Optimizing (Socio-)linguistic Analysis: Language Variation Suite Toolkit

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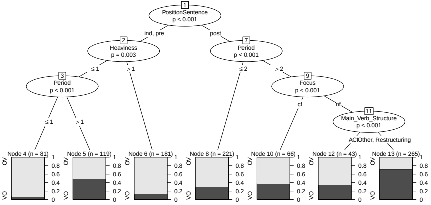
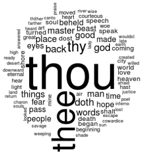
Goal

Provide researchers with a variety of quantitative methods to advance language variation studies.





Objectives

1. Introduce a novel (socio)linguistic toolkit
2. Develop practical skills
3. Understand and interpret advanced statistical models

What is LVS?

Introduction
Data Preparation
Language Variation Suite
Working with Data
Visual Analytics
Inferential Analysis
Mixed Effects
Appendix
References

Language Variation Suite

It is a Shiny web application designed for data analysis in sociolinguistic research.

It can be used for:

- Processing spreadsheet data
- Reporting in tables and graphs
- Analyzing means, regression, conditional trees ... (and much more)

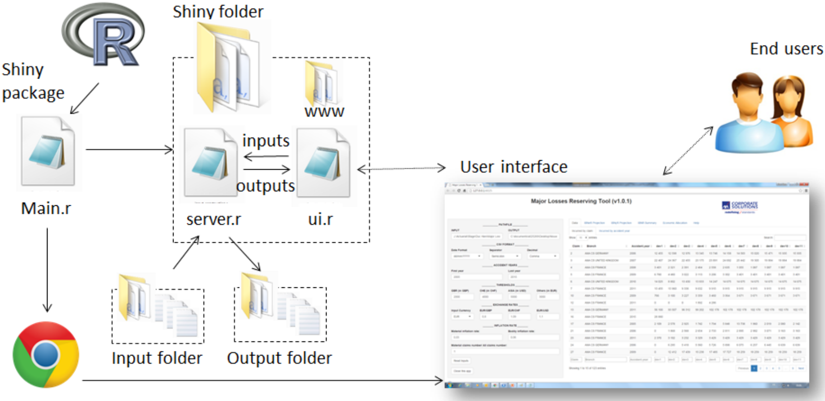
Background

LVS is built in R using Shiny package:

1. **R** - a free programming language for statistical computing and graphics
2. **Shiny App** - a web application framework for R

Computational power of R + Web interactivity

Background



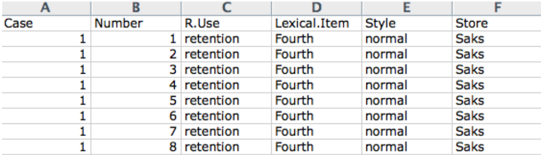
Major Losses Reserving Tool (v1.0.1)

http://littleactuary.github.io/blog/Web-application-framework-with-Shiny/

Data Preparation

Important things to consider before data entry:

- File format:
  - Comma separated value (CSV) - faster processing
  - Excel format will slow processing
- Column names should not contain spaces
  - Permitted: non-accented characters, numbers, underscore, hyphen, and period
- One column must contain your **dependent** variable
- The rest of the columns contain **independent** variables



A	B	C	D	E	F
Case	Number	R.Use	Lexical.Item	Style	Store
1	1	retention	Fourth	normal	Saks
1	2	retention	Fourth	normal	Saks
1	3	retention	Fourth	normal	Saks
1	4	retention	Fourth	normal	Saks
1	5	retention	Fourth	normal	Saks
1	6	retention	Fourth	normal	Saks
1	7	retention	Fourth	normal	Saks
1	8	retention	Fourth	normal	Saks

Workspace

Browser

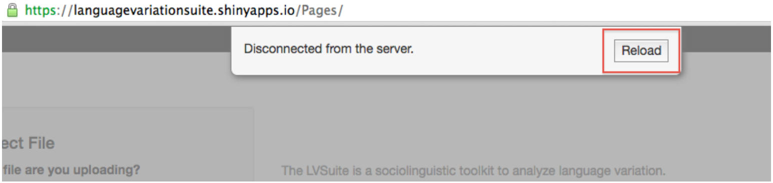
- Chrome, Firefox, Safari - recommendable
- Explorer may cause instability issues

Accessibility

- PC, Mac, Linux
  - Data files will be uploaded from any location on your computer
- Smart Phone
  - Data files must be on a cloud platform connected to your phone account (e.g. dropbox)

Server

Since LVS is hosted on a server, Shiny idle time-out settings may stop application when it is left inactive (it will grey out).



https://languagevariationsuite.shinyapps.io/Pages/

Disconnected from the server.

Reload
ect File
file are you uploading?
The LVSuite is a sociolinguistic toolkit to analyze language variation.

Solution: Click **reload** and re-upload your csv file

Terminology Review

a. **Categorical** - non-numerical data with **two** values
   - yes - no; deletion - retention; perfective - imperfective

b. **Continuous** - numerical data
   - duration, age, chronological period

c. **Multinomial** - non-numerical data with **three or more** values
   - deletion - aspiration - retention

d. **Ordinal** - scale: currently not supported

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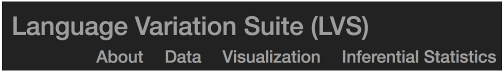
ARE YOU READY?

Workshop Files

`https://languagevariationsuite.wordpress.com/`

1. **categoricaldata.csv**: categorical dependent - Labov New York 1966 study
2. **continuousdata.csv**: continuous dependent - Intervocalic /d/ in Caracas corpus (Díaz-Campos et al.)
3. **LVS web site**: `www.languagevariationsuite.com`

Language Variation Suite - Structure



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   - Upload file, data summary, adjust data, cross tabulation
2. Visual Analysis
   - Plotting, cluster classification
3. Inferential Statistics
   - Modeling, regression, conditional trees, random forest

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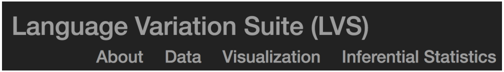

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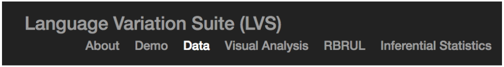
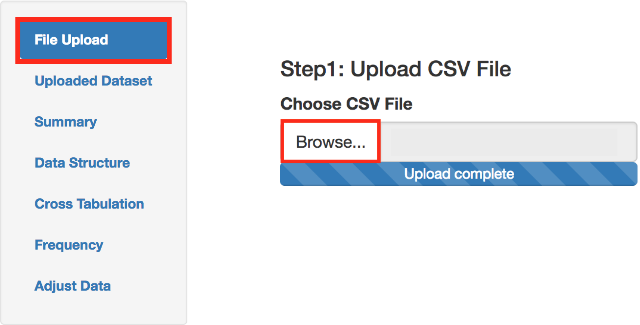
Upload File

