

Study Guide

Beauty and the Feast

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Summary

What exactly is so wrong about green eggs and ham? Why does nature provide food in such an outrageous rainbow of colors when a stomach has no eyes? Can color be a guide to healthful eating? Why bother to serve a meal that is a “feast for the eyes”? Find out in **Beauty and the Feast: Eating With Your Eyes**.

This program is about nutrition, aesthetics, and the psychology of eating. It explores how the appearance of food influences our eating patterns and shows how color can be a guide to good nutrition.

Viewers will learn that nature uses colors as a kind of visual teaching aid to instruct about nutrition. They will also learn that “looks count” when planning meals. Viewers will understand that how a food looks is part of how it tastes and that the phrase “eating with your eyes” is not merely a figure of speech.

A meal is an experience for all the senses. Balanced nutrition is important, but visual beauty and color are also part of a meal that is a treat for the whole person.

Script Excerpts and Commentary

The following pages contain script excerpts for research and discussion. The commentary in *italics* gives additional information and references.

FOOD AND COLOR IN THE MARKETPLACE

How a food looks influences its taste. You can see that in an experiment where volunteers ate a rather unique meal of steak and french fries. The steak was blue, and the fries green – thanks to food coloring.

Here's the catch. The steak and fries were served under special lighting that hid the coloring. At first the volunteers enjoyed the meal. But slowly, the lighting changed to reveal the colors. Most eaters showed disgust and some became physically ill.

*Experiment as reported in J. Wheatley, "Putting Color into Marketing," **Marketing**, October 26, 1973.*

You can do your own experiment to show that color influences taste. Mix food coloring into vanilla pudding to make it look like chocolate. Give it to some unsuspecting friends. You will be surprised that some will accept it as chocolate pudding because they EXPECT brown pudding to be chocolate. Their expectation shapes their experience so they will "taste" the non-existent chocolate.

If you give friends some doctored pudding and ask them "how does it taste?" they will be suspicious. You need to devise a method so the people eating the pudding have no reason to expect anything unusual. Of course, once you reveal the coloring, most will claim they "thought something was wrong." You might find more interesting results using red food coloring with vanilla pudding.

In one study, panelists tasted fruit-flavored sherbets with colors and flavors switched around. For example, lemon sherbet colored red and strawberry sherbet colored yellow.

A study in Great Britain offered four flavored fruit drinks (orange, lemon, grapefruit, and pineapple) to a panel of volunteers. When all were uncolored, the volunteers could correctly identify the favors only 70% of the time. When drinks were “correctly” colored, correct recognition jumped to 90%.

The researchers knew that about three of four tasters can identify the sherbet’s flavor when the colors are correct. They discovered that when the colors were switched only about half the tasters could identify the fruit flavor. Food makers find if they make the red coloring brighter in a fruit-flavored product (like a soft drink or gelatin), people will perceive it as sweeter. They can actually make a drink “taste sweeter” by adding more color.

Nature provides over seventeen thousand varieties of apples, yet most supermarkets sell only a few. The big, Red Delicious reigns supreme. In fact, many varieties have disappeared from orchards. One reason is that many tasty varieties would never win a beauty contest.

Visit Applesource (applesource.com or 800-588-3854) and order the classroom sampler of tasty but “unusual” apples.

*For more information on the amazing variety of apples and why we have so few today see chapter one in **The Botany of Desire** by Michael Pollan (Random House, 2001).*

Studies show we judge sourness, bitterness, and sweetness depending on how much red, yellow, and green we see in food.

*A study measured the effects of red, green and yellow on the threshold concentrations of sweet, sour, salty and bitter tastes. The yellow-colored sweet solution was detected at a significantly higher concentration than the colorless control. Therefore, tasters did not associate yellow color with a sweet taste. However, the green-colored sweet solution was detectable at a concentration significantly below that of the control. (Fergus Clydesdale in "Color as a Factor in Food Choice," *Critical Reviews in Food Science and Nutrition*, 33(1): 83-101, 1993)*

Food colorings are used in pills and medicines. Studies show the color influences how people judge its effectiveness.

