

Bioprinting
 City
 Creativity
 Decoding
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 Environment
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Cooking
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Isabel Lugo

“Food becomes culture when it is prepared because, once the basic products of his diet have been acquired, man transforms them by means of fire and a carefully wrought technology that is expressed in the practice of the kitchen”

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Feeding, Culture and Technology: Global Strategy Design

Although its ingredients are found in nature, human feeding isn't a natural fact but a cultural practice. It is the result of man's action to transform nature and make it edible. Human beings create their food when they think of it, produce it, transform it, commercialise and consume it, and from the very beginning this creation is based on deliberate design.

Food, at the Root of Technology and Design

Sometimes, reflections on the meaning of words we use all the time without realising their origin can light a spark that proves more intuitively enlightening than several hours of study. Such is the case of the word savour that derives from the Latin verb *sapio, sapis, sapere*, meaning to physically perceive something's flavour through the sense of taste. To savour was initially to like, to recognise a savour; *sapor, saporis* also stem from *sapio*, and from this origin, *sapere* went on to mean to know, to have knowledge or wisdom, to have good judgement, to understand. Those who savour can safely discern (what to eat); they possess the most necessary and vital knowledge, succeed in surviving, and are therefore able to attain the remaining forms of knowledge: flavour, savour, taste, tasty, insipid, knowledge, wisdom, wise ...

This digression into the field of etymology is only an attempt to symbolise the close links between food, knowledge, biology and preservation of the species.

The transcendental quality of food for human life needs no reasoning for it is a biological need that has to be met in order to ensure survival, both of the individual and of the group. With this objective in mind, the first utensils human beings used for hunting and fishing were 'conceived', designed and manufactured: to obtain, contain, store, transform, cook and consume food.

Our remotest ancestor was the *Homo habilis*, 'the tool maker'. Some two million years ago, he was the first to produce primitive stone tools in order to secure animal protein (to be precise, the bone marrow of animals hunted by other predators), an initiative that would have a decisive influence on his brain development and on the social organisation of hominids.¹ Following this reasoning, securing sustenance lies at the basis of the evolution of human knowledge, expressed in the gradual technological

¹ Eudald Carbonell and Ignasi Pastó, 'La alimentación de nuestros ancestros,' in Jordi Salas, Pilar García and Josep Ma. Sánchez, *La alimentación y la nutrición a través de la historia*, Glosa, Barcelona, 2005, pp. 17-34.

control of the natural environment, in the development of skills and techniques, the manufacturing of tools and utensils and the creation of storage, distribution and consumption spaces.²

So, contrary to the more conventional opinion, to pose a reflection on the relationship between food, technology and design does not necessarily imply contextualising it in the contemporary era, or even in the period that followed the Industrial Revolution, when mass production, the mechanisation of food processes, new systems of preservation, cuisine understood as products and services, and the food and agriculture industry first appeared. This vision would place the food of previous historical ages in the realm of the 'natural' and design in the environment of the conceived object, of the contrived, the artificial. However, even though in the field of design the artificial is a requirement, foodstuffs do not usually appear untransformed in material or cultural terms. As noted by Massimo Montanari, human beings 'create' their own food, and this is where its cultural significance lies: 'Food is culture *when it is produced*, even "performed," because man does not use only what is found in nature (as do all the other animal species) but seeks also to *create* his own food, a food specific unto himself, superimposing the action of production on that of predator or hunter. Food becomes culture *when it is prepared* because, once the basic products of his diet have been acquired, man transforms them by means of fire and a carefully wrought technology that is expressed in the practice of the kitchen. Food is culture *when it is eaten* because man, while able to eat anything, or precisely for this reason, does not in fact eat everything but rather *chooses* his own food, according to criteria linked either to the economic

and nutritional dimensions of the gesture or to the symbolic values with which food itself is invested.³

