

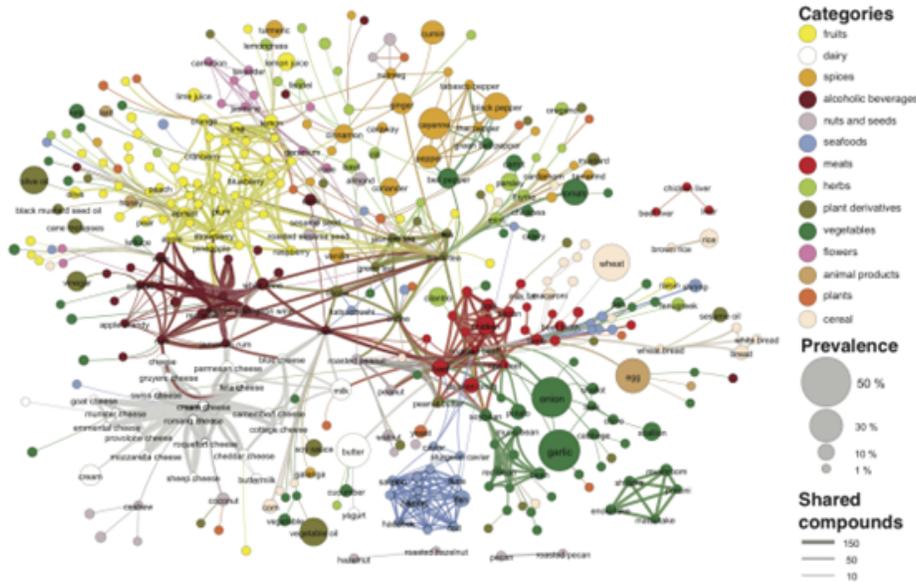


Flavour Networks Shatter Food Pairing Hypothesis

Recipe networks give the lie to the idea that ingredients that share flavours taste better together

KFC 11/29/2011

6 COMMENTS



Some years ago, while experimenting with salty foods and chocolate, the English chef Heston Blumenthal discovered that white chocolate and caviar taste rather good together. To find out why, he had the foods analysed and discovered that they had many flavour compounds in common.

He went on to hypothesise that foods sharing flavour ingredients ought to combine well, an idea that has become known as the food pairing hypothesis. There are many examples where the principle holds such as cheese and bacon; asparagus and butter; and in some modern restaurants chocolate and blue cheese, which apparently share 73 flavours.

But whether the rule is generally true has been hotly debated.

Today, we have an answer thanks to the work of Yong-Yeol Ahn at Harvard University and a few friends. These guys have analysed the network of links between the ingredients and flavours in some 56,000 recipes from three online recipe sites: epicurious.com, allrecipes.com and the Korean site menupan.com.

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They grouped the recipes into geographical groups and then studied how the foods and their flavours are linked.

Their main conclusion is that North American and Western European cuisines tend towards recipes with ingredients that share flavours, while Southern European and East Asian recipes tend to avoid ingredients that share flavours.

In other words, the food pairing hypothesis holds in Western Europe and North America. But in Southern Europe and East Asia a converse principle of antipairing seems to be at work.

Ahn and co also found that the food pairing results are dominated by just a few ingredients in each region. In North America these are foods such as milk, butter, cocoa, vanilla, cream, and egg. In East Asia they are foods like beef, ginger, pork, cayenne, chicken, and onion. Take these out of the equation and the significance of the group's main results disappears.

That backs another idea common in food science: the flavour principle. This is the notion that the difference between regional cuisines can be reduced to just a few ingredients. For example, paprika, onion and lard is a pretty good signature of Hungarian cuisine.

Ahn and co's study suggest that dairy products, wheat and eggs define North American cuisine while East Asian food is dominated by plant derivatives such as soy sauce, sesame oil, rice and ginger.

Ahn and co conclude by discussing what their network approach can say about way recipes have evolved. They imagine a kind of fitness landscape in which ingredients survive according to their nutritional value, availability, flavour and so on. For example, good antibacterial properties may make some spices 'fitter' than others and so more successful in this landscape.

Others have also looked at food in this way but Ahn and co bring a bigger data set and the sharper insight it provides. They say their data contradicts some earlier results and that this suggests that better data is needed all round to get a clearer picture of the landscape in recipe evolution.