*Italian researchers found that patients with sleep problems benefited more from blue than orange capsules. A British study found red was the most effective color for pain relief for rheumatoid arthritis. A Univ. of Alabama study found white pills are usually associated with pain relief, lavender with hallucinogenic effects, orange and yellow with stimulant or antidepressant action. Information from **Timeless Healing: The Power and Biology of Belief** by Herbert Benson, Md. (Scribner, 1996).*

In general, we judge brightly colored foods better tasting than bland-looking foods, even if the flavors are identical.

Marketers know that kids respond to colors. Researchers find that young children often judge a food based on appearance. Enter green and purple ketchup. Kids take one look and say “that’s cool” while adults think “that’s disgusting.” *Marketers learn from child development research. According to Piaget’s stages of cognitive development, children between the ages of 2 and 7 are pre-operational; they are “perception bound” and will judge foods strongly on one factor — often by how they look.*

So, in a very real sense we do taste with our eyes. Supermarkets certainly know that looks influence consumer decisions. Grocers use special light bulbs to shine on fruits and vegetables. Lighting fixtures are skillfully balanced to make reds and greens pop. And some items are waxed and polished like a vintage automobile. Good looks moves produce faster than good taste. People feel that “if it looks good it must taste good.”

Supermarket meat counters often feature special lighting that gives steaks a reddish color. What about that pink color in salmon? Wild salmon get pink from eating seafood called krill. Farm raised salmon don't eat krill. Instead, they are fed vitamins with red pigment to turn them pink enough to win buyers' acceptance.

Roche, the pharmaceutical company, markets Carophyll Pink to salmon farmers. Carophyll Pink is a pigmented vitamin that farmers use to redden the salmon's flesh. If salmon were farmed without adding the pigment, its flesh would be gray. Consumers would not likely embrace gray salmon.

Chickens are raised with feed with marigold petals to give the meat the yellow glow consumers prefer.

Coloring agents are routinely used in soft drinks, cookies, jams and jellies, bread, ice cream and most processed foods. Remove all added food colors from a supermarket and the shelves would be nearly empty.

Have students read ingredient lists for processed foods and determine which have added colors. Many foods, left uncolored, would look unappetizing. Be careful not to “blame” food processors for needless additives. They know shoppers vote with their pocketbooks. And the vote always says, “no color, no buy.”

Both shoppers and restaurants can buy chicken or hamburger patties with black stripes already “built-in” to give that “just-been-grilled-over-a-barbecue” look.

Surimi-based imitation crabmeat is a much better-looking substitute with the familiar red color on the outer surface. Cheese-flavored snack seasonings also are colored so consumers don't assume the product is over salted.

None of these fruit juices contain fruit juice from the fruits in their names. These brightly colored drinks are all pear juice with added colors and flavors.

Peach Papaya has yellow #6 and red #40, both apple raspberry and strawberry melon have red #40 and blue #1. Have students read labels on fruit drinks to learn how important colors are to taste and marketing.

Butter is often colored yellow. Without color it would vary considerably depending on the cow's diet and the time of year. People have colored butter yellow for at least seven hundred years!

The gold color is from beta-carotene which cows use in differing amounts depending on diet and season.

And various spreads and margarines that would look like (lard) are instead colored to help them resemble (and presumably taste like) butter.

When margarine was a new product, dairy producing states such as Wisconsin feared it would hurt farmers. To make margarine less attractive, they outlawed adding color that would make it look like butter. Margarine in Wisconsin looked much like lard or Crisco®. Margarine was sold with a small packet of food coloring which consumers had to mix in by hand.

The Food and Drug Admin. regulates food colorings and certifies seven blue, red, green, and yellow colors. It checks a sample from each batch of food coloring and certifies it. FD&C on a label means the color was certified (tested) for use in **F**ood, **D**rugs, and **C**osmetics.

