

**BEFORE: System development and improvement within incomplete feedback context: comparative analysis of forests and food systems**

AFTER: System development and improvement within incomplete feedback context: focus on food systems

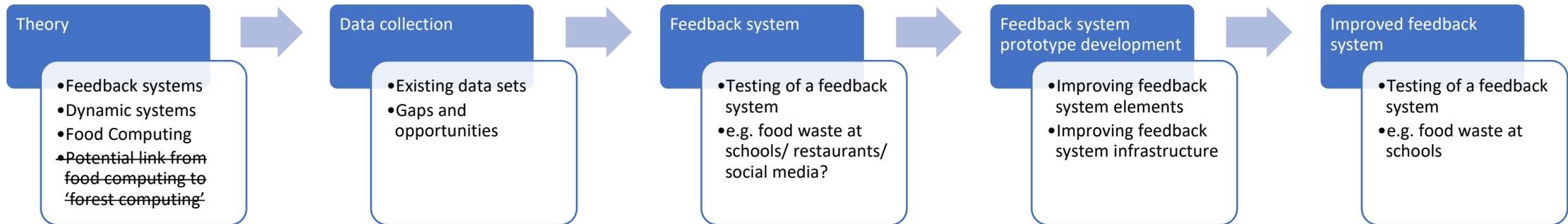
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- Supervisor of Dissertation: Prof. Jurgis Šķilters
- Rīga, 11.12.2019

# Research Focus

The aim of the work is to contribute to the development of the theory of systems in the context of an **incomplete feedback**. Analyzing the ~~forest~~ ~~and~~ food information systems, we can conclude that these systems ~~both~~ operate in incomplete feedback context, ~~thus, comparative analysis of systems can make an important contribution to the development of the~~ ~~theory~~. The study, based on the methodology of **ubiquitous computing and human-computer interaction**, is intended to test hypotheses: (1) the feedback system, which significantly improves the system, plays an important role in **system development**; (2) expanding the feedback from the visual message and including other senses can significantly improve **the quality of the feedback**.

# Structure of the work



# Complexity of Food Consumption: Deconstructing Recipes

**14th International Symposium of Cognition, Logic and Communication**

"Linking Senses: Cross-Modality in Perceptual Domains across Cultures"

Authors:

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Riga, 7 December, 2019

# Complexity of Food Consumption: Deconstructing Recipes

- WHY?
  - Food sector inefficiencies
    - 40% of food goes to food waste
    - Growing number of obesity, cardiovascular diseases & other life-style/food/nutrition related illnesses
    - Changing life-style, consumption patterns
  - **RQ: How can we utilize the data we have to shift towards more healthy diets and thus higher life quality?**

# Complexity of Food Consumption: Deconstructing Recipes

- Challenge: interdisciplinarity of cognitive & computer science
  - Cognitive science
    - Mechanics of favouring: calorie rich, red
    - Quest for hedonism: limited control of decisions
    - **Notion of complexity**: the more complex – the more likeable
  - Big data
    - Textual information
      - Recipes
      - Growing number of food blogging entries
      - Menus
    - Food images

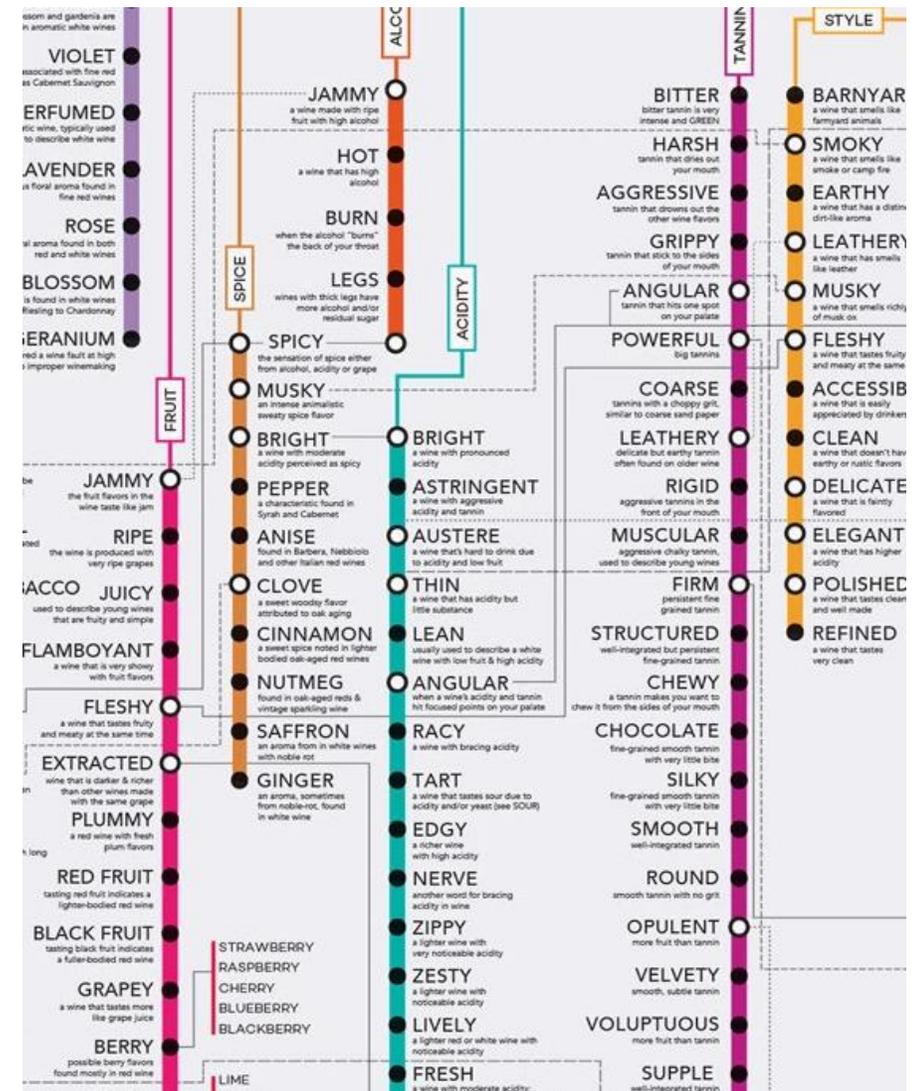
# Complexity of Food Consumption: Deconstructing Recipes

