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Visual Representation of Health Information: A Critique of the 2005 Food Pyramid

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The purpose of this paper is to examine one the most significant and longest running social marketing campaigns in the United States: the campaign to educate people about nutritional information and recommended daily dietary guidelines. Since the late 1800s the various attempts to communicate this information to the public frequently made use of visual displays of the scientific data. We provide background information pertinent to the 2005 food pyramid and provide a detailed critique of the latest redesign of the food pyramid in 2005. We discuss the implications of the format used to communicate the information. The food pyramid is an excellent example of how the visualization of scientific information is used with the intent to educate and persuade the public. We argue that a visual display of such scientific information is crucial, however, the current pyramid falls short in its' intent to clearly communicating the messages that Americans need to understand and put to use in their daily lives. We look at the design of the pyramid including; the visual representations of food categories and statistical information, color coding, and the imagery used in the different pyramids.

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Public health has been a concern for the United States federal government since its' inception. The United States Department of Agriculture (USDA) has a mandated responsibility for food and agricultural systems, including food assistance and nutritional education systems (USDA, 2004). In 1894 the USDA first published a set of dietary guidelines in a Farmers' Bulletin to educate the public about nutrition and influence food choices. The goals of the USDA guidelines are to promote healthy eating and balanced diets.

The history of USDA guidelines has been well documented (see Davis & Saltos, 1999 or Nestle, 2003). During this time there has been a profound shift in what a balanced diet means. This shift has been characterized by Nestle (2003) as a paradigm shift from "eat more" messages to an "eat less" imperative. When the guidelines first came out in 1894 the focus was on providing enough nutrition for people to have the energy to work and to prevent deficiencies that could lead to sickness. Today the U.S. is experiencing an obesity epidemic, thus the focus of the USDA is on preventing overweight and the chronic, non communicable diseases that have been linked to obesity. The shift in USDA guidelines correlates with a shift from the leading cause of death in the late 19th century and early 20th century of infectious diseases to the current leading cause of death: non communicable conditions. Non-communicable conditions include cardiovascular diseases, diabetes, cancers and respiratory disease, and account for 56.5 million deaths annually (Ratzan, 2004). Currently low-income families and children are disproportionately affected by overweight.

With 12 million people killed by heart attacks and strokes annually and nearly 4 million by hypertensive and other heart conditions, the reality strikes home. However, the antecedent risk factors continue to rise portending a trend with no end in site: More than one billion adults worldwide are overweight, with at least 300 million clinically obese. And estimated 177 million people are affected by diabetes, the majority by type 2 diabetes; two-thirds live in the developing world. (Ratzan, 2004, p.1).

Although the reasons for the increases in non communicable disease cannot be scientifically linked to a particular cause, the causes have been attributed to high caloric diets, sedentary lifestyles and smoking. As Ratzan explains, "There is no greater challenge for this generation than to figure out a way to reverse the trend that may make their children destined to a shorter life expectancy than their parents (2004, p.2)."

Obesity has become an epidemic in the United States. According to the Centers for Disease Prevention and Control, in 2003-2004, an estimated 64 percent of U.S. adults were overweight or obese, along with 17 percent of children and adolescents. The total annual cost of obesity was an estimated $117 billion in 2000. In 2001 United States spent $123 billion dollars in health services for obesity (USDA, 2004). This is both enormously costly in money and lives. The USDA's focus is on the prevention of obesity which results from ingesting more calories from food than are expended in physical activity.

Thus, the USDA has a mandate to prevent obesity due high caloric intake, which is more prevalent among low-income families and children. The USDA has setout a multi-pronged initiative, and the food pyramid is at the center of these initiatives.

