



Between utensils and food

Laurea Magistrale Design del prodotto per l'innovazione

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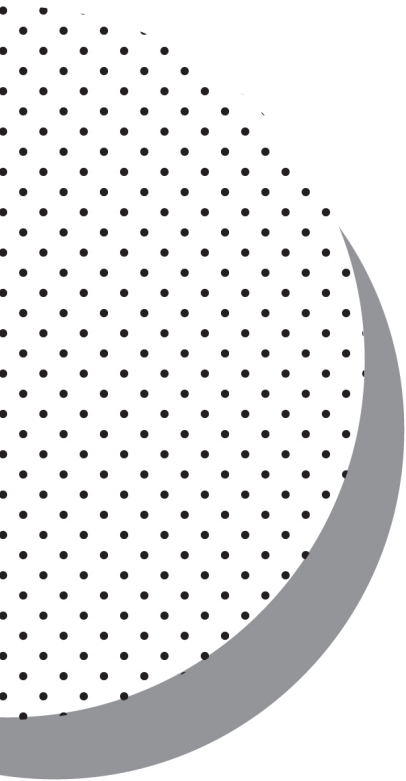
References

This thesis is focusing on the theme of the dynamic between food and dishware. Based on the detailed explanation of concept "eating experience", an context is built for exploring the application of this cross-discipline concept in food design, product design and interior design fields.

The meaning of "Eating" is far beyond the functionality of keeping us alive and far from starving. Thanks to the improvement of our living quality, "eating" as the most important behavior has been creating rich impacts socially and culturally . The eating experience works with the synesthesia through the most basic elements and senses. By the effort of deep understanding and manipulating of these basic elements, we are able to enrich the experience of creating and enjoying food.

How have the dishware been evolving in the way of use, form, material and manufacturing technologies? What could be the next step of this journey? A promising answer could be blurring the boundary between food and dishware. Recently exploring the innovative usage of food materials is a diffusely discussed subject. In the following part, understanding of eating experience and food's essence incentive each other is the core of my research.

Among all the food resources I chose rice as the starting point of my study subject. In the oriental cultural background rice is the major food resource and agriculture breed. Rice is a very neutral food in every way. However it shows a rich potential to bring an innovative experience on the texture level. The significant wasting is found in rice industry process as well as in cooking procedures which brings us an opportunity to reuse the wasted rices and stalks to generate the energy and build up a sustainable model. The product comes along will be made of rice material in order to help optimizing eating experience with various food and cuisine.



1.
BETWEEN
UTENSILS AND
FOOD

1.

Relationship between utensils and food

1.1 A short history of eating utensil

'One of the more spectacular triumphs of human culture over nature is our determination when eating to avoid touching food with anything but metal implement .— Visser '

Thousands of years ago stones wood and the nature material have been used as eating utensils. People used shells horns like a **spoon**. The word 'cucchiao' in italian is form 'cochlea' in latin meaning a spiral shaped snail shell.

And then is **knife**, early table knife was used to spear the food and to bring it direct to the dinner's mouth, or the dinner can use two knives to cut and put into mouth. In 1637 the **fork** finally showed on the table.

the material has changed from stone wood to metals, the silver is used a lot for the high nobility. Soon, the quality of one's spoons began to signal one's livelle in society.

Time flies and our society is developing and the eating utensil's shape has not changed dramatically, but the material was changed by the invention of the material.

The invention of silver-plating in the middle of the nineteenth century, and then aluminium cutlery became fashionable and also the other metal like iron, brass, bronze. The most common material used to make cutlery today is stainless steel, followed by silver. And the metal one give us always more quality then the plastic one.

Recently with the experiment of dr Piqueras Fisman , we get a results of the relationship

between material of the spoon and the taste of the food. So the material is a very important part for the eating utensil.

How can it influence the taste and what the theory support behind that ? There will be a detailed explanation in next part.

1.2 How can the eating utensils affect the taste

1.2.1 The food styling and the table ware

The material of a plate can change your whole dining experience. What will you feel about that material, cold or warm, matt or smooth. The feel of a particular piece of plateware against our skin can generate unpleasant sensations or an unforgettable experience.

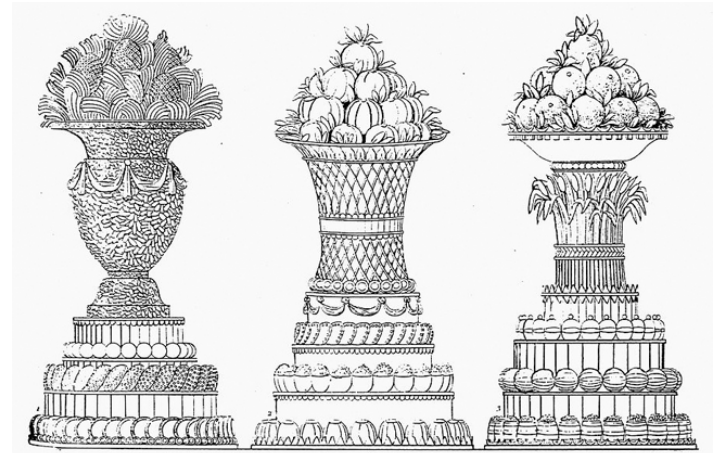
Not only the sensations of touching material but also the visual affect the flavor, so it born the word **"food styling"**. That is all the theory about **multisensory and synesthesia**.

'the visual sensation of a dish is as important as its flavor.' said Yang.

the term 'plating' being part of the vocabulary since 1990. In the seventeenth and eighteenth centuries French chef Antonin Careme created the fantastic and luxury plating of the food. The french cusine was always be the top in that years the society's elite was leading the france, they has invented some art of cooking and presentation.

Around the 1960s the french cuisine mature increasingly they reorganize the classic methods of cuisine. The food can be considered by single plate. They opened the french culinary school, the french plating be known by all over the world.

The food styling is famous in those year and we experiment our perception of the food and our eating behaviour. The basic element which can change the flavor could be the shape the size the color the material and then.



"How we experience food is a multisensory experience involving taste, feel of the food in our mouths, aroma, and the feasting of our eyes,"

"Even before we put food into our mouths our brains have made a judgment about it, which affects our overall experience."

said Prof Charles Spence and Dr Vanessa Harrar.

1.2.2 The shape and size

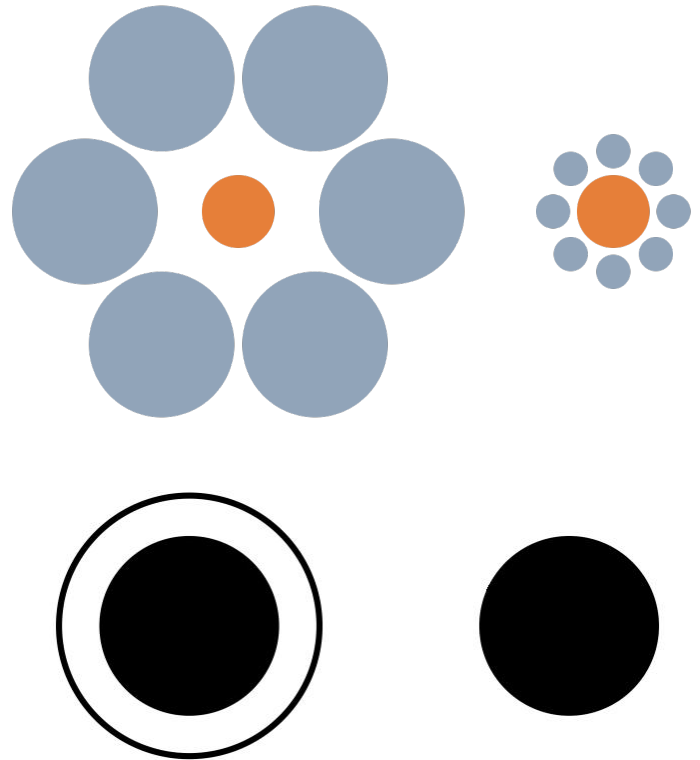
For the styling of the food people usually based on the theory of color and shape which was researched before.

In perhaps the most well-known version of the former illusion we 'see' a circle as larger when surround by smaller circles than another identical circle that happens to be surrounded by bigger circles.

The secondo illusion makes us think that, of two identical circles, the one that is placed within a larger ring looks smaller than the other one without the ring or else placed within a smaller ring. Many result in given amount of food being perceived as much smaller against the background of a lager bowl, and as lager when presented in a small bowl instead.

For example, people generally eat less when food is served on smaller plates.

Several years' worth of research points to a relationship between plate size and how much we serve ourselves. In one study, members of a test group with larger bowls ate 16% more cereal than those given smaller bowls. What's more, when both groups were asked to estimate the size of the cereal portion they'd just consumed, those with larger bowls estimated they'd eaten



7% less than those with the smaller bowls– even though the participants in the group with larger bowls had eaten more. This is just one in a series of studies that suggest eating from larger bowls and plates can cause us unknowingly to eat more at meals than we would if served from smaller dinnerware.

* <http://www.builtlean.com/2013/07/04/plate-size/>

* *The Perfect Meal: The Multisensory Science of Food and Dining*, Charles Spence, Betina Piqueras-Fiszman, 2014

1.2.3 The color

color contrast

Regarding the effects of the color of the container on serving size, van Ittersum and Wansink found that those participants in a high color contrast condition served 9.8% more than the target serving size on a larger plate, and 13.5% (P <0.01) less than the target serving size on a smaller plate. Meanwhile, in another study, **van Ittersum and Wansink tested** the effect of color contrast between the food and the plate on serving sizes in a realistic serving situation. Their results revealed that participants in the low color contrast condition (white pasta sauce on a white plate or red pasta sauce on a red plate) **served themselves significantly more pasta than participants in the high color contrast condition** (white pasta sauce on a red plate or red pasta sauce on a white plate). These two studies can potentially be framed in terms of the Delboeuf illusion, the name given to the illusion where by a central circle appears smaller when surrounded by a much larger concentric circle than when surrounded by a circle that is only slightly larger . It has been shown that this illusion is enhanced by color contrast, and it could therefore provide a possible explanation for why and how plate size can influence people's serving behavior in a variety of real life situations.

the basic colors and the basic tastes

One of the classic studies to investigate color influence on taste sensitivity was conducted by Maga (1974). He investigated the effects of coloring an aqueous solution red, green, or yellow on perceptual thresholds for four of the basic tastes (salty, sour, sweet, and bitter). Note

that each of the basic tastes was tested in a separate part of the experiment, meaning that the participants were presumably never uncertain with regard to the identity of the tastant whose presence they were trying to detect. In many cases, Maga observed that the concentration of the tastant had to be increased in order for his participants to be able to detect its presence in the colored (as compared to the uncolored) solutions. So, for example, the addition of green coloring to a sweet solution significantly increased taste sensitivity, while yellow color decreased taste sensitivity (see Table). Interestingly, red coloring had no significant effect on sensitivity to sweet taste. With respect to sour taste sensitivity, both the yellow and green coloring of solutions decreased participants' sensitivity, with red coloring again having no effect. Coloring a clear solution red decreased bitter taste sensitivity, while the addition of yellow and green coloring had no such effect. Finally, adding color had no effect on taste detection thresholds for salt solutions.

1.2.4 The weight

There is a research of Piqueras-Fisman aim to explore whether the weight of the bowl can influence on their multisensory flavour perception.

The taster was given three bowls identical except for their weights; the bowls were filled with the same amount of yoghurt. The participants will hold the bowl while rating the yogurt they were given 4 scales for rating.

And the result showed us the bowl sample from the heaviest bowl was rated as being 13% more intense in flavour, 25% denser, 25% more expensive, and was liked 13% more than the sample from the light bowl.

Like the word 'heavy' in English are often used to describe the density of food. So many people will associate the heavier bowl onto the participant's perception of the qualities of the in the bowl itself.

The yoghurt from the heavier bowl was being felt denser and as likely to be more filling.

