Rationalizing food recipes: a paradigm shift in cooking education

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Let’s start with some reflexions

**Molecular gastronomy**: scientific discipline dedicated to the study of physical and chemical processes that occur during cooking and eating. (Hervé This)

"Gastronomy is the knowledge and understanding of all that relates to man, as he eats."  
Jean-Anthelme Brillat-Savarin, *Physiologie du Goût*, 1825

"…It pertains to [natural history](#), by the classification of food substances, to [physics](#), by the examination of their compositions and qualities, to [chemistry](#), through various analyzes and breakdowns it subjects them, and to [cooking](#), through the art of preparing food and make it palatable."

"Cooking, without ceasing to be an art, will become [scientifical](#) and subject its formulas, too often empirical, to a method and a precision that will leave nothing to chance."
Georges Auguste Escoffier, *Guide culinaire*, 1907

“I think it is a sad reflection on our civilization that while we can and do measure the temperature in the atmosphere of Venus we do not know what goes on inside our soufflés.”
Nicholas Kurti, *The physicist in the kitchen*, Royal Society lecture 1969

"One cannot help being surprised every time we questioned ourselves on objects that are most familiar to us, on the most trivial things, to see how our ideas are often vague and uncertain and how, therefore, it is important to clarify them by experiments and facts."
Antoine Lavoisier, *Œuvres complètes*, 1783
The (first) goals of molecular gastronomy

- gathering and scientific investigation of culinary precisions
- modeling of cooking practices
- introduction of new tools, methods and ingredients in cooking practice
- invention of new dishes

Hervé This, 1995, La gastronomie moléculaire et physique, PhD thesis, University Pierre et Marie Curie – Paris 6

Stewed pears

Take a dozen medium size pears, peel them and put them in one by one in cold water. Then melt at low heat in a pan 125 grams of sugar cubes with a little water; when the sugar is melted, add the pears, sprinkle them with lemon juice if you want the pears stay white; if you prefer them red, do not add lemon juice, but cook in a pan of tinned copper.
1- Know your ingredients

solid  liquid  gas

?
2- (know how to) mix your ingredients → *physical changes*

<table>
<thead>
<tr>
<th>Line dispersed in column</th>
<th>Gaz (G)</th>
<th>Liquid (O ou W)</th>
<th>Solid (S)</th>
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<td>Gaz</td>
<td>Liquid aerosol</td>
<td>Solid aerosol</td>
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<td>G/G</td>
<td>W/G ou O/G</td>
<td>S/G</td>
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<td>Liquid (O ou W)</td>
<td>Foam</td>
<td>Emulsion</td>
<td>Suspension</td>
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<td>G/W or G/O</td>
<td>W/O ou O/W</td>
<td>S/W ou S/O</td>
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<td>Solid (S)</td>
<td>Solid foam</td>
<td>Gel</td>
<td>Solid suspension</td>
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<td></td>
<td>G/S</td>
<td>W/S ou O/S</td>
<td>S1/S2</td>
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</tbody>
</table>

3- (know how to) cook your ingredients → *chemical changes*

4- get inspiration

Ferran Adria
(El Bulli, Rosas, Spain)

Heston Blumenthal
(The Fat Duck, London, UK)

Georgianna Hiliadaki and Nikos Roussos
(Funky Gourmet, Athens, Greece)

Sang Hoon Degeimbre
(Air du Temmps, Liernu, Belgium)

Grant Achatz
(Aliena, Chicago, USA)

Alex Atala
(DOM, Sao Paulo, Brazil)

Homaro Cantu
(Moto, Chicago, USA)

Denis Martin
(Denis Martin, Vevey, Switzerland)
Cooking studies in France

En général ces formations peuvent être préparées par la voie scolaire, l'apprentissage et la formation professionnelle continue.

(1) Réponse à un besoin de formation destinée à satisfaire un profil d'emploi local, voire national.
(2) Poursuites d'études possibles prévue par le référentiel ou mention au Bac Pro.
(3) Diplôme intermédiaire : le BEP. Les situations d'évaluation du CCF sont effectuées au cours des 2e et 3e semestre de formation du Bac Pro.
Le jury final du BEP aura lieu en juin de première professionnelle. Dernière session des deux options du Bac Pro 2 ans en 2012.
What is taught to our students?

1955 – recipes

1985 – technics (to invente recipes) <- *Nouvelle cuisine*

1995 – technics (with some simplification)

2005 – technics (with some new ones) + a little bit of science <- *Molecular cuisine*

2015 – technics (less and less) + science (more and more)
To peel, to segment, to vandyke, to slice, to crush, to chop, to slash, to prepare shellfishes, to dress and truss poultries, to prepare fishes, to blanch.

To cook in a liquid: eggs, green vegetables, dried vegetables, pasta and rice, fish, meat.
To steam: fish, vegetables.
To grill: white meat, red meat, fish, poultry, vegetables.
To roast: white meat, red meat, poultry.
To sear.
To sauté: vegetables, eggs, breaded items, fish.

To bind/thicken a liquid base with: a roux, a kneaded butter, a fat, egg yolks, mashed vegetables.
To concoct basic sauces and stocks: tomato sauce, veal stock, fish velouté, etc.
To work up cold emulsions.
2015 - series "science and technology for hotel and restaurant"
Program "culinary science and technology"

To identify key physical/chemical phenomena generated by the culinary act:
- Transformations: fat, protein, carbohydrates, water
- Impact of temperature
- Foams and emulsions

The implementation involves a strategy adapted to the class level, avoiding the
strict reproduction of techniques. As part of the observed processes, the
physical/chemical phenomena will be demonstrated. These discoveries will be
further revealed during experiments, observations, demonstrations...

The link will have to be done with the science class.
What next?

Thanks for your attention