A brief history of the food pyramid

Since the 1894 Farmers' Bulletin changes in the recommended diet over the following years have reflected new discoveries in the science and medicine that were incorporated to improve national health. "As the knowledge base about nutrition has expanded over the century, dietary recommendations have evolved to keep pace with both the new findings as well as with changing patterns in food consumption and physical activity" (Davis & Saltos, 1999, p. 34). In 1917 the USDA issued its first set of overall recommendations a 14 page pamphlet, "How to Select Foods." The format and principles used in this pamphlet still guides USDA policy on dietary advice today (Nestle, 2003). Here the USDA established the food group format: fruits and vegetables; meats and proteins (including milk for children); cereals and starches; sweets, and fatty foods. Throughout the years the food groups have been renamed. In the latest version, released in 2005, there are give groups: Grains, Vegetables, Fruits, Milk and Meat & Beans. Sugar and fat were eliminated as group in 2005.

From the beginning the USDA ignored advice to recommend limits on the intake of fats and sugars by A.O. Atwater, the first director of research activities. Over the years, the USDA has succumbed to food industry influences that have strongly (and successfully) lobbied congress to ensure the USDA "is not telling the public that their products were bad for health" (Nestle, 2003, p. 40). The strongest lobbies come from cattle ranchers, egg producers, sugar producers, and the dairy industry.

The result of these politics has left the U.S. with a food pyramid that is the basis of a nutritional education system so politically influenced it is ineffective (Nestle, 2003). In the 1970s The American Medical Association (AMA) was so unhappy with USDA dietary goals, the AMA offered an official statement preferring that the government should not give dietary advice to the nation; nutrition would be better left in the hands of individual doctors (Nestle, 2003). With the release of the 1977 Dietary Goals for the United States by the Senate Select Committee on Nutrition and Human Needs, "the focus shifted from obtaining adequate nutrients to avoiding excessive intakes of food components linked to chronic diseases" (Davis & Saltos, 1999, p. 36). It reflected research that "related over consumption of certain food components—fat, saturated fat, cholesterol, and sodium—and the risk of chronic diseases, such as heart disease and stroke." It was also in the 1970s that Congress mandated that the USDA dietary guidelines be updated periodically to reflect new pertinent scientific research (Davis & Saltos, 1999).

The food pyramid graphic was introduced by the USDA in 1992 with *The Food Pyramid Guide*. The USDA describes the graphic as "an outline of what to eat each day. It's not a rigid prescription, but a general guide that lets you choose a healthful diet that's right for you." (1992, p. 2). The graphic (Figure 1) could be considered a snap-shot of the

dietary guidelines. The purpose of the graphic is to communicate the key concepts of the recommended dietary guidelines: how to have a healthy life and reduce the chances of developing certain chronic diseases by eating a variety of foods, maintaining proportionality among the six food groups, and consuming foods in moderation.

The concept of developing a visual display that summarizes and communicates the most important aspects of a healthy diet is an essential one. Visual representations of data are good at presenting information, patterns and relations among elements and measurements. A visual display is successful if the pattern, trend, or comparison it presents can be immediately apprehended (e.g., Kosslyn, 1994, Pinker, 1990; Ware, 2000). As Norman (1993) explains, external aids in the form of cognitive artifacts complement and strengthen our mental abilities: The power of unaided mind is highly overrated. Without external aids, memory, thought, and reasoning are all constrained. But human intelligence is highly flexible and adaptive, superb at inventing procedures and objects that overcome its own limits. The real powers come from devising external aids that enhance cognitive abilities. (p. 43)

Visual displays are cognitive artifacts. If the visual display is effective it will enhance reasoning and foster understanding of fundamental health guidance, thus facilitating good decision-making in daily food consumption, which will result in a healthier population.

From the 1992 to 2005 Food pyramid

Literature in Information Visualization (e.g.Larkin & Simon, 1887; Pinker, 1990; Ware, 2000) suggests that effective data representations use perception to amplify cognition. Independent of the medium (e.g., printed information devices, dynamic information visualizations), of data type (e.g. physical data, abstract data, statistical data), and, of function (e.g., communication, reasoning), all visualizations are spatial representations of data. The pyramid visual display has a static medium, even if it is viewed on a computer screen; the data is abstract because it represents categories of food, the data is also statistical because it represents proportions; and the function is communication and education. Visual displays make use of graphic elements and properties to encode data into a schema.