During this research chef could be rethink the way to presentation the food which be hold by hand.

The results revealed that yoghurt was perceived as denser and more expensive when tasted from a lighter plastic spoon as compared to the artificially weighted spoons; the size of the spoon only interacted with the spoon-weight factor for the perceived sweetness of the yoghurt. The taste of the yoghurt was also affected by the colour of the cutlery, but these effects depended on the colour of the food as well, suggesting that colour contrast may have been responsible for the observed effects. Finally, we investigated the influence of the shape of the cutlery. The results

Colour of solution	Taste			
	Sour (citric acid)	Sweet (sucrose)	Salt (sodium chloride)	Bitter (caffeine)
Red	No effect	No effect	No effect	Decrease
Yellow	Decrease	Decrease	No effect	No effect
Green	Decrease	Increase	No effect	No effect

* *Plate Size and Color Suggestibility: The Delboeuf Illusion's Bias on Serving and Eating Behavior*, Koert Van Ittersum and Brian Wansink, 2012

showed that the food was rated as being saltiest when sampled from a knife rather than from a spoon, fork, or toothpick.

1.2.5 The material

This study investigated the effect that the taste of certain metals has on the perception of food. Four spoons plated with different metals (**gold, copper, zinc, and stainless steel**) were used to taste cream samples having different tastes: sweet, sour, bitter, salty, and plain. The results revealed that the zinc and copper spoons, in addition to transferring a somewhat metallic and bitter taste, enhanced to a greater or lesser extent, each cream's dominant taste. Contrary to our expectations, the metallic taste of the copper and zinc spoons did not seem to affect the pleasantness of the samples significantly. These findings reveal that the effect that the metals from which cutlery can be made have on food perception differs from that found when the metal salts are added to the composition of the food itself.

In any case, Laughlin, Miodownik, et al. wanted to test the taste of solid metals. They speculated that metals such as copper and zinc that were less stable, and thus more likely to acquire electrons, would taste more metallic because their atoms would form a solution in human saliva more readily. Their blindfolded spoon-eaters (with each lick of a spoon, as Miodownik explained to Dunlop, we are not just tasting metal, but actually "consuming 'perhaps a hundred billion atoms'") confirmed the scientists' suspicions, **rating the less chemically active gold**

and chrome spoons as the most pleasant and sweet tasting, and the more reactive copper and zinc as bitter, strong, and metallic tasting spoons.

The spoons used in this study were the same as those used in Laughlin et al.'s (2011) study, each of exactly the same size, shape, and texture. Given Laughlin et al.'s results, four of the same teaspoons were used: three stainless steel spoons electroplated with either gold, zinc, or copper to a thickness of 10 microns (0.01 mm), and a fourth spoon that remained as stainless steel. According to Laughlin et al., 10 microns provides a homogeneous layer with no possibility of exposure to the stainless steel lying beneath the electroplating. Thus the spoons had almost exactly the same weight, since the electroplated layer is thin enough to contribute very little extra weight to the spoons. These metals were selected on the basis of their non-toxic status, suitability for contact with human skin and mucus membranes, their susceptibility to electroplating, and the ease with which they could be sterilized.

Food stimuli

Four creams were prepared by adding 20 g of table sugar (sweet), 5 ml of freshly squeezed lemon juice (sour), 5 g of lemon pith (bitter), and 5 g of table salt (salty) per 100 g of extra thick double cream (50.5% fat; Tesco, UK) to obtain creams of distinguishable tastes/flavours. Plain cream was also used as a "control" sample.

process

The experiment followed a full-factorial (4 × 5) design, resulting in a total of 20 tastings with the participants' eyes closed during tasting. The order in which the spoons were presented was randomized between participants, and the order in which the samples were presented was also randomized for each of the spoons. At the

start of the experiment, participants were asked to rinse their mouths with still spring water (Harrogate Spa, UK) served at room temperature. After the instruction screen, a three digit random number appeared on the screen, indicating to the experimenter which sample and spoon to give to the participant. Approximately five grams of cream were served during each tasting. The participants were instructed to close their eyes. Once they had done this, the handle of the first spoon was placed in their hand. Note that the participants were not informed that spoons of different materials would be given to them.

Pleasantness

Finally, the type of spoon also affected the pleasantness ratings significantly. In addition, the sample/spoons interaction was significant, demonstrating that the differences among the samples were influenced by the spoon.

The sweet sample was the most liked, tasted with the copper and zinc spoons, which gave it a slightly sweeter sensation. By contrast, the salty cream samples tasted with these spoons were the least liked. The sweet and sour creams were similarly liked.

“cutlery coated with different materials really does taste different,” and, what’s more, that these differences are significant enough to “influence the perception of taste and pleasantness of food consumed from them.”

The more metallic tasting copper and zinc spoons enhanced or added bitter qualities to each of the creams, as expected, but — to the scientists’ surprise — they also boosted its dominant taste. In other words, the sweet cream was perceived as being slightly sweeter when



eaten from a copper or zinc spoon than a gold or stainless steel spoon, while the salty cream tasted saltier.

* <http://www.ediblegeography.com/sensoaesthetic-spoons/>

* *Food Quality and Preference, Tasting spoons*

1.3 The eating experience

1.3.1 The multisensory experiences

We have introduced serve element which can influence the flavor, but in the field of cuisine we need to consider more than one sense.

Food is one of those multisensory experiences where if you change just one sensory element then the whole experience will likely be ruined. The eating experience depends on a lot of things, the mood that we are in, the environment in which we eat and drink, and a host of other factors. We will take a look at the emerging body of evidence from the field of gastrophysics that is helping to illustrate just how important a host of product factors are to our perception and enjoyment of food and drink. We will take a look at the role of naming and the description of a dish; Everything from the lighting, to the background music, and even the feel of the chair you happen to be sitting on.

the food design experience was to understand how the human brain intuitively responds to different stimuli during eating. Our senses can be affected by many aspect, not only the above we talked about the environment but also the food culture in which societal, technological, and environmental influences play an important role, or in some detail element which was very important for the food design today,like the weight size color and shape. Aim to show the creative of the food a lot of chef and designers work and experiment on those element.

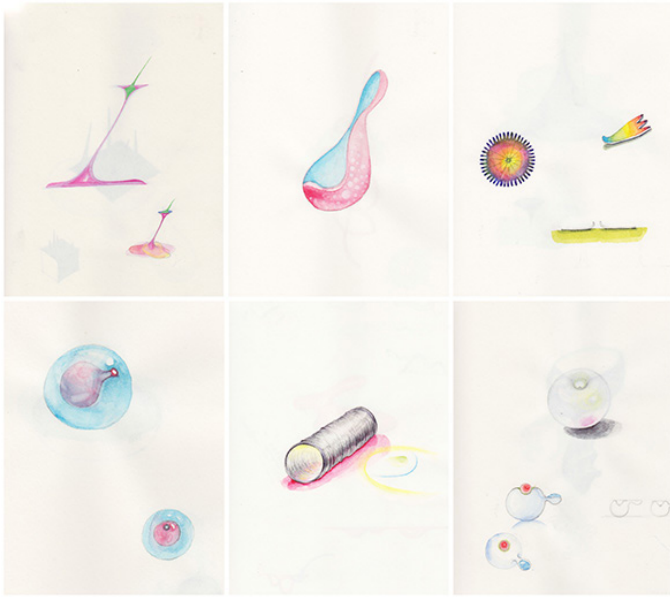
there is a word 'phenomenon of synesthesia', is means when we eat, we opened our senses and they influence each other.

There is a Korean designer did a lot of interested research of the multisensory of taste.

How do people visualize taste?

Synesthesia-Like Mapping is a way to force people to be aware of their senses and analyze them from a different perspective, synesthetic point of view. Based on commonality in visualization database of people's drawings, I mapped my own drawings -Visualization, Materialization, and Pattern Study of Taste- in order to further investigate how our sensorial experiences could shape the objects we use everyday. It was a way to widen our awareness of senses and actually analyze them from a different perspective as cross-wiring sensorial perceptions. Despite the differences between individuals, there are common elements that define a comprehensive basic level of synesthetic experience. Synesthete who has this ability uses their experiences to aid in their creative process, and many non-synesthetes have attempted to create works that may capture what it is like to experience synesthesia. Psychologists and neuroscientists study synesthesia not only for its inherent interest, but also for the insights it may give into cognitive and perceptual processes that occur in synesthetes and non-synesthetes alike. Therefore, my investigation shows that a new way of perceptual processes would challenge our potential sensory experiences and possibly impact on in the process of sensory perception.

: SWEET



Sticky sweetness

Soft-Jelly sweetness

Rainbow-honeyedness

Hint of sweetness in the air

Silvery sweetness

Roly-poly honeyedness

: SALTY



Gritty brine

Gritty salty sea air

Volume of salty taste

Muricate salty taste

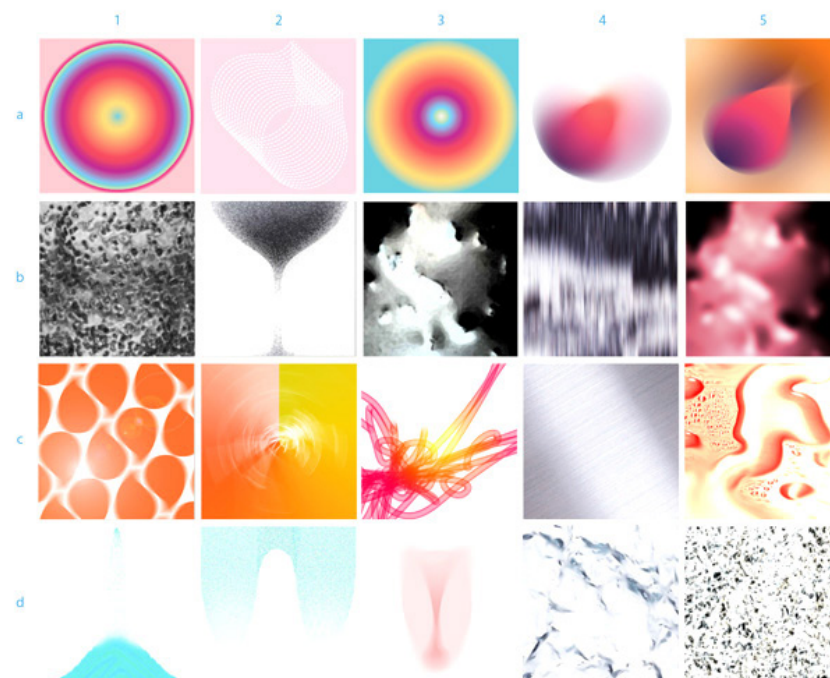
Husky seawater

Sharp-edged brine

1 Sweetness series, Illustration

2 Saltiness series, Illustration

<http://jjhyun.com/portfolio/sensory-stimuli/>



1 Sight. 2 Smell. 3 Taste.
 4 Sound. 5 Touch x
 a Sweet. b Bitter. c Sour. d Salty



1.3.2 The product in the eating experience

Sensory Stimuli

Sensory Spoon Set, 2013

The TSS sensory dining utensil is the pure-white ceramic version, made of alumina and reinforced ceramics, while the materials in the initial design compose of metal, plastic, glass and ceramics. Each material possesses its natural temperature, which works in harmony with the intent of the design. How the experimental research has been started with, motivated, and conducted exploring with the subject of synesthesia-like-mapping in various boundaries. The project aims to reveal just how much more, stretching the limits of what tableware can do. To create a path to new ways of perceiving in the process of design challenges social thought pattern and impacts on latent senses. How to tease or train our body where is processed in the brain? I am creating, therefore, a series of sensory utensils interweaving with the general archetype of the spoon for constant daily use for general people.

The idea what Hyun want to show us is how the multisensory really work in a object.

