CONCEPTUAL ORGANIZATION IN THE SUPERMARKET

Adam Hornsby (@adamnhornsby), Thomas Evans, Peter Riefer, Rosie Prior & Brad Love

https://arxiv.org/abs/1810.08577

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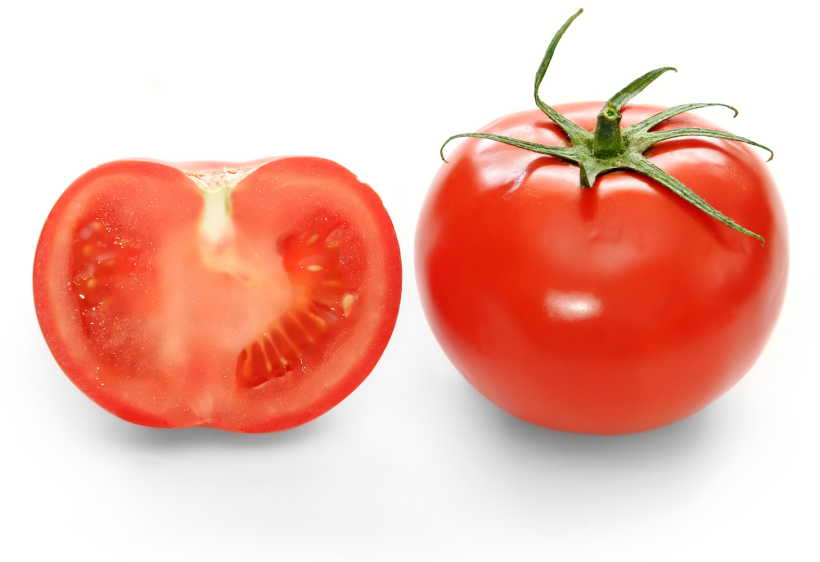
INTRODUCTION

WHAT IS A TOMATO?



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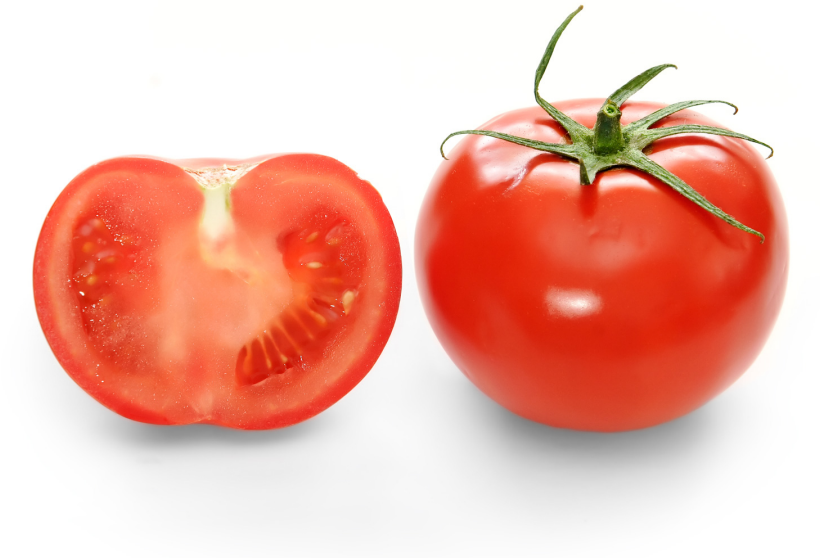

It's a **fruit**, it's **red**, it's **fleshy** and **juicy**...

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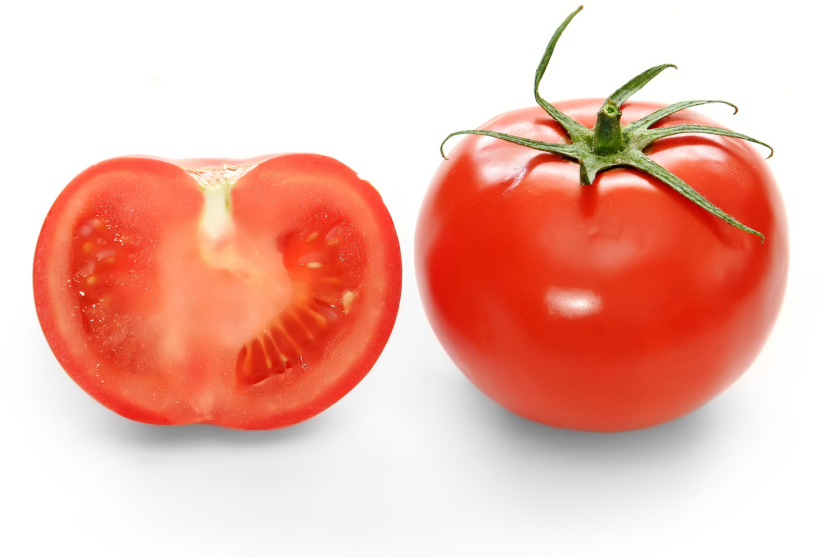