The visual schema can reflect knowledge schemata, the use of metaphors, or involve the creation of new models. The schema makes the system — elements and relations — and the patterns within the system readily visible, explicit and easily perceived. Meaning is conveyed by means of symbolic references, where the graphic elements and the graphic structure in a representation stand for elements and relations in another domain (in our case healthy dietary information). Efficiency will be provided to the extent that the schema allows for correspondences between conceptual information and visual attributes and in so far as the visual attributes are encoded reliably (e.g., Kosslyn, 1994; Pinker, 1990).

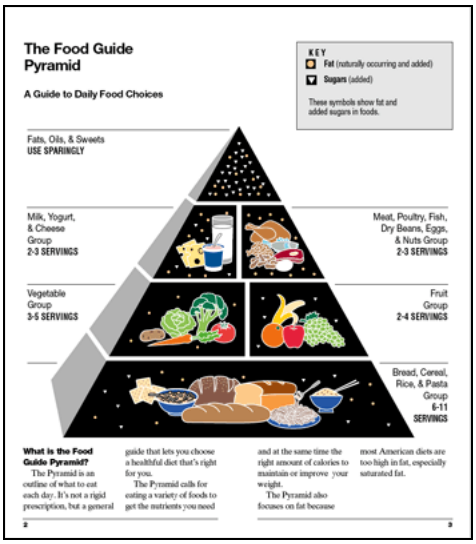

Figure 1: 1992 Food Pyramid graphic, in The Food Guide Pyramid (USDA, 1992). http://www.cnpp.usda.gov/Publications/MyPyramid/OriginalFoodGuidePyramids/FGP/FGPPamphlet.pdf

The 1992 Food Pyramid graphic (above) used the pyramid as the spatial metaphor to organize and represent quantitative food information in a hierarchical data structure: an equilateral triangle divided horizontally to represent different food categories proportionally. It is beyond the scope of this paper to make an analysis of this particular diagram. The focus of this article is on the recent redesign released in April 2005, but it is relevant to include a brief discussion of the 1992 Food Pyramid. The 1992 version became a familiar visual display to millions of Americans, mainly due to its extensive use as an educational tool over thirteen years.

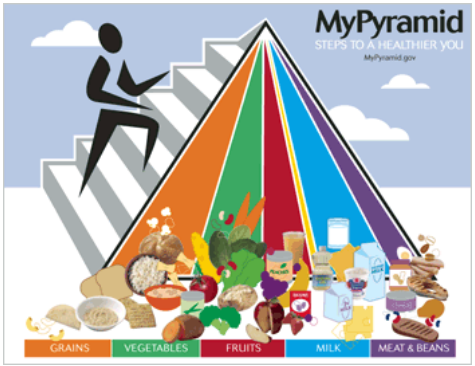

Figure 2: 2005 Food Pyramid graphic in the mini poster (http://www.mypyramid.gov/downloads/MiniPoster.pdf). Link to web site: http://www.mypyramid.gov/

The 2005 pyramid graphic display (Figure 2 above) — named MyPyramid — uses the plane figure of a triangle as the container for the spatial representation of data. The triangle surface is divided from the top angle to the base into triangular areas. The area sizes of the inner divisions, referred to as bands by USDA (2005), stand for quantitative data. Color is used to code categorical information — the food groups. Images of food examples are displayed from the bottom of the main triangle to a row of color coded rectangles with the labels for each category. The left side of the data structure is connected to the representation of a staircase with a human figure. The title of the display is at the top right corner. The background of the entire display is divided into two sections. The top section depicts a blue sky with clouds and the bottom one is white.