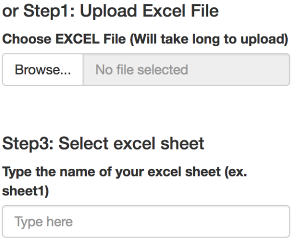


Upload **movie_metadata.csv**



Excel Format

1. Slow processing



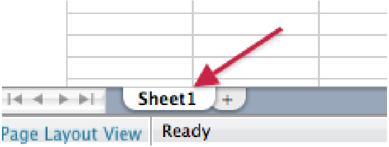
or Step1: Upload Excel File

Choose EXCEL File (Will take long to upload)

Step3: Select excel sheet

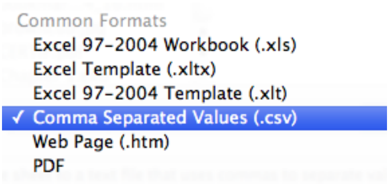
Type the name of your excel sheet (ex. sheet1)

2. Requires the name of your excel sheet



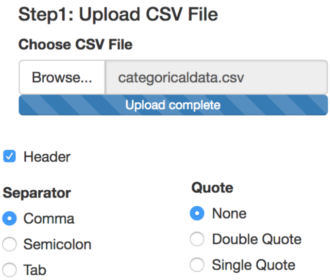
Save Excel as CSV Format

To optimize speed - **Save as CSV** prior upload


Common Formats
Excel 97–2004 Workbook (.xls)
Excel Template (.xltx)
Excel 97–2004 Template (.xlt)
✓ Comma Separated Values (.csv)
Web Page (.htm)
PDF

Upload File

Upload **categoricaldata.csv**



Step1: Upload CSV File

Choose CSV File

categoricaldata.csv

Upload complete

☑ Header

Separator

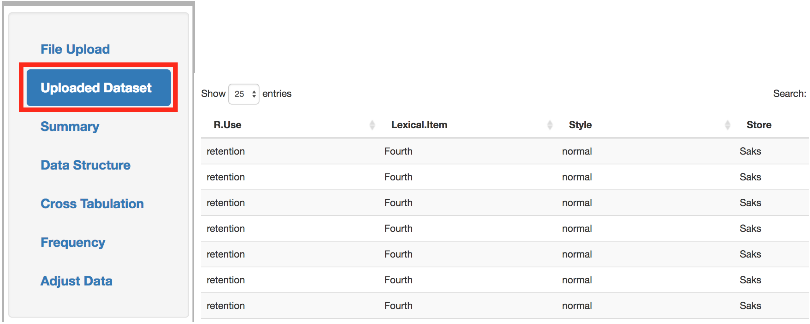
● Comma
○ Semicolon
○ Tab

Quote

● None
○ Double Quote
○ Single Quote

Uploaded Dataset

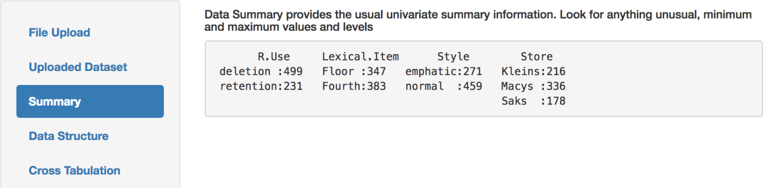
The data content is imported as a table and allows for sorting columns.



R.Use	Lexical.Item	Style	Store
retention	Fourth	normal	Saks
retention	Fourth	normal	Saks
retention	Fourth	normal	Saks
retention	Fourth	normal	Saks
retention	Fourth	normal	Saks
retention	Fourth	normal	Saks
retention	Fourth	normal	Saks

Summary

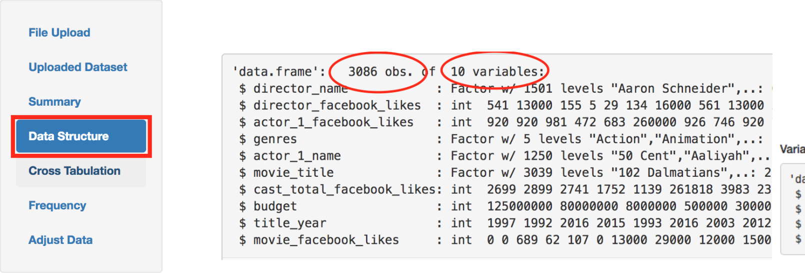
Summary provides a quantitative summary for each variable, e.g. frequency count, mean, median.



Data Summary provides the usual univariate summary information. Look for anything unusual, minimum and maximum values and levels

```
       R.Use      Lexical.Item      Style          Store    
 deletion :499   Floor :347    emphatic:271   Kleins:216  
 retention:231   Fourth:383    normal  :459   Macys :336  
                                              Saks  :178  
```

Data Structure

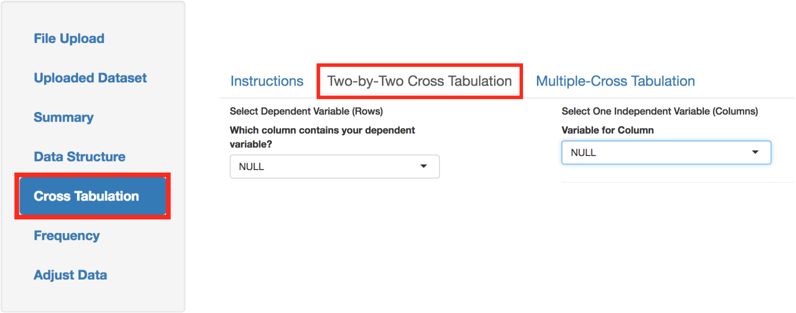


```
'data.frame':   3086 obs. of  10 variables:
 $ director_name           : Factor w/ 1501 levels "Aaron Schneider",..:
 $ director_facebook_likes : int  541 13000 155 5 29 134 16000 561 13000
 $ actor_1_facebook_likes  : int  920 920 981 472 683 260000 926 746 920
 $ genres                  : Factor w/ 5 levels "Action","Animation",..:
 $ actor_1_name            : Factor w/ 1250 levels "50 Cent","Aaliyah",..
 $ movie_title             : Factor w/ 3039 levels "102 Dalmatians",..: 2
 $ cast_total_facebook_likes: int  2699 2899 2741 1752 1139 261818 3983 23
 $ budget                  : int  125000000 80000000 8000000 500000 30000
 $ title_year              : int  1997 1992 2016 2015 1993 2016 2003 2012
 $ movie_facebook_likes    : int  0 0 689 62 107 0 13000 29000 12000 1500
```

1. Total number of **observations** (rows)
2. Number of **variables** (columns)
3. Variable **types**
   - **Factor** - categorical values
   - **Num** - numeric values (0.95, 1.05)
   - **Int** - integer values (1, 2, 3)

Cross Tabulation

Cross-tabulation examines the relationship between variables.



