# A propos de l'article *Ultra-processed foods: how functional is the NOVA system?*

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**Résumé**

L'*European Journal of Clinical Nutrition* vient de publier un article intitulé *Ultra-processed foods: how functional is the NOVA system?*, signé par Véronique Braesco, Isabelle Souchon, Patrick Sauvant, Typhaine Haurogné, Matthieu Maillot, Catherine Féart et Nicole Darmon. Ce texte analyse la cohérence d'une classification des aliments nommée NOVA, laquelle propose quatre catégories, selon le degré des transformations qui seraient appliquées à des denrées brutes. L'article publié conclut que la classification manque de cohérence, ce qui pose à la fois la question de la naturalité des aliments, alors que des idéologies s'affrontent, parfois avec le présupposé que le naturel est meilleur que l'artificiel, et que se développe une cuisine de synthèse, qui brouille les catégories des additifs, des auxiliaires technologiques et des aromatisants.

**Abstract**

The *European Journal of Clinical Nutrition* recently published an article entitled *Ultra processed foods: how functional is the NOVA system?*, by Véronique Braesco, Isabelle Souchon, Patrick Sauvant, Typhaine Haurogné, Matthieu Maillot, Catherine Féart and Nicole Darmon. This article analyzes the robustness of a food classification named NOVA, where four categories are proposed, according to the degree of transformation. The published article concludes that the classification lacks coherence, which raises the question of the nature of food, while ideologies clash and a "synthetic cuisine" develops, which blurs the categories of additives, technical aids and flavourings.

## 1. An article analyzes a strangely popular classification

As the Western world became more urbanized, the food industry developed, rationalizing production and seeking economies of scale (Chaouad and Verzeroli, 2018). It improved traditional preservation techniques, at the same time as it introduced new processes (appertization, refrigeration, modified atmospheres, preservatives, ionization, etc.), in order to be able to offer at any time of the day foods that the public demands to be healthy and cheap (This and Pascal, 2011), or even ready to eat, with only, sometimes, a final reheating step.

This development has consequences. First, the users of the foodstuffs sold, often unaware of the industrial conditions of manufacture, sometimes distrust these products for no real reason (Meijer et al., 2020), with criticisms that are not always well-founded, of a toxicological, political, ethical, ecological or dietetic nature (Lepiller, 2012). On the other hand, as the processes used move away from traditional culinary techniques, changes in the physical or chemical nature of food may have occurred. The possible changes in human nutrition have legitimately led (Boeing, 2013) to the search for possible nutritional and toxicological effects of the consumption of these modern foods, in particular in order to provide public services with data allowing the introduction of nutritional classifications that would guide citizens in their choices, in particular from a dietetic point of view (Santé publique France, 2022): the classifications named NOVA, Siga, Poti, IfiC, IARC-EPIC have been discussed by Sadler et al. (2021), who highlighted in particular that guidelines based on food processing could be misinterpreted, for example to mean that the processing itself would be bad. This could encourage consumers to seek out unprocessed foods (e.g., raw milk) or to engage in domestic processing without sufficient safety controls. Citizens' rejection of industrial food products could also hinder innovation, even though it is needed to increase the sustainability of human food (Dive and Tamarelle-Verhaeghe, 2022). In particular, the studies of Sadler et al (2021) led them to conclude that the foundations of the classification systems analyzed were not well documented, so that it is not yet possible to use them in nutrition policies.

At this stage of the present note, it is proposed to distinguish between nutrition, a natural science that explores human physiology as it relates to food, and dietetics, which is the "set of rules of food hygiene based on the study of the calorific value and the nutritional value of foods, making it possible to establish the appropriate diet for each person" (Trésor de la langue française informatisé, 2022a) ; With these definitions, it is necessary to distinguish between nutritional scores, which would be objective evaluations of foods (remembering that one eats mostly food, rather than food), and dietary scores, which are more prescriptive, or other scores that would include environmental considerations (Braesco et al. , 2022a).

On what rational basis should nutritional assessments and dietary recommendations be developed? The simplest way is to base them on fat, sugar or salt content, but with limitations: some foods rated E by the Nutri-Score, for example (such as lipids), are nonetheless essential to human nutrition (Bleu-Blanc-Coeur, 2022).

