



LESA PERRODIN

GO ON, HELP YOURSELF

- 1 When at the buffet with a companion, learn their likes and dislikes in advance
- 2 DON'T make the mistake of just grabbing your favourite item first
- 3 Choose items you and your companion both like – denying them the chance to select them
- 4 Move on to your favourite item. **RESULT:** one happy diner, one sulen companion

The secret of the 3ft-tall salad bowl

Fill your boots

- 1 Fill the bowl and lay carrot strips across the top
Carrots Potatoes
- 2 Use slices of cucumber to build 'walls'
Cucumber
- 3 Fill the tower with your choice of food

James Gillespie

IT is a subtle form of warfare fought out with sharp elbows at thousands of restaurants, wedding receptions and drinks parties: the battle of the buffet.

How do you defy gravity to pile up your plate at a salad bar? And how do you ensure that you beat others to exactly the food that you want? Scientists have come up with the answers.

Shen Hongrui, a Chinese engineer, has found a way to circumvent the "one bowl, one visit" rule imposed at his local Pizza Hut in Beijing.

Through careful calculation, he has designed a "salad tower" strong enough that it can be built to a height of 3ft using just the ingredients available and into which the diner can load all the food he or she can eat.

The secret, according to an article in *New Scientist* magazine on Shen's efforts, lies in building a solid base. First, fill the bowl up to the rim with ingredients such as potato or chick peas.

"The foundations are very important, so choose dry and strong material," Shen advised.

Then arrange a layer of radiating carrot sticks on top of the food and balanced on the

bowl rim. Start building vertical walls with cucumber slices or fruit blocks on this base and you will soon have the beginnings of your tower. As you progress upwards, fill the inside of the cylinder with the food you actually want to eat. When you have reached the optimum height (a simple equation, with the answer dictated by your appetite) you can close off the top of the tower with filling, douse it with sauce and you are ready to go. Then you just have to get your tower back to the table...

But it is not only a question of loading up; you have to make sure you get the items you

want. This is where the American mathematicians Lionel Levine and Katherine Stange come in.

Treating the buffet more like a poker table, they have used a variation of game theory to develop a devious strategy that allows you to outplay your dining companions. They warn that the biggest mistake you can make is just grabbing greedily for your favourite food.

Sharing a meal one day at an Ethiopian restaurant, Levine, of Cornell University, who is renowned for his work on abelian networks, and Stange, an expert on algebraic and integer sequences at Stanford University, began to wonder about the human dynamics of the buffet. "We're always looking for interesting mathematical issues in everyday life," Levine said, and so their research began.

Using game theory, they discovered something that will surprise the unsophisticated buffet-grazer: it does not always pay to take your favourite item first. To devise the best strategy you need to take into account your companion's preferences as you approach the table.

This is particularly

important if some items are running low. For example: a couple are dining out. She loves chicken, likes quiche but hates sausages. He loves sausages, likes quiche and hates chicken.

In this situation, the worst thing for either of them to do is simply pile up their plate with their favourite: it is not under any threat because their companion is not going to eat it. The prime target should be the quiche, because that appeals to both of them equally. Whoever seizes the last slice of quiche can then move on to their favourite item at leisure.

"You probably wouldn't use this strategy on a date," Levine conceded. "It all depends on knowing exactly what your opponent – sorry, companion – likes and doesn't like."

As Stange added, it also depends on you caring whether your companion is happy or not. "You're only worried about your own happiness," she said. "If you cared about the other person, it would be a very different situation."

However, they have struck a rich seam for scientific research. Their work, to be published in the next edition of *American Mathematical Monthly*, is based on discoveries in the 1970s by the

game theory scientists David Kohler and R Chandrasekaran. For the next stage of their research, Levine and Stange were joined by Scott Sheffield, from the Massachusetts Institute of Technology, to examine how the game plays out at a dinner party with more than two diners.

It is not just grabbing the best food that makes it a tough world at the buffet table. Even getting there can be a challenge. Brian Wansink, a food scientist at Cornell, found that fat people sit 15ft closer to the buffet than those of average weight. Among the heavier

diners, 71% face the buffet so they can keep a keen eye on the food while only 2% of average-sized diners do so.

So after you have fought your way to the buffet table, beaten your companion to the tastiest items and built your salad tower, what have you learnt? "It's never too early to start thinking about dessert," said Levine.

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ARE IMPORTANT
— CHOOSE
POTATOES OR
CHICK PEAS

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