MyPyramid represents a significant change from the 1992 representation in how dietary information is visually represented. By transforming the horizontal divisions into vertical ones, MyPyramid transformed a familiar representation into a completely new one with no relation to the previous display besides two aspects: the use of the triangle as the geometric data structure — the container — of the diagram; and the name pyramid. In MyPyramid, the metaphorical use of pyramid has been lost, in that it is no longer used as a structural hierarchical schema of dietary information. For example, it is no longer possible to refer to the base or the tip of the pyramid, rather, to a triangular surface divided into colored bands. This might seem contradictory at first, especially when we consider that the new design attempts, more than its predecessor, to create a three-dimensional pyramid with the insertion of the stairs on the side. Recall that the goal of the diagram is not to recreate the image of an ancient architectural monument but rather to communicate fundamental health principles. This raises some questions: Why call it a Food Pyramid when the metaphor is lost? Why use a triangle as the container of health dietary information? Or even more fundamental: Why use the metaphor of pyramid in the first place?

The 2005 Food pyramid analysis

Along with the release of the new pyramid, the USDA provided manifold techniques to disseminate information and support material. The main thrust of the campaign involves a website that explains aspects of the pyramid and provides additional dietary information, encourages fitness, and allows people to create their own pyramid, individualizing daily dietary recommendations. In the movie MyPyramid Animation (USDA, 2005), while presenting the new design, the narrator explains that they “tipped the pyramid on its side. Now all the food group bands run from the top of the pyramid to the base” (see Figure 3).

Figure 3: Screen shots from the movie Pyramid Animation
http://www.mypyramid.gov/global_nav/media_animation.html

The horizontal divisions of food groups in the 1992 Food Pyramid graphic is no longer used in the new design. In MyPyramid food groups are depicted side by side. As such, hierarchy was eliminated from the model. Given that the pyramid metaphor was used to depict hierarchy, the lack of hierarchy in the 2005 graphic renders the reference to "pyramid" meaningless. And while the majority of health and nutrition experts condemned the pyramid as an educational tool, hierarchy was one of the few aspects of the 1992 pyramid that they applauded (Harvard University, 2006). Food groups are all equally important in the 2005 design. The triangle, now an isosceles (the base is wider than the two other sides), is divided into six areas of different colors representing the five food groups and Oils (no longer a group).

We use objective criteria to analyze the correspondences between the goals and concepts set forth by the USDA and the visuals chosen to depict these concepts in the 2005 MyPyramid diagram. We ask, do the concepts set forward by the USDA efficiently convey meaning and facilitate learning? To what extent does the visual representation stand for the content being depicted? Are the correspondences well defined, reliable, readily recognizable, and easy to learn? The framework for the analysis is provided by the six main concepts described in the *Anatomy of MyPyramid* (Figure 4): Activity, Personalization, Moderation, Proportionality, Variety and Gradual Improvement. We scrutinize how effectively these concepts and health information are communicated visually in MyPyramid.

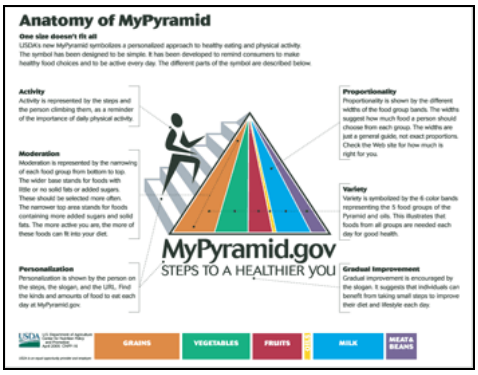

Figure 4: Anatomy of MyPyramid
http://www.mypyramid.gov/downloads/MyPyramid_Anatomy.pdf

To understand something, we must grasp its implications and notice its relations to other things. Visual displays often are more like stories than like pictures of objects; although they have components that must be identified, it is the relations among the components that convey the specific information. This aspect of understanding in part requires recalling the rules of how a display format works, and in part requires reasoning. (Kosslyn, 1994, p. 23)

Activity, Personalization and Gradual Improvement

For the purpose of this article, we combined the three concepts Activity, Personalization, and Gradual Improvement because they are all connected to the image of the human figure. According to the *Anatomy of MyPyramid* (USDA, 2005), Activity "is represented by the steps and the person climbing them, as a reminder of the importance of daily physical activity." Personalization "is shown by the person on the steps, the slogan, and the URL. Find the kinds and amounts of food to eat each day at MyPyramid.gov." Gradual Improvement "suggests that individuals can benefit from taking small steps to improve their diet and lifestyle each day."