"How it is possible to induce non-synesthetic experiences in people without this condition? To further investigate the research explores how cross wiring sensory can be achieved through products and what effect this can have. It is a way to force people to be aware of their senses and actually analyze them from a different perspective view. In order to challenge social thought pattern, the project has been conducted in sensory perceptions and intuitive behaviors



to engineering emotional experiences and gains insight into the intuitive thought processes of the human brain. To inspire innovative ways of designing by exploring unknown disabilities is a known approach by the inclusive design field. This project is crossed over genres in the fields of design, food and art, more science and neurology and so forth. "

Tableware as Sensorial Stimuli

Sensory Cutlery Collection, 2012

Cutlery design focuses on getting food in bite-sized morsels from the plate to the mouth, but it could do so much more. The project aims to reveal just how much more, stretching the limits of what tableware can do. Focusing on ways of making eating a much richer experience, a series of dozens of different designs has been created, inspired by the phenomenon of synesthesia. This is a neurological condition where stimulus to one sense can affect one or more of the other senses.

An everyday event, 'taste' is created as a combination of more than five senses. Tasty formulas with the 5 elements – temperature, color, texture, volume/weight, and form – are applied to design proposal. Via exploring 'synesthesia' if we can stretch the borders of what tableware can do, the eating experience can be enriched in multi-cross-wiring ways. The tableware we use for eating should not just be a tool for placing food in our mouth, but it should become extensions of our body, challenging our senses even in the moment when the food is still on its way to being consumed. Each of designs have been created to stimulate or train different senses – allowing more than just our taste buds



to be engaged in the act and enjoyment of eating as sensorial stimuli, therefore it would lead the way of mindful eating which guides to rediscovering a healthy and joyful relationship with food.

The materials in the design currently compose of metal, plastic and ceramics. Each material possesses its natural temperature, which works in harmony with the intent of the design. From the thickness of the handle to the volume mass of the spoon, it evokes a different effect. Weight distribution changes according to the thickness and the volume affects the sound vibration. Each of these features is subtle but in combination, they harmonize into enhanced tasty effects. As for the specific workings of the features of the design, it could be understood through the elaboration of the five elements – temperature, color, texture, volume/weight and form.



Enhanced Tasty Formulas

Temperature

$\text{SWEET} \times 36.5^{\circ}\text{C} = \text{SWEET} \times +++$
 $\text{SALTY} \times < 36.5^{\circ}\text{C} < \text{SALTY} \times < 0^{\circ}\text{C}$
 $\text{SOUR} \times 36.5^{\circ}\text{C} = \text{SOUR} \times 100^{\circ}\text{C}$
 $\text{BITTER} \times 36.5^{\circ}\text{C} > \text{BITTER} \times 100^{\circ}\text{C}$

Tactility

$+++ \times (\text{SWEET} + \text{SALT}) = X$
 $\text{SWEET} + (0.5\% \times \text{SALT}) = \text{SWEET} ++$
 $\text{SALT} \div \text{SOUR} = \text{SALTY/SOUR} -$
 $\text{SALTY} \times \text{SOUR} = \text{SWEET} +$

Colour

$10\% \times (5R\ 4/14 + 5YR\ 4/14 + 5Y\ 4/14) = 2.0$
 $90\% \times (5R\ 4/14 + 5YR\ 4/14 + 5Y\ 4/14) = 0.1$
 $20\% \times R > 20\% \times Y$

Volume/ Weight

$5\text{cm}^3 \times \text{SOUND/ SIGHT} = 10\text{g} \times \text{TOUCH}$

Form

$1\text{mm} \times \text{TOUCH} > 10\text{mm} \times \text{TOUCH}$
 $(y=f(x)) \times \text{TOUCH} = Y$

PROEF a set of tools for people who have difficulties eating

One of our dear friends and former Pinch intern, Louise Knoppert, debuted her latest product concept at Dutch Design Week. Besides the beautiful design, PROEF is smart and thoughtful. And we would expect nothing less from Louise, a self-proclaimed ambitious enthusiastic perfectionist studying at the Design Academy Eindhoven in The Netherlands.

As a result, she has been nominated for a Better Award and is going to an expo about health-care in Taiwan to expose more of the world to PROEF.

Below is Louise's thesis of PROEF:

Every year, around 5000 people in the Netherlands have a tube installed in their stomachs permanently for tube feeding. All food is being pumped into their stomach directly. Many of these people are capable of living regular lives like us, except they are not allowed to eat or drink ever again.

During the research I found that there are more groups of people who have difficulties eating and drinking. These are people suffering from ALS, dementia, terminal illnesses, neurological disease, cancer or children who have troubles with food.

I can't imagine life without food and drinks, and missing out on all the social events that revolve around it. I want to give these people something back, something to experience, something to share. I want to invite them to the dinner table again.

With the set of tools I developed you can create a new food experience.

The set includes a variety of sensations, flavors, feelings, movements, actions, etc.

The flavors are related to particular cuisines or events so people can relate properly to what others around them are having.



DIP

This flexible piece is for dipping. After dipping it into a paste you can either lick it or brush it onto your tongue. The flexible arches make for a pleasant texture, and allow for playing around with.

MIST

Squeezing this piece will spray mist from it. The vapor leaves a pleasant sensation in your mouth, and flavor of course.



SPONGE

This piece sucks up a liquid that can be squeezed out by using your mouth. The sponge feels soft, and the liquid inside is juicy.

FOAM

This piece must be shaken to create foam on the liquid inside. The flexibility makes sure you can squeeze out the foam, which will then make its way onto the textured surface.

In the mouth, the foam reveals a flavor burst and it leaves a tingly sensation and sound in the mouth when it goes away.





VAPOR

This piece uses ultrasonic/atomizer technology to create smoke from a flavorful liquid.

The rings around the top give a pleasant feeling of texture on the lips.

TINGLE

This piece sprinkles tiny shunks on your tongue which pop, melt and tingle and spread the flavor.

PINCH

A pinch of powder that melts on your tongue.

ICE

With this piece you can create a tiny layer of ice around the shape.

Between the shape and the cap, which functions as a mould, is a flavorful liquid. After freezing you can take off the cap and enjoy the cold sensation with flavor and texture.

ROLL

With this piece you can roll the flavor onto your tongue and lips, providing a massage and putting the flavors directly onto the taste buds at the same time.

FOAM



ICE



* PROEF, Louise Knoppert, 2014

<http://design-milk.com/louise-knoppert-proef-eating-tools/>

1.3.3 The ambience in the eating experience

Steinbeisser's 'experimental gastronomy'

An exclusive dinner is being served up by two-michelin star chef edwin vinke. not only will the dinner showcase the contemporary uniqueness of meticulous food preparation, the experience includes making the hungry diners utilize unusual cutlery while eating their food. the utensils used during the dinner has been specially produced by designers stian korntved ruud and sarah hurtigkarl.

stian korntved ruud has an ongoing project of crafting spoons made completely of timber

in which he sources from native forests, and then carves by hand with tools. using precision, patience and an array of forms, the spoon-shapes all have individuality and is a sculptural piece in itself. meanwhile, danish maker sarah hurtigkarl has exhibited an ethereal installation searching for the border between cutlery, art and jewelry. resembling fascinating artifacts, together, the two creatives have carefully crafted the metal utensils which complements the contemporary tone of the overall food experience.

* <http://www.anothersomething.org/2015/09/08/>

steinbeissers-gastronomy/

* *The Perfect Meal: The Multisensory Science of Food and Dining*







Nagashi somen - a feast for the senses

Japan has four distinct seasons, each with its own unique expression of natural beauty and subtle climatic shifts. Seasonality is called *shun* in Japanese, and SHUN STYLE aims to celebrate each season in turn with feature articles on the finest seasonal eating.

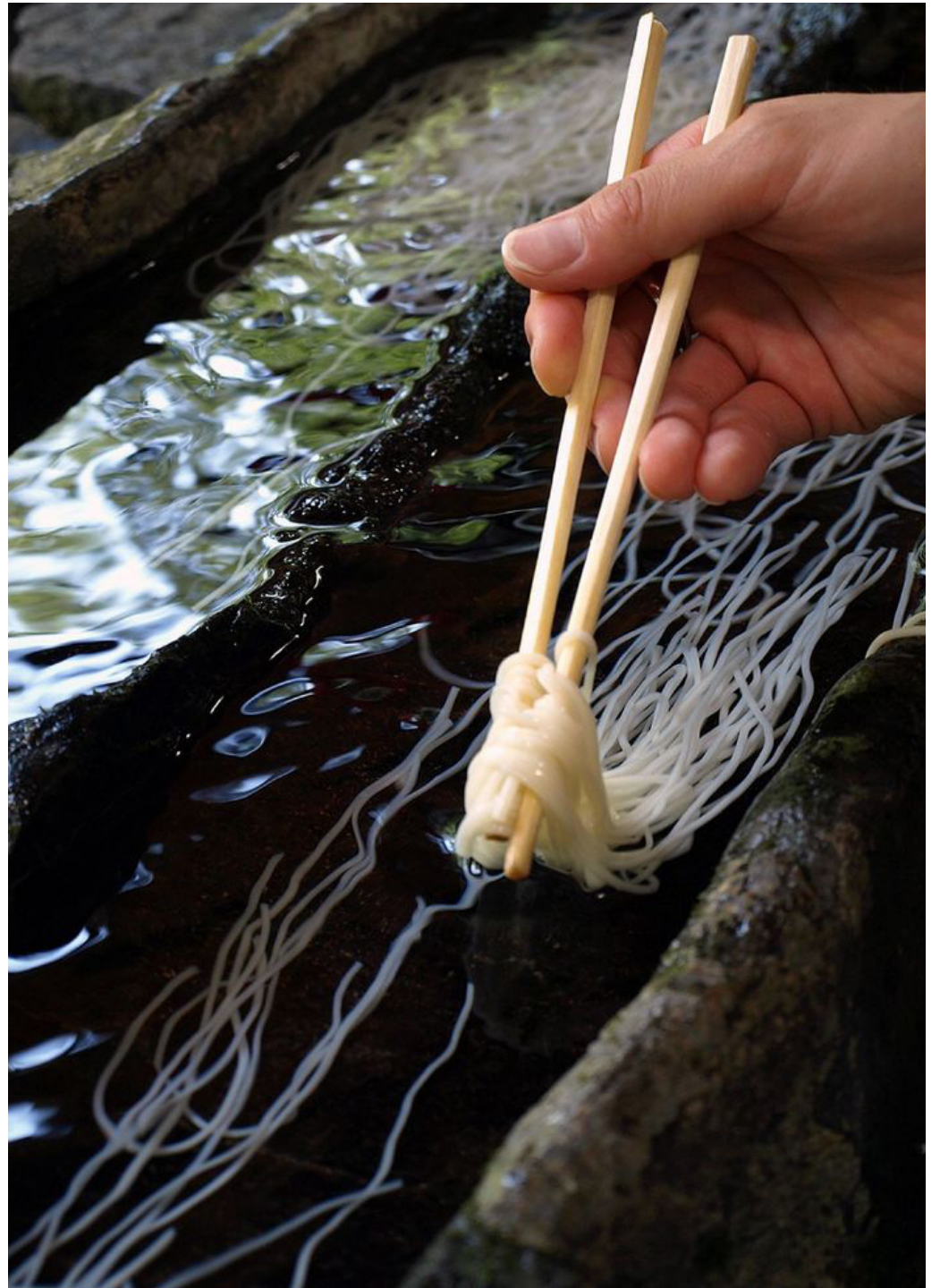
Summer is drawing to a close and autumn is almost upon us. For many Japanese, there is still time to enjoy the last days of summer at the beach or riverside before the weather turns cooler.

Japan has a longstanding culinary tradition of presenting food as a celebration of all the senses, and nagashi somen is surely the epitome of this. Everything about this refreshing and cooling dish evokes the essence of summer in Japan.