Given the number of ingredients we seem to eat, the total number of possible recipes is some 10^{15} but the number humans actually prepare and eat is a mere 10^6 . So an important question is whether there are any quantifiable principles behind our choice of ingredient combinations.

Another intriguing possibility is that this kind of evolutionary approach will reveal more not just about food, but also about the behaviour of the individuals that created it.

Food pairing seems to be one principle operating in some parts of the world. How far antipairing can take us has yet be seen, although customers to the Blumenthal's restaurant, The Fat Duck, may be among the first to find out.

It's still early days in the science of food networks. There are surely exciting discoveries ahead.

Ref: arxiv.org/abs/1111.6074: Flavor Network And The Principles Of Food Pairing

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19 DAYS AGO | 11/29/2011

not the correct data and conclusions



foodpairing

We (www.foodpairing.com) are doing for 7 years of research on this topic and we are sure the Foodpairing principle also applies in Asia. Japan is one of the success stories. You cannot look to the complete flavor data. That doesn't make any sense.

1 Comment

From the analysis it is clear by us that the analysis is done not by people who are into food. You need flavor insight and insight how the recipes are structured.

[REPLY](#)

Torbjorn_Lar...

164 Comments

19 DAYS AGO | 11/29/2011

What is your data?

Two things come immediately to mind:

1. You can't validate a theory by invalidating another. Indeed the suggestion is a false choice fallacy, a third theory may be the correct one.

It remains for a food pairing theory to test its own predictions. (And it seems from the data here that it would be a problem.)

2. The argument of too much data et cetera is a replay of criticism of molecular biology genome phylogeny when it started competing with fossil phylogeny.

It turned out that the whole genome is better than a few genes or fossil traits to resolve phylogenies. (Well, duh!)

The problem comes when you try to fish large data sets for hypotheses. Compare with medicine when looking for disease or other medically relevant genes within the whole genome. You will find correlations that are not causal, and you have to tease the causality out by careful parameter variation.

So while I find it likely that flavor networks can invalidate earlier hypotheses, I would be suspicious of its new hypotheses until they are soundly validated.

[REPLY](#)

ZephirX

239 Comments

19 DAYS AGO | 11/29/2011

/*..the food pairing hypothesis holds in Western Europe and North America. But in Southern Europe and East Asia a converse principle of antipairing seems to be at work...*/

It would be interesting to determine, why is it so. It could be related to condensed phase physics (formation of Cooper pairs for example).

[REPLY](#)

Torbjorn_Lar...

164 Comments

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Re: Physics models

Why would such simplistic models be applicable?

The use of flavor would be culturally influenced, perhaps with some genetic basis.

And the "anti-pairing" suggested is rather a non-pairing. It isn't a spin alignment analog, but a covalent bonding analog. (An atom binds covalently with some other atoms, may ion bond with some but more importantly not at all with yet others.)

[REPLY](#)

megmuck

1 Comment

19 DAYS AGO | 11/29/2011

Presence does not equal flavor

The majority of eggs in North American cuisine aren't used for flavor; they're used for their chemical properties as a binding agent.

Do you think that eggs are a predominant flavor in chocolate cake? Gingerbread? Key

lime pie? Fried chicken (used to make the batter/coating)?

[REPLY](#)

osame

5 Comments

18 DAYS AGO | 11/30/2011

Culinary evolution

Perhaps people would like to see this:

New Journal of Physics Volume 10 July 2008

Osame Kinouchi et al 2008 New J. Phys. 10 073020

doi:10.1088/1367-2630/10/7/073020

The non-equilibrium nature of culinary evolution

Osame Kinouchi, Rosa W Diez-Garcia, Adriano J Holanda, Pedro Zambianchi and Antonio C Roque

Food is an essential part of civilization, with a scope that ranges from the biological to the economic and cultural levels. Here, we study the statistics of ingredients and recipes taken from Brazilian, British, French and Medieval cookery books. We find universal distributions with scale invariant behaviour. We propose a copy-mutate process to model culinary evolution that fits our empirical data very well. We find a cultural 'founder effect' produced by the non-equilibrium dynamics of the model. Both the invariant and idiosyncratic aspects of culture are accounted for by our model, which may have applications in other kinds of evolutionary processes.

[REPLY](#)

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