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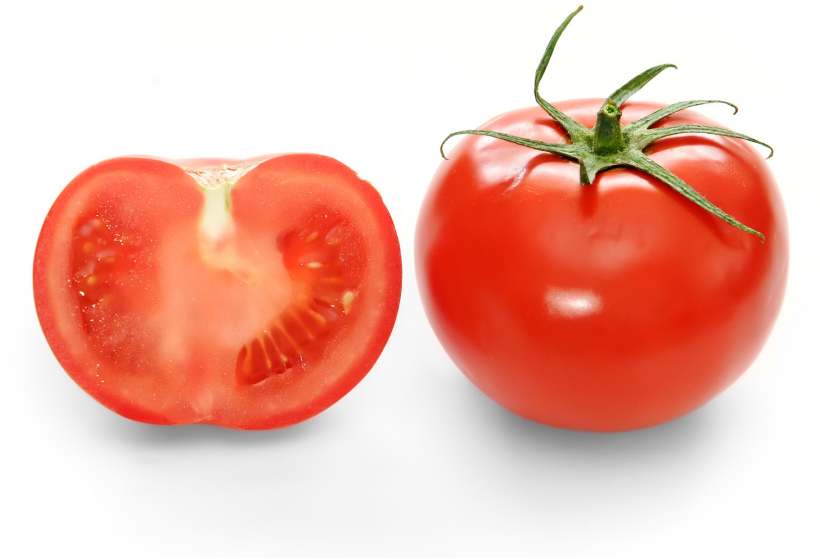

It's a **fruit**, it's **red**, it's **fleshy** and **juicy**...
...but is this **how customers think?**

The answer helps us to **optimize in-store and online search** for customers

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TOMATOES ELUDE US BECAUSE...

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Objects gain meaning through their **interactions** with other objects (Wittgenstein, 1967, Jones & Love, 2007)

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People **categorise** things in terms of **goals** (tomato → salad), as well as taxonomy (tomato → fruit)

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Objects gain meaning through their **interactions** with other objects (Wittgenstein, 1967, Jones & Love, 2007)
People **categorise** things in terms of **goals** (tomato → salad), as well as taxonomy (tomato → fruit)

Can we **categorise products** in a way that is more aligned with how customers think?

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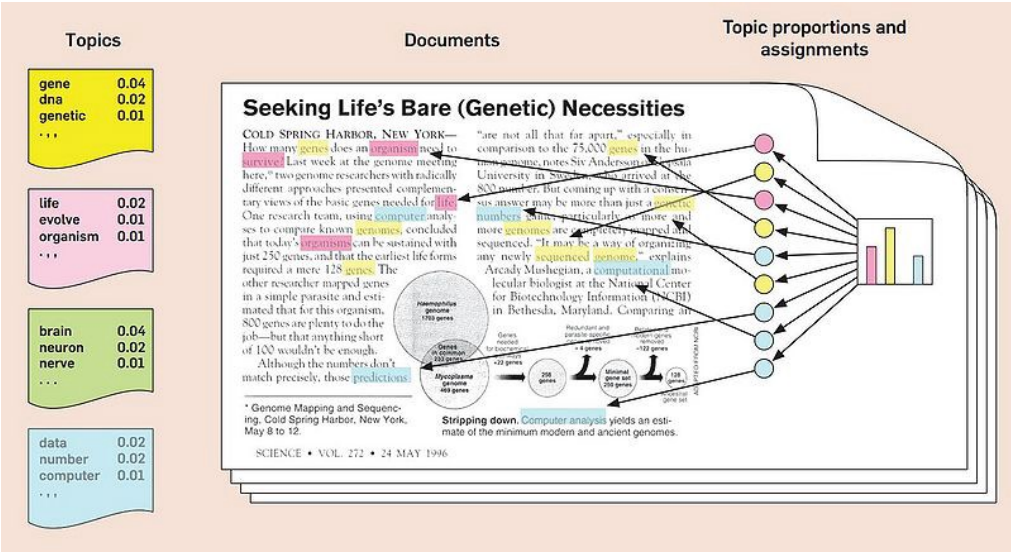
NLP RESEARCHERS KNOW ABOUT INTERACTIONS