- Complexity
  - *“The single greatest standard used in assessing the quality of a wine is complexity. The more times you can return to a glass of wine and find something different in it – in the bouquet, in the taste – the more complex the wine. The very greatest wines are not so much overpowering as they are seemingly limitless.”* (Spence , 2018, pp. 1)
  - Complexity can be operationalized in ingredients, in preparation, or in the flavor experience (Spence, 2018, pp. 8)
  - “Chemical complexity, in this case, being roughly equal to the number of distinct volatile and, importantly, smellable (i.e., detectable, or volatile aromatic; note that not all volatile molecules are detectable by the human nose), compounds that are to be found within the particular foodstuff or beverage, under discussion” (Spence and Wang, 2018, pp. 451).
  - “...we believe that another account is needed to explain what, exactly, is going on, and how, and why, one unitary flavor experience may be judged as more complex than another (cf. Snitz et al. 2016). Perhaps it is more appropriate to talk of inferred complexity rather than necessarily perceived complexity, given the differing perceptual attribute (not to mention inferential processing) that would seem to underlie such judgements” (Spence and Wang, 2018, pp. 458).

# Complexity of Food Consumption: Deconstructing Recipes

**Complexity** = a notion that has not been defined clearly

- Could be looked upon through:
  - 1) the prism of time (e.g. complexity to obtain the food, its cooking complexity)
  - 2) the number of ingredients that the food entails/  
chemical complexity
  - 3) more abstract notion of complexity – such as  
aftertaste [e.g. of wine], and other  
multi-modal experiences
  - 4) perceived complexity
  - 5) inferred complexity
- Recipe data sets allow us to analyze only the second theme –  
the number of ingredients as signifiers of complexity: a  
**simplistic approach** to the notion of complexity as such



## *Side-step to literature*

# Topic Modeling Genre: An Exploration of French Classical and Enlightenment Drama

The concept of literary genre is considered highly **complex** for several reasons

The present contribution is one brick in that building, laying the focus on thematic aspects of genre and using Topic Modeling. This technique has proven to be useful **to discover thematic patterns and trends in large collections of texts**. Here it is applied, as has rarely been done so far, to collections of dramatic texts

Topic Modeling is an **unsupervised method** used to discover latent semantic structure in large collections of texts (for an introduction, see [[Blei 2012](#)]). In practice, individual words with the highest scores in a given topic are assumed to be semantically related words

On a slightly more technical level, **a topic is a probability distribution over word frequencies**; in turn, each text is characterized by a probability distribution over topics. Topic modeling is an entirely unsupervised method which discovers the latent semantic structure of a text collection without using lexical or semantic resources such as electronic dictionaries. This means that Topic Modeling is not only language-independent, but also independent of external resources with potential built-in biases. Rather, Topic Modeling is based on assumptions about language first developed in distributional semantics, whose basic tenet is that the meaning of a word depends on the words in whose context it appears

**The highest-ranked words in a topic are those words which frequently occur together in a collection of documents.** A second, related assumption of Topic Modeling is a specific view of how the writing process is envisioned. In this view, text is generated from several groups of semantically related terms which are chosen, in different proportions for each text, when the text is written

As John R. Firth famously put it in 1957, **“a word is characterized by the company it keeps”**

Christof Schöch (2019), University of Würzburg, Germany

[Source: http://www.digitalhumanities.org/dhq/vol/11/2/000291/000291.html](http://www.digitalhumanities.org/dhq/vol/11/2/000291/000291.html)

