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How Intellectual Property Rights Shape Neuropsychological Demand for Orange Flavors

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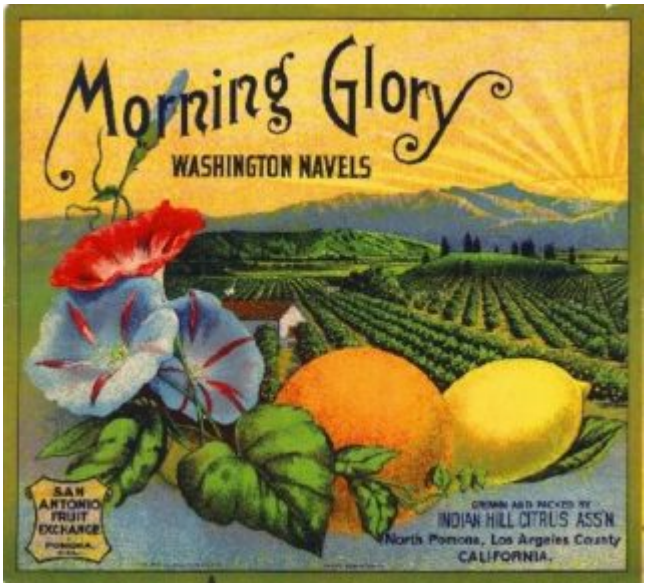

Oranges possess a special cachet in the American dream. Growing up in the baby-boomer era meant that you heard—"breakfast without orange juice is like a day without sunshine"—thousands of times while watching rerun episodes of *Leave it to Beaver* and *The Flintstones*.

As my breakfast chore, I would dutifully mix three cans of tap water with one can of "fresh" frozen concentrated orange juice. *Voilà,* we had our morning OJ, just like Anita Bryant's cheery TV family. Little did I know that the 3-to-1 formula was patented—to quench a mass-produced taste for sweet orange flavor.

As a youngster, I was also oblivious to the barrage of *cognitive priming*—in the form of TV ads, radio jingles, point-of-purchase placards, etc.—that would stimulate my desire to eat oranges and drink their juice to this day. *Memory traces* of orange flavor are encoded in my brain.

How does the flavor of an orange leave its memories lodged somewhere in the hippocampus[1] region of the brain for later retrieval? Behind the scenes, intellectual property rights have long shaped—and marketers have long exploited—our innate, *neuropsychological* demand for foodstuffs.

Food Memories, Flavors and Neuropsychology

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The process by which we imagine food, place it in our mouth and later remember its flavor is a growing object of neuropsychological study. It starts with vision. As the philosopher Apicus stated, the "first taste is always with the eyes."[2]

Neuroscientists analyze the pathways and receptors for sense organs. Flavor perceptions arise from sense impressions. "We assume that flavor involves the interaction of at least two senses—smell and taste—and flavor cannot occur without both of these senses becoming stimulated. However, flavor also involves other variables such as texture, temperature, sound and vision."[3]

Humans can detect thousands of odors, but only five or so tastes. How we perceive and recall food flavors is not well understood, however. The neuropsychological research work is daunting, as it is a "universal rule in psychology, [that] when sense qualities combine to form what is called a perception, the result of their combination is not a sum but a system; not a patchwork but a pattern."[4]

Advances in this field of study are set forth well in Gordon M. Shepard's groundbreaking work, *Neurogastronomy: How the Brain Creates Flavor and Why It Matters* (2012) and G. Neil Martin's *The Neuropsychology of Smell and Tastes* (2013).

Hypothetically speaking, the vivid nature of food memories may mean they are qualitatively different from more daily memories lost in the shuffle of time. Perhaps they are encoded in some special manner in our brains that allows for their ready retrieval. One need look no further than MFK Fisher's ruminations on food and life in *How to Cook a Wolf* (1942) to glimpse the extraordinary power of food memories.

From Bitter (Seville) to Sweet Oranges

In order to avoid gastrointestinal distress, taste is the final arbiter of what we decide to ingest, chew and swallow. Sweet tastes invariably please our palates; whereas most poisons are bitter tasting.[5]

The first orange to make it to American shores—the bitter *Seville* orange—did not pass this taste test. Spanish conquistadores brought it across the Atlantic to the Caribbean during the 16th century "Age of Discovery." (The orange had previously come to Spain through Islamic trading routes from the East.) To battle scurvy, sailors would plant orange seeds along trade routes, hoping to reap health benefits later.

In addition to tasting bitter, the Seville orange would not win any marketing battles: it is "an ugly looking fruit, squat with a thick, rough skin. It can be seen growing wild or as an ornamental tree" in northern Mexico, southern Texas, Arizona, and even in Capitol Park in

Sacramento. Its juice "is used with other condiments to season meats or fish, or as a base for onion and chile sauces, or in the pickled onions used as a topping for *panuchos,* or in escabeches in Yucatán."