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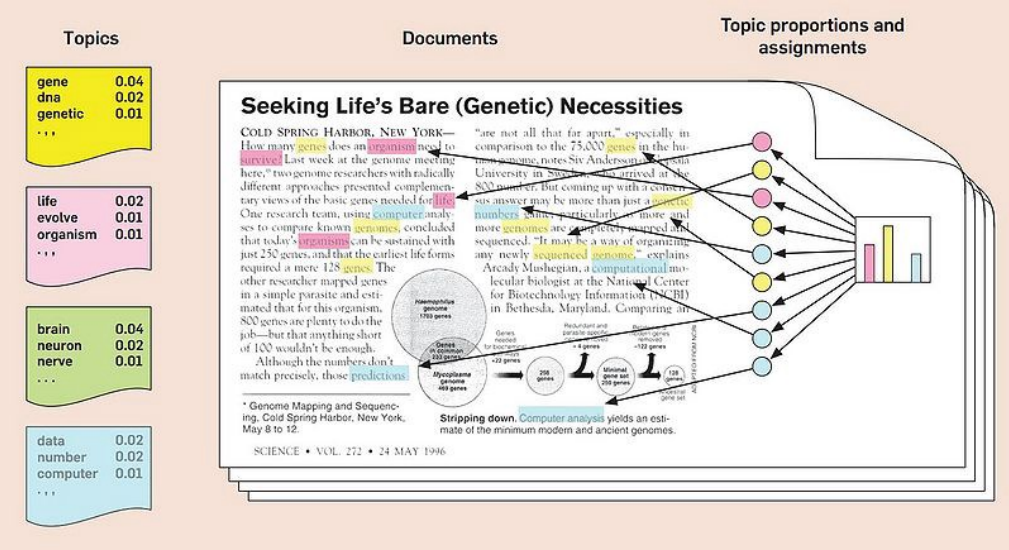

*"You shall know a word **by the company it keeps**"* (Firth, 1957)
(i.e. Distributional Hypothesis)

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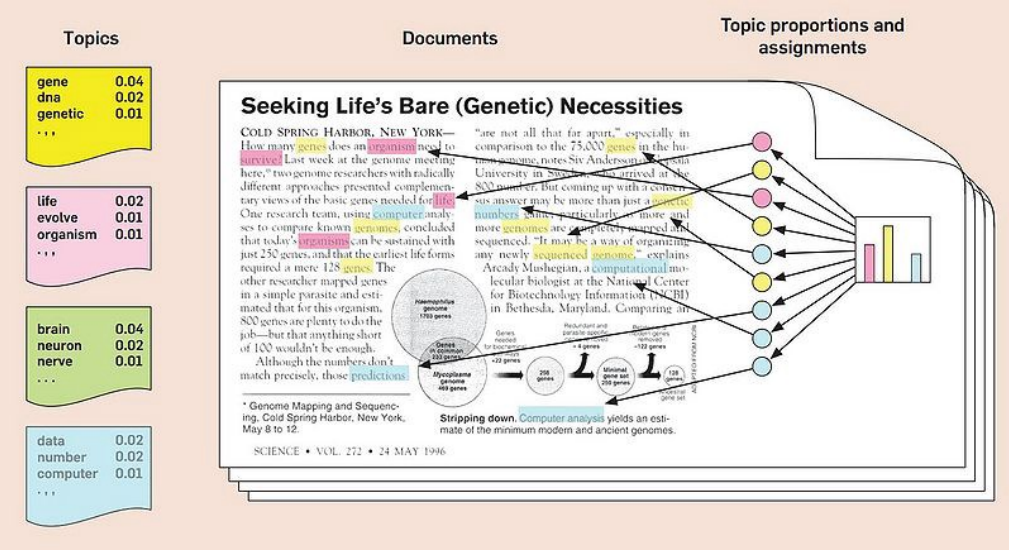