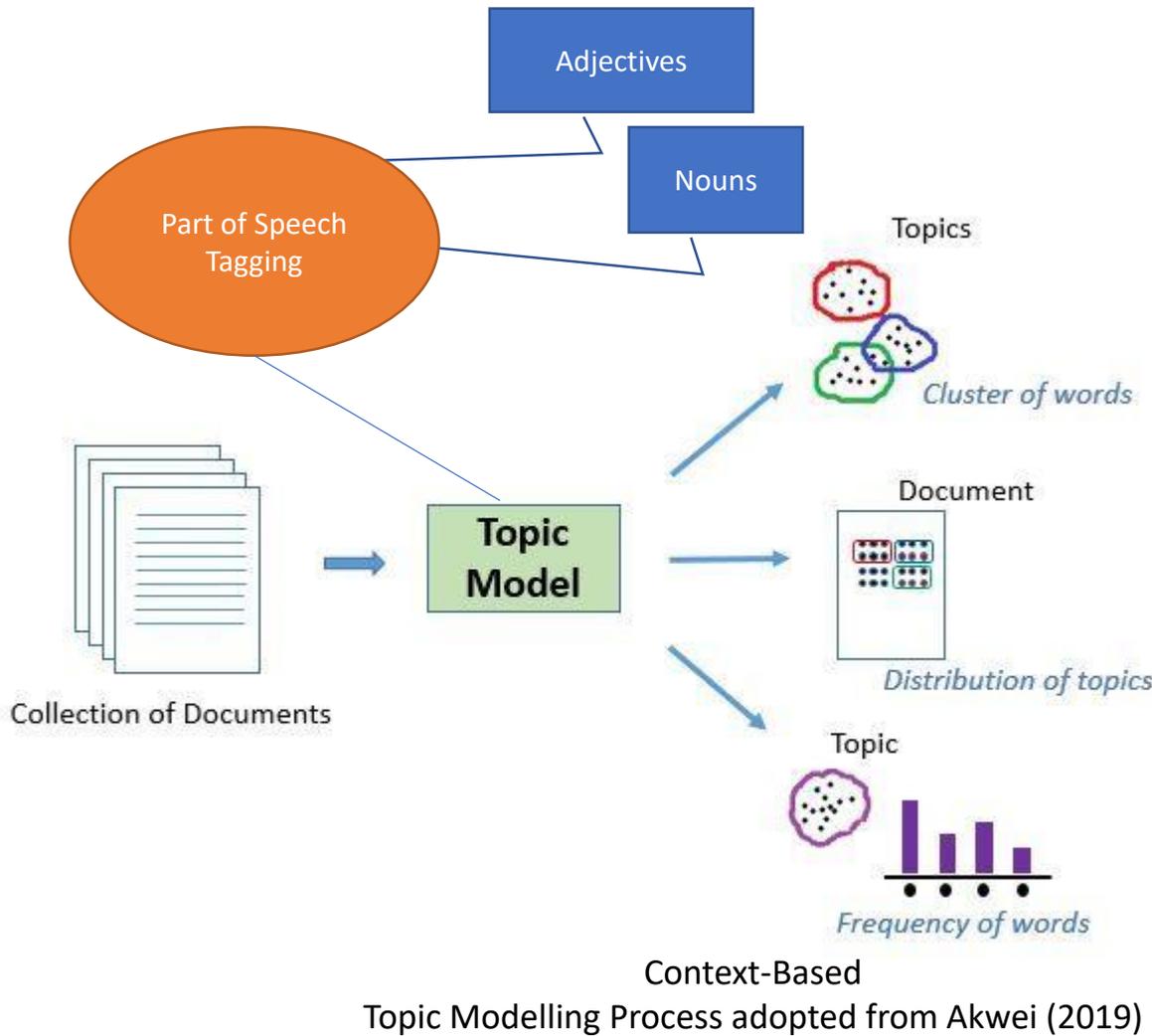
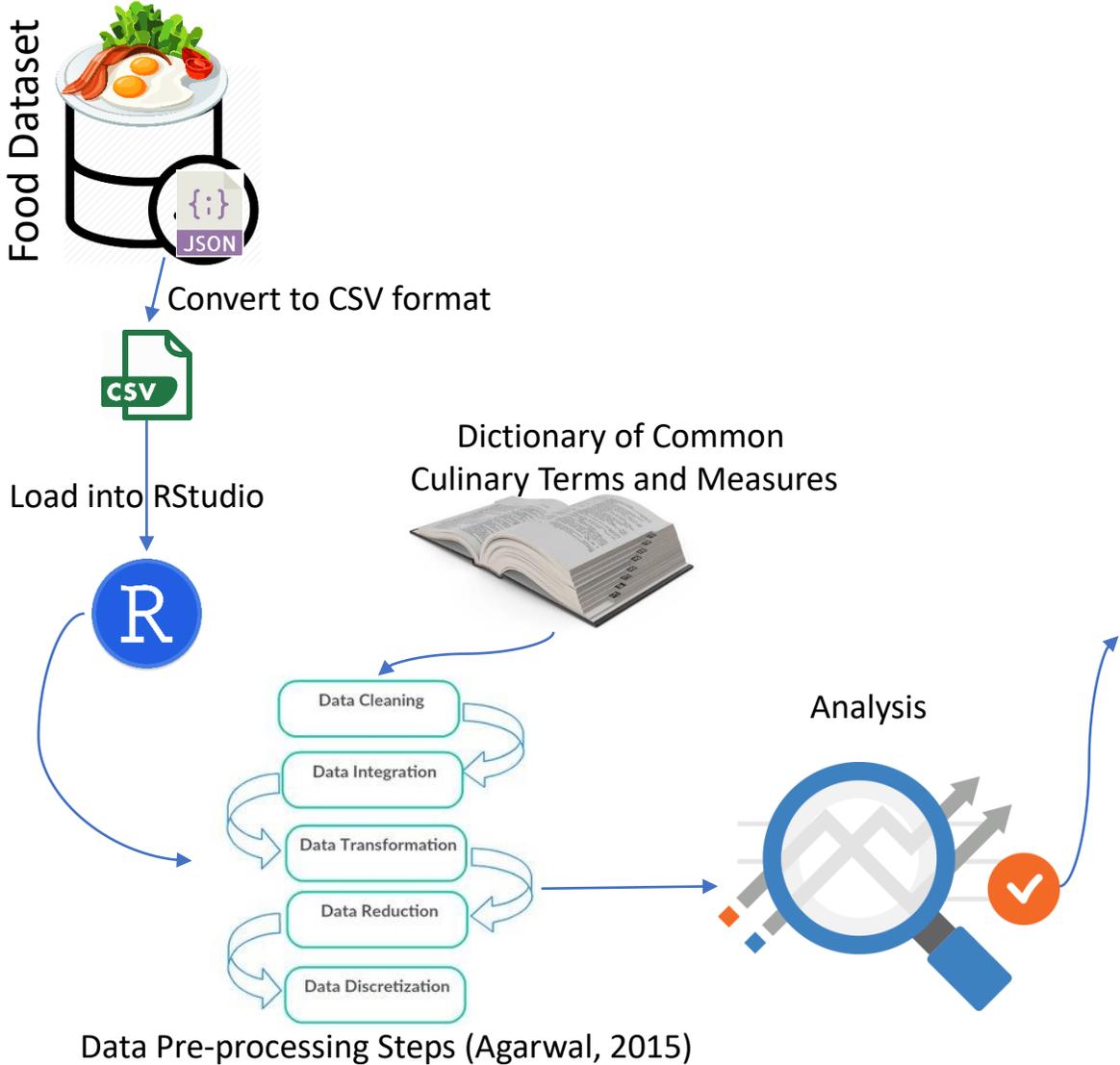
# Complexity of Food Consumption: Deconstructing Recipes

- Simplification of Complexity
  - Complexity: number & composition of adjectives and nouns in the recipes
  - Comparative analysis of Mexican and American cuisines
  - Topic modelling and visualization
  - Conclusions

# Complexity of Food Consumption: Deconstructing Recipes

- **Methodology:** Topic Modelling
- **Dataset:** <http://vipl.ict.ac.cn/homepage/jsq/Resource-E.html> un  
<https://alioben.github.io/yummly/>
- **Code:** <https://github.com/agbozo1/foodComputing>