From this perspective, as a fact that transcends what is natural to become a material and cultural expression, human feeding is intricately linked to design, for 'Design exists in all forms in society. It is not even a style, nor the consequence of a form of society. Every kind of society has developed its own design depending on its culture, rites and needs.⁴ If we consider design to be the process consisting of identifying a need or a problem, deciding on the transformation required and then giving it shape, this process was applied to solve problems related to the main objective of procuring food and then to that of improving the provision, transformation, preservation, service, consumption and cultural identification of food through utensils, flatware, tools, machines, containers and messages.⁵

A Much Needed Transversal Vision

Even though eating is a basic and complex area of human existence, it is only recently that food has become an object of academic study. Funnily enough, when it began to be asserted as such in the mid-twentieth century, the French Annales school led by Fernand Braudel defended food if not as a topic of study in itself, at least as a tool for the global comprehension of societies from a point of view that prioritised provisioning, the knowledge of food regimens and notably material history.⁶ Despite this interest in technology, however, history has tended to consider feeding utensils as independent objects, disregarding the dynamics of their design process and their socio-economic, technical and formal implications.

Today, while academic research in the field of anthropology and the history of food is abundant, we could say that the situation has barely changed. Many reference works and monographs dedicated to the history of food systems and their products, the evolution of taste and the social history of table manners are written without any special attention being paid to technology or to the progression of the material design of related objects and utensils.⁷

Similarly, the history of design and the professionalisation of the activity are relatively recent. Although the first objects to be conceived and manufactured were devised for provisioning food, and thus from the very beginning design has been intricately connected to feeding, no specific studies of the multiple aspects shaping the realm of food have emerged from these areas either. This is explained, in part, because both disciplines are relatively new, but also because the fact that eating isn't just a basic human activity but also an everyday act detracts from its academic standing, and because in comparison with the important issues related to the evolution of food systems, in terms of their social and economic implications, of nutrition, health, food shortage and hunger, the objects, utensils, flatware and tableware associated with eating seem insignificant.⁸

If we bear in mind that design, professional or otherwise, has been inextricably tied to the creation of the material strategies for human feeding, and indeed has even influenced them, it would be desirable that both disciplines, the history of food and the history of design, in conjunction with the history of technology, work together to create a body of integrated knowledge regarding technology in the field of food.

When Design Wasn't Yet Design

Throughout the long pre-industrial age, design was almost invariably preceded by need. And the basic needs surrounding food had remained unchanged for centuries, and even millennia. Beliefs and cultural visions were—and in many traditional societies are still—characterised by forces that are much greater than individual will. Consequently, many material and technological solutions have persisted, with scarce variations, in vast geographic areas and different sociocultural contexts. This explains the diffusion of a design as simple as the pestle and mortar, the grinding stone with its grooved pattern, or the *tannur*, the clay oven shaped as a beehive for baking flatbread, a 'design' first documented in Egypt in the Fourth Dynasty and that with slight changes extends from Mauritania to northern India and eastern China. In this case, a technological solution with a design easily adapted to its function (baking bread), in a geographic context in which fuel either isn't abundant or it is reserved for other uses, determines the format of the product, transforming the flattened dough, round in shape and almost unleavened, into the traditional bread of these areas of the globe. Another example is the wok used in Chinese cookery, a design that enables food to be sautéed at high temperature with a minimum use of fuel, developed in a region where firewood is scarce. The widespread use of firewood as fuel also explains the continuity and universality of the fireplace in kitchens in Europe and in other regions of the world. Furthermore, the need to optimise the heat produced by the flame, and even the embers, explains the existence of widespread cooking concepts such as *cocido* (cooked, but also stew), *pote* (pot-au-feu or Galician soup), *escudella* (bowl, but also broth), *olla* (casserole), etc., in all of which the terms used for utensils or techniques are extended to describe the actual food. Cooking in liquid is usually a slow, gentle process that produces a wholesome sauce or gravy, and the meat, root vegetables and leafy vegetables braised or stewed in the liquid