The North American palate never acquired a taste for Seville oranges. Its prior use in Europe had been largely decorative—for fashionable royal *orangeries* then in vogue.

The complexity of the Seville orange flavor is evident in this Diana Kennedy recipe for its substitute:

- 1 teaspoon finely grated grapefruit or green Meyer lemon rind
- 2 tablespoons fresh orange juice
- 2 tablespoons fresh grapefruit or ripe Meyer lemon juice
- 4 tablespoons fresh lime juice[6]

The sweet orange, *aka Citrus sinensis,* would arrive later to the Americas, following a circuitous migratory path from Southeast Asia:

[T]he origin of the sweet orange [appears to be a] female pummelo crossed with [a] male mandarin to create the initial interspecific hybrid that was further crossed again with [a] male mandarin to produce [the] sweet orange. This event might have happened at least 2,300 years ago, or much earlier, as [the] sweet orange was recorded in Chinese literature as long ago as 314 BC. Although additional genetic changes might have occurred afterward, it is still remarkable that this ancient hybrid genotype seems to be preserved in today's sweet orange . . . ." [7]

Just a handful of sweet orange varieties managed to take over the North American market during the latter 19th century.

In California, a seedless navel orange—the Washington Navel—proved to be the best tasting variety. The "navel" portion is actually a small second fruit embedded partially inside the larger fruit. This orange originated in Brazil. Its first US planting occurred in Riverside, California around 1873. Navel oranges now "own" the fresh produce markets in the States.

Cultivated mostly for juicing purposes, the Florida orange market differs dramatically from California's. In his book entitled *Oranges* (1966), John McPhee highlights the comparisons:

An orange grown in Florida usually has a thin and tightly fitting skin, and it is also heavy with juice. Californians say that if you want to eat a Florida orange you have to get into a bathtub first. California oranges are light in weight and have thick skins that break easily and come off in hunks. The flesh inside is marvelously sweet and the segments almost separate themselves.[8]

Two juice varieties—the Valencia and the Hamlin—predominate in the Sunshine State. Navel oranges do not grow well in Florida. In pomologist parlance, they "proved to be too shy a bearer there."[9]

Of Orange Crate Posters, Cognitive Priming and Failed Copyrights

Our craving for sweet orange flavors begins with our ancestors, who passed on their food preferences to upcoming generations. They set a sociological stage for our *neuropsychological* reactions to the idea of eating an orange or drinking its juice.

With a late 19th century populace shifting from rural to urban areas and with railroad transportation opening up new agricultural markets, Americans increasingly had to rely on visual cues regarding the source of their fresh fruit and vegetable produce. For psychological purposes, this is called *cognitive priming*, i.e., an exposure to one stimulus (a picture, symbol, etc.) will influence the response to another stimulus—here, a purchase/consumption decision.

For oranges, that imagery came through the colorful paper labels adorning the wooden shipping crates. When viewed as a stacked array in warehouses or grocery stores, they offered a romantic vision of nature's cornucopia. The advent of color printing made these posters stunningly gorgeous. To take a peek, check out these vintage orange crate posters in the footnote link.[10]

Orange crate posters of earlier eras depict southern California as a vast Mediterranean paradise-in-waiting. Place names—like *Pomona*, the Roman goddess of fruit trees, gardens and orchards—herald the founding of a new Arcadia in the Golden State.

Drawing on an Indian River and Lake County lineage, Florida orange growers festooned their orange crates with dreamy portrayals of Native Americans, bucolic images of peaceful lagoons and carefully tended rows of orange orchards—all with no actual farm laborers ever in sight.

Neuropsychological research shows that colors assist us in making judgments about food and its acceptability. The "better the congruence between the colour and the source of the food (yellow and lemon, for example), the greater the intensity of the rated taste." "Brown M&Ms are judged to be more chocolatey—but no less likeable—than are green ones . . . and red added to drinks increases their ratings of sweetness."[11]

As marketing ploys, the orange crate posters worked brilliantly. They assured consumers that their oranges came from a "natural" place of cleanliness, harmony and abundance. Using the sun as both a simile and metaphor—think *Sunkist*—offered an easy branding syllogism: sun = light = nature = goodness = oranges.