Figure 5: Detail of MyPyramid depicting a human figure climbing the stairs.
http://www.mypyramid.gov/pyramid/index.html

In the 2005 design, a staircase was added to the side of the pyramid, replacing the narrow solid gray triangle in the 1992 diagram. In the staircase there is a human figure climbing the stairs (Figure 5). According to USDA, the goals of the staircase and the climber are to remind the viewer of the importance of daily physical activity, to express that the pyramid is personalized to each individual, and that a person can take steps to achieve gradual improvement, hence the new name: MyPyramid. Attaching the significance of daily exercise to a human being climbing stairs is possible. The steps themselves are a literal representation of gradual improvement and bring to mind the adage "one step at a time." The symbolic representation of the human figure is generic enough that it does not refer to any gender in particular, and can be read in a personal way. The three concepts are reinforced by the name and the slogan of the poster, "MyPyramid: Steps to a healthier you" which help to convey the meaning.

Proportionality

The *Anatomy of MyPyramid* (USDA, 2005) explains that "Proportionality is shown by the different widths of the food group bands. The widths suggest how much food a person would choose from each group. The widths are just a general guide, not exact proportions. Check the Web site for how much is right for you."

All visual displays represent visual information on macro and micro levels. When looking at visual representations humans tend to switch between the global and local processings in order to comprehend both contextual information and specific details. The global level of the MyPryamid is provided by the triangle, which represents contextual quantitative and qualitative information. The local levels on MyPryamid are the divisions of the triangle (the food groups), the food images, and the food labels.

Literature in information design (e.g., Bertin, 1967/1983; Kosslyn, 1994) explains that in displays presenting proportion and percentage, if the components sum to a single whole, it is essential that the relations among the various components and their relations to the whole are clear and easily perceived. In this sense, we assume that in MyPyramid the main triangle represents 100% (the whole) of recommended daily food intake. And the inner divisions represent proportions that together sum to the whole.

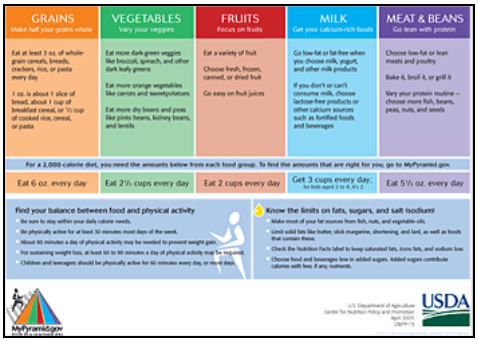

Figure 6: Second page of MyPyramid mini poster.
http://www.mypyramid.gov/downloads/MiniPoster.pdf

There are two ways to understand quantitative information, by absolute and/or relative amount. The absolute amounts of recommended daily food intake are presented on the second page of the MiniPoster (Figure 6). MyPyramid uses area sizes to represent proportions that are relative to the whole. Therefore, the viewer should be able to discriminate the different relative proportions. The USDA clearly explains that MyPyramid does not represent "exact proportions." In fact, in data displays such as MyPyramid (representing proportions) precise amounts can only be conveyed with the addition of labels and numerical information. Literature in Perception and Cognition indicates that our visual systems are not good at judging spatial relations or at measuring angles, chords, or areas of wedges precisely. During perception we tend to distort areas and some visual dimensions. Kosslyn explains that "some dimensions are systematically distorted by our visual systems; specifically, our visual impression of area is less than what is actually present" (1994, p. 24).