2 Faustino Cordón, *Cocinar hizo al hombre*, Tusquets, Barcelona, 1980.

3 Massimo Montanari, 'Introduction,' in *Food Is Culture*, Columbia University Press, New York, 2006.

4 Ruedi Baur, 'Visual self-satisfaction that is almost universal,' *ELISAVA Temes de Disseny*, No. 24, 2007.

5 For a conceptual and visual illustration of this relationship, see the exhibition entitled *Design and Making: The Story of Food*, organised by the Cape Craft & Design Institute (CCDI) and the Social History Collections Department of Iziko Museums of South Africa, on occasion of the designation of Cape Town as World Design Capital 2014 [on line]. [Accessed: 5 March 2015]. Available at: <http://ccdi.org.za/media-room/media-releases/feast-of-food-facts>

6 Jean-Louis Flandrin, 'Historia de la alimentación: Por una ampliación de las perspectivas,' *Manuscripts: revista d'història moderna*, Barcelona, No. 6 (1987), pp. 7-30.

7 Victor Margolin, 'Design Studies and Food Studies: Parallels and Intersections,' in *Agrindustrial Design: 2nd International Product and Service Design Congress and Exhibition on Agricultural Industries - Mediterranean / Food / Design* (Proceedings), Izmir University of Izmir University of Economics, Faculty of Fine Arts and Design, Department of Industrial Design, 26-28 April 2012, pp. 19-32.

8 Bee Wilson, *Consider the Fork: A History of How We Cook and Eat*, Basic Books, New York, 2012.

are also consumed. The generic name for this preparation in French, pot-au-feu, is highly illustrative and perfectly encapsulates the utensil-procedure coupling.

In all societies and geographic areas, the history of food is, above all else, the history of material and technological development. Human evolution in the pre-historic age is characterised by the transformation of natural elements to provide safety, shelter and food. The landmarks of this period were the materials used in the making of utensils: stone, bronze and iron.

The agricultural revolution of the Neolithic age is another process linked to food. The development of farming and sedentary lifestyles resulted in the growing number and specialisation of the tools used for agricultural tasks, of the facilities for storing and preserving food, and of course of the equipment for transforming it: pots, casseroles, grinding stones, etc. Clay, a new malleable material related to the labour of the land, emerged along with pottery, the technique required to give it shape.

City life, and to a fair extent its architecture, derived from the links between human settlements, their need for food and their sources of provisioning. The first great civilisations of antiquity were societies defined by food production. In Mesopotamia, the organisation of the Sumerian cities of Ur, Uruk, Larsa and Nippur was marked by their relationships with their productive environments. From then on and throughout history, cities would be characterised by clearly visible connections to their hinterlands, and would simultaneously grow around their food distribution centre: markets.

The technology and a fair part of the material culture of these civilisations were devised to solve problems related to food provisioning (farming techniques, taming, hunting, fishing, harvesting), food treatment (mortars, mills, ovens), food storage (granaries, wells, silos, cellars) and food preservation (traditional techniques, formats and containers adapted to salting, drying, smoking or fermenting

in acid or alcohol). In this sense, and forcing the historical extrapolation somewhat, we could say that the application of traditional preserving systems prompted an intuitive food product design that resulted in beer, wine, cheese, salted fish, cured meats and even cold meats, in order to achieve products that were rich in protein (milk, fish, meat), extending their lifespan and avoiding health risks.

“The serving of victuals, from the civilisations of antiquity to the eighteenth century it was essentially based on the idea of sharing food, on the same plate in the case of kinship, and on the possibility of choosing among a variety of dishes served at the table”

A paradigmatic case is that of cereals (barley, wheat, rice, corn and millet), the mainstays of the agricultural revolution of the Neolithic age that continue provide staple food around the world. They must necessarily be processed before being consumed and assimilated by the human body: virtually all of them have to be ground, and all of them subjected to the effect of heat, either dry or damp. Suffice it to think of the effort put into all this, in physical (manual), technological and intellectual terms.