The orange "halo effect" seeped into an American consciousness over time. John Steinbeck's novel *Grapes of Wrath* employs the orange as a literary symbol of both the success and failure of the American dream during the Great Depression. These passages highlight the Dust Bowl migrant's plight vis-à-vis the orange:

Why don't you go out west to California? There's work there, and it never gets cold. Why you can reach out anywhere and pick an orange. (Chapter 5)

The works of the roots of the vines, of the trees, must be destroyed to keep up the price, and this is the saddest, bitterest thing of all. Carloads of oranges dumped on the ground. The people came for miles to take the fruit, but this could not be. How would they buy oranges at twenty cents a dozen if they could drive out and pick them up? And men with hoses squirt kerosene on the oranges, and they are angry at the crime, angry at the people who have come to take the fruit. A million people hungry, needing the fruit—and kerosene sprayed over the golden mountains. (Chapter 32).

While copyright law exists to protect authorial rights, label artists "often considered their work to be less prestigious that the design of magazine covers or national product advertisements. Since label design was often a joint project, and since many lithographic companies had restrictions against signed work, practically no label designs bear the artist signature."[12]

Thus, most vintage orange crate posters did not display the © symbol and any otherwise protectable copyright interests were automatically lost when they were published under a 1909 copyright law regime without the copyright symbol.

Nonetheless, their eye-popping colors and soothing imagery conditioned successive American generations into making positive mental associations with oranges. Eating them even became part and parcel of the American patriotic experience. One orange crate poster shows Uncle Sam holding oranges with the banner proclaiming, "I Grow These Myself in California."[13]

Patented Orange Juice Goes Viral

Composed of hard-to-pronounce aldehydes, esters, alcohols and hydrocarbons, the volatile flavor components of freshly squeezed orange juice are evanescent and degrade when processed and during storage. One early study quantified 29 volatile constituents of orange juice and showed that two new constituents appeared after heat

treatment of the juice. In a word, the taste of fresh squeezed orange juice is highly unstable.[14]

Shortly after WWII, three central Florida scientists "surprised themselves with a simple idea that resulted in the commercial development of orange juice concentrate."[15] It evolved into U.S. Patent No. 2,453,109, "Method of Preparing Full-Flavored Fruit Juice Concentrates (issued on November 9, 1948):

The principal object of this invention is to prepare a concentrated fruit juice containing a substantial portion of the original aroma, flavor, and palatability. This may be accomplished by adding a portion of fresh single-strength juice to a relatively strong concentrate of medium strength. The fresh juice returns much of the natural aroma, flavor and palatability to the concentrate. We have found that when concentrates prepared in this manner were diluted to original concentration with water, the resulting product is superior in aroma, flavor, and palatability to similar products prepared from conventional vacuum concentrates, and is hardly distinguishable from fresh juice.

Soon, many Florida oranges were being shipped to enormous processing factories that would result "in small, trim cans, about two inches in diameter and four inches high, containing orange juice that has been boiled to high viscosity in a vacuum, separated into several component parts, reassembled, flavored, and then frozen solid."

The impact of the "fresh frozen" concentrated orange juice on the market for fresh oranges cannot be understated. Per capita U.S. consumption of fresh oranges fell 75% in the twenty years after this invention.

Fresh oranges have become, in a way, old-fashioned. The frozen product made from them is pure and sweet, with a laboratory controlled balance between its acids and its sugars; its color and its flavor components are as uniform as science can make them, and the consumer opening the six-ounce can is confident that the drink he is about to reconstitute will taste almost exactly like the juice he took out of the last can he bought. Fresh orange juice, on the other hand, is probably less consistent in flavor than any other natural or fermented drink, with the possible exception of wine.

This is the precise "orange flavor" I—and millions of others—became habituated to during our baby boomer childhoods. Whether we like it or not, this is the memory trace we share of orange flavor. I would sometimes experiment with adding more water than the three cans specified—we were a family of six growing to eight after all—and regretted it when I tasted the pale comparison. I learned not to stray from the 3-to-1 reconstitution directions.

"A Day Without Orange Juice"

Persuading a populace to alter eating habits and accept a novel food is no small undertaking. To do so with frozen concentrated orange juice, producers resorted to all of the advertising tricks that make the *Mad Men* television series so fascinating. In the early 1960s, that meant creating rhythmic jingles and directing ads to a children's demographic market.

Adding rhymes and melodies to ads appears to allow for easier memory retrieval. Neuroscience research already indicates that melodic, musical memories receive some sort of special encoding in our brains for recall purposes.[16] Vast repetition of trademarked phrases and reams of copyrightable subject matter encouraged American families to reconstitute frozen orange juice on a daily basis.

The Florida Citrus Commission's use of Anita Bryant as its brand advocate is a case-in-point. With a seemingly cheery disposition, former beauty queen pageant looks, modest singing talents, and brunette (not blonde) hair, she became a symbol of the efficient supermom, making sure her children were drinking plenty of healthy orange juice, full of doctor-recommended vitamin C, and, economically, for only pennies a day.

