Introduction

Research has shown that time spent in the kitchen has decreased in modern times (Scanlon, 2004; Wolfson et al., 2016). Some literature suggests that the emergence of new kitchen technology further decreases time spent in the kitchen (Fonseca et al., 2019; Siio et al., 2004). The decreased time has also been associated with a sense of business; consciously decreasing the time due to a feeling of not having enough time (Palmer, 2018).

Parallel to these time-optimizing lifestyle changes, it has been shown that our linguistic style has changed as well: The modern written English language tends to use less and shorter words (Joshi, 2014). This effect may be accelerated by modern large language models (Rudnicka, 2025).

To our best knowledge, it has not yet been examined whether the use of modern kitchen technology has affected the written language of cooking: recipes.

Hypothesis Statements

We investigate a potential overlap of modern habits of more concise, short language and less time spent in the kitchen. We compare the language in recipes that are oven-based versus air fryer-based.

We control for number of ingredients. We also investigate an interaction effect between number of ingredients and recipe type, to see if the effect of technology differs across ingredient.

We test three hypotheses:

H1: Air fryer-based recipes use less words than oven-based recipes.

H2: Air fryer-based recipes use shorter words than oven-based recipes.

H3: Word count and length of words is better predicted by an interaction effect between recipe type and number of ingredients.

Methods

The *recipes* (Singh, 2025) dataset from Kaggle and was loaded into R. The dataset contained 62.126 and eight variables: Title, Category, Subcategory, Description, Ingredients, Directions, N(Ingredients), and N(Steps).

The dataset already contained Air fryer Recipe as a Subcategory, but this logic was incomplete, as air fryer recipes occurred in other subcategories as well. Air fryer was not a Category.

Data Cleaning

The dataset was subset to only include recipes where either the word air fryer or the word oven was in the description or title. If the description contained the word air fryer, it was considered as an air fryer recipe and vice versa. A recipe containing both words did not qualify.

Two independent variables were computed. One was the recipe type, which was dummy coded with a 1 for air fryer recipes and 0 for oven recipes. Number of ingredients was re-computed within our pipeline for safety.

Two dependent variables were also computed. The first one was the number of words in the directions, computed by splitting the original Directions variable into a list of strings, and then calculating the length of each list. Then, average word length was computed by calculating the total number of characters within each list and then dividing by the number of words.

The final dataset thus contained four variables and 2419 rows. 1002 of the recipes were air fryer recipes.

Assumptions Tests

Each variable was tested for normality, collinearity, homoscedasticity, and outliers. Bell curve of number of words looked left-skewed, and thus was converted to logarithmic scale. Remaining variables met assumptions.

Data Analysis

Four linear models were defined:

Model 1: $N(LogWords) \sim RecipeType + N(Ingredients)$

Model 2: $N(LogWords) \sim RecipeType * N(Ingredients)$

Model 3: $M(WordLength) \sim RecipeType + N(Ingredients)$

Model 4: $M(WordLength) \sim RecipeType * N(Ingredients)$

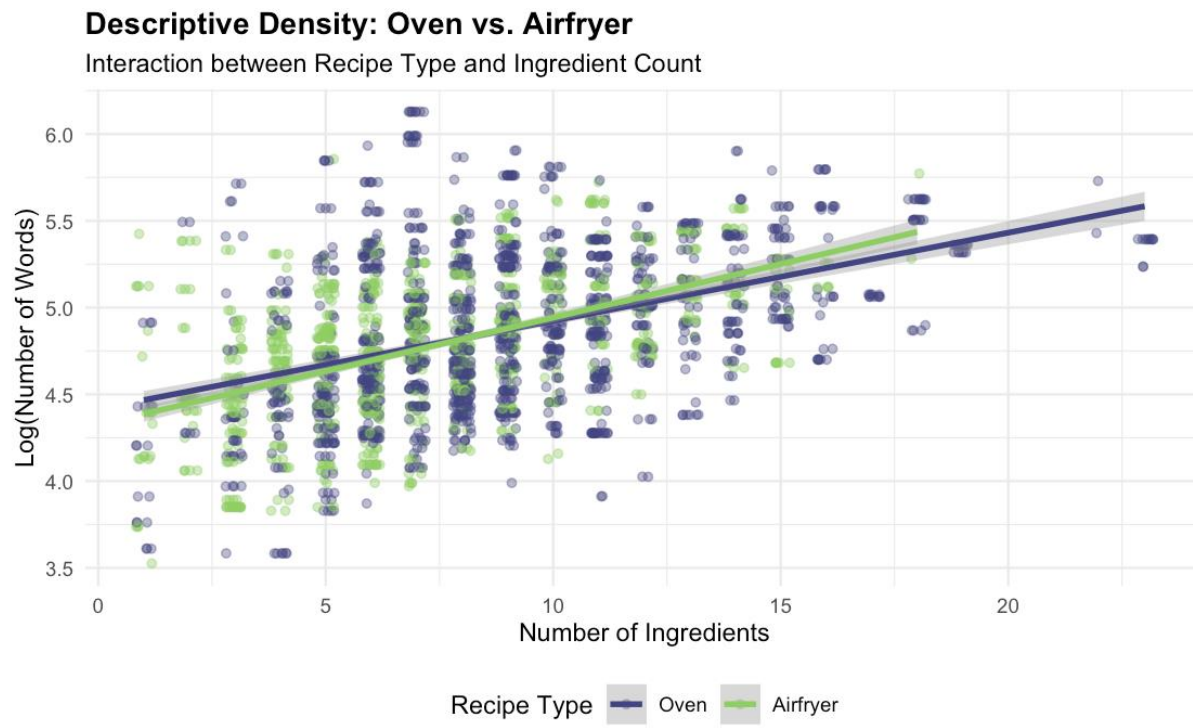
The models were compared using a one-way ANOVA.