Another way is to look for a characterization of a degree of transformation, and it is such a classification that is discussed in the scientific article that is the subject of this note (Braesco et al., 2022b): the classification that has been named NOVA (Monteiro et al., 2010; 2017), with capitals that are undue since it is not an acronym (in the rest of the text, therefore, the denomination "Nova" will be used, more in line with the Typographic Code and French usage), wanted to be based on the nature, extension and purpose of the processes used.

This classification proposes to group foodstuffs into four categories. The first would be (as we shall see later, the reason for this conditional) that of unprocessed or "minimally" processed foods; these are parts of plants or animals that are offered after separation and "minimal" modification. The second category would include "culinary ingredients" such as salt, oil, sugar or starch, produced from products in the first category. The third category would include "processed foods", such as freshly baked breads, canned vegetables, processed meats, obtained by combining products from the first and second categories. Finally, the fourth category would be "ultra-processed foods", ready-to-eat products, industrially formulated, which would be "made mainly or entirely of substances derived from food and additives, with little or no food from the first group".

A classification, especially if it is to be used by health authorities, must at least be consistent, and it must also be useful. What is the value of the Nova classification? This question, which had been posed by Braesco et al. (2019) and then by others (Petrus et al., 2021; Sadler et al., 2021), was then experimentally investigated by the authors of the paper that is discussed here.

To this end, Braesco et al. organized an online system, to involve food, nutrition, and dietetic experts (several hundred) in their study. After explanations similar to those given above, the raters (n = 177) were asked to rank foods in the four groups of the Nova classification, while indicating how confident they were in making the rankings.

Of course, the results of a work are only as good as the rigor of the methods that were used to obtain the proposed results, from which interpretations can then be derived. We refer to this long section of the article by Braesco et al (2022b), because the present note does not want to paraphrase unnecessarily, but to add comments, in order to better appreciate the scope of the published work. We need only observe that the authors of the study carefully selected the products submitted for classification, using a list that had already been used for nutritional studies, and that they obviously carried out tests to check the honesty and care taken by the evaluators.

The main result was that the evaluators made inconsistent rankings, regardless of their professional background, and despite their desire to do the right thing. Also of interest is the finding that a significant proportion of foods of good nutritional quality fell into the fourth category.

This is similar to the results obtained by the only previous study of the same question (Bleiweiss et al., 2019), but with many more raters. Not only that, but the authors were surprised to observe that providing detailed product information did not improve the consistency of the rankings, nor the confidence that the raters had, in making the proposed ranking.

Based on these findings, Braesco et al. observe, as do Sadler et al. (2021) and Petrus et al. (2021), that the Nova ranking needs to become more consistent and relevant before it can be used to guide public dietary policies or consumer choices. One of the rapporteurs of this note noted that there would also be reason to question the reliability of the conclusions made by epidemiological studies that use the classification discussed here. We obviously agree with this observation.


## 2. Why the article of Braesco *et al.* Is useful

The use of the word "ultra-processed," introduced with the Nova classification, would have been legitimate only if the classification had been consistent. The results of the Braesco et al. study - in agreement with those of Sadler et al. (2021) and Petrus et al. (2021) - show that it was premature to use this word (whose prefix "ultra" seems to be rhetorically connoted), for the dissemination of information or to make it the basis of various actions: mathematicians know and teach that, before characterizing the properties of an object, it is necessary to establish its existence.

This analysis is in line with that made a few years ago by the "Human Food" section of the French Academy of Agriculture, which recommended avoiding the term "natural foods" (Pascal et al., 2018; Lorient, 2019), because, before the regulations, there is the language, which has a consensus that what is "natural" is what is not processed by a human being, and what is "artificial" is what is processed by a human (Trésor de la Langue Française informatisé, 2022b). Whatever the

classification of foodstuffs, by the Nova classification or by any other classification, they are always strictly speaking artificial products: our carrots, apples, onions, etc. are the result of centuries or millennia of domestication and selection (Gallais, 2021); their "naturalness" has been lost for a long time, even since the human species existed. Moreover, as long as these foods are in the soil, they are not food, according to the regulatory definition (European Commission, 2002a), and when they are washed, cut, seasoned, then they become part of preparations of the "culinary art", perfectly artificial.