For example, Yellow No. 6 is often used in cereals, baked goods, and snack foods.

The seven certifiable colors are FD&C Blue No. 1, and No. 2, Green No. 3, Red No. 3 and 40, and Yellow No. 5 and 6. Two other colors (Orange B and Citrus Red No. 2) are certified only for specific foods.

Certifiable color additives are man-made, with each batch being tested by the manufacturer AND the FDA. This "approval" process, (known as color additive certification) assures the safety, quality, consistency and strength of the color additive before it is added to food.

In 1900 there were about 80 man-made color additives available to the food industry and no regulations about their use.

Certifiable color additives are used either as a "dye" or "lake." Dyes dissolve in water and take the form of powders, granules, or liquids. They are used in beverages, dry mixes, baked goods, confections, dairy products, and pet foods among others. Lakes are the water insoluble form of the dye. Lakes are more stable than dyes and are used for foods containing fats and oils or other ingredients that lack enough moisture to dissolve dyes. Lakes are common in coated tablets, cakes and donut mixes, hard candies, and chewing gums.

Beet juice, pumpkins, and carrot oil are among twenty-six other coloring additives made from plants or minerals that are approved as natural pigments.

Beet juice and cranberries are natural color additives. Caramel color is made from cooked sugar or

carbohydrates, and a natural red colorant called cochineal is made from crushed insect shells. Annatto is a golden color made from the seeds of a tropical evergreen tree.

Food makers often prefer synthetic colors because they can be added in smaller quantities, are more consistent, and do not impart “off flavors.” Many prefer “natural” colors based on a bias that “natural” is better.

Using beets and cranberries for red coloring require 10 to 100 times as much colorant and adds some off flavors.

Under FDA regulations, any color added to a food product cannot be considered "natural," no matter what the source, unless the colorant is natural to the food product itself-- strawberry juice that gives strawberry ice-cream a pink hue, for example.

So strawberry ice cream colored with beet extract cannot be labeled "naturally colored," because beet juice is not a natural part of strawberries or ice cream.

If you see a green or blue color, it's not from a natural source. No true greens or blues from natural sources are currently approved for food use in the United States.

Color as a Guide to Good Nutrition

You can use color as a guide to healthy eating. Bright colors often signal important nutrients.

The dark meat in chicken or turkey is richer in iron and zinc than white meat.

Red grapefruit provides thirty times more Vitamin A than white grapefruit.

In grains, a natural brown color (not from caramel coloring) signals whole grains rich in fiber and minerals.

Many of the pigments that give fruits and vegetables their bright colors do far more than dazzle the eyes. The colors themselves help protect against disease. Since “phyto” is Greek for plant, these pigments are called phytochemicals. *Not all phytochemicals are pigments.*

The phytochemical lycopene colors tomatoes and watermelon bright red and may stimulate the immune system to battle cancer cells. Lycopene is also abundant in dark leafy greens like spinach, but its red is hidden by chlorophyll. Just as green chlorophyll hides the reds and oranges of tree leaves until cool autumn nights allow the oranges and reds to show.

Many vegetable plants behave like the leaves of trees. They are green, red, or yellow depending on the season. We think of leaves as green that “turn” yellow in the autumn. We could just as well think of them as yellow or red that is often hidden by chlorophyll. Cool autumn weather “unveils” their true colors.

Pigments called carotenoids make corn gold and carrots orange. Beta-carotene gives carrots that outrageous orange color -- and scientists suspect it also helps fight cancer and keep eyes healthy.

Many consider iceberg lettuce a health food, but its pale color suggests it is a nutritional weakling. The darker Romaine lettuce has five times as much vitamin C and up to ten times as much beta carotene as iceberg lettuce.