Ads featuring Ms. Bryant promoting orange juice consumption reveal a 1960s form of dietary colonization and a national obsession with vitamins.[17] Vague health claims, doctor recommendations and constant references to Vitamin C abound—as little boys with crew cut haircuts and girls in bobby tails run around.

To target a children's demographic, these ads include a tie-in with a Disney character, a mute Orange Bird who flits about a Florida Sunshine Tree. The cartoon bird figure would become a roving character at the Sunshine Tree Terrace in Walt Disney World's Adventureland. Anita Bryant and the Orange Bird even had their own children's book and LP record, with these kind of sappy lyrics:

Little Orange Bird in the Sunshine Tree
Won't you think of something sunny just for me?
Think funny thoughts or sunny words
That will make me happy, little Orange Bird.[18]

The inference from these citrus ads is clear: (1) drinking OJ is the most wholesome thing you can possibly ingest; and (2) you are a "bad" mom if you are not serving it every day. (Fathers are nowhere to be seen in these ads.) You are also probably un-American.

In designating Bryant as their brand ambassador, the Florida Citrus Commission learned an early lesson in American culture wars. She parlayed citrus ad fame into a publicly contentious campaign against gay

rights. Bigoted political activism would transform her into a *persona non grata*. Dropped from ads, she faded from view. When queried about their knowledge of Anita Bryant, my informal polling of millennials elicited blank stares. They appear to be demographically free of her memory traces.

The IP/Food Takeaway

Like Billie Holiday's "cigarette that bares a lipstick's traces," the delicate flavor of orange juice leaves some form of memory trace in the hippocampus region of your brain—just waiting to be retrieved with appropriate stimulation.

It is lodged there because you absorbed sights, smells, taste and texture every time you opened that can of fresh frozen orange juice, reconstituted it with water, and then swallowed it. Behind the scenes, each of those sights, smells, tastes and textures may well well owe its origin and tribute to an intangible intellectual property right.

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[1] "There are two schools of thought about what role the hippocampus - a region of the brain - plays in memory. Some neuroscientists think that it is involved in retrieving all memories. Others believe that its contribution is restricted to the retrieval of recent memories, while a neighboring part of the brain called the parahippocampal region takes over to retrieve older memories." *See* V. Lux. et al, "Imaging a memory trace over half a life-time in the medial temporal lobe reveals a time-limited role of CA3 neurons in retrieval." 5 eLife 11862 (2016), available online at https://elifesciences.org/content/5/e11862

[2] G. Neil Martin, *The Neuropsychology of Smell and Taste* (2013), at 152.

[3] *Id.* at 155.

[4] *Id.* at 148 (internal quotations omitted).

[5] *Id.* at 3.

[6] The Seville orange description and recipe substitute are from Diana Kennedy's *The Essential Cuisines of Mexico* (2000), at 493-494.

[7] *See* Q. Xu, et al., "The draft genome of sweet orange (*Citrus sinensis*)" 45 Nature Genetics 59 (2013), available online, http://www.nature.com/ng/journal/v45/n1/full/ng.2472.html#ref38.

[8] J. McPhee, *Oranges* (1967), at 9.

[9] *Id.* at 14

[10] *See* Google image search results for query "orange crate labels": https://www.google.com/search?q=orange+crate+labels&tbm=isch&tbo=

u&source=univ&sa=X&ved=0ahUKEwjagfqAxovUAhUp0YMKHapZARYQsAQIJw&biw=1920&bih=1070.

[11] *See* note 2, at 152.

[12] G. McClelland and J. Last, *California Orange Box Labels* (1985), at 7.

[13] *Id.* (cover art).

[14] M. Nisperos-Carriedo and P. Shaw, "Comparison of Volatile Flavor Components in Fresh and Processed Orange Juices," 38 *J. Agric. Food Chem.* 1048 (1990).

[15] Other than the quotation from the '109 fruit juice concentrate patent, the quotations in this section are from John McPhee's book *Oranges* (1967), at 7-8.

[16] R. Zatorre, A. Evans and E. Meyer, "Neural mechanisms underlying melodic perception and memory for pitch," *The Journal of Neuroscience* (April 1994), available online at http://www.jneurosci.org/content/14/4/1908.

[17] *See https://www.youtube.com/watch?v=3ld8DQkC6po* and https://www.youtube.com/watch?v=6ffEJJhB8qI (Florida Citrus Commission orange juice ads featuring Anita Bryant from the early 1970s).

[18] From "Orange Thoughts of an Orange Bird," by Richard and Robert Sherman. *See* http://allears.net/tp/mk/orangebird.htm.