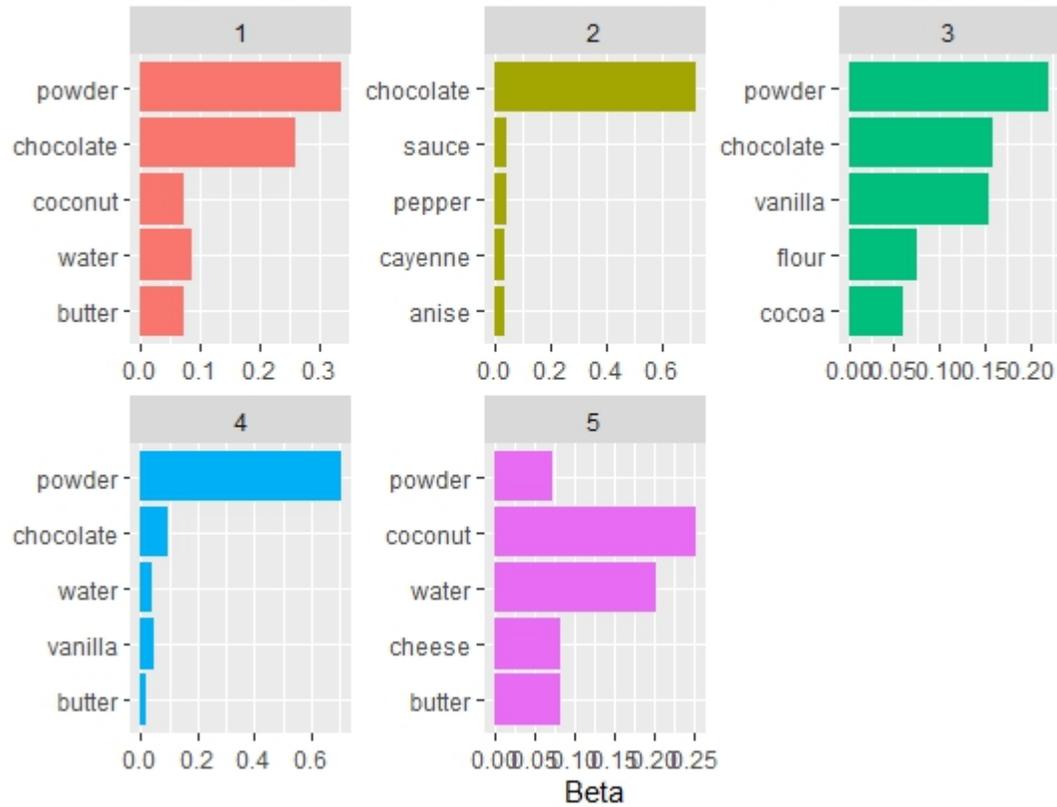
# Topic Modelling Methodology



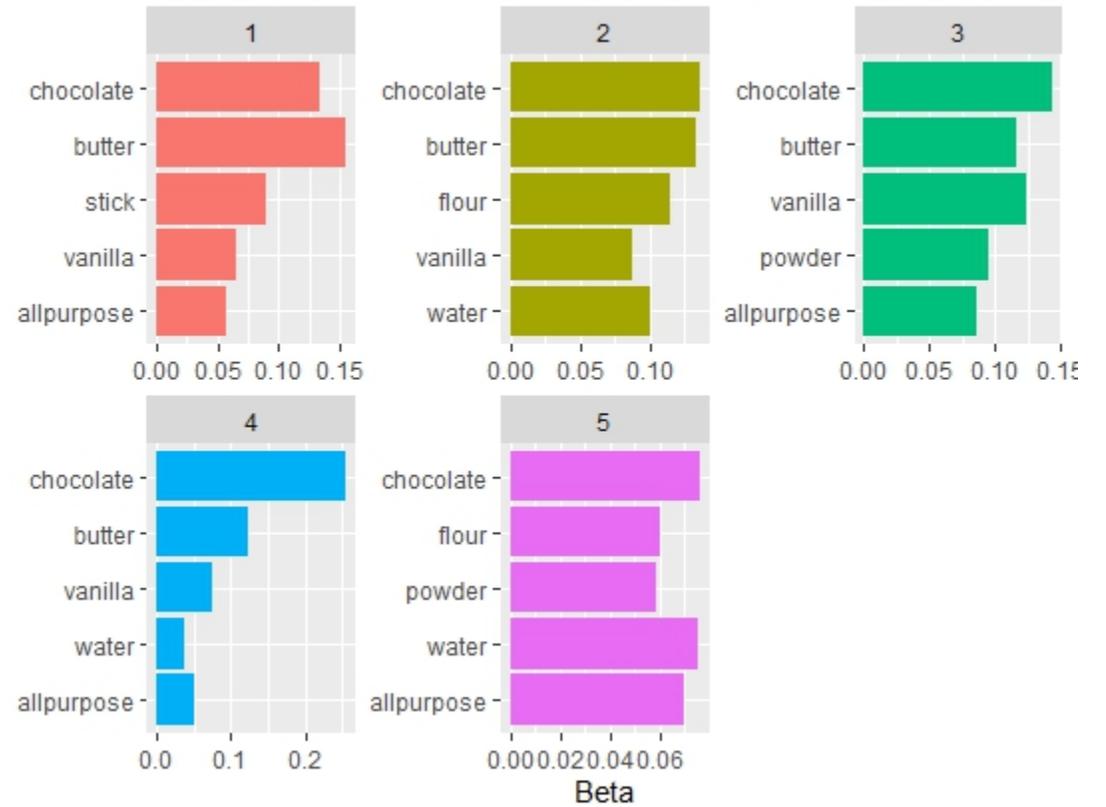


# Complexity of Food Consumption: Deconstructing Recipes

Top Nouns associated with Desserts in Mexican Cuisines

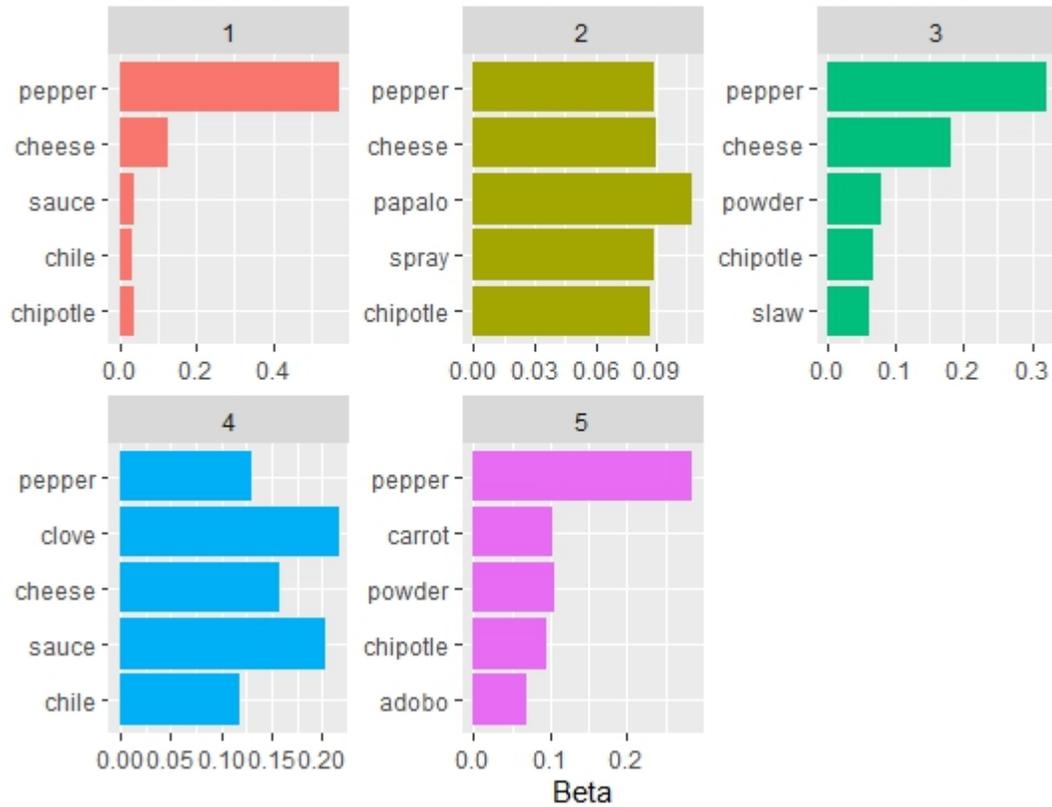