Results

The air fryer recipes had on average 7.27 (±3.42) ingredients compared to oven recipes' 9.11 (±3.38). Average words in air fryer recipes was 128.23 (±51.23) compared to oven recipes' 147.0 (±72.79). Average word length looked similar (air fryer: 4.45±0.2; oven: 4.43±0.2).

To examine the relationship between recipe type and description length, a main-effects model (Model 1) was compared against an interaction model (Model 2). In Model 1, the number of ingredients significantly predicted log-transformed word count (b = = 0.055, $t(2416) = 24.80$, $p < .001$), whereas recipe type showed no significant effect (b = -0.004, p = .799).

a



b

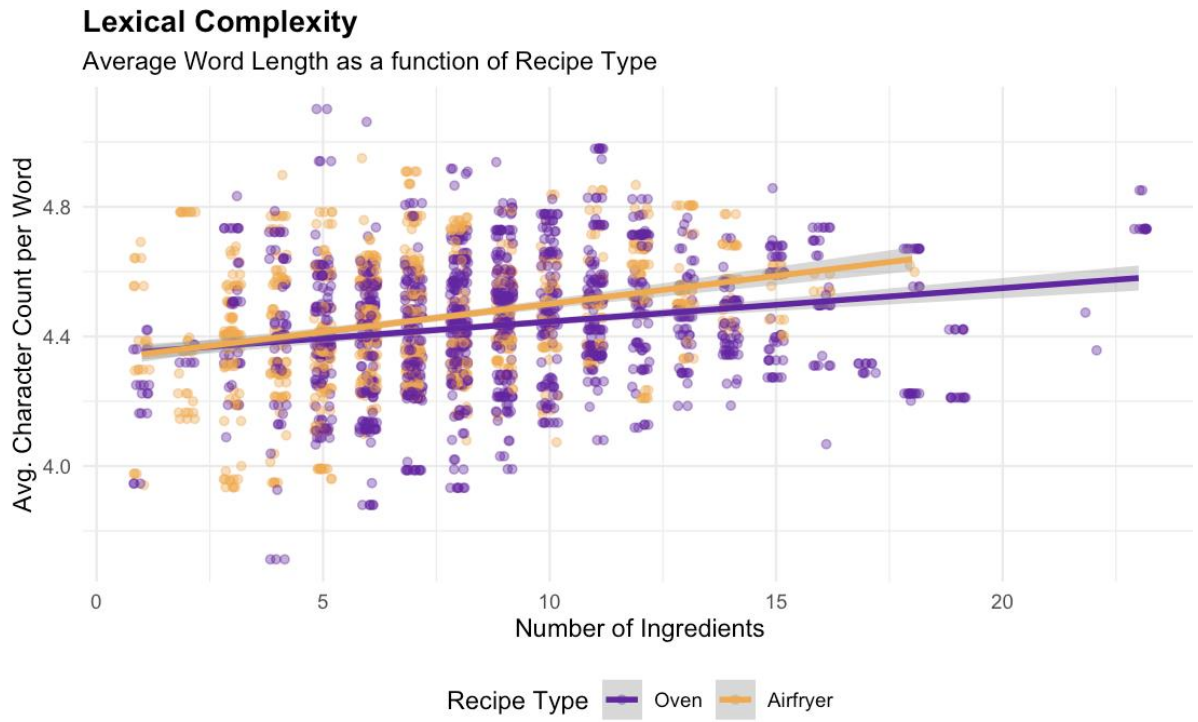


Figure 1: *Graphical display of relationships between linguistic measures as a function of recipe type and ingredients.*
a. *Comparison of word count*
b. *Comparison of word length*

Model 2 significantly improved model fit ($X^2(1) = 0.90$, $p = .017$). In this model, the interaction between recipe type and ingredient count was significant ($b = 0.011$, $t(2415) = 2.39$, $p = .017$). Air fryer recipes exhibited a lower baseline length ($b = -0.09$, $p = .023$) but a steeper increase in word count per ingredient compared to oven recipes. The practical effect size was small, with explained variance increasing by 0.19 (from $R^2 = .2135$ to $R^2 = .2154$), as supported by Figure 1a.

Model 3 indicated that both recipe type ($b = 0.04$, $p < .001$) and ingredient count ($b = 0.01$, $p < .001$) were significant predictors for word length. Model 4 significantly outperformed the main-effects model ($X^2(1) = 0.36$, $p = .0018$). The interaction term was significant ($b = 0.007$, $t(2415) = 3.12$, $p = .002$), indicating that lexical complexity increases more rapidly in air fryer recipes as ingredient density grows. The increase in R^2 was marginal (from $R^2 = .057$ to $R^2 = .061$), , as supported by Figure 2a.

Discussion

We found no robust evidence that air fryer recipes differ significantly from oven recipes in word count or word length when controlling for ingredient count. Although some significant changes were found, these were due to a high number of samples rather than a big change observed.

The negative intercept for air fryer recipes in the interaction models initially support the narrative of simpler language in response to technology changes. However, the positive interaction coefficient indicates that as we move away from simple, mono- or duo-ingrediential recipes, air fryers recipes' word length actually inflated faster than oven recipes'.

This could be a reflection of more established terms with oven use, such as "baking" and "roasting", where air fryer recipes might lack exact pendants.

The current study must reject H1 or H2. H3 achieved significant results, but due to a non-impressing difference in explained variance, we are forced to reject it.

The lexical differences across different recipe types warrant further investigations, with better control for additional variables, such as type of food or cuisine, web-based versus printed recipes, and year published.

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Link to GitHub REPO:

https://github.com/sofiascharf/cds_repo.git