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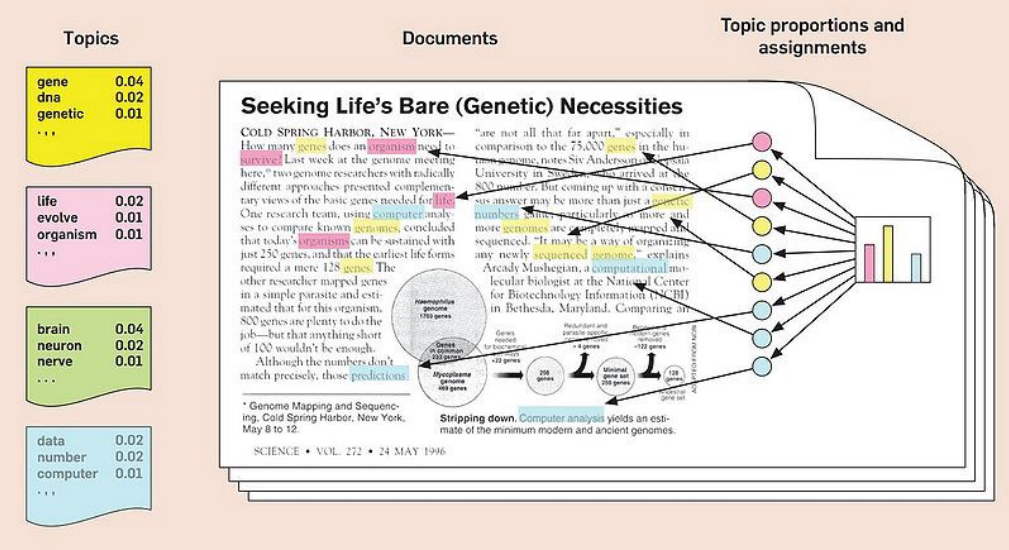

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So maybe a topic model can learn the mental categories **used by customers**?

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IMAGINE A BASKET INSTEAD OF A SENTENCE

Item	Count
Dog	1
Cat	0
Man	1
Bites	1
...	...

Item	Count
Chili	2
Lime	1
Milk	0
Banana	1
...	...

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Will a **topic model** recover meaningful **categories** from basket data directly?

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RESULTS

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OUR TOPIC MODEL DISCOVERED SEMANTIC GROUPS

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We tuned an LDA model (through Spark 1.6) on **1.2m real supermarket transactions**

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So **did they make sense to consumers**?

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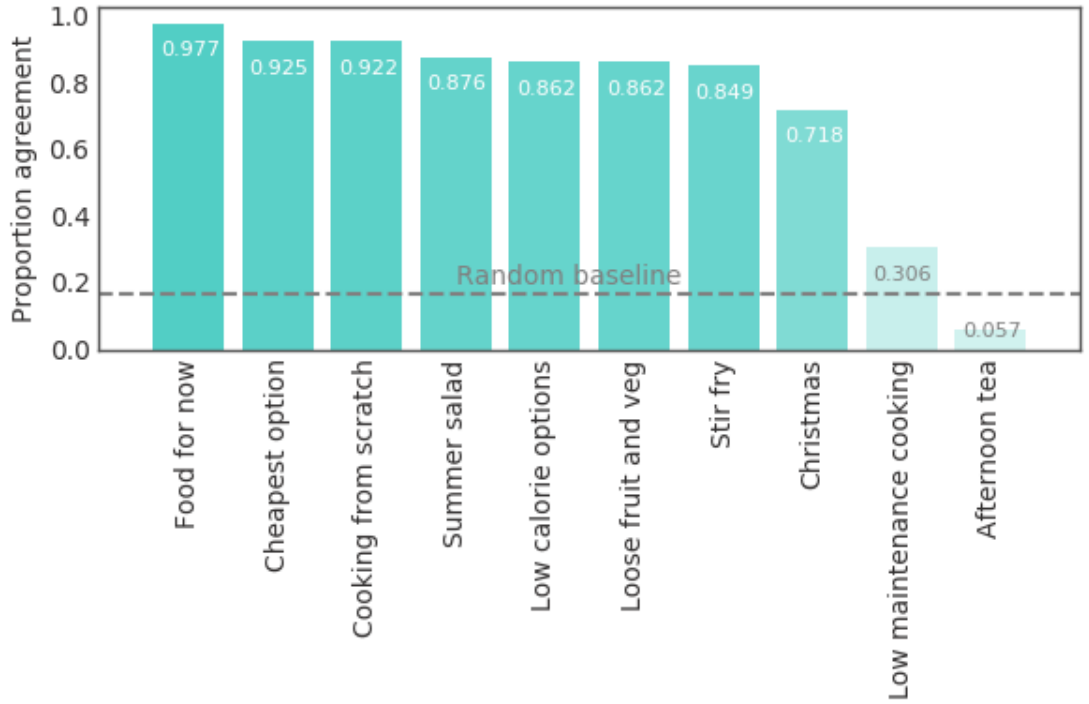
CONSUMERS AGREED WITH LDA'S TOPICS