Is it possible to measure a degree of distance between a food and a state that would be natural? This would require both identifying the reference state, and then determining a degree, a number... and it is not clear that this is possible, because it would require an orderly relationship, which is arbitrary in a multidimensional space (Davey and Priestley, 1990), as is that of food, with its physical, chemical, and microbiological constitution. Staying with home-produced foods, what would be more "natural" (assuming the question makes sense): a cassoulet that has been heat-treated ("cooked") for more than ten hours at a "gentle simmer" (95°C, for example), or a steak that has been "sautéed" for a few minutes, but at a temperature that reaches more than 300°C on contact with the cooking utensil (personal measurements)? Here, we can see that the question is implicitly asked for the time-temperature couple, but if we were interested in the molecular modifications generated by these treatments, the question would be even more difficult, as these modifications are so numerous, sometimes generating nutritionally useful compounds and, sometimes, compounds with a high toxicity.

This example shows how difficult it is to make comparisons, as the characterization of physico-chemical systems such as foods imposes many dimensions, not to mention the fact that classifications of complex objects may not be transitive (Gardner, 1970; 1974; Savage, 1994).

This has not been mentioned so far, but many of the discussions about so-called ultra-processed foods have revolved around the issue of additives, as if these products were all to be rejected (Efsa, 2022). We will not repeat here that gelatin is classified as an additive (E441), or that highly diluted hydrochloric acid has a higher pH than vinegar or even wine; should we waste time justifying the use of products that have been widely evaluated toxicologically, on the grounds that their use is disputed by certain groups (Lepiller, 2012)?


## 3. What is food?

Finally, while foods have become considerably more diverse, there is the question of their definition. What is a food? What foodstuffs qualify with the retained definition, and are likely to be the subject of the "food trade" (Braesco et al., 2019)?

The definition may come from the dictionary, with meanings that may have varied according to time or region, or according to regulations, national or European, for example (European Commission, 2022b). The diversity of cultures suggests difficulties in reaching consensus. Finally, we understand that there is the absorption of material substances, for the maintenance and development of the organism, with a difference for the different living organisms (the food of the lion can differ from that of bacteria, and from that of the human being). In short, the game of definitions is notoriously difficult, especially when the different communities (nutrition science, dietetics, processing techniques, etc.) examine the object from different angles.

Littré (2022) indicates that, in the language of physiology, "food" is a generic term used to designate all materials, whatever their nature, that usually serve or can serve for nutrition. But is it nutrition or food? From the point of view of the needs they satisfy, foods would be divided into beverages, condiments or seasonings, and foods proper, composed mainly of principles of vegetable or animal origin. But Littré's dictionary is a smaller work than the Trésor de la langue française informatisé (2022c), which defines food as "any substance that can provide living beings with the elements necessary for their growth or preservation": this is already clearer.

In addition to lexical definitions, there are regulations, such as the European Community regulation EC n°178/2002 (European Commission, 2002b), which stipulates that a "foodstuff" is any substance

or product, whether processed, partially processed or unprocessed, intended to be ingested or reasonably expected to be ingested by humans. This term includes beverages, chewing gum and any substance, including water, intentionally incorporated into foodstuffs during their manufacture, preparation or processing.

It will be observed that this definition forgets that a plant taken from the soil is already "transformed", since this action triggers cascades of enzymatic reactions and tissue modifications (Lara et al., 2019). Furthermore, it perfectly accepts as "food" a product that would be the result of a "synthetic cuisine", with the exclusive use of compounds chosen for their food interest, i.e. nutritional, gustatory, etc.

For this synthetic cuisine, which has been nicknamed "note-to-note cuisine", new regulatory questions are raised, because the difference in status between additives, processing aids (these are actually technical aids) and flavoring agents is lost (This, 2016). Wouldn't there be more safety with synthetic foods, free of myristicin (or 5-allyl-1-methoxy-2,3-methylenedioxybenzene) from nutmeg (Zhu et al., 2019), estragole (1-allyl-4-methoxybenzene) from basil or tarragon (Yadav et al., 2021), benzopyrenes from barbecues (Lawal, 2017), or the most troublesome glycation products, such as carboxymethyllysine (Tessier, 2021)? Conversely, would this not be an opportunity to benefit from advances in nutrition, in order to compose foods with controlled bioactivity, containing the ideal fibers, for example?

## Conclusion

After the work of Petrus et al. (2021), Sadler et al. (2021), Braesco et al. (2022b), it therefore seems no longer possible to use the Nova classification or the terminology "ultra-processed", before significant modifications to the classification, which may be thought to have been used too quickly. Public policy must wait for another system that will not have the shortcomings of Nova and other classifications that have shown their inadequacies.

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