Nagashi somen involves somen noodles being carried by a stream of running water down a long section of bamboo pipe. Chopsticks are used to pick the noodles out as they flow down the pipe. The noodles are then dunked in *mentsuyu* dipping sauce and eaten cold. There are many theories about the origins of nagashi somen. It is said that during the Edo period there was a particular section of Naha Bay in the kingdom of Ryukyu (present-day Okinawa) where the highlight of summer festivities was nagashi somen sent down from the cliff top on a stream of crystal-clear water. This would suggest that nagashi somen has been a feature of summer in Japan for hundreds of years.

* <http://taiken.co/single/nagashi-somen>









1.3.4 The process in the eating experience

Tea ceremony

A tea ceremony is a ritualized form of making tea practiced in Asian culture by the Chinese, Japanese, Indian, Taiwanese, and Vietnamese.

Tea ceremony is a blend of two principles, *sabi* and *wabi*. "Wabi" represents the inner, or spiritual, experiences of human lives. Its original meaning indicated quiet or sober refinement, or subdued taste "characterized by humility, restraint, simplicity, naturalism, profundity, imperfection, and asymmetry" and "emphasizes simple, unadorned objects and architectural space, and celebrates the mellow beauty that time and care impart to materials." *Sabi*, on the other hand, represents the outer, or material imperfection of life, also the original nature of things. Zen Buddhism has been an influence in the development of the tea ceremony.

The elements of the tea ceremony is the harmony of nature and self cultivation, and enjoying tea in a formal and informal setting. The tea ceremony developed as a "**transformative practice**", and began to evolve its own aesthetic, in particular that of "*sabis*" and "*wabis*" principles. Understanding emptiness was considered the most effective means to spiritual awakening, while embracing imperfection was honoured as a healthy reminder to cherish our unpolished selves, here and now, just as we are – the first step to "*satori*" or enlightenment.



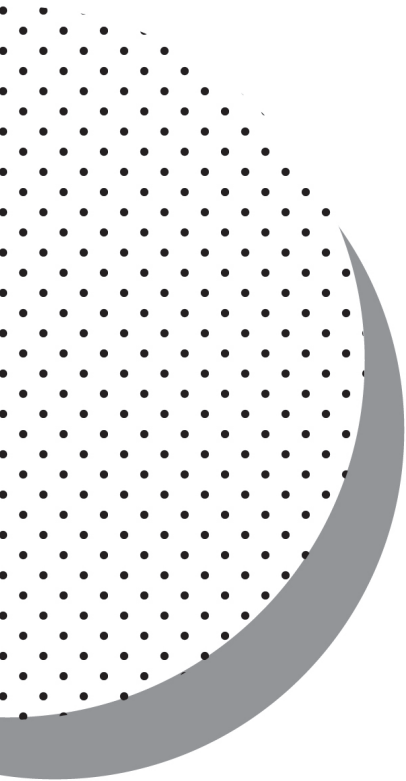


Peking Duck

The cooked Peking Duck is traditionally carved in front of the diners and served in three stages. First, the skin is served dipped in sugar and garlic sauce. The meat is then served with steamed pancakes (simplified Chinese: 春饼; traditional Chinese: 春餅; pinyin: chūn bǐng), spring onions and sweet bean sauce. Several vegetable dishes are provided to accompany the meat, typically cucumber sticks. The diners

spread sauce, and optionally sugar, over the pancake. The pancake is wrapped around the meat with the vegetables and eaten by hand. The remaining fat, meat and bones may be made into a broth, served as is, or the meat chopped up and stir fried with sweet bean sauce. Otherwise, they are packed up to be taken home by the customers





2. THE TRANSFORMATION OF EATING UTENSILS

2. The transformation of the eating utensils

2.1 How dose the food be served in natura

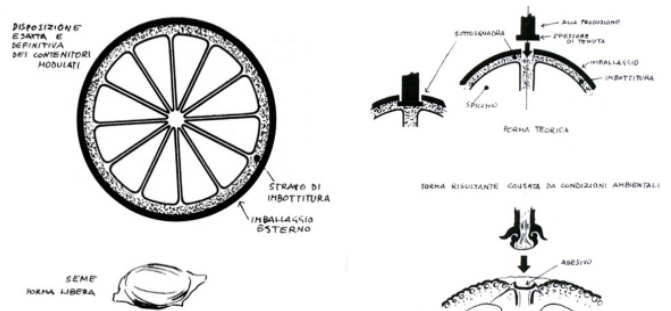
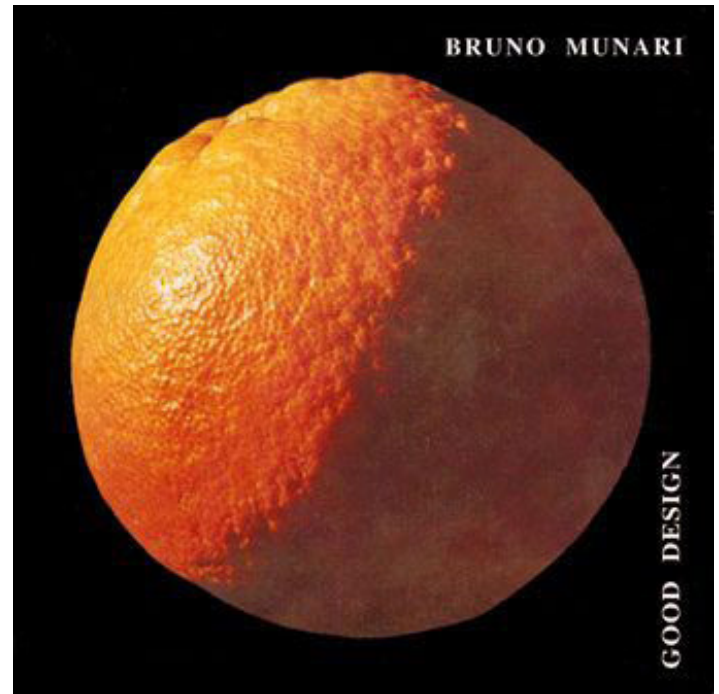
The perfect orange

We study and search from the nature, what the food used be, the form the color the texture of the original one.

The orange is a perfect object in the world said Bruno Munari in 1963. He described a wonder in natura, shown his point of view about a meaning of the fruit which is a real industry product.

The object is costitued by the modulated formarranged circularly around a vertical axis. Each piece is formed by a thin transparent film to hold the juice. A very weak adhesive holds together the pieces between them so it is easy to separate the object from other equal pieces. The packaging, as it is used today. Something must be said about the shape of the piece: each piece has exactly the shape of the arrangement of the teeth in the human mouth that, once open the package you can put it between the teeth and with gentle pressure, break and drink the juice.

Usually, the piece contain juice and a small seed: a little gift that the production offers to the consumer that they would like to have a personal production of these objects. That is an idea against the psychological is born between the consumer and production: none, or very few, they plant orange trees, but the offer of this grant highly altruistic, the idea of being able to do , free consumers and establish a relationship of trust. Gesture friendly and elegant.



The orange is therefore an object nearly perfect where there is absolute coherence between form, function, consumption.

The color is right, in blue would be wrong. Typical subject of a mass and international production where the absence of any element symbolic expression related to fashion styling or industry aesthetic.

** BRUNO MUNARI , GOOD DESIGN, 1963*

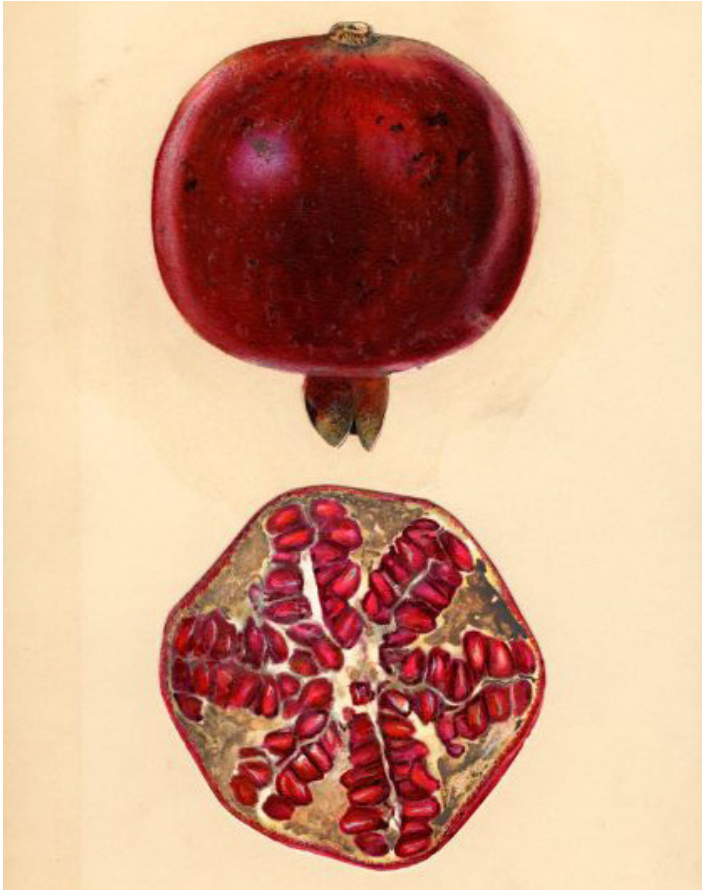
The natura food has its own characteristics and exists in a reasonable way. And could became a symbol.

Before said orange, now that another kind of fruit, the **coconut** appearance is to preserve the juice, but its skin is very hard, it may be because of the coconut is to fall from a high coconut trees, so it needs to be extremely hard shell. Especially in hot places to good heat insulating effect. Its shell is very useful. And now it becomes a symbol of the relax and vacation, see the picture of coconut can think of the seaside and holiday.

Banana is exist in other species. It can be said is a group of banana, but each are also independent of the group, the part which connected with the whole group is very fragile, easy to take off. And the fragile part became a handle, to peeler the skin. It can be said a good functional design.

the other species is the **beans**, the soybean. In Japan has become the dishes with wine, because its special way to eat, it is tiny, you need to concentrate on your finger. So it could become a part of snack food. Even a part of the culture.







2.2 The traditional natura material for food

The Zongzi, a traditional food in China

We study and search from the nature, what the food used be, the form the color the texture of the original one.

The orange is a perfect object in the world said Bruno Munari in 1963. He described a wonder in natura, shown his point of view about a meaning of the fruit which is a real industry product.

The object is costitued by the modulated
The orange is therefore an object nearly perfect





2.3. Recently tableware design

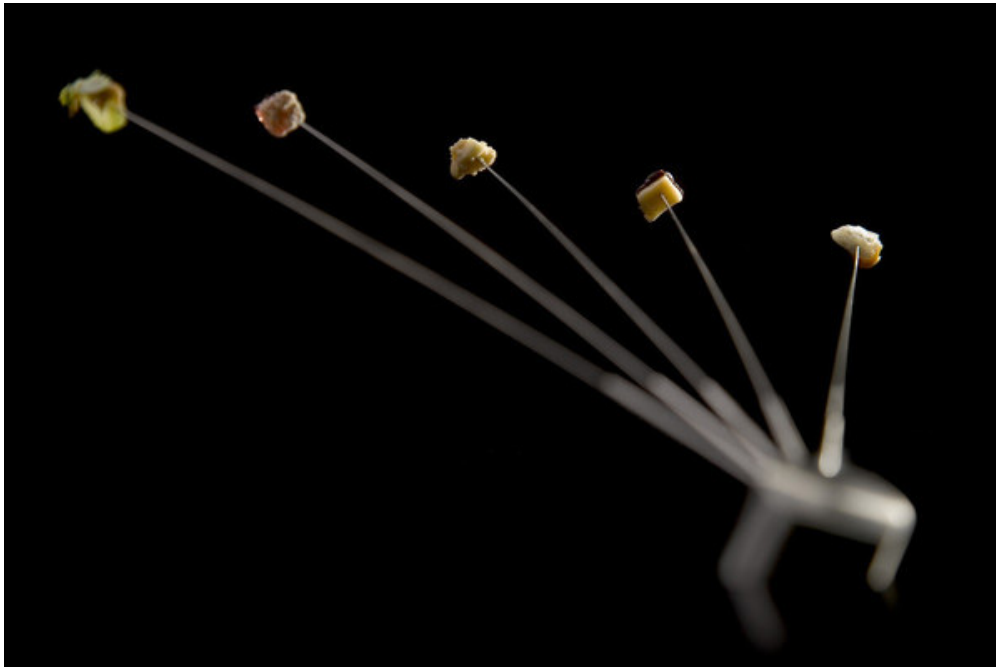
Crucial detail

Crucial Detail is an award-winning design studio founded by Martin Kastner. For more than a decade, Crucial Detail has explored the synergy of food and design, working at the forefront of fine dining in collaborations with the world's best chefs.