Figure 7: Detail of MyPyramid showing the six colored bands

In MyPyramid the colored bands indeed have different sizes. However, the area sizes only vary slightly and as such are not distinct enough from each other (Figure 7). There are several factors that contribute to difficulties in inferring proportionality. First, vertical divisions on a triangle are not the most appropriate way to represent areas that vary only in small amounts. Lines are not parallel to each other and make the comparison of widths and area sizes more difficult, especially when differences are not large. It is also relevant to remark that comparison of band widths at the base level is impossible due to the obliteration of the pyramid base by the positioning of visual food examples (Figure 8).

Figure 8: Detail of MyPyramid showing the obliteration of the base of the triangle by the food examples.

Second, it is impossible to infer what each band represents in terms of intake amount because the bands are too similar in width. Neither is it possible to compare sizes or proportions among the groups. Literature in information design suggests that we will not perceive actual differences in the data if they don't produce corresponding visible differences in the display. Kosslyn explains that "greater amounts of the measured substance should be depicted by greater visual amounts, either in extent or in area. In this

way we can compare relative amounts at a glance; bigger visual differences are interpreted as reflecting bigger differences in the data" (1994, p.207).

Studies in information design (e.g., Bertin, 1967/1983; Kosslyn, 1994) suggests that it is easier to perceive and to recall information that is ordered or in progression into a unit. MyPyramid violates this principle by arranging the food groups and Oils in an arbitrary way. From left to right, the order of the groups are: Grains, Vegetables, Fruits, Oils, Milk, and Meat & beans. If compared to the other food groups, Oils has the smallest band. However, it is not positioned on one of the sides of the main triangle. In this particular instance it is even more problematic, because oil — which is not a group — is represented with the same visual vocabulary as the five food groups, and as such perceived as a group.

Another aspect contributing to difficulties in perceiving proportions is the use of colors. Colors can be deceptive in how we perceive area sizes. Visual Perception studies (Kosslyn, 1994) indicate that we tend to perceive lighter areas as larger than darker ones This perceptual distortion applies to brightness of color and to shades of gray. Ware explains that "[color] is excellent for labeling and categorizations, but poor for displaying shape, detail, or space" (2000, p. 105). In MyPyramid, color is used primarily to code categorical information (see section on Variety below). However, the colors used in the display influence and distort how quantitative information is conveyed for all of the bands. For example, at a first glance the blue band (Milk) seems larger than the green one (Vegetables). When measured, the base of these two triangles has exactly the same length. This also points to a difference in the proportions set forward in the 1992 pyramid, where the Vegetable group was represented as larger than the Milk group. And above all it contradicts the information provided on page two of MyPyramid poster. In the supplemental information on the second page of MyPyramid the USDA provides specific measures regarding the amount of each food group a person should eat every day. In this information, 3 cups daily from the blue group (Milk) is recommended while 2.5 cups of the green group (Vegetables) is recommended. Presenting each group as the exact same area size is deceptive.

In MyPyramid the main triangle is demarcated by a thick black line serving as the border. Food groups are separated from each other and from the black outline enclosing them by a white thick line. The result is that the top of the pyramid is now of a white color, due to the encounter of all contour lines, which carries absolutely no information (and makes the pyramid look more like a snowy mountain). The Gestalt principle of "good continuation" explains that we tend to construct visual entities out of visual elements that are smooth and continuous (Wertheimer, 1923/1950). According to this principle, it is possible to argue that the white lines are not necessary as visual elements to demarcate boundaries in MyPyramid. The shape of the bands (continuous triangular shapes) in addition to their distinct surface colors enable easy discrimination of each food group without the need for extra contour elements. Therefore, the food group bands would be easily perceived and distinct from each other without the white lines. As contour elements the white lines in MyPyramid are so heavy (thick) that they almost feel

like bands themselves, especially when focus is on the top of the triangle (see Figure 7). This factor contributes to the difficulties in perceiving proportions.

Figure 9: Detail of MyPyramid showing the rectangles with the names of food groups.