Pigments are clues to the presence of vitamins, minerals, and phytochemicals. “Almost across the

board, the most intensely colored fruits and vegetables have the highest levels of protective phytonutrients,” says endocrinologist Daniel Nadeau, M.D., director of the HealthReach Diabetes, Endocrine, and Nutrition Center in Hampton, New Hampshire

So use color to guide your nutrition. Salad greens — pick the dark green ones. Go for nutrient rich sweet potatoes instead of white. Add bright peppers or tomatoes. Try carrots, blueberries, or mangoes as snacks.

A philosophy in Japan, called Shojin Ryori, involves preparing vegetarian Buddhist temple food. One goal of Shojin Ryori is to get five colors on the table — red, yellow, blue-green, white, and black. This approach helps insure a variety of nutrients.

Supplements containing these chemicals cannot replace food. We cannot create nature’s complexity in a lab.

YELLOW/ORANGE — Carrots, pumpkins, acorn and butternut squash, sweet potatoes, apricots, mangoes, and cantaloupe, papaya, pineapple, peaches, tangerines, nectarines. The orange comes from alpha and beta carotene. Alpha carotene intake has been linked with a reduced risk of various cancers.

RED — Tomatoes and watermelons, pink grapefruit, and guava contain the carotenoid lycopene, a red pigment. Strawberries do not contain lycopene.

GREEN — Avocados, spinach, green beans, green peas, green peppers, honeydew melon, kiwi, romaine lettuce, broccoli and brussels sprouts..

RED/PURPLE — Cranberries, blueberries, strawberries, beets, eggplant, red and purple grapes, red cabbage, plums, cherries.

Beautiful Food in Meals

The Japanese traditionally prepare meals to "be eaten with the eyes." Food is fashioned with attention to detail, color, form, and balance, while serving dishes function like a painter's canvas.

A serving of white rice or tofu is more appealing when presented in a black lacquer bowl...and vegetables are artfully arranged on just the right shape and color plate and maybe even garnished with leaves or flowers from the garden.

An entire meal seldom fits on one plate. Instead small dishes, each of a different design, and each for a specific food, make the meal a visual delight.

To the Japanese, how a food is presented is as important as how it is cooked. Appearance is not an art reserved for gourmet dining, it's important even in preparing a lunch box for school children.

Many Japanese mothers still carefully prepare a "bento", a traditional box lunch, for their children. The bento typically includes an assortment of tiny helpings of meat, fish, vegetables, egg, and perhaps a tiny pickled plum, all carefully arranged in a small lacquered box.

You understand colors when it comes to picking out what to wear or putting a room together. The same principles of color apply to meals as well.

Need a quick refresher on the color wheel? Colors directly opposite on the color wheel are called

complementary colors — red and green for example. These colors complement each other — they make each other look their brightest.

Nature often uses the colors red and green together. In fact, we learn our ideas of what colors are pleasing from nature – not from “color experts” or decorators.

Adding green to a mostly red food gives visual interest. Colors next to each other on the color wheel are called related colors. Yellow and green, for example. Potato salad by itself is not visually interesting, so chives or a sprinkling of paprika adds color.

A monochromatic scheme uses various shades and tints of the same color. Salads made with a mix of green from light iceberg to dark spinach are more attractive than a salad of one kind of lettuce.

There is more to food’s beauty than color. You can use your knowledge of design to make food more attractive as well. Consider the visual idea of a border. A frame does far more than merely hold a painting, and wood does more for a window than merely hold it in place. Gardeners use borders in flower gardens as well. The same visual ideas work for food.

Sidelight: One of the first color-themed meals goes back to 1889 when a chef in Naples, Italy created a dish to honor Italy’s Queen Margherita. His dish embodied the colors in the Italian flag — red (tomato sauce) , white (mozzarella cheese), and green (basil). His creation? Pizza. This basic pizza is still found on menus (especially in Italy) under the name Margherita.

A plate, like a picture frame, does more than merely hold food. The plate can become part of the visual design of the meal.