In addition to being named by The Future Laboratory as one of the world's 100 most influential designers, Kastner and Crucial Detail received a Global Innovation Award for Best Product Design for the Porthole, and Book Design of the Year Award for the Alinea book.

In 2015, Crucial Detail was instrumental in Team USA's historic silver finish at the world's most prestigious culinary competition, Bocuse d'Or.

* <http://crucialdetail.eu/collections/all>



Peacock



Sashimi Platter

Sand blasted cast glass is chilled and sits upon an acrylic base, allowing the fish to be served at proper temperature without the need for ice.



Antenna

A self-supporting skewer which subtly sways, giving life and movement to food.
self-supporting skewer





Bow
This suspension piece allows food to move naturally while elevated above the table. Perfect for small courses where accentuating lightness and translucency is desired.
stainless steel utensil



Lime Centerpiece
The fruit is the vessel.



WRITING SPOON

An innovative design from Julia Mariscal, each piece is hand-made of 18/10 stainless steel. This spoon has a tip that resembles that of a fountain pen. Just dip it in coffee, chocolate, or sauce, and use it for writing. Great for the table and also for plating in the kitchen! Dishwasher-safe. Made in Spain.

"Leave it in the drawer to lie with the other spoons, leave it to be a spoon until you decide that it can be something else."

- Julia Mariscal

Edible dishes bon aprofit

Bon Aprofit is a project that promotes healthy eating and nutrition education through the development of an edible seasonal dishes made from fruit and vegetables.

goals

Bring healthy eating in a fun way to adults and children. In the case of the smallest it is important to introduce them to the world of fruits and vegetables in a fun way, to familiarize them as soon as possible.

Practically teach what fruits and vegetables in season and proximity are, and what their properties. We discover what foods we should use to enhance mood aspects like concentration,

vitality, joy, and many others. Together we will check the different effects that cause us the different colors and properties of food.

Develop ingenuity and creativity through play, play, smell and design amazing dishes.

Spread a positive message: carry out a healthy diet affects our physical and emotional health. If we eat well, we better find inside and out.

* <http://bonaprofit.format.com/vajilla-comestible>





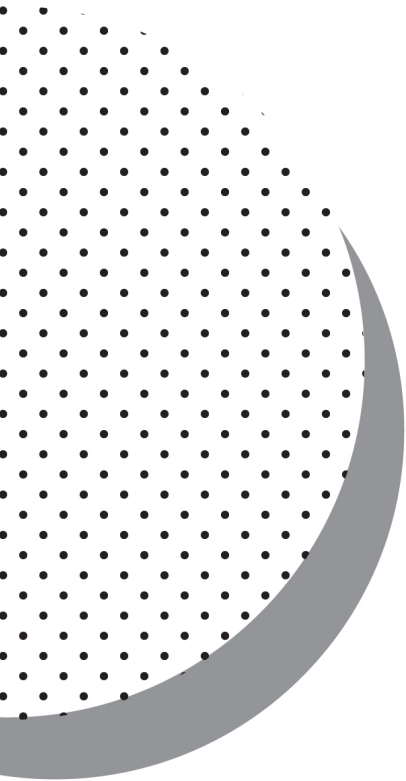


Vegetable Silverware Designs

Boring, white plastic silverware is old news to artist Qiyun Deng. Recently, the innovative product designer developed a collection of environmentally-friendly, but still disposable, silverware and serving bowl concepts that look just like everyday plants and vegetables. The series, entitled Graft, features objects constructed out of bioplastic PLA, a material pulled from renewable sources like vegetable fats and oils.

Graft was produced as part of Deng's diploma project at the École cantonale d'art de Lausanne in Switzerland and it is strongly inspired by nature. The artist crafted forks, spoons, and knives that blend nature together with manmade objects that we use everyday. Although the shapes mimic vegetables, they are designed to properly function as utensils. The handle of the fork looks just like a stalk of celery and the handle of the spoon looks just like a carrot. Deng asks, "By waking both visual and haptic sensation it brings along a question: Will you throw them away easily?"





3.

DIY MATERIAL

3. DIY material

The democratization of personal fabrication technologies in parallel to the rising desire of individuals for personalizing their products offers great opportunities to experiment with advanced, distributed and shared production processes as well as design new materials.

Materials in everyday artefacts are embodied in products mainly through mass production. This will not change in the near future. However, in the past decade, parallel to the advancements in mass production technologies, another approach has emerged, bringing a new dimension to the relationship amongst designers, technologies, production processes, and materials. This new approach combines making, crafting and personal fabrication

There is a growing interest for mass customization and personalization services provided by companies and industries in order to satisfy the emerging demand of unique products. The materials of self-production provide an opportunity to reconsider the features of existing manufacturing processes and industrialised material properties, in order to create new, unique experiential qualities.

Self-production refers to a way of controlling production processes through experimentation and tinkering: creating a material in a 'lab' and in the same lab, processing the material into a product. This approach triggers the designer to see almost everything as a possible candidate to be a matter of self-production effort.

In DIY material design practices, the designer becomes a craftsman, able to build and to modify the tools for his/her production aims. A result of the DIY material design process is new aesthetic expressions grounded on 'imperfect aesthetic qualities' that show the existence of an alchemist's (i.e. designer's) manual labour and craftsmanship, and hence traces of humanity. On an emotional level, DIY materials can facilitate 'attachment' due to their self-produced nature.

This novel approach to material aesthetics also explains designers' interest in creating unique materials, where imperfection becomes synonymous with added value, originality and personalisation.

**Materials and Design 86 (2015) 692–702 (2015)*

*Valentina Rognoli , Massimo Bianchini , Stefano Maffei ,
Elvin Karana*

3.1 The alchemy of the food The innovation edible eating utensils

Taste No Waste® Project

The Taste no Waste Project communicates the concept of the edible plate as a viable cultural and material model for the reduction of waste. Edible containers are made to replace disposable food containers and to offer viable solutions for waste reduction at its source, while simultaneously offering a complimentary gastronomic discovery experience in the process. The concept features a new aesthetic and typology of products that give rise to new ways of handling food and encouraging new prehensile modes and rituals around the meal.

‘The Taste No Waste project seeks to shift fundamental preconceptions about the ways we’ve learned to behave towards food and their containers, and applies culture-specific anthropological study and insight to provide contextual solutions for sustainable food material innovation. I consider edible tableware a viable agent for cultural change. Creating a new typology of shapes and food materials that provides the user with greater interaction with the product - and a tasteful and nutritional experience - generates a deeper, more meaningful experience and helps support this new sustainable food practice.’

The Edible Plate as a Viable Cultural and Material Model for Waste Reduction

Urban mobility, in its multiple forms, has created greater demand for ready-made meals. Recent anthropological and sociological research on food widely documents the extent to which

food behavior for individuals of all ages and cultural backgrounds has evolved in recent decades. Food consumption has become more individualized and less structured around the home-cooked meal. As a result, food is often consumed over the entire day, with meals frequently eaten rapidly or on the fly. The disposable plate, therefore, is a symptom of this tendency towards deconstructed food habits, a symbol of the disposable culture that marks our time. To cater to this trend, the fast food industry has responded with an incomparable range of now widely available products, which, in turn, has only led to a further increase in the use of disposable plates.

The Taste No Waste® project offers potential solutions to the reduction of waste at its source by creating edible food container products, which simultaneously encourage new approaches to food usage and handling.

The project distinguishes itself as one of the first projects to transform food into useful, and - perhaps more importantly - sustainable objects. It facilitates the exploration of links with experimental cuisine on a gastronomic and artistic level, and with transformation techniques well-known to the food industry. The project contributes new knowledge and practices to the fields of food and industrial design.

For the last 15 years, Bisson has been exploring the potential scope of production processes for diverse edible containers. Through field inquiry, she has widely investigated the nutritional and sanitary issues they raise. First explored locally in Montreal with various edible containers destined for serving pastries over the counter, the concept

was brought to a more provocative level with prototypes commissioned by Toronto Design Exchange in 2003 for the exhibition Design for the XXI Century. In 2008, started a two-year food science exploration with the support of the Fonds québécois de recherche sur la société and the collaboration of chefs and scientists from the industry and of the ITHQ Research and Expertise Center (Institut du tourisme et d'hôtellerie du Québec). In the book Edible: Food as material (2009), Diane Leclair Bisson gives account of the work in gastronomy and food science conducted during this experimental phase, which served to validate a wide range of recipes and techniques for transforming edible matter. Edible introduces food into the array of production materials. The food explorations, presented in the book as material samples, illustrate the production processes and the possible scope and forms of future edible containers and plates. They also illustrate the potential of vegetables and fruits as well as new flours in producing highly nutritional and colourful products. This research enabled her to create a new typology of edible products with innovative shapes and tastes to serve a variety of food. Her edible containers include: the Jelly bowls, the Food Nest series, the 3-bite spoon, children's wraps and the basket series. Since 2012, she also serves as Director of Research & Development of Edible Bubbles for PhoodStation, a conceptual food science laboratory based in Montréal.

The edible object calls not only for a new aesthetic, which will have an impact on our understanding of food, but also for new gestures contributing to waste reduction. More than just a practical response to pollution, the edible plate

is a vehicle for a change in social norms. The concept of a new range of edible objects and the exploration of food transformation contributes to the definition and introduction of a new as-yet unexplored avenues in regard to sustainable practices.

Food Material Sample Series

Through a series of food samples, Diane Leclair Bisson explores the capacity for foods themselves to be transformed into nutritional and tasty edible containers. Using diverse processes, she examines how food can be processed into thin, layered materials that can structurally support a wide variety of foods. Over 40 recipes of crunchy, firm, soft and jelly-like materials were developed. Attention is given to the mechanical, organoleptic and colour properties of foods. Samples are made primarily of a diversity of vegetables, and absolutely no artificial colors or additives are incorporated into the recipes. This culinary research reveals an original food aesthetic, and creatively introduces food sources to the vast world of production materials.

Scoop (Black)

Key Ingredients : Carob bean powder flour

Globules (Yellow)

Key Ingredients :

Carrot juice, goat cheese, yogurt

Bottle

Key ingredients:

Sugar, pectin, gelatine, agar agar



Interlaced Cups (Purple)

Blackberry and blueberry purées, mascarpone



Double Bowls (Green)

Pistachio powder, Matcha tea powder, spinach purée



Strata (Dark Brown)

Black quinoa and poppy seed flour





Jelly Bowls

The Jelly Bowls explores the concept of simple, geometric and mouldable edible containers, as well as the concept of the soluble container. The cylindrical containers may be used for salads or other cold meals. And because of its the high melting point, the gelified containers made with agar agar can also withstand warm liquid meals - even soups. Paradoxically, the natural gel is one of the very few food materials that can hold warm liquids for extended periods, and yet the only one to completely dissolve in very hot water. The use of Agar Agar powder is widespread in Asian cuisine, but has only recently been adopted by western cuisine, mostly in gastronomy and therefore remaining less known among the larger public. Its many applications in cooking make it an efficient, versatile and economical ingredient for moulding edible containers as well as edible films. Recipes include vinaigrette bowls such as tomato, red pepper and basil vinaigrette, and herbal-fruit juice bowls such as apple and coriander.