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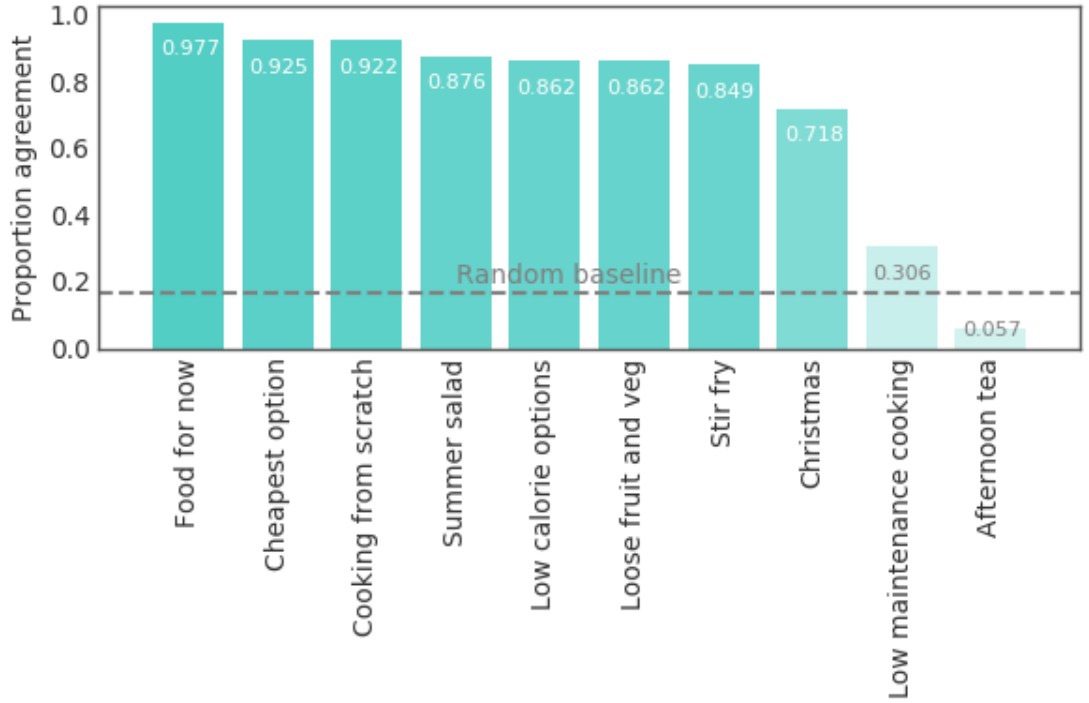