Finally, there is a conflict between how proportionality is conveyed in the diagram and in the rectangular bands carrying the names of food groups at the bottom of the poster. All the rectangles have equal lengths and as such carry no information in terms of proportionality (Figure 9). Shouldn't these rectangles reflect the widths — in other words the proportions — of the food groups? Or at least serve as a mechanism to reinforce proportionality? Research in cognition has shown that we "are impaired when the two messages, that from the physical stimulus itself and that from the meaning, conflict. The brain attempts to fit all inputs into a single coherent pattern and balks when there is a conflict" (Kosslyn,1994, p.8). This aspect is reinforced by the bands with food intake information presented in the second page of MyPyramid (see Figure 6). In the MyPyramid table, all food groups have the same column width. It is relevant to remember that this table is the template for the document one gets as the result of personal information at the web site (Figure 10).

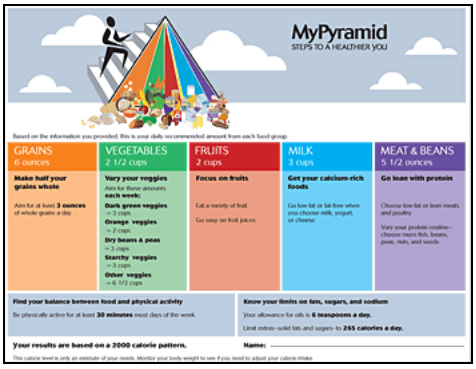

Figure 10: Results from MyPyramid web site (http://www.mypyramid.gov/) with daily food recommendations for a 40 year old female with physical activity from 30 to 60 minutes.

Moderation

The *Anatomy of MyPyramid* (USDA, 2005) explains that "Moderation is represented by the narrowing of each food group from bottom to top. The wider base stands for foods with little or no solid fats or added sugars. These should be selected more often. The narrower top area stands for foods containing more added sugars and solid fats. The more active you are, the more of these foods can fit into your diet."

The concept of moderation is not expressed visually. There are no visual cues in MyPyramid that express that the top of each band represents food with more fat or sugar. All bands are of solid color from top to bottom indicating no change in how we perceive them. The only perceptual difference is that the bottom is wider than the top. However, that is a given difference considering that the container is an isosceles triangle, and as such a geometric figure with the bottom larger than the tip. Therefore, it is natural, or at least expected that divisions of a triangle going from the tip to the base would have similar shapes as its whole. In this case, the shape alone without the help of other elements to indicate increase from bottom to top does not convey the concept of moderation.

Figure 11: Detail of MyPyramid showing the Milk food examples.

The visual examples of food also fail to convey moderation because they are not positioned inside the pyramid, but rather are located at the bottom of each band and extending outside the area of the pyramid itself. A closer inspection of these images shows that there is no attempt to represent information about increase of fat from bottom to top. The food images are not ordered in any scale of fat. For example, the food images in the Milk group from bottom to top are: at the very bottom, slices of light yellow cheese (similar to what could be a Swiss cheese) overlapping on the horizontal band with the group name; a carton of 1% fat milk; a pot that looks like an yogurt (no indication of amount of fat); a fat-free milk carton; then two slices of yellow cheese (cheddar perhaps?); and at the very top a glass of milk? How much fat is in this glass? (Figure 11). The same inconsistency can be found in all other groups, where food is not represented in any scale of increasing fat and sugar amounts from bottom to top.

Figure 12: Detail of MyPyramid showing the different renditions of food examples.

The arrangement of the visual examples of food appeared to us to be reminiscent of the cornucopia, "a goat's horn overflowing with fruit, flowers, and grain signifying prosperity" (Merriam-Webster's collegiate dictionary, 1993). The images of food spill from the lower quarter of the pyramid into the "ground" without any evident purpose. The different renditions of the images, represented in a mixture of photographs and two kinds of drawings: outline and solid ones (Figure 12) are also confusing. For example, why are the apple and strawberries photographs and bananas and grapes drawings? There are several drawings that we had difficulty in determining what food they represented. We ask you to guess. In figure 13, what do you think the images represent? Is the piece of meat with a whole in the center fish, pork or beef?