* <http://www.dianeclairbisson.com/>

* *Food as Material*, Les éditions du Passage, Montreal, 2009



Uses Food Scraps & Compost for 3D Printing "Agridust"

Ironically, the maker community is made up of a large group of generally ecologically-minded people who are now responsible for making, as well as discarding heaps of plastic filament, not to mention 3D models that for one reason or another become unwanted and end up in the trash.

No one wants to have trashed plastic piling up all over the office or workshop, and along with that, none of us really want to have the pleasure of 3D printing killed by the guilt of creating more trash and any sort of environmental harm. Most of us are pretty in-tune with recycling these days and even find joy in it—taking that one step further is the art of composting, which allows you to reduce waste even further by tossing organic scraps into the compost bin.

Now, what if you could combine composting with 3D printing? Marina Ceccolini is an Italian designer who was motivated to bring the



AGRIDUST

1. RECUPERO SCARTI INDUSTRIALI



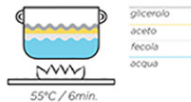
2. ESSICCAZIONE (solare o con forno)



3. POLVERIZZAZIONE DEGLI SCARTI



4. PREPARAZIONE LEGANTE



5. AMALGAMAZIONE legante + scarti



6. COTTURA DEL MATERIALE





ultimate, in not only highly available material, but a completely ecologically friendly process. And let's face it—everyone's gotta get a kick out of cooking at the 3D printer with part of last night's meal or this morning's coffee grounds.

Ceccolini calls her material 'Agridust.' Inspired by nature—as so often happens in many innovations—Ceccolini was examining a dried orange peel, struck by its seemingly durable, sturdy nature while in its desiccated, degrading state. Not stopping there, she began examining

other compostable items such as peels from other similar citrus fruits bearing harder exteriors, but also more seemingly delicate ones like tomato skins. She put them all into a big compost blend, including shells from peanuts, coffee grounds and more—all items that anyone who composts is well familiar with seeing in the 'pile' or bin.

Putting together an industrial design project, Ceccolini combined all the naturally recyclable items and then had to find a way to hold them together. She found that potato starch was not

only a great binder, but it was compatible with 3D printing as well.

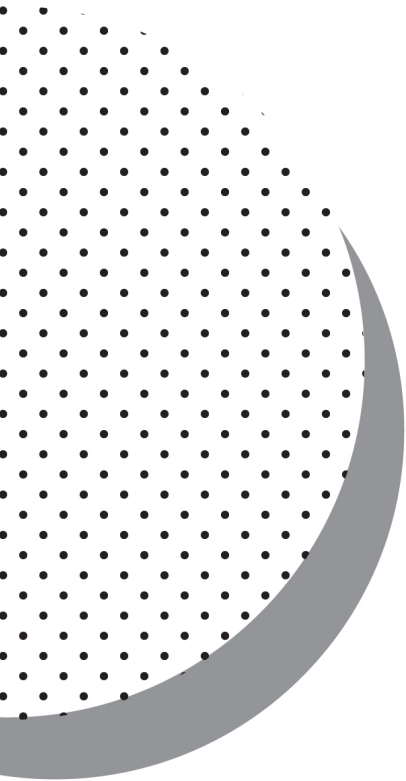
Considering how many first prints are just tests anyway, and how many prototypes makers—especially novices—often send through the 3D printer before reaching the desired shape and effect, Agridust offers a way to test and enjoy more 3D printing without worrying about the environment—the only concern is that the 3D printed items will not last indefinitely and are considered disposable.

Considering some pretty frightening statistics regarding the amount of waste we are using through 3D printing, Ceccolini's Agridust material comes just in time—and means you don't have to feel so bad about that half-eaten apple or the raw kale your kids just couldn't quite stomach. Overall, the 'recipe' for the material is 64.5% food waste and 35.5% potato starch binder. To be used as a 3D printing material one would need to replace the classic extruder with a syringe.

Ceccolini's project, which she considers to be 'a project of recovery and valorization of waste fruit and vegetables,' is one that she now considers must be taken to a higher level to come to full fruition in helping to realize a way to reduce the use of plastics in 3D printing worldwide. As energy sources like vegetable waste and oil for use in fueling cars becomes more widespread, it's not so foreign a thought to think of this as a viable material in 3D printing.

* <http://3dprint.com/55358/agridust-food-3d-printing/>





4. THE WASTE OF RICE

4.

The waste of rice

Rice is the staple food of over half the world's population. It is the predominant dietary energy source for 17 countries in Asia and the Pacific, 9 countries in North and South America and 8 countries in Africa. Rice provides 20% of the world's dietary energy supply, while wheat supplies 19% and maize (corn) 5%.

It is the grain with the second-highest worldwide production, after maize (corn), according to data for 2010.

"Rice is Life" (PDF). Food and Agricultural Organization of the United Nations. 2004.

A detailed analysis of nutrient content of rice suggests that the nutrition value of rice varies based on a number of factors. It depends on the strain of rice, that is between white, brown, red, and black (or purple) varieties of rice – each prevalent in different parts of the world. It also depends on nutrient quality of the soil rice is grown in, whether and how the rice is polished or processed, the manner it is enriched, and how it is prepared before consumption.

Juliano, Bienvenido O. (1993). "Rice in human nutrition". Food and Agricultural Organization of the United Nations.

Highly colored rice strains, such as black (purple) rice, derive their color from anthocyanins and tocols. Scientific studies suggest that these color pigments have antioxidant properties that may be useful to human health. In purple rice bran, hydrophilic antioxidants are in greater quantity and have higher free radical scavenging activity

than lipophilic antioxidants. Anthocyanins and -tocols in purple rice are largely located in the inner portion of purple rice bran.

Comparative nutrition studies on red, black and white varieties of rice suggest that pigments in red and black rice varieties may offer nutritional benefits. Red or black rice consumption was found to reduce or retard the progression of atherosclerotic plaque development, induced by dietary cholesterol, in mammals. White rice consumption offered no similar benefits, which the study suggests may be due in part to a lack of antioxidants found in red and black varieties of rice.

Ling, WH; Cheng, QX; Ma, J; Wang, T (2001). "Red and Black Rice Decrease Atherosclerotic Plaque Formation and Increase Antioxidant Status in Rabbits". Journal of Nutrition 131 (5): 1421–1426

As of 2009 world food consumption of rice was 531.6 million metric tons of paddy equivalent (354,603 of milled equivalent), while the far largest consumers were China consuming 156.3 million metric tons of paddy equivalent (29.4% of the world consumption) and India consuming 123.5 million metric tons of paddy equivalent (23.3% of the world consumption).[103] Between 1961 and 2002, per capita consumption of rice increased by 40%.

Rice is the most important crop in Asia. In Cambodia, for example, 90% of the total agricultural area is used for rice production.[104] U.S. rice consumption has risen sharply over

the past 25 years, fueled in part by commercial applications such as beer production.[105] Almost one in five adult Americans now report eating at least half a serving of white or brown rice per day.



A second life for rice husk

The rice husk (or hull) is the outermost layer of the paddy grain that is separated from the rice grains during the milling process. Around 20% of paddy weight is husk and rice production in Asia produces about 770 million tons of husk annually.

Rice husk was largely considered a waste product that was often burned or dumped on landfills, according to Martin Gummert, postharvest expert at the International Rice Research Institute.

“In Vietnam, it used to be a waste some years ago and was dumped in the rivers, causing a big problem, but now it has a value,” Mr. Gummert said. “In fact, in most countries, rice husk is not waste anymore.” Some enterprising companies are turning it into various products not only for the eco-conscious market place but also for the industrial sector.

In India, a nongovernment organization uses rice husk to supply rural villages with cheap and affordable electricity, while a company in Spain saves the environment one wood-free chopstick at a time.

Recycled light

India, one of the biggest rice producers in the world, not surprisingly, also produces vast amounts of rice husk. Bihar alone is estimated to produce 1.8 billion kilograms of rice husk every year. For Gyanesh Pandey, an engineer and native of the state, this was an inexpensive energy source to light up villages outside India’s

industrial power grid.

Mr. Pandey is the co-founder and CEO of Husk Power Systems (HPS), a rural empowerment enterprise that designs, installs, and operates mini power plants using a biomass gasification technology he co-developed. The process burns rice husk with a controlled amount of oxygen to produce gas that powers an internal combustion engine that produces electricity. The mini power plants, operated by local villagers trained by HPS, can generate from 25 kW to 100 kW of electricity. Rice husk power plants, depending on their of up to 4,000 people.

The electricity is distributed directly to subscribing households, farms, and small businesses, within a radius of 1.5 kilometers, on a payfor- use basis. Consumers prepay a fixed monthly fee, ranging from US\$2 to \$3, to light two fluorescent lamps and one mobile charging station, according to HPS. This is at least 30% cheaper than the cost of kerosene and diesel and enables savings of up to \$50 for each household every year.

Since 2008, HPS has installed more than 80 plants in Bihar—enough to provide over 200,000 people across 300 villages and hamlets with electricity. By 2014, HPS plans to take its decentralized electricity generation and distribution model to more than 6,500 rural areas. HPS estimates that more than 10 million people will benefit from the power of recycled rice husk.



Back on the table

rice husk to produce chopsticks

Another company is bringing rice husk back to the dining table, not as food but as the main material for producing disposable chopsticks.

The use of wooden disposable chopsticks—which are cheap, convenient, and hygienic—has a tremendous effect on the environment. In China alone, an estimated 45 billion pairs are used and thrown away every year, the equivalent of almost 4 million fully grown trees, according to a report by China Daily. The environmental impact of wooden disposable chopsticks is so serious that the Chinese government has imposed a “chopstick tax” to curb production and use.

Japan is another major consumer of disposable chopsticks. Eliminating disposable chopsticks in the country could prove more difficult because of traditional beliefs that “chopsticks lose their original divine power after a single use.” To preserve its forests, Japan imports disposable chopsticks from China, Vietnam, Indonesia, Chile, and Russia, resulting in deforestation in those countries. Japan, however, still has to deal with the problem of used chopsticks—an estimated 25 billion pairs every year. This is where rice husk comes in.

Algan Technology, a company that specializes in reusing waste products and by-products, has developed a new material that contains 90% rice husk and only 10% resin. This nontoxic material, called SOLIT RICEIT, can be used

for manufacturing reusable and disposable chopsticks without cutting down a single tree.

“SOLIT RICEIT chopsticks have the feel and appearance of regular chopsticks so they can be used over and over again as eating implements,” said Joaquín Rodrigo García, co-founder and project manager of Algan Technology. SOLIT RICEIT chopsticks are so eco-friendly they can also be recycled into new products such as boxes, boards, pallets, and others traditionally made from wood without using any additives or water.

“The daily use of disposable chopsticks means 200 hectares of trees, mainly birch and aspen, have to be cut every 24 hours around the world,” said Mr. García. If Algan Technology has its way, chopsticks will no longer “grow” on trees but come from byproducts of rice growing.

<http://irri.org/rice-today/a-second-life-for-rice-husk>

4.1. Analysis and the process of rice

Rice is typically rinsed before cooking to remove excess starch. Rice produced in the US is usually fortified with vitamins and minerals, and rinsing will result in a loss of nutrients. Rice may be rinsed repeatedly until the rinse water is clear to improve the texture and taste.

Rice may be soaked to decrease cooking time, conserve fuel, minimize exposure to high temperature, and reduce stickiness. For some varieties, soaking improves the texture of the cooked rice by increasing expansion of the grains. Rice may be soaked for 30 minutes up to several hours. Brown rice may be soaked in warm water for 20 hours to stimulate germination.