Those aspects related to cooking and the utensils associated with the handling, serving and consumption of food are equally important, perhaps less decisive, yet culturally and socially significant. The techniques of culinary transformation have evolved in connection with the gradual development of materials and the possibilities of monitoring and controlling cooking. As regards the serving

of victuals, from the civilisations of antiquity to the eighteenth century it was essentially based on the idea of sharing food, on the same plate in the case of kinship, and on the possibility of choosing among a variety of dishes served at the table. Even today this continues to be the case virtually all over Asia, in Northern Africa and the western Mediterranean, as exemplified by *mezzé* in the eastern Mediterranean and the Middle East, *antipasti* in Italy and *rijsttafel* in Indonesia. The sumptuary role and the aesthetic quality of flatware can therefore be quite significant, although their diversification according to use was limited. Individualism at the table and the design of tools that prevent direct contact between hands and foodstuffs are only recent developments, as epitomised by the use of the fork that would be widespread in Europe between the eighteenth and nineteenth centuries as a sign of the progressive refinement of habits.⁹

New Geographic Areas, New Technologies, New Consumptions

As from the Early Middle Ages, and in the Modern Age in particular, a new prescientific mentality began to emerge in the West. Prompted by rationalism, it introduced significant technological changes related to food production: in the first place, the progressive mechanisation of agriculture in the seventeenth and eighteenth centuries, which led to new articles such as ploughs with iron mould boards and the horse-drawn seed drill invented by the English agricultural pioneer Jethro Tull; then, the slow yet gradual replacement of manpower and animal traction by hydropower and wind power applied to cereal milling, and the consequent widespread use of mills.

Experimental sciences begin to develop at this time. The scientific and technological innovations of the nineteenth century were actually initiated in the seventeenth and eighteenth centuries, as the idea of utopia, the utility of machines in improving man's relationship with nature and a new philosophical vision that begins to relate an object's beauty with its function and utility (Berkeley, Hume, Ledoux, Kant) were disseminated.¹⁰

The rational and enlightened spirit was accompanied by a new interest in improving the diet of peoples, announcing the age in which feeding would be assisted by machines designed using scientific principles. In 1681, French doctor and physician Denis Papin published the treatise entitled *A New Digester or Engine for Softening Bones, Containing the Description of its Make and Use ...* in which he described the *digesteur*, a steam digester with a safety valve that was able to soften bones and thus eradicate hunger among the popular classes. This digester is considered to be the forerunner of the modern pressure cooker.

At the same time the world was beginning to interconnect thanks to long sea expeditions, explorations, discoveries and the colonial economy. The transcontinental trade of new crops (rice, sugar cane, potato, coffee, cocoa) broadened the perspectives of feeding on a worldwide scale, modify the economy, provisions, food patterns and cooking in many parts of the world, and introduced new technologies, areas of consumption and service elements, such as those related to coffee and chocolate.

In the field of material culture, the kitchens and salons of the nobility and the bourgeoisie desirous of giving an impression of distinction, refinement and good taste, began to welcome new handicrafts, often sumptuary and for private use (pottery, gold and silverware, furniture). In this respect, we should mention that the first china and porcelain factories, such as Wedgwood in England, have traditionally been considered the forerunners of modern design

⁹ Norberto Elias, *El proceso de la civilización. Investigaciones sociogenéticas y psicogenéticas*, Fondo de Cultura Económica, Mexico City, 2010.

¹⁰ Tomás Maldonado, *El diseño industrial reconsiderado*, Gustavo Gili, Barcelona, 1993.

for they were responsible for introducing industrial processes in the production of manufactures.¹¹

Food, Science and Industrial Production

The advent of the Industrial Revolution in the nineteenth and twentieth centuries led to sustained demographic expansion, the mechanisation of production, the transfer of rural populations, the growth of cities, the development of transport and trade systems, and the progressive replacement of a subsistence economy with a market economy. The development of experimental sciences would have an effect on the improvement of crops and the breeding of animals, rationalising knowledge of the process of human feeding, and improving the security of the production and preservation of foodstuffs.