Top Nouns associated with Desserts in American Cuisines



# Complexity of Food Consumption: Deconstructing Recipes

Top Nouns associated with Lunch and Snacks in Mexican Cuisine

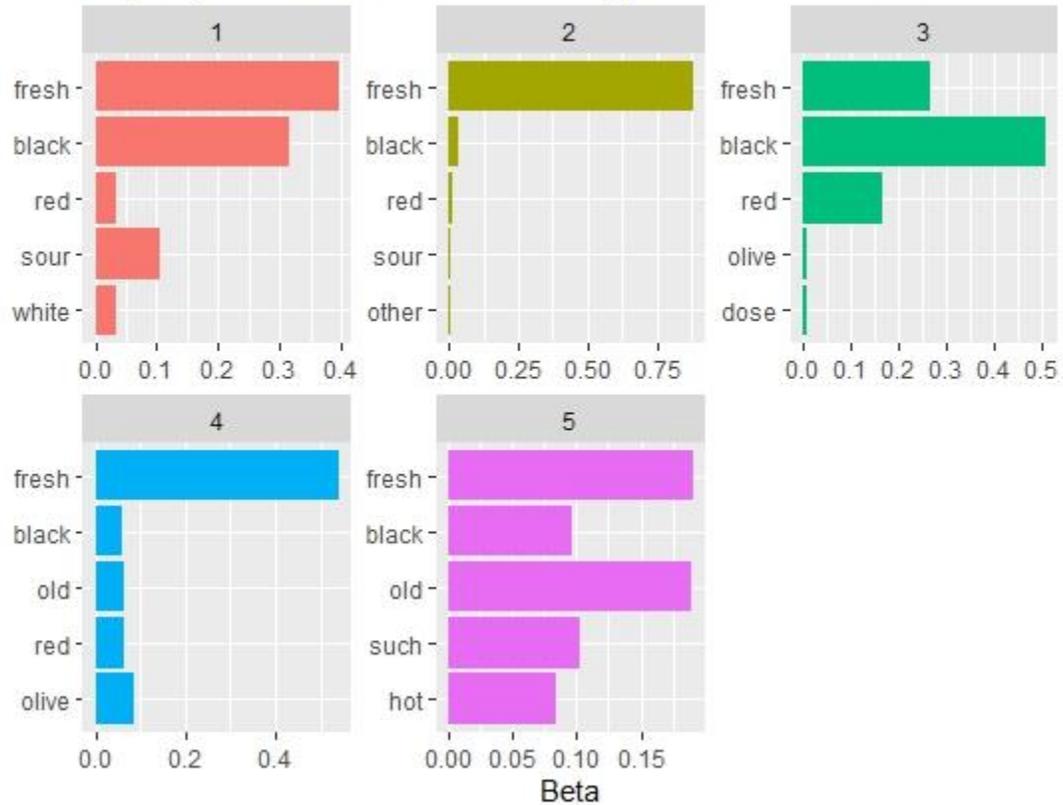