Rice is cooked by boiling or steaming, and absorbs water during cooking. With the absorption method, rice may be cooked in a volume of water similar to the volume of rice. With the rapid-boil method, rice may be cooked in a large quantity of water which is drained before serving. Rapid-boil preparation is not desirable with enriched rice, as much of the enrichment additives are lost when the water is discarded. Electric rice cookers, popular in Asia and Latin America, simplify the process of cooking rice.



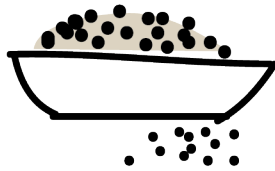
Materials add only water and rice, dry rice after becoming hard and well together.

And waterproof, experiments show that the material will not affect in the water at ordinary temperatures within half an hour.

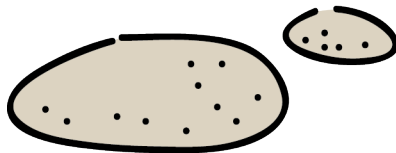
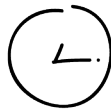
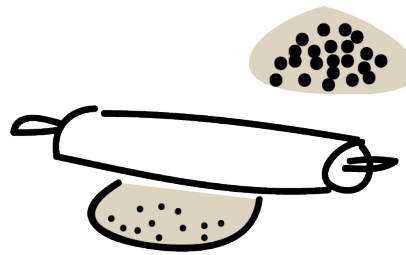
Can dry at ambient temperature, it takes about two days to dry completely.

After completely dry will not mildew.

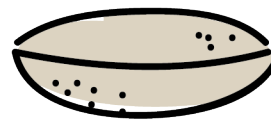
DAY 1: Use cooked rice



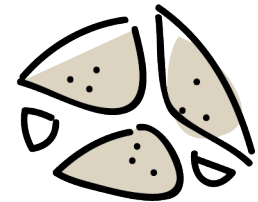
DAY 1: Rolling and pressing when it mix good



DAY 1: Modeling and drying in cool place



DAY 2: Dry complete, Deformed and curved



1 week



Deformation automatic



DAY 1



DAY 2



DAY 3

sensorial scale gradings (2 days after)

	5	4	3	2	1	1	2	3	4	5	
opaque											transparent
non-reflective											reflective
matte											glossy
not elastic											elastic
light											heavy
hard											soft
tough											ductile
smooth											rough
cold											warm

sensorial scale gradings(1 day)

	5	4	3	2	1	1	2	3	4	5	
opaque											transparent
non-reflective											reflective
matte											glossy
not elastic											elastic
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tough											ductile
smooth											rough
cold											warm





4.3. Material benchmarking

4.3.1 The similar material from natural material

Marmo
Ceramica





4.3. Material benchmarking

4.3.2 The similar material from new created material

sensory and aesthetic way

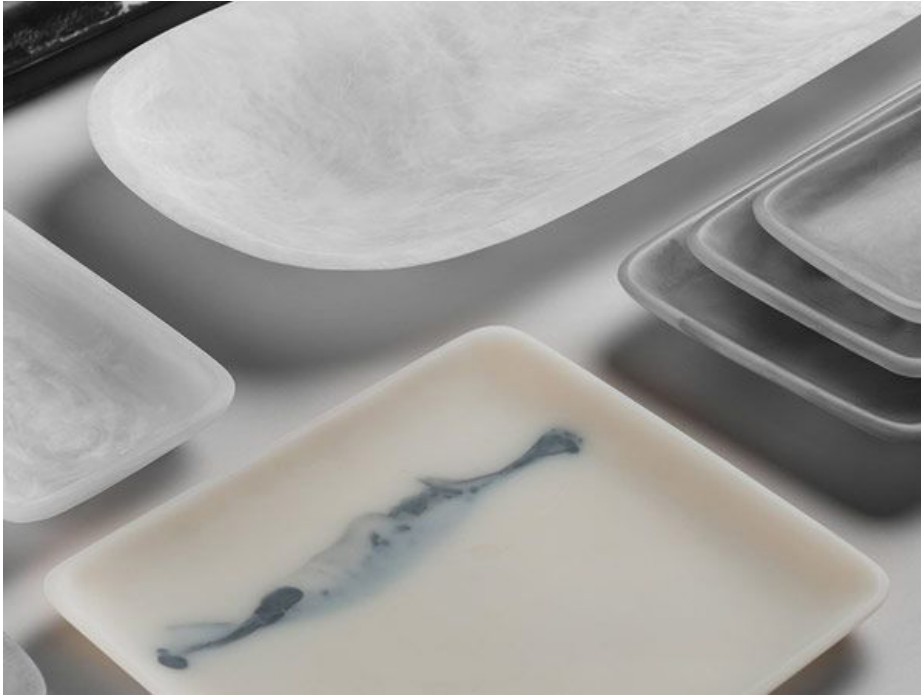
STURDY is makes sculptural home furnishings using resin, brass, steel and wood. Everything is made to order and handmade. Our studio is zero-waste using locally sourced materials and a team of artisans who have been working with us for decades. In every way we are the opposite of “mass-produced”.

Designer is Martha Sturdy. Born and raised in British Columbia, Martha has always been inspired and guided by the elements. Materials like mineral and salvaged Cedar find expression

in her work — offering a reflection of a landscape that is itself bold, clean and strong.

Martha has always been enthralled with the scale of nature on the West Coast. Never delicate, but always pared down, her work finds a balance in its weightiness and a resolve in its proportion. Our primary material is resin – We love that it will endure abuse like stone, has all of the comfort of wood, and carries colour and light like glass. We work with brass because of the warmth and old-world flavour that it lends to cleaner forms. We love steel because it is rugged, strong, and unapologetically masculine. All of the qualities we are drawn to in our materials are the things we are inspired by in nature.





<http://plastolux.com/the-method-behind-martha-sturdy-sturdy.html>

similar production process

IMPASTO

IMPASTO is a self-invented biodegradable natural fibre composite made of leftovers from wood-, coffee- and skin production. The raw materials are mixed with pigment into a dough, pressed, rolled and folded into flat sheets. The colours become partially mixed. This makes every sheet unique. Afterwards the sheet can be shaped by vacuum forming. The project was based on sustainable materials research. This led to experiments with different natural fibres and binders, with the aim of creating a new material that is biodegradable, easy to work with and simple to understand. The development of the production process is driven by an idea

of creating a process that is adaptable to the industry, but has a unique output as if it was handmade.

The process has so far been used in a series of products, where the meeting of oak and fibre composite has become a central detail in the design. The “handmade – high tech” process makes every piece in the collection unique.

<http://steenfatt.dk/work/impasto/>





StoneCycling

StoneCycling by the Dutch designer Tom van Soest found a way to use demolition and industrial waste as raw materials for creating products with higher value. It focuses on three categories of products: bricks, tiles and furniture. The designer mechanizes the process of pulverizing, pressurizing, and adding heat, using a tub grinder and a kiln. The raw material comes from demolition and construction waste or manufacturing refuse with no binders required. This opens the possibility for a continuous, waste-free production cycle.

<http://lin-morris.com/blended-materials-by-tom-van-soest/>



recycled agricultural waste

This materials development project succeeded in processing agricultural waste into low-cost construction panels bonded with tannin-based adhesive. Plant-based agricultural wastes from the cultivation of rice, maize and cassava crops provide natural fibers that are a sustainable resource for the production of building materials to achieve a reduction in construction costs, reducing dependence on imported, higher-cost alternatives.

The panels are an affordable building material for housing economically disadvantaged communities and help to improve rudimentary living conditions. Diverting crop byproducts from the waste stream produces positive environmental side effects since waste incineration and considerable air pollution are avoided. The building material provides a tangible contribution to reducing the estimated deficit of 17 million low-cost dwellings in Nigeria alone.



4.4. The possibility of the material experience





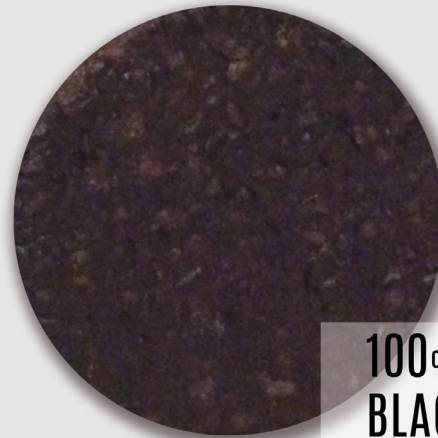
The different kind of rice and the different texture

In order to get a different textures, there are several ways, you can choose a different mix of rice, or a different degree of compaction

30% BLACK RICE
70% WHITE RICE



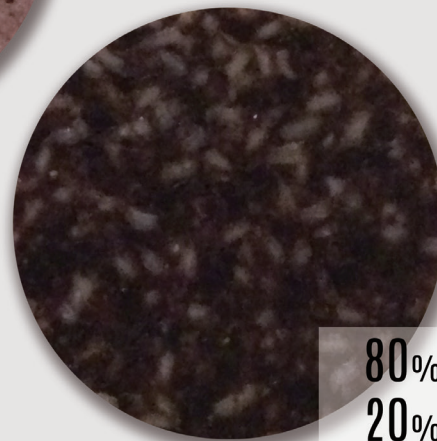
**100%
BLACK RICE**



5% BLACK RICE
95% WHITE RICE



80% BLACK RICE
20% WHITE RICE



The experiment of color—mix in different rice



RED FRUIT TEA



GREEN TEA

The experiment of color—use the colored water, Natural colors added



The texture experiment— without add the secondo material



RED SEA SALT



BLACK SEA SALT



MIGLIO



ROSEMARY



SESAME

TEXTURE EXPERIMENT

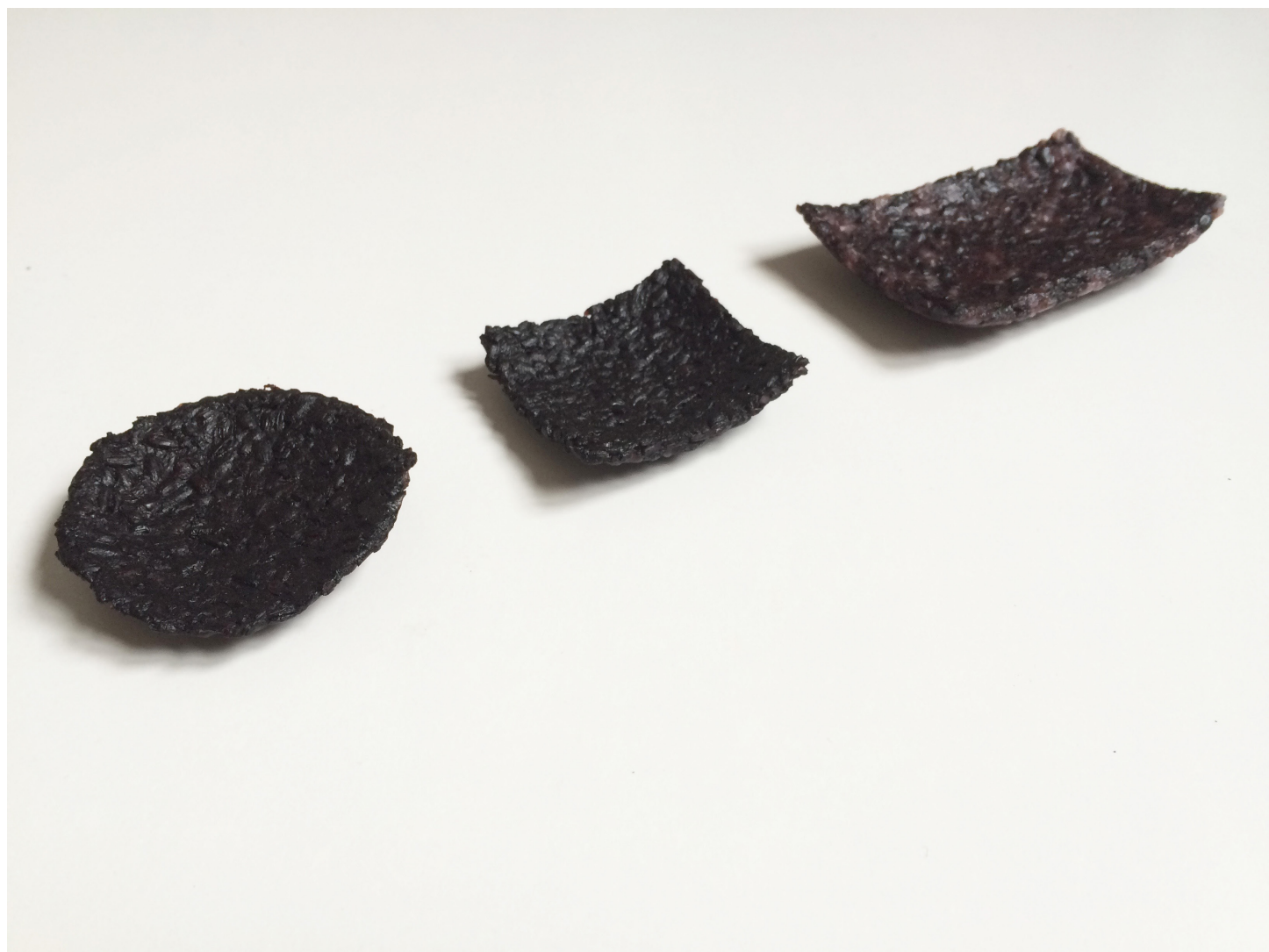
The texture experiment— add other ingredient, taste and non taste