Select Dependent Variable (Rows)

Which column contains your dependent variable?

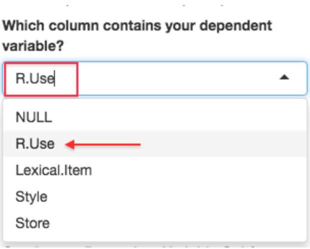
NULL

Select One Independent Variable (Columns)

Variable for Column

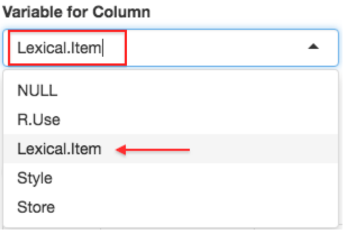
NULL

Cross-Tabulation: One Dependent and One Independent Variables



Which column contains your dependent variable?

R.Use

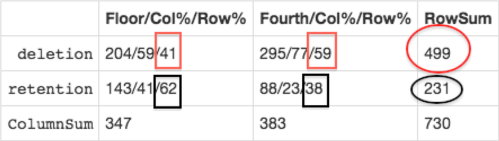


Variable for Column

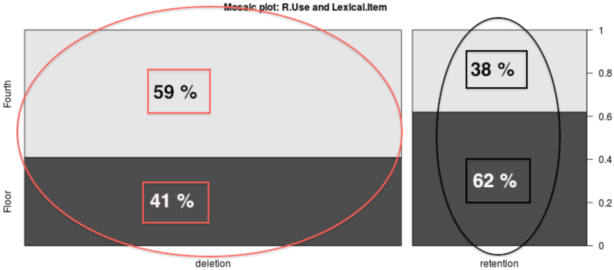
Lexical.Item

Cross-Tabulation Output

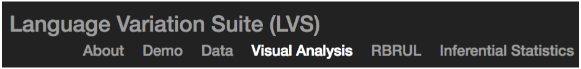
Raw frequency / Proportion by column / Proportion across row



	Floor/Col%/Row%	Fourth/Col%/Row%	RowSum
deletion	204/59/41	295/77/59	499
retention	143/41/62	88/23/38	231
ColumnSum	347	383	730



Language Variation Suite - Structure



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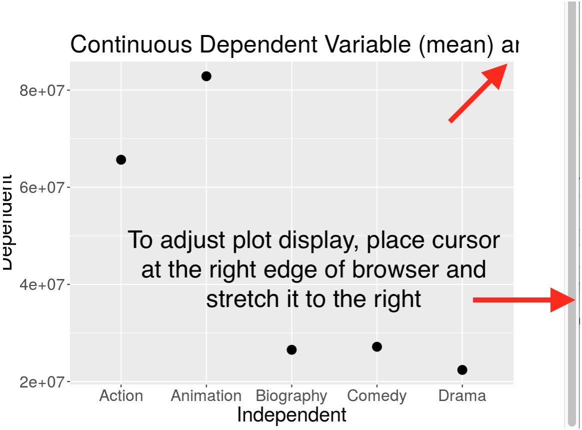
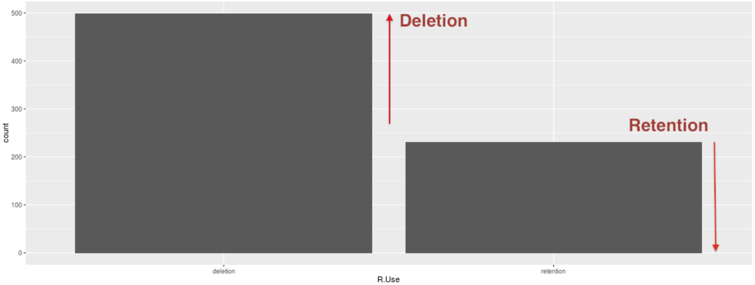
Adjusting Browser - Layout

Shiny pages are fluid and reactive.

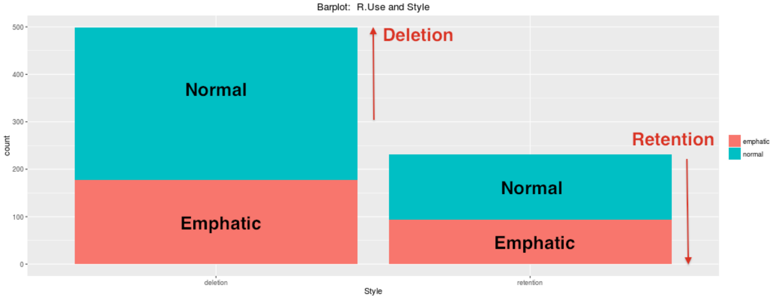


To adjust plot display, place cursor at the right edge of browser and stretch it to the right

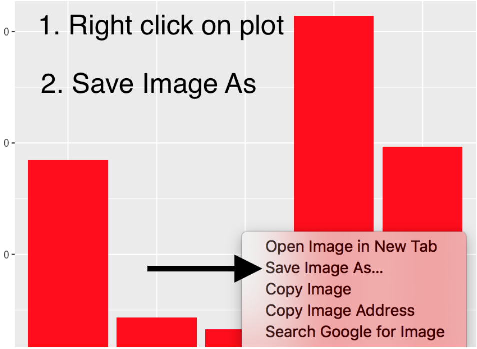
One Variable Plot



Two Variables Plot



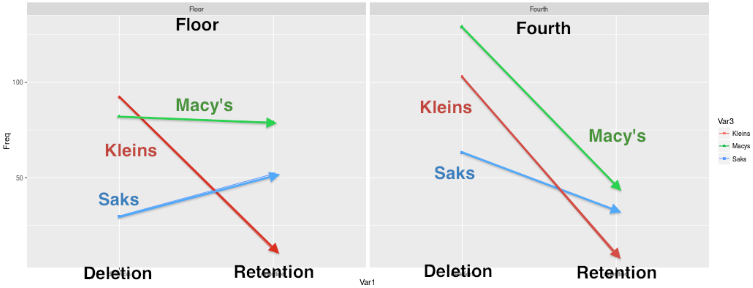
Saving Plot



1. Right click on plot

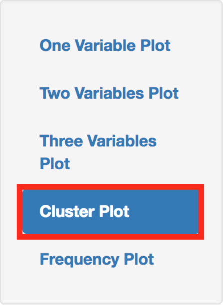
2. Save Image As

Three Variables Plot

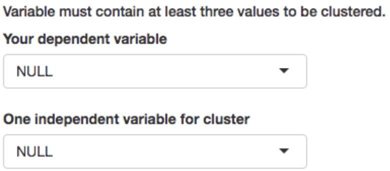


Cluster Plot

- Classification of data into **sub-groups** is based on **pairwise similarities**
- Groups are clustered in the form of a **tree-like dendrogram**