Top quality restaurants worldwide often set the tables with colorful and decorative plates. But, before the food arrives, the plates are whisked away only to be replaced by plain white plates. Why?

Those elaborately colored plates look great as part of a table setting but might look awful as the setting for some foods and/or sauces. White is the “plate de jour” for restaurants because it is a neutral color that works well with almost any food.

Food can also use patterns for visual interest. From dentil molding on a house, to the ruffles on a pie crust, to the pleats in a skirt, simple repeating patterns offer a visual treat to the eye.

The same patterns used to give visual interest to art, clothing, and architecture can be used for food as well. The patterns are simple and universal.

The most basic design element is simple repetition. A pleated skirt illustrates repetition of a single element (a straight line) with variation (the lines vary in angle and length).

Architecture uses the same idea of repeated shapes and lines. Imagine if houses had no siding, shingles, or bricks to add repeating patterns. The same principle applies to food arranged on a plate for a meal.

Paying attention to how food is arranged on a plate adds visual interest. And paying attention to how food LOOKS is part of nourishing the soul as well as the body. Beauty is a part of food as is nutrition and taste. In a sense, we do eat with our eyes.

Classroom Activities

1. Devise your own experiment to test the influence of color on taste. The video suggests adding food coloring to vanilla pudding. Other choices for added food coloring include imitation whipped cream, custard, sherbet and ice cream, flavored gelatin, and fruit drinks.

Set up your experiment so you do not “tip off” your intent. Ask tasters to evaluate the food. Do not ask them if it “tastes like lemon or raspberry.”

Another activity is to conduct a study to verify or disprove the following study mentioned in the video: *A study in Great Britain offered four flavored fruit drinks (orange, lemon, grapefruit, and pineapple) to a panel of volunteers. When all were uncolored, the volunteers could correctly identify the flavors only 70% of the time. When the drinks were “correctly” colored, correct recognition jumped to 90%.*

2. Have students conduct an inventory of their pantries or refrigerators at home in search of added food colors. List all the colors they find, both “natural” and “artificial.”

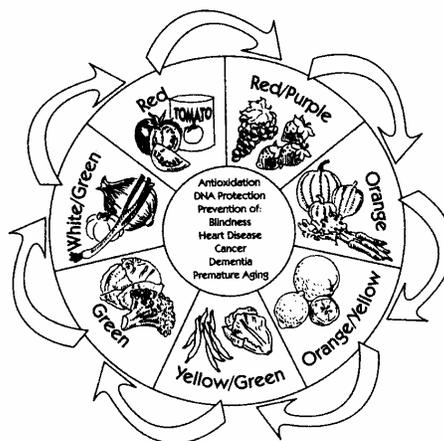
3. Have a group of students research the Japanese art of food presentation and show examples. Part of the study should be to learn about the centuries-old form of food-to-go called the bento.

4. Have a group of students report on how eating fresh foods with a variety of colors contributes to health.

5. Assign one group of students to do “makeovers” of standard meals. Take pictures showing the food both “before” and “after” the plate has been presented with attention to appearance.

Books and Websites

What Color Is Your Diet by David Heber, M.D., Ph.D. (2001, Harper Collins). Heber is director of the UCLA Center for Human Nutrition and his book reflects a solid, science based approach to what he calls a “DNA-compatible diet.” He presents a color wheel of foods (see below), and disputes misconceptions about healthy eating and dieting.



The Color Wheel of Foods

The Color Code by James A. Joseph, Daniel Nadeau, and Anne Underwood (2002, Hyperion Books). This book deals more with using color as a guide to finding foods with disease fighting qualities. Includes meal plans and recipes.

WWW.IFIC.ORG is the website of the International Food Information Council. This food industry sponsored site offers publications and a guide called “Food Color Facts.”

The Chemistry of Food Dyes is a 60 page monograph aimed at chemistry teachers. For information contact terrificscience.org. Includes many experiments.