The increase in food production and the needs of the emerging industry entailed the development of more efficient preservation systems, the technological application of the principles formulated by physics and chemistry. The first refrigeration rooms were patented in the mid-nineteenth century and thermal treatments, applied since the late eighteenth century, would flourish with Louis Pasteur's discoveries concerning the control of bacterial proliferation and the improvement of fermentation processes in the nineteenth century. The production of wine and dairy by-products would benefit the most, although in the mid- and long-term the general consequences of these findings as regards improved food hygiene, the drop in illnesses caused by poor food preservation and the health of the population in general was spectacular.¹²

In this context, many traditional and domestic procedures were transformed into technological and industrial processes, as illustrated by the paradigmatic appearance of industrially processed and tinned foods. The first attempts at preserving vegetables by the action of heat were carried out between the late eighteenth century and the early nineteenth century, when French inventor Nicolas Appert succeeded in sterilising foodstuffs by placing them in hermetically sealed glass jars and cooking them in boiling water. By 1813, tin plate was being used in the industrial manufacturing of canned food. A few years later the procedure would be extended to sweetened condensed milk, meat and fish preserves, dehydrated food and meat extracts. The birth of the Swiss chocolate industry, with pioneers such as Philippe Suchard, François-Louis Cailler, Henri Nestlé, Rodolphe Lindt and Jean Tobler, would mark another milestone thanks to the opening of colonial markets, the active production of sugar beet in place of sugar cane, and the new techniques for sterilising and preserving dairy produce.¹⁴

The century's great showcases reflect these innovations and patents and industrial licenses abound. Since the Great Exhibition held in London in 1851, innovations in the food sector are included in catalogues of achievements: tinned foods in various formats, dehydrated products, instant foodstuffs and new industrial products like margarine.

Alongside the mechanised production of secondary raw materials like sugar, cereal flours and wine, tinned food became the star of the emerging food and agriculture industry, breaking the limitations of space and time for food, reducing the dis-

tance between producers and faraway consumers and globalising a new experience of consumption.

Between the late nineteenth century and the early twentieth century, these examples contain all the elements liable to be subjected to a deliberate and professional design process, typical of mass production: product (foodstuff), container (object), message (label). Industrially prepared foodstuffs are processed and packaged. As their contents are hidden from view, these foodstuffs must provide information regarding their properties and be attractive to consumers: hence packaging, labelling and food advertising, new areas in which design professionals begin to work within the actual industrial production process.

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Parallel to this mechanisation and industrialisation of food production, networks and permanent distribution centres, i.e. markets, are set up in the new social sphere of industrial cities that began to emerge in the nineteenth and twentieth centuries.

The modern restaurant also began to develop at this time as a new commercial formula and space for consumption that welcomed a new interior design adapted to the process of food preparation and serving, the possibility of immediate choice by customers, individualised service and menus with new consecutive sequences for serving food and beverage.

ages. All this would lead to countless new pieces of flatware, glassware, cutlery and serving utensils adapted to specific uses.

The preparation of foodstuffs would benefit from the appearance of new sources of fuel such as coal, gas and electricity, and of new materials such as aluminium and steel. The new cooking possibilities, improved by the design of specific tools and machinery, and the use of increasingly varied and better preserved raw materials favoured the development of a culinary practice all the more safe, technical and sophisticated.

Between the late nineteenth century and the first quarter of the twentieth century, the incipient production of domestic commodities—stoves, toasters, mincers, juicers—mechanised and therefore facilitated the tasks of housewives (or servants), as the kitchen began to be defined and embraced as a domestic space. The equipment and utensils related to the preparation and consumption of food had entered the realm of industrial production and consumption once and for all, while design was beginning to emerge as a professional activity.

New Lifestyles, Mechanisation and Gastronomic Experience

From the mid-twentieth century to the present, the food sector in industrialised countries has been characterised by a fast dissociation between food production and consumption. While our ancestors had striven for centuries to provide themselves with sufficient food to guarantee their survival, our concern today is with producing enough food for market consumption, a process that includes aspects such as the creation of complex logistical networks for transporting and distributing food, the mechanisation of the processes involved in food preparation and outsourcing. The latter has an effect on culinary preparation, as the food and agriculture industry supplies all sorts of concoctions that optimise the processes and management involved in the

11 Anna Calvera, 'Cuestiones de fondo: la hipótesis de los tres orígenes del diseño,' in Isabel Campi, Oscar Salinas, Raquel Pelta, Anna Calvera, Guy Julier, Viviana Narotzky, Mireia Freixa and Concha Bayó, *Diseño e Historia: Tiempo, Lugar y Discurso*, Designio and Fundació Història del Disseny, Barcelona and Mexico City, 2010, pp. 63-85.