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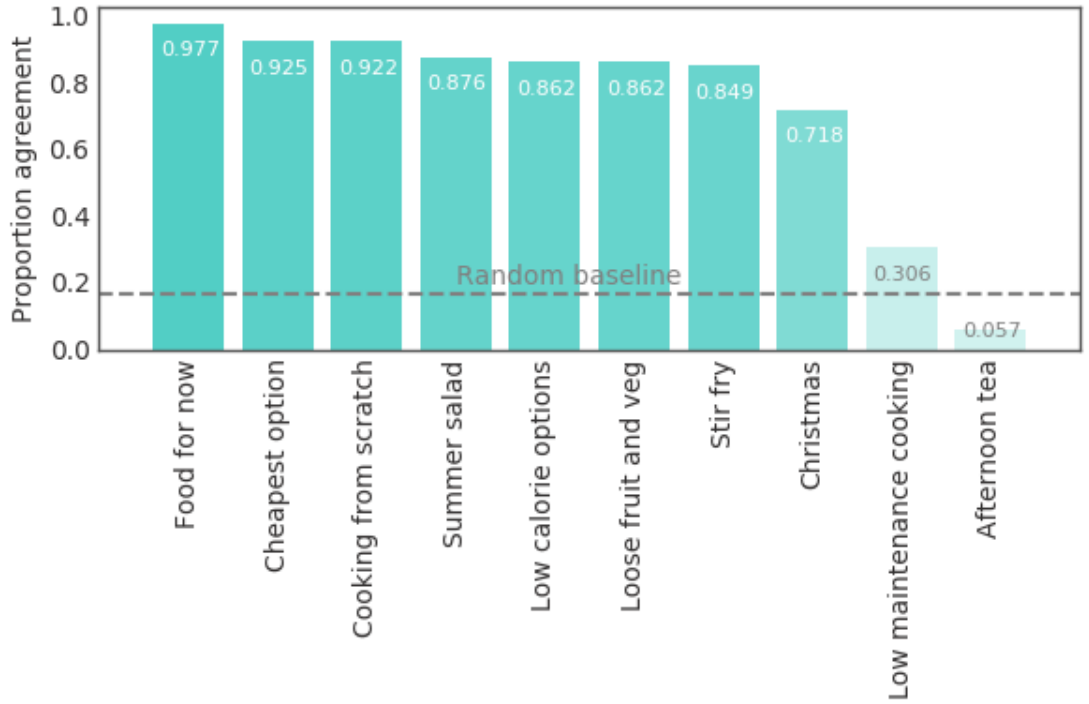

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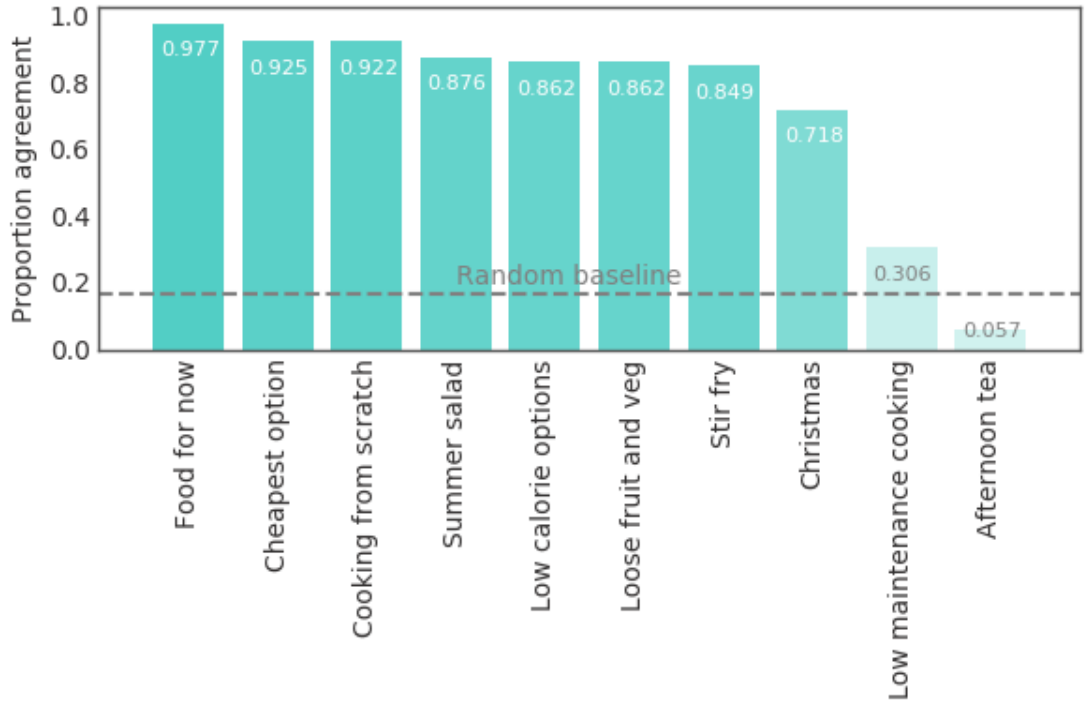

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Some were difficult (e.g. *Afternoon tea*), perhaps due to **individual differences**

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TOPICS ALSO PREDICTED INDIVIDUAL DIFFERENCES

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This can help us to **personalise search** algorithms