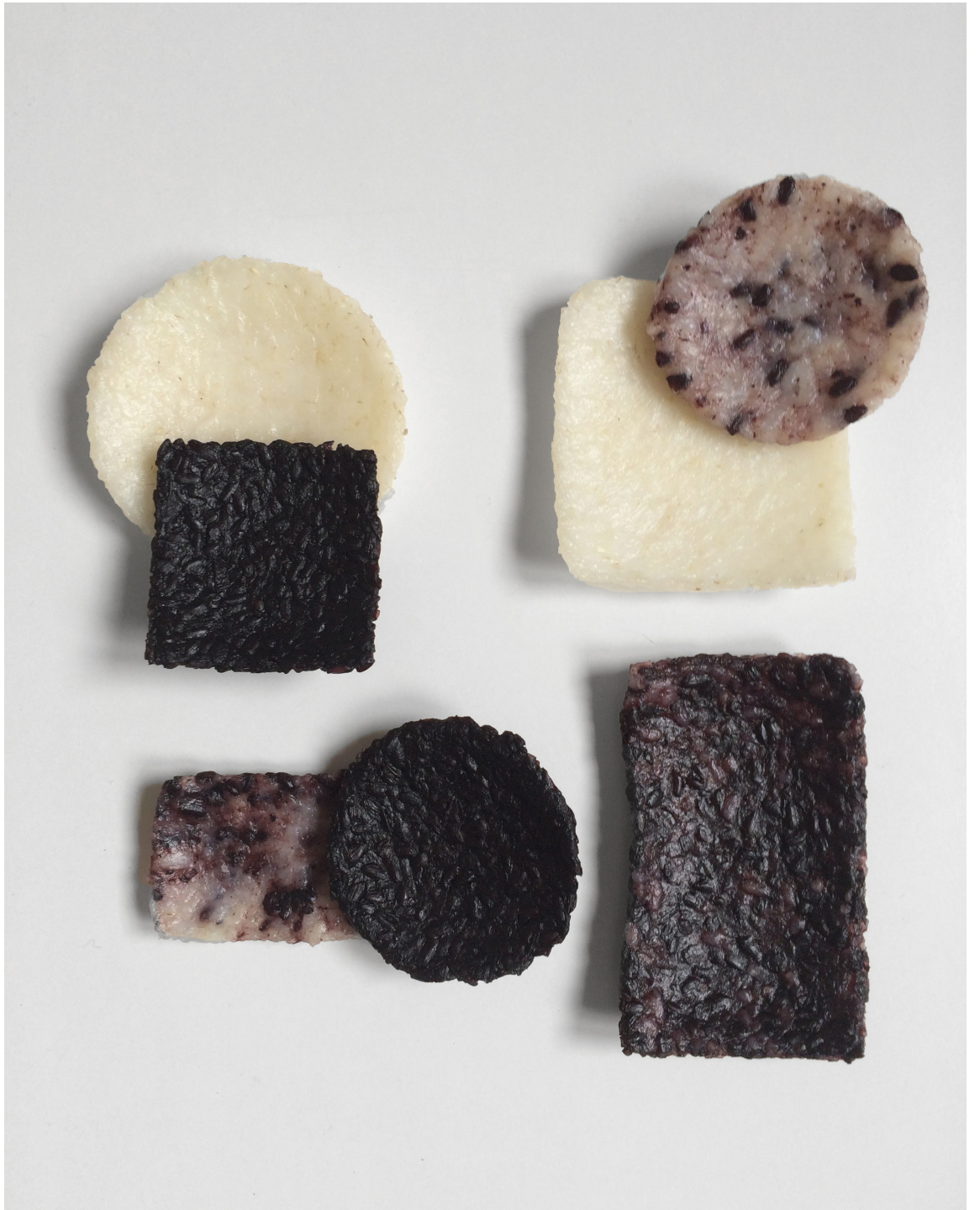










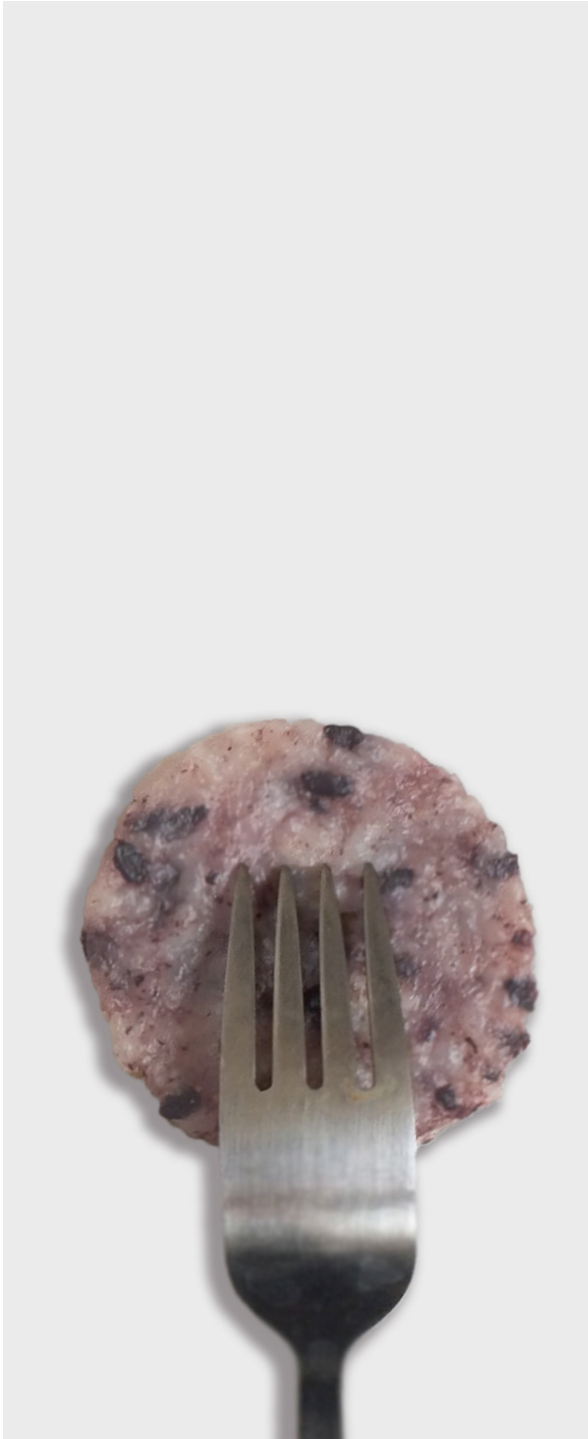




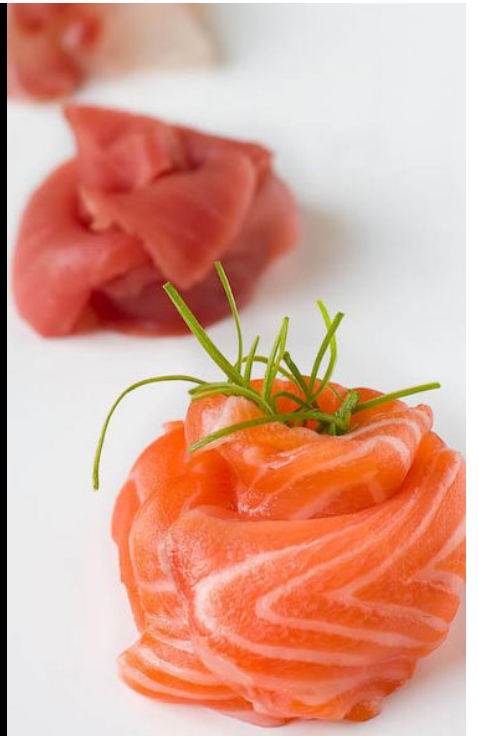


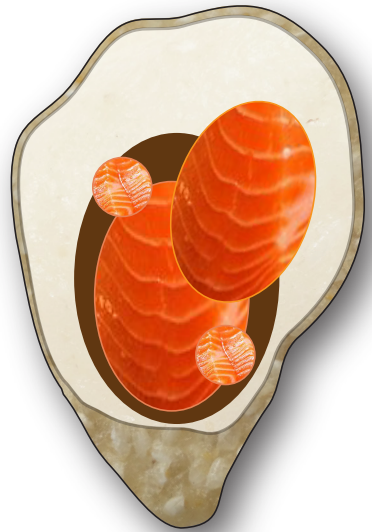


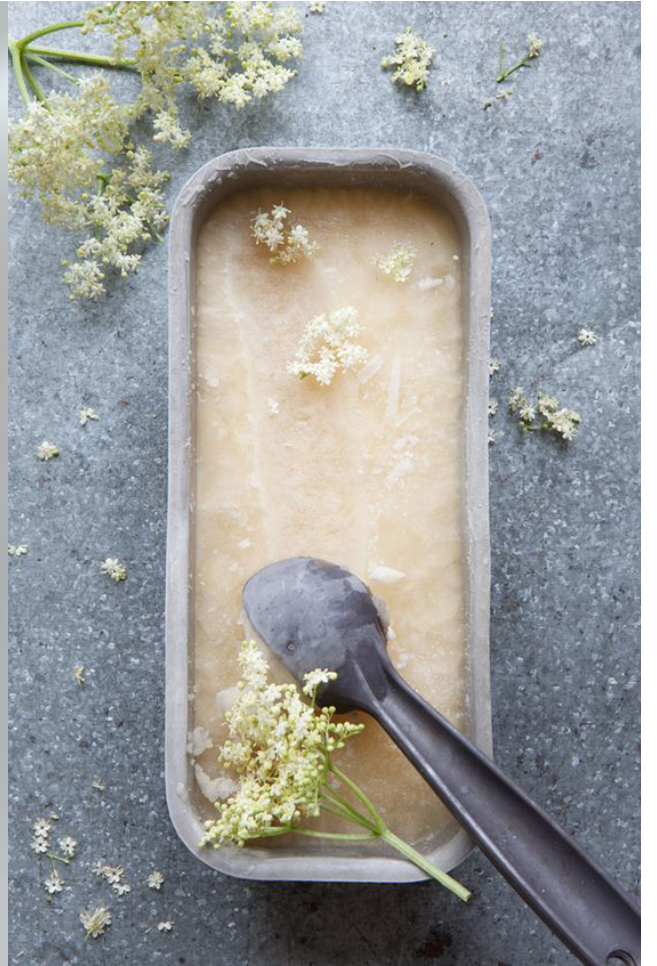














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