sugar and salt as well. It hasn't been a fair fight.

- Every 1.7 ounces of processed meats consumed per day increases the risk of colon cancer by 21%.

Chapter eleven “No Sugar, No Fat, No Sales”

- Obesity was setting all sorts of records in 2003. The average adult was 24 pounds heavier than the 1960.

Part three: salt.

Chapter twelve ‘People Love Salt’

Chapter thirteen “The Same Great Salty Taste Your Customers Crave”.

Chapter fourteen “I Feel So Sorry for the Public”

Epilogue “We’re Hooked on Inexpensive Food”

- On my last day at Nestlé, I had lunch with the president of the company’s new health science unit, Luis Cantarell.
- He envisions—quite excitedly—the prospect of drug-like foods, or food-like drugs that could upend the traditional approach to medical care, in which expensive drugs are used to treat the scourges of overeating: diabetes, obesity, high blood pressure.
- One of the most promising experiments in resisting the sirens of overeating is taking place in Philadelphia, where a professor of clinical psychology at Drexel University, Michael Lowe, is trying to overcome another root cause of obesity. Besides the influence of Wall Street and the aggressive marketing by soda companies, he points to a tear in the social fabric that first appeared in the early 1980s, as the obesity rates started to surge. “When a lot of us grew up,” he told me, “there were three meals a day, and maybe a planned snack at bedtime—and that was it. You never ate outside of those times because you would spoil your appetite. That changed. People began eating everywhere, in meetings or walking down the street. There’s no place where food isn’t acceptable now, and people are so busy they don’t make time to sit down for meals. We have to work to encourage families to get together, and that used to be automatic.
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