Top Nouns associated with Lunch and Snacks in American Cuisine

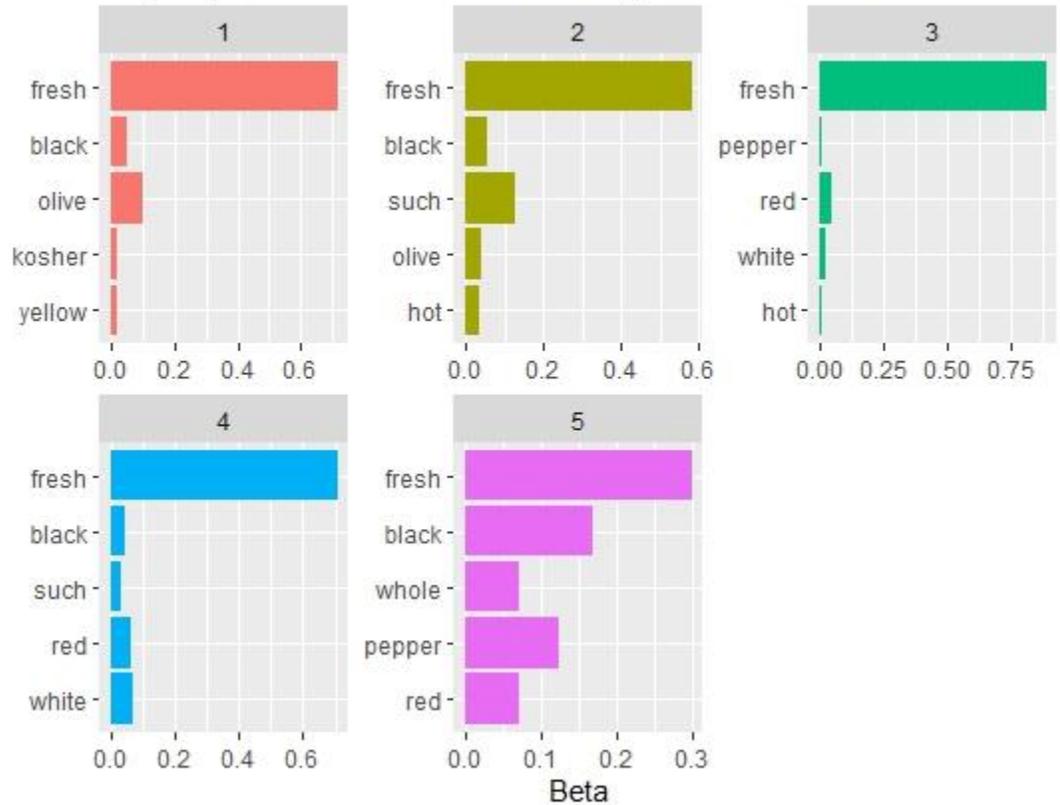


# Complexity of Food Consumption: Deconstructing Recipes

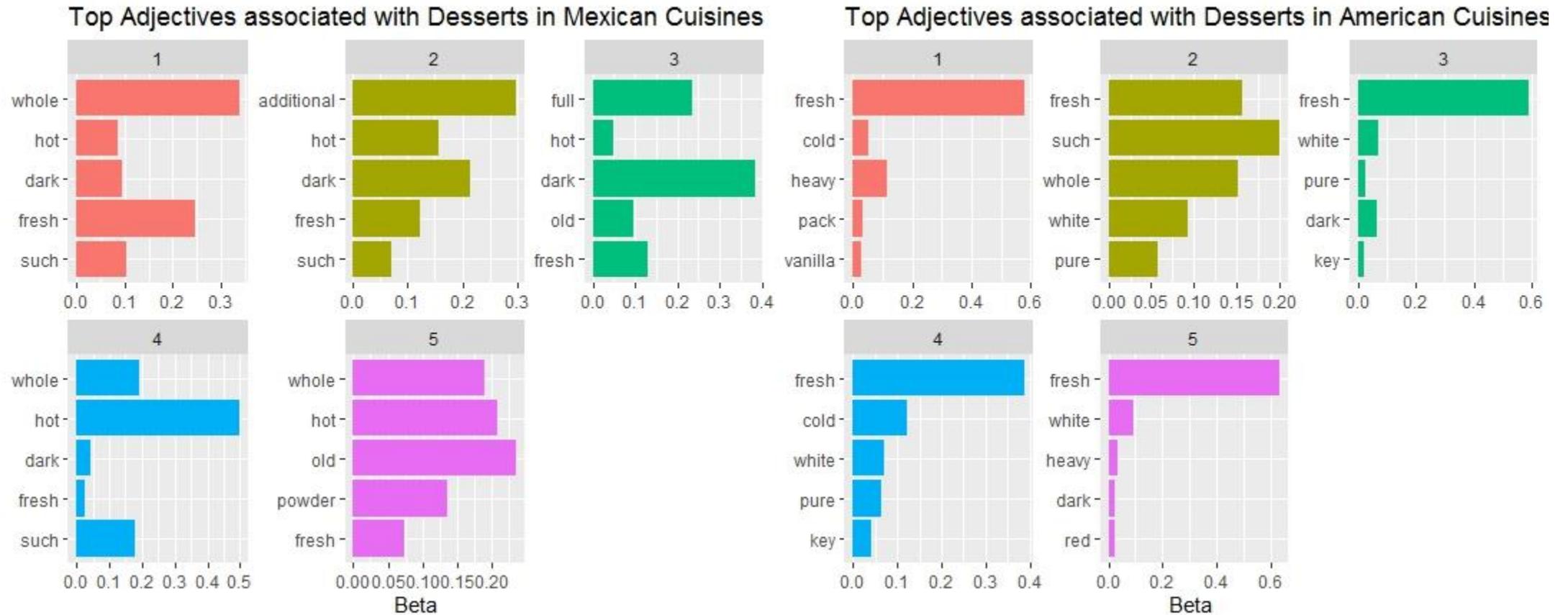
Top Adjectives associated with Appetizers in Mexican Cuisines