Figure 13: Detail of MyPyramid showing food examples for the Meat & Beans of food group.

There are additional perceptual problems with the food images. Groups of food examples are not clearly separated from each other. Although they are displayed more or less in relation to the band where they belong, visuals from one food group tend to overlap on examples from other food group. For example, a canned vegetable is in front of a bowl which apparently belongs to the grain food group, so is the corn, and so on (see Figure 12). The Gestalt principle of "proximity" states that we tend to group into

perceptual unit visual elements that are near one another (Wertheimer, 1923/1950). Proximity is essential to how elements are spatially associated. In this sense, there is a lot of confusion in MyPyramid in terms of identifying food examples in relation to food groups.

Variety

The *Anatomy of MyPyramid* (USDA, 2005) explains that "Variety is symbolized by the 6 color bands representing the 5 food groups of the Pyramid and oils. This illustrates that foods from all groups are needed each day for good health."

In MyPyramid color is used to code the different food groups. Color is very effective to code categorical and nominal information (e.g. Kosslyn, 1994; Ware, 2000). Color coding is widely used for this purpose in data representations. The colors in MyPyramid are easily perceived and very distinct from each other, which communicates well both the differences among categories and the concept of variety.

In the Food Pyramid Guide (USDA, 1992, p. 8) there is a diagram with the following color scheme for the food groups: brown for Grain, orange for Fruit, green for Vegetable, blue for Milk, red for Meat, and yellow for Fat (Figure 14). The 05 redesign changed that color scheme to: orange for Grains, green for Vegetable (same color), red for Fruits, blue for Milk (same color, now a lighter blue), purple for Meat & Beans, and yellow for Oils (same color, although now not a group and the band doesn't represent fat and sugar). It is important to remind that the 1992 Pyramid was extensively used to communicate healthy diets over a period of thirteen years. It is possible to argue that the colors have been learned and are now associated with food groups. Studies in perception and cognition (e.g. Kosslyn, 1994; Ware, 2000) indicate that processing might be impaired if a visual display codes information in a way that conflicts with learned associations stored in memory.

Figure 14: 1992 Food Pyramid color scheme in The Food Guide Pyramid (USDA, 1992).
http://www.cnpp.usda.gov/Publications/MyPyramid/OriginalFoodGuidePyramids/FGP/FGPPamphlet.pdf

When using color to code categories, such as in MyPyramid, it is important to consider cultural conventions that are shared among the population that is the target audience (e.g., Kosslyn, 1994; Ware, 2000). In MyPyramid not all colors are easily associated with the food group they represent. For example, the choice for the color green for vegetables is meaningful and intuitive given the large amount of that color in the foods from that group. Green also signifies fauna and vegetable life for most cultures. But if we look at purple for the Meat & Beans group, it is hard to find any representative in that group that would have that color.

Conclusion

In this critique of the food pyramid as a visual learning tool we have highlighted some of the problems with the graphic. If the goals are to help Americans learn about health information, retain that information, and apply that information, then the graphic is a not a success. Our analysis points to several problems in terms of correspondences between the visual depictions and the concepts they try to convey. For example, the diagram doesn't support detection and recognition of differences among food group area sizes, and as such doesn't convey meaning in terms of proportions. In general, MyPyramid doesn't support perceptual inferences. For example, it is impossible to infer proportions from the rectangle bars labeling the groups. Above all MyPyramid doesn't provide a model for a healthy dietary daily guidance. It is possible to argue that as a visual display MyPyramid is not effective in conveying recommended dietary information.

As demonstrated in this article, the MyPyramid is not an effective learning tool. In addition, one of the biggest problems is that to comprehend the graphic and its' concepts you must access the website. Recall that low-income families and children are disproportionately affected by obesity. While most children can access the internet at school, it is not evident that low income families have easy computer access. Therefore, given that this graphic cannot stand on its own, we cannot endorse its' use as a learning tool. Additional research regarding MyPyramid would be beneficial. Future studies could investigate how people perceive the graphic and how they (if they) use the graphic.

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