12 Josep Tarragó, 'De Triptolemos a hoy: contribución de los avances científico-técnicos a la alimentación del hombre,' in Alimentos. *La conquista humana*, Lunweg / Alimentaria / Fundación Triptolemos, Barcelona, 2004, pp. 21-32. *humana*. Barcelona. Lunweg, 2004, p. 21-32.

13 Siegfried Giedion, *Mechanization Takes Command: A Contribution to Anonymous History*, University of Minnesota Press, Minnesota, 2014. First published in 1948.

14 Maguelonne Toussaint-Samat, *A History of Food*, translated from the French by Anthea Bell, Blackwell Publishing Ltd., Oxford, 1994. Originally published as *Histoire naturelle et morale de la nourriture*, Bordas, Paris, 1987.

restaurant industry, making home food preparation easier in an age when women are gradually entering the labour market and the new lifestyles reserve less and less time to preparing meals.

From 1950 onwards, the design of industrially prepared food has influenced our ways of eating, not only because buying affordable, transformed products in supermarkets and department stores is becoming a majority trend that influences consumers' tastes, appreciation and habits, but also because agricultural varieties, the breeding of animal species, fishing activities, the design of food products and sales formats adapt to the new reality imposed by large companies, that leads to standardisation and to the disappearance of varieties. It also affects the preparation and serving of food, through the development of the restaurant industry, in commercial and collective terms. Eating out has become a habit and a necessity, besides being a leisure experience, social and cultural in its gastronomic aspects.

The technification and automation of processes are other features of modern food. Technology reduces the time and effort we devote to preparing meals and becomes in itself an object of desire and consumption. Similarly, the urban sphere expresses the reality of contemporary food. If food was instrumental in shaping cities, today these have become the main areas of food distribution and consumption, removed from their sources of provisioning and set in the framework of complex logistic networks. Nevertheless, today we are also able to establish a clear connection between the movements that defend food self-sufficiency through the creation of allotments, the integration of local food production in neighbourhood networks, and the new trends in the design and layout of cities.

At present, the production, preparation and consumption of food are chiefly technological and industrial activities, and deliberate and professional design processes are present in each of their stages: food production (which is mostly agro-industrial); food technology and the physical, chemical and

genetic aspects it entails; product and machinery design, the tools and utensils employed in its preparation; transport, packaging and advertising; the design of spaces for consumption and the creation of messages and images that represent, and sometimes determine, how we want our food to be.

“If food was instrumental in shaping cities, today these have become the main areas of food distribution and consumption, removed from their sources of provisioning and set in the framework of complex logistic networks”

Conclusion

Faced with this reality, the twenty-first century reveals two trends as regards the triangle food-technology-design, the unfolding of which will be examined by future analysts. On the one hand, food has gone from being a biological need for survival that inspired mankind's material and technological development, to being a global consumer product, an excuse for tourism, art, play, creativity or aesthetic experience, as illustrated by the emergence of avant-garde cuisine, the design of gastronomic routes, show food, food events and food art as artistic pursuits in which food and meals are materials to be worked with. On the other hand, the concern with sustainability leads us to consider food as a strategic field of action for fair redistribution and the preservation of resources, territorial development and the physical and sociocultural well-being of individuals and communities.

Today, research and innovation focus on food and the activities related to it. In 2050 the world population is expected to reach 9 billion inhabitants. During the next thirty-five years food production should increase considerably yet in a sustainable fashion, in order to meet these demands. In spite of the evolution we have traced, access to food and food safety continue to be priority problems for most of the world's population. Therefore, as pointed out by Victor Margolin,¹⁵ without neglecting its distinctive areas such as products, communication, spaces and packaging, design professionals should explore the food system to provide sustainable solutions to this challenge, in collaboration with other disciplines, particularly agronomy, economy, social sciences, nutrition, engineering and health sciences.

¹⁵ Victor Margolin, 'Design Studies and Food Studies: Parallels and Intersections,' op. cit.