Top Adjectives associated with Appetizers in American Cuisines

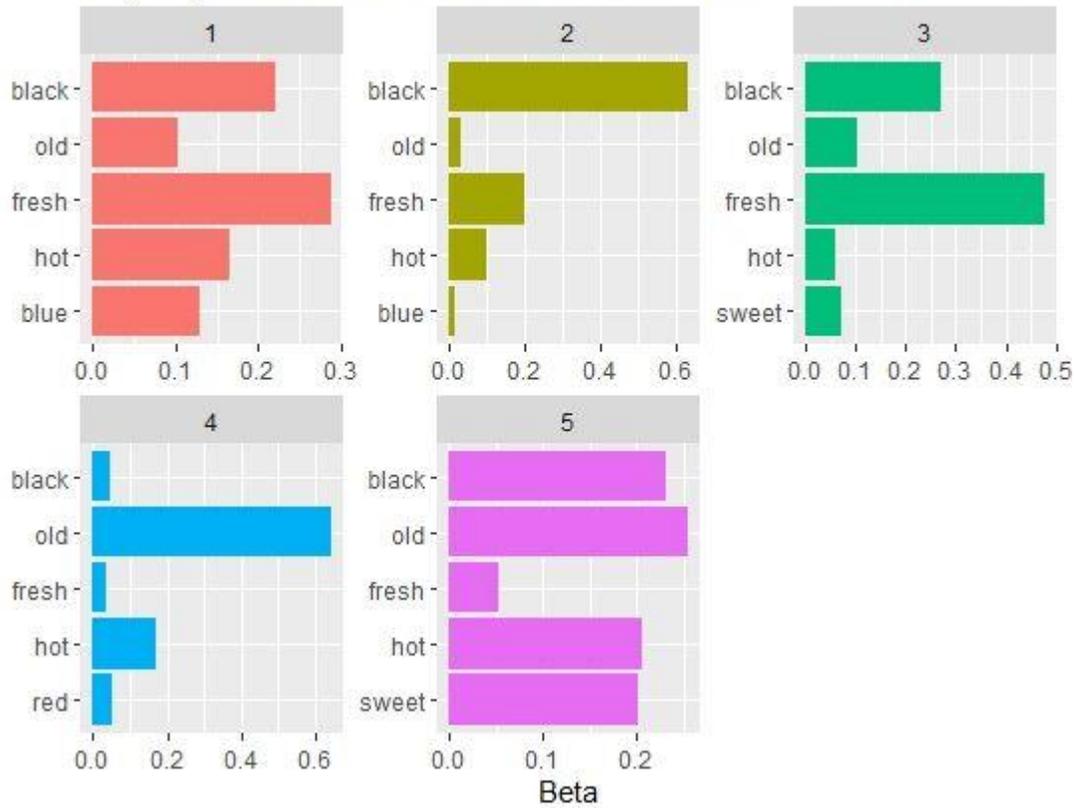


# Complexity of Food Consumption: Deconstructing Recipes

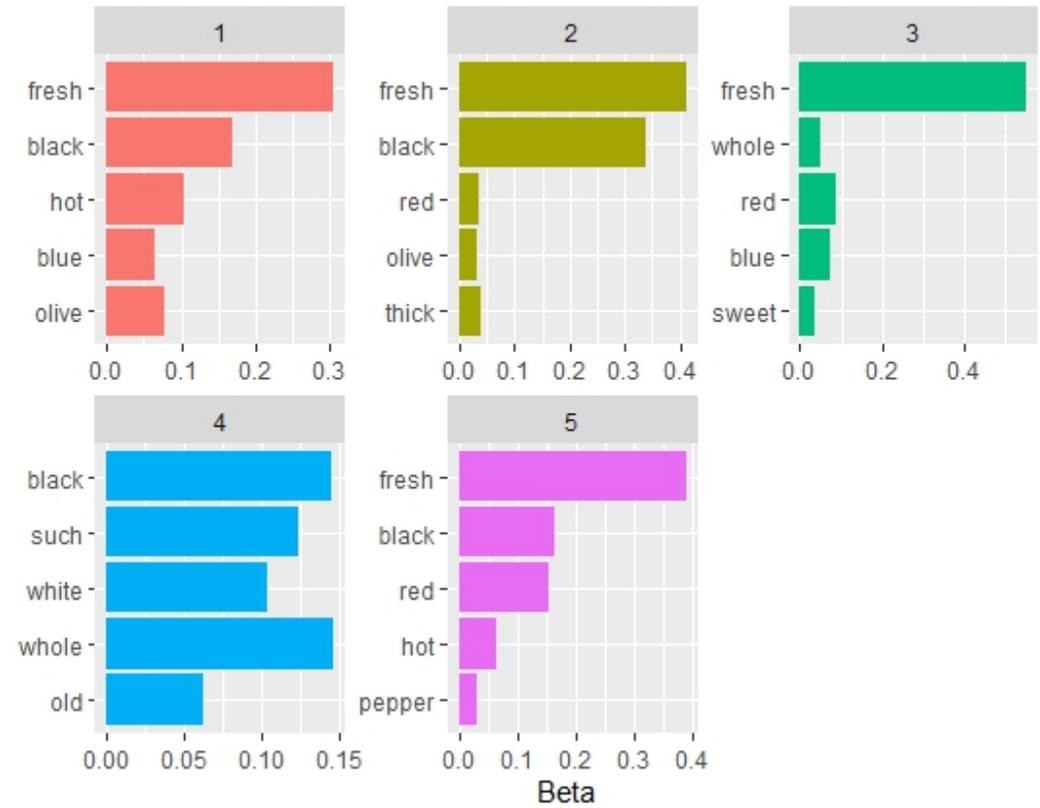


# Complexity of Food Consumption: Deconstructing Recipes

Top Adjectives associated with Lunch in Mexican Cuisines

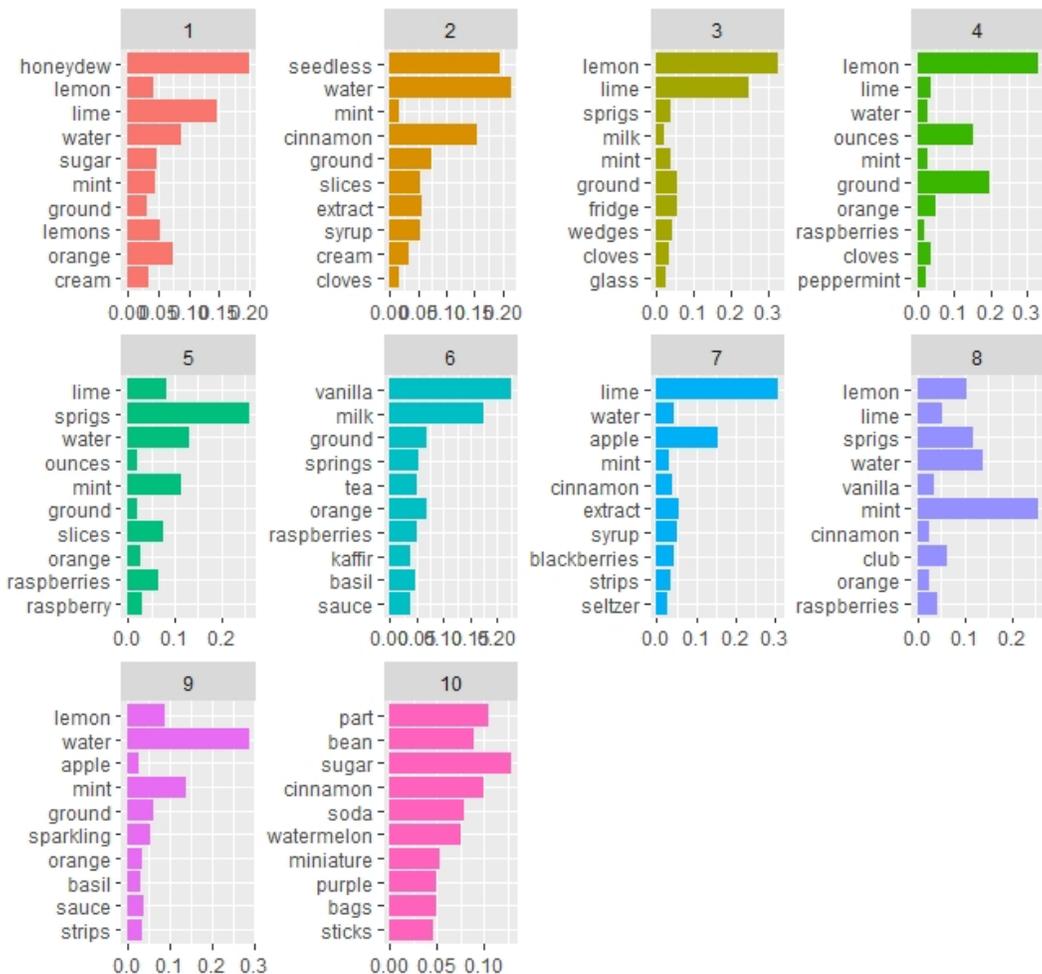


Top Adjectives associated with Lunch and Snacks in American



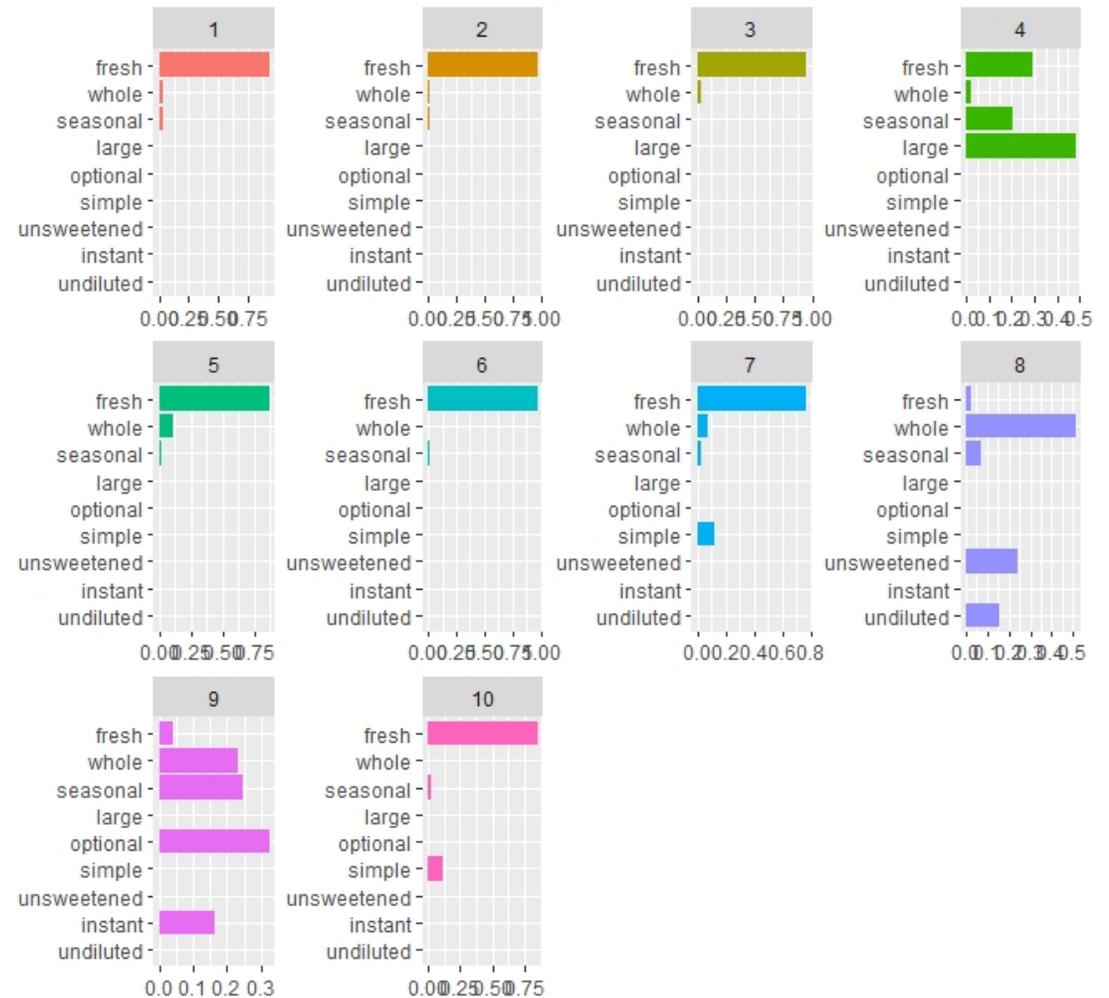
# Complexity of Food Consumption: Deconstructing Recipes

Topics associated with Beverages in American Cuisines



Beta

Top Adjectives associated with Beverages in American Cuisines



Beta

# Complexity of Food Consumption: Deconstructing Recipes

## **Conclusions**

### Utility:

- topic models of recipes can serve as a baseline for further social media/food blogging entries' topic models
- complexity (via ingredients/adjectives) in different kitchens can be compared (e.g. Mexican & American)
- Input for automatically generated food stories/recipes

### Further research:

- food blogging entries/social media
- Capturing the notion of complexity via big-data

# Feedback

- Potential to collaborate with the industry:
  - Valmiermuiža
    - Perception of sweetness
  - Gelato
    - Forms & shapes («Crossmodal and affective links in gelato tasting» by Nora Bērziņa (University of Latvia), Linda Valkovska (Technical University Riga), Līga Zariņa (University of Latvia), Kārlis Gross (Bliss Gelato / Technical University Riga), Jurgis Šķilters (University of Latvia))
- Other researchers
  - Klemens Knöferle – doing perceptual fluency and crossmodal correspondence type expts – multisensory marketing - <https://www.bi.edu/about-bi/employees/department-of-marketing/klemens-knoferle/>
  - Paula Almiron-Chamadoira – data scraping, where ‘red’ and ‘sweet’ come out top, though we are strgling to know how best to analyse data, <https://metaaprendizaje.academia.edu/PaulaAlmironChamadoira>
- Further steps
  - Bi-gram development
  - Food blogging entries’ analysis
- Forthcoming conferences
  - The annual conference, “Digital Humanities in the Nordic Countries,” invites submissions of proposals for its 5th conference to be held in Riga, Latvia, 17–20 March 2020. [The DHN conferences](#) aim to provide an overview of research, education and communication about the interdisciplinary field of digital humanities from the Nordic to the Baltic region, and beyond.

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