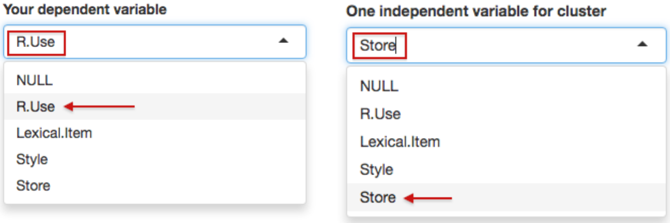
Cluster Plot



Variable must contain at least three values to be clustered.

Your dependent variable: NULL

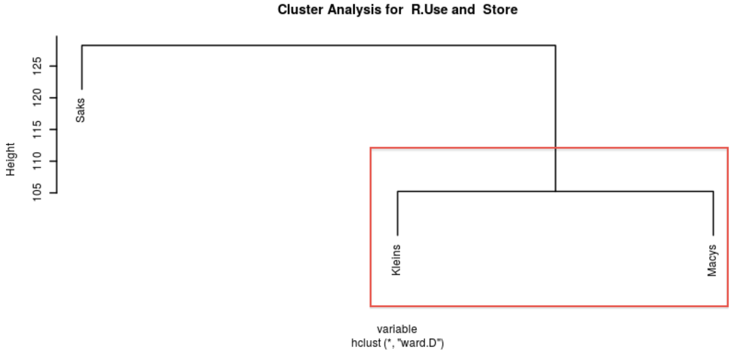
One independent variable for cluster: NULL



Your dependent variable: R.Use

One independent variable for cluster: Store

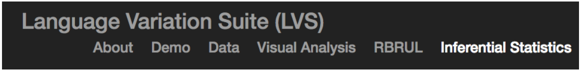
Cluster Plot



Saks (upper middle-class store), **Macy's** (middle-class store), **Kleins** (working-class)

Inferential Statistics

Language Variation Suite - Structure



Language Variation Suite (LVS)

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How to Create a Regression Model

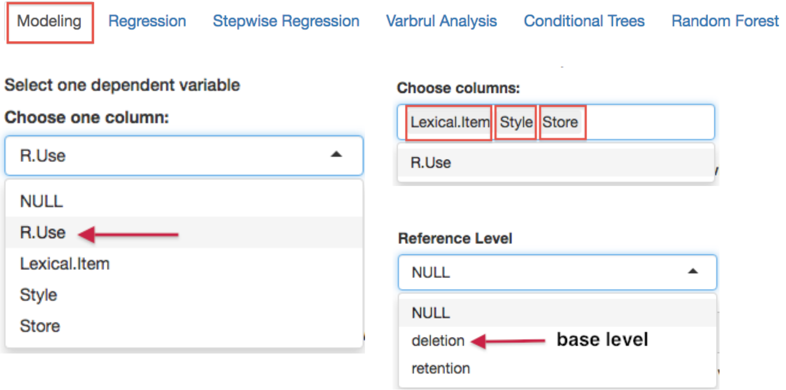
Step 1 **Modeling** - create a model with dependent and independent variables

Step 2 **Regression** - specify the type of regression (fixed, mixed) and type of dependent variable (binary, continuous, multinomial)

Step 3 **Stepwise Regression** - compare models (Log-likelihood, AIC, BIC)

Step 4 **Conditional Trees** - apply non-parametric tests to the model

Modeling



Select one dependent variable

Choose one column:

R.Use

Choose columns:

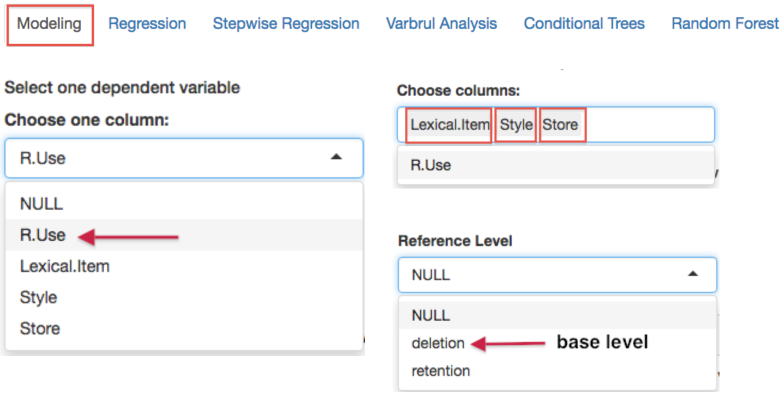
Lexical.Item Style Store

Reference Level

NULL

base level

Modeling



Select one dependent variable

Choose one column:

R.Use

- NULL
- R.Use
- Lexical.Item
- Style
- Store

Choose columns:

Lexical.Item Style Store

R.Use

Reference Level

NULL

- NULL
- deletion
- retention

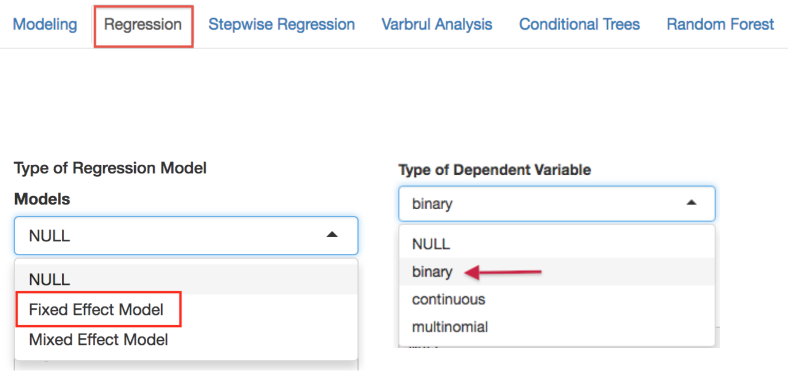
base level

We are interested in RETENTION = Application

Regression Types

- **Model**
  a.) Fixed effect
  b.) Mixed effect - individual speaker/token variation (within group)
- **Type of Dependent Variable**
  a.) Binary/categorical (only two values)
  b.) Continuous (numeric)
  c.) Multinomial - categorical with more than two values

Regression

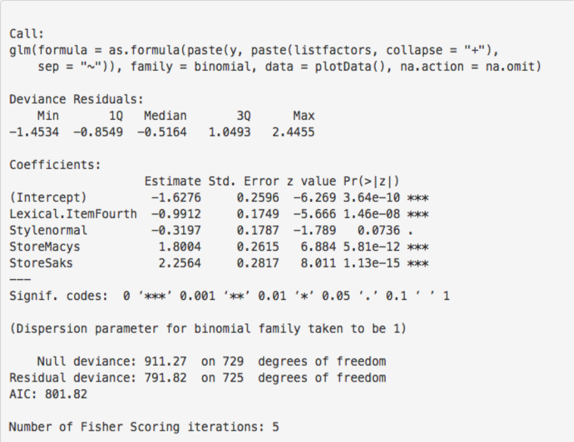


Type of Regression Model

Models: NULL

Type of Dependent Variable: binary

Model Output



```
Call:
glm(formula = as.formula(paste(y, paste(listfactors, collapse = "+"),
    sep = "~")), family = binomial, data = plotData(), na.action = na.omit)

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-1.4534  -0.8549  -0.5164   1.0493   2.4455

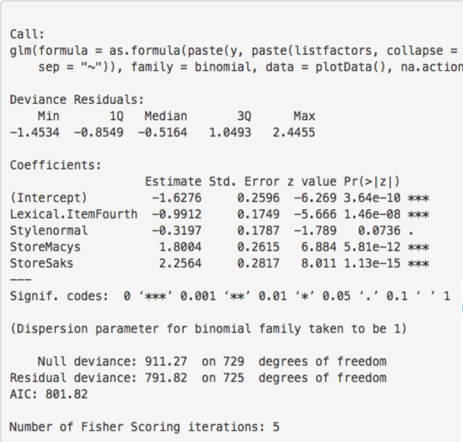
Coefficients:
                   Estimate Std. Error z value Pr(>|z|)
(Intercept)         -1.6276     0.2596  -6.269 3.64e-10 ***
Lexical.ItemFourth  -0.9912     0.1749  -5.666 1.46e-08 ***
Stylenormal         -0.3197     0.1787  -1.789   0.0736 .
StoreMacys           1.8004     0.2615   6.884 5.81e-12 ***
StoreSaks            2.2564     0.2817   8.011 1.13e-15 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

(Dispersion parameter for binomial family taken to be 1)

    Null deviance: 911.27  on 729  degrees of freedom
Residual deviance: 791.82  on 725  degrees of freedom
AIC: 801.82

Number of Fisher Scoring iterations: 5
```

Model Output



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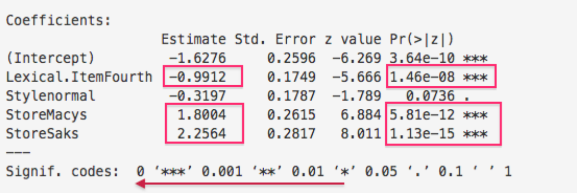
Interpretation



```
Coefficients:
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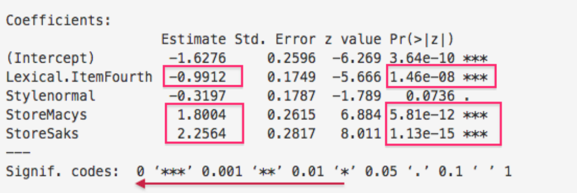
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

- **Deletion** is the reference value
- Positive coefficient - positive effect
- Negative coefficient - negative effect

Interpretation



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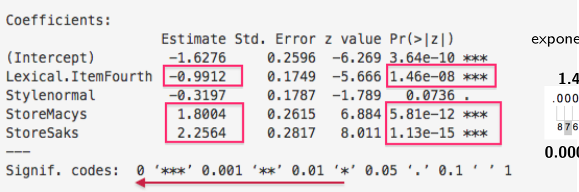
Lexical.ItemFourth -0.9912     0.1749  -5.666 1.46e-08 ***
Stylenormal        -0.3197     0.1787  -1.789   0.0736 .  
StoreMacys          1.8004     0.2615   6.884 5.81e-12 ***
StoreSaks           2.2564     0.2817   8.011 1.13e-15 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

- Lexical item **Fourth** has a negative effect on **retention** compared to Floor and is significant
- **Normal** style has a slightly negative effect on **retention** but its coefficient is not significant
- **Macy’s** and **Saks** have a positive and significant effect on **retention**. Saks (upper middle class store) is more significant than Macy’s (middle class store)

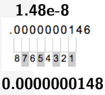
http://www.free-online-calculator-use.com/scientific-notation-converter.html

Interpretation



```
Coefficients:
                   Estimate Std. Error z value Pr(>|z|)    
(Intercept)         -1.6276     0.2596  -6.269 3.64e-10 ***
Lexical.ItemFourth  -0.9912     0.1749  -5.666 1.46e-08 ***
Stylenormal         -0.3197     0.1787  -1.789   0.0736 .  
StoreMacys           1.8004     0.2615   6.884 5.81e-12 ***
StoreSaks            2.2564     0.2817   8.011 1.13e-15 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

exponential notation:



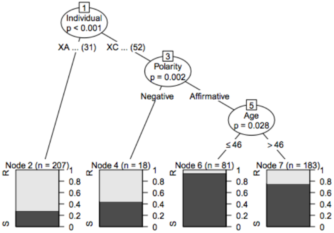
- Lexical item **Fourth** has a negative effect on **retention** compared to Floor and is significant
- **Normal** style has a slightly negative effect on **retention** but its coefficient is not significant
- **Macy's** and **Saks** have a positive and significant effect on **retention**. Saks (upper middle class store) is more significant than Macy's (middle class store)

http://www.free-online-calculator-use.com/scientific-notation-converter.html

Conditional Tree

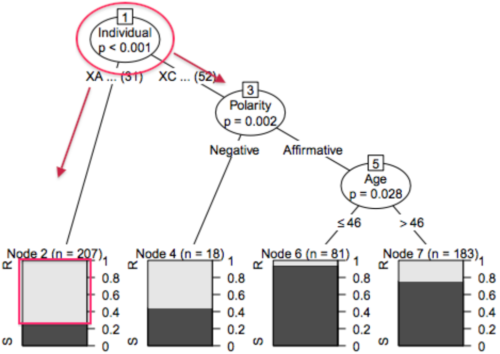
Conditional tree: a simple non-parametric regression analysis, commonly used in social and psychological studies

- Linear regression: all information is combined linearly
- Conditional tree regression: visual splitting to capture interaction between variables



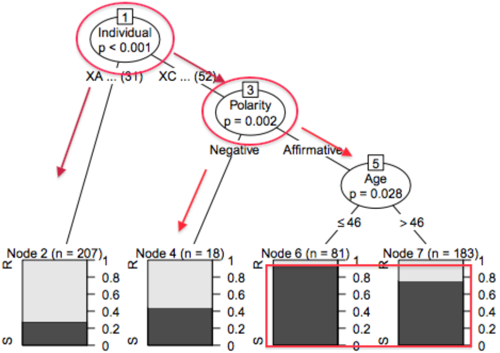
Recursive splitting (tree branches)

Conditional Tree - Tagliamonte and Baayen 2012



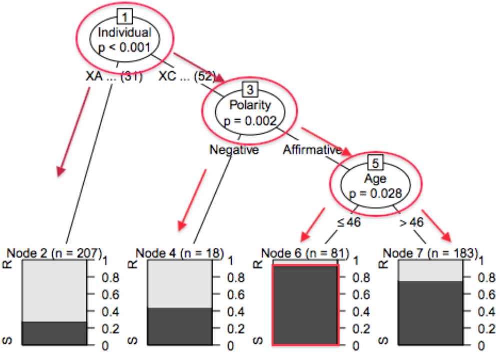
1. The distribution of **was/were** is split in two groups by individuals.
2. The variant **were** occurs significantly more frequently with the first group.

Conditional Tree - Tagliamonte and Baayen (2012)



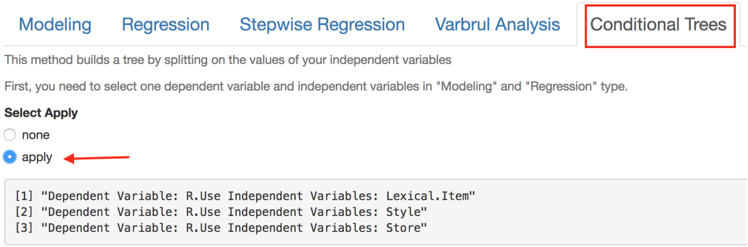
1. **Polarity** is relevant to the second group of individuals.
2. The variant **were** occurs significantly more often with **negative** polarity

Conditional Tree - Tagliamonte and Baayen (2012)



1. **Affirmative Polarity** is conditioned by **Age**.
2. The variant **was** is produced significantly more often by Individuals of 46 and younger.

Conditional Tree



This method builds a tree by splitting on the values of your independent variables

First, you need to select one dependent variable and independent variables in "Modeling" and "Regression" type.

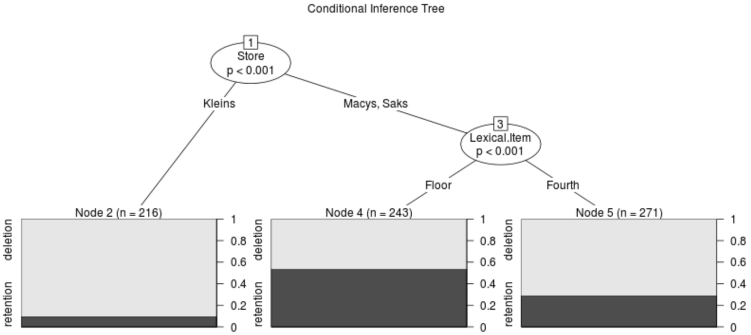
Select Apply

○ none

● apply

```
[1] "Dependent Variable: R.Use Independent Variables: Lexical.Item"
[2] "Dependent Variable: R.Use Independent Variables: Style"
[3] "Dependent Variable: R.Use Independent Variables: Store"
```

Conditional Tree

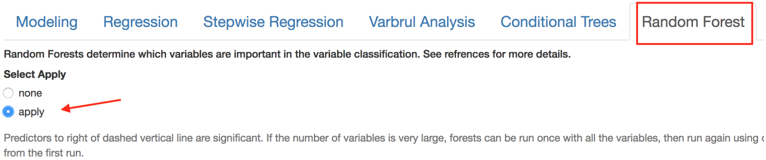


1. **Store** is the most significant factor for R-use
   - **Kleins** (working class store) - more R-deletion
2. R-use in Macy's and Saks is conditioned by **lexical item**:
   - **Floor** shows more R-retention than **Fourth**
3. **Style** is not significant

Random Forest

1. Variable importance for predictors
2. Robust technique with *small* **n** *large* **p** data
3. All predictors considered jointly (allows for inclusion of correlated factors)

Random Forest



Random Forests determine which variables are important in the variable classification. See refrences for more details.

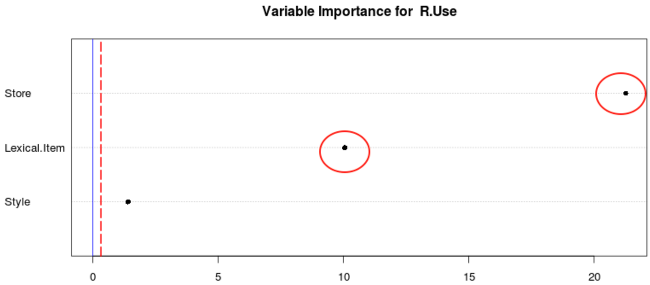
Select Apply

○ none

● apply

Predictors to right of dashed vertical line are significant. If the number of variables is very large, forests can be run once with all the variables, then run again using
from the first run.

Random Forest



1. **Store** is the most important predictor
2. **Lexical Item** is the second predictor
3. **Style** is irrelevant: close to zero and red dotted line (cut-off value).

Fixed and Mixed Models

Fixed Effects Model : All predictors are treated independent. Underlying assumption - no group-internal variation between speakers or tokens

Mixed Effects Model : Allows for evaluation of individual- and group-level variation

Fixed and Mixed Models

Fixed Regression Model - ignoring individual variations (speakers or words) may lead to Type I Error: "a chance effect is mistaken for a real difference between the populations"

Mixed Regression Model - prone to Type II Error: "if speaker variation is at a high level, we cannot discern small population effects without a large number of speakers" (Johnson 2009, 2015)

Mixed Effect Regression

Mixed Model = fixed effects + random effects

Fixed-effect factor - “repeatable and a small number of levels”

Random-effect factor - “a non-repeatable random sample from a larger population” (Wieling 2012)

- **walk**, **sleep**, **study**, **finish**, **eat**, **etc**
- **event verb, stative verb**
- **speaker1**, **speaker3**, **speaker3**, **etc**
- **male, female**

Mixed Effect Regression

Mixed Model = fixed effects + random effects

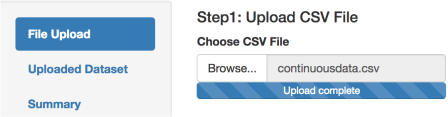
Fixed-effect factor - "repeatable and a small number of levels"

Random-effect factor - "a non-repeatable random sample from a larger population" (Wieling 2012)

- **walk, sleep, study, finish, eat, etc**
- **event verb, stative verb**
- **speaker1, speaker3, speaker3, etc**
- **male, female**

Preparing for Mixed Model

1. Download **continuousdata.csv**
2. Upload this file on LVS



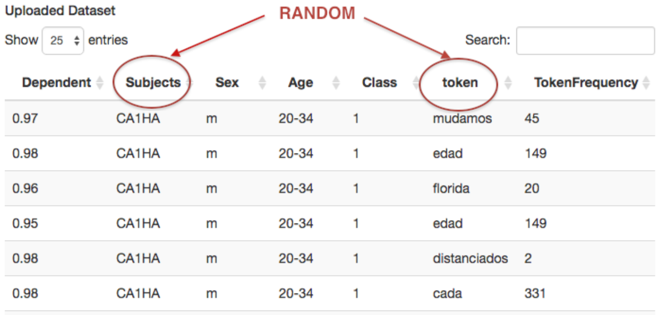
Step1: Upload CSV File

Choose CSV File

Browse... continuousdata.csv

Upload complete

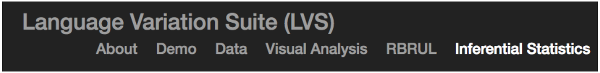
Data - Uploaded Dataset

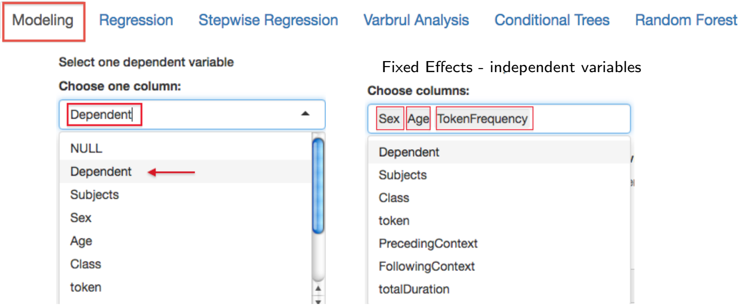


Uploaded Dataset

Dependent	Subjects	Sex	Age	Class	token	TokenFrequency
0.97	CA1HA	m	20-34	1	mudamos	45
0.98	CA1HA	m	20-34	1	edad	149
0.96	CA1HA	m	20-34	1	florida	20
0.95	CA1HA	m	20-34	1	edad	149
0.98	CA1HA	m	20-34	1	distanciados	2
0.98	CA1HA	m	20-34	1	cada	331

Mixed Effect Modeling



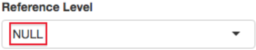


Select one dependent variable

Choose one column: Dependent

Fixed Effects - independent variables

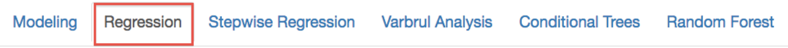
Choose columns: Sex Age TokenFrequency

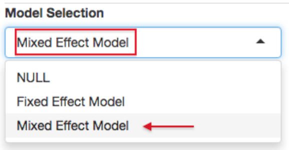


Reference Level: NULL

NULL when the dependent variable is continuous

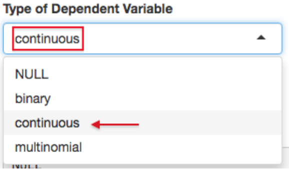
Mixed Effect Modeling


Modeling | Regression | Stepwise Regression | Varbrul Analysis | Conditional Trees | Random Forest


Model Selection

Mixed Effect Model

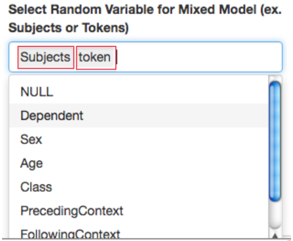
- NULL
- Fixed Effect Model
- Mixed Effect Model


Type of Dependent Variable

continuous

- NULL
- binary
- continuous
- multinomial

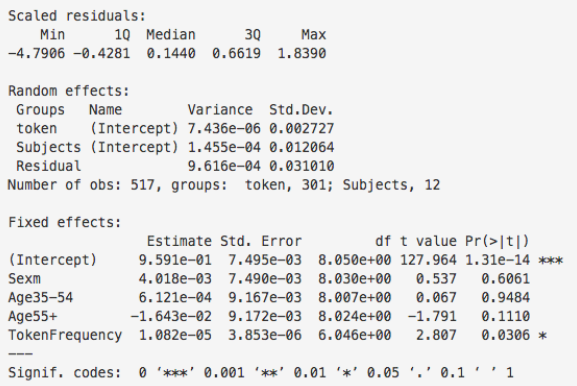
Mixed Effects - group-internal variation


Select Random Variable for Mixed Model (ex. Subjects or Tokens)

Subjects token

- NULL
- Dependent
- Sex
- Age
- Class
- PrecedingContext
- FollowingContext

Regression Results

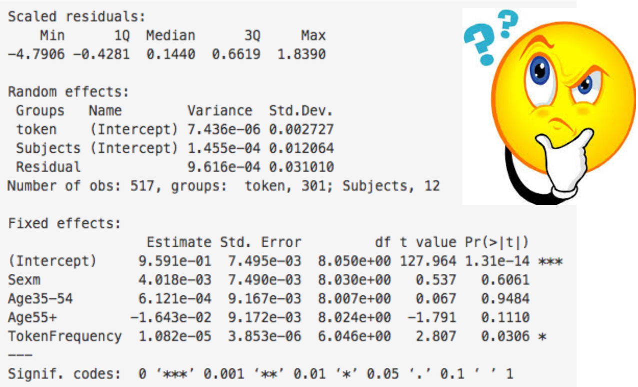


```
Scaled residuals:
    Min      1Q  Median      3Q     Max
-4.7906 -0.4281  0.1440  0.6619  1.8390

Random effects:
 Groups   Name        Variance  Std.Dev.
 token    (Intercept) 7.436e-06 0.002727
 Subjects (Intercept) 1.455e-04 0.012064
 Residual             9.616e-04 0.031010
Number of obs: 517, groups:  token, 301; Subjects, 12

Fixed effects:
                 Estimate Std. Error        df t value Pr(>|t|)
(Intercept)     9.591e-01  7.495e-03 8.050e+00 127.964 1.31e-14 ***
Sexm            4.018e-03  7.490e-03 8.030e+00   0.537   0.6061
Age35-54        6.121e-04  9.167e-03 8.007e+00   0.067   0.9484
Age55+         -1.643e-02  9.172e-03 8.024e+00  -1.791   0.1110
TokenFrequency  1.082e-05  3.853e-06 6.046e+00   2.807   0.0306 *
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

Regression Results

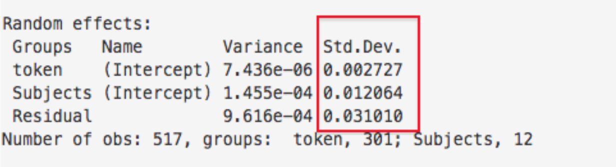


```
Scaled residuals:
    Min      1Q  Median      3Q     Max
-4.7906 -0.4281  0.1440  0.6619  1.8390

Random effects:
 Groups   Name        Variance  Std.Dev.
 token    (Intercept) 7.436e-06 0.002727
 Subjects (Intercept) 1.455e-04 0.012064
 Residual             9.616e-04 0.031010
Number of obs: 517, groups:  token, 301; Subjects, 12

Fixed effects:
                 Estimate Std. Error        df t value Pr(>|t|)
(Intercept)     9.591e-01  7.495e-03 8.050e+00 127.964 1.31e-14 ***
Sexm            4.018e-03  7.490e-03 8.030e+00   0.537   0.6061
Age35-54        6.121e-04  9.167e-03 8.007e+00   0.067   0.9484
Age55+         -1.643e-02  9.172e-03 8.024e+00  -1.791   0.1110
TokenFrequency  1.082e-05  3.853e-06 6.046e+00   2.807   0.0306 *
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

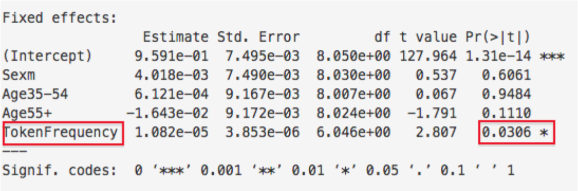
Interpretation - Random Effects



```
Random effects:
 Groups   Name        Variance  Std.Dev.
 token    (Intercept) 7.436e-06 0.002727
 Subjects (Intercept) 1.455e-04 0.012064
 Residual             9.616e-04 0.031010
Number of obs: 517, groups:  token, 301; Subjects, 12
```

1. **Standard Deviation**: a measure of the variability for each random effect (speakers and tokens)
2. **Residual**: random variation that is not due to speakers or tokens (residual error)

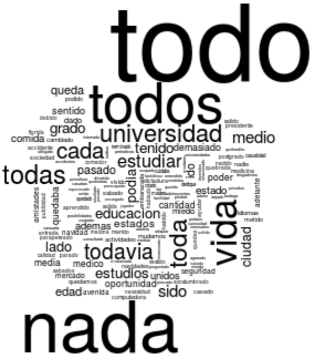
Interpretation - Fixed Effects



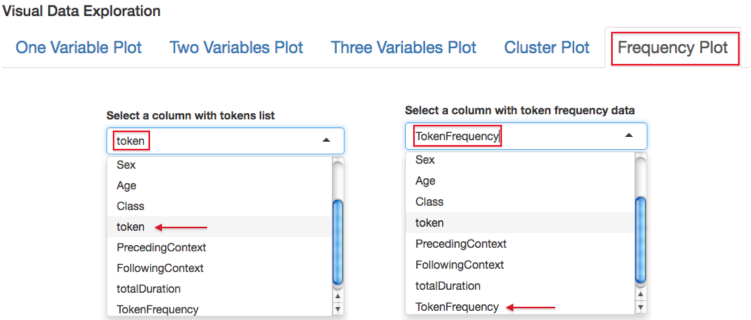
```
Fixed effects:
                 Estimate Std. Error        df t value Pr(>|t|)    
(Intercept)     9.591e-01  7.495e-03  8.050e+00 127.964 1.31e-14 ***
Sexm            4.018e-03  7.490e-03  8.030e+00   0.537   0.6061    
Age35-54        6.121e-04  9.167e-03  8.007e+00   0.067   0.9484    
Age55+         -1.643e-02  9.172e-03  8.024e+00  -1.791   0.1110    
TokenFrequency  1.082e-05  3.853e-06  6.046e+00   2.807   0.0306 *  
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

1. **Estimate/coefficient**: reported in log-odds (negative or positive)
2. **P-value**: tells you if the level is significant

Bonus - Word Clouds



Frequency Plot



Visual Data Exploration

One Variable Plot | Two Variables Plot | Three Variables Plot | Cluster Plot | Frequency Plot

Select a column with tokens list

token

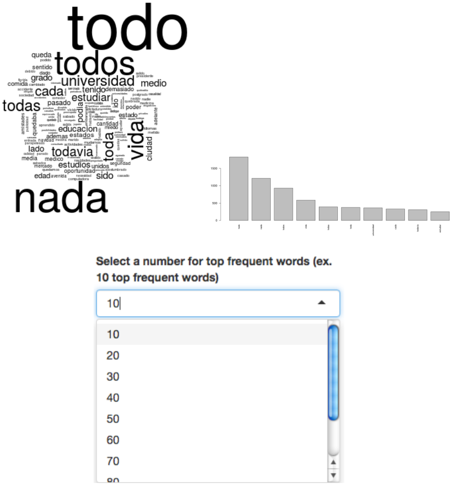
- Sex
- Age
- Class
- token
- PrecedingContext
- FollowingContext
- totalDuration
- TokenFrequency

Select a column with token frequency data

TokenFrequency

- Sex
- Age
- Class
- token
- PrecedingContext
- FollowingContext
- totalDuration
- TokenFrequency

Frequency Plot