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CONCLUSIONS

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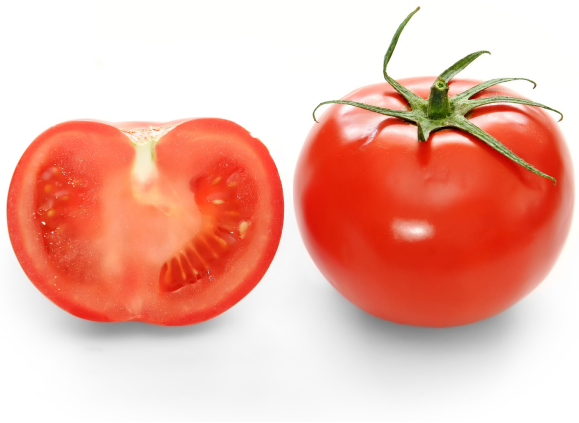

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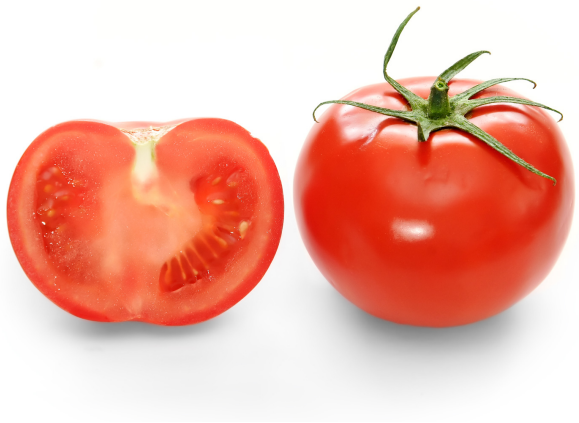

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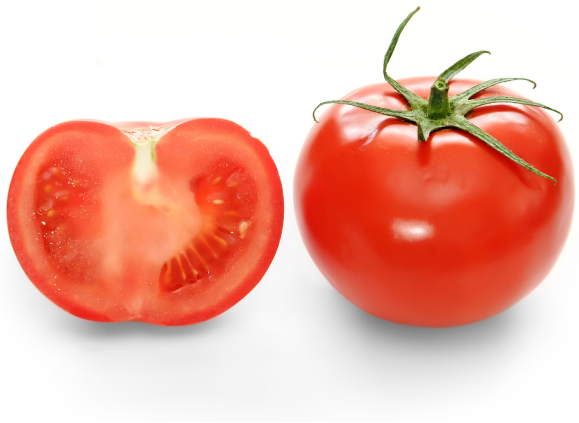

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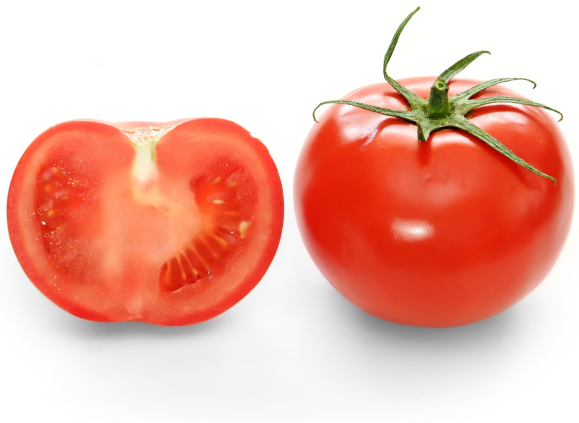

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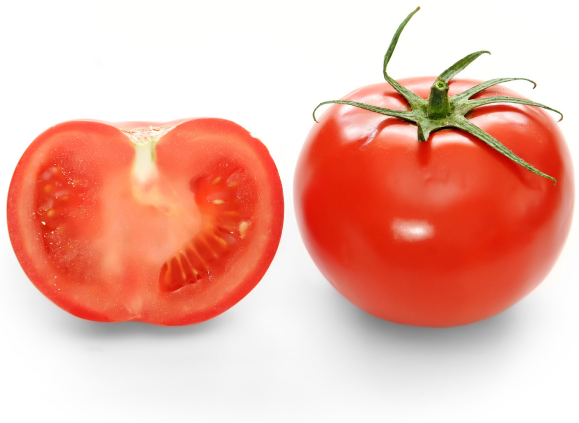

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An **alternative source of data** for evaluating NLP models
(data & code available soon)

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THANK YOU

arxiv.org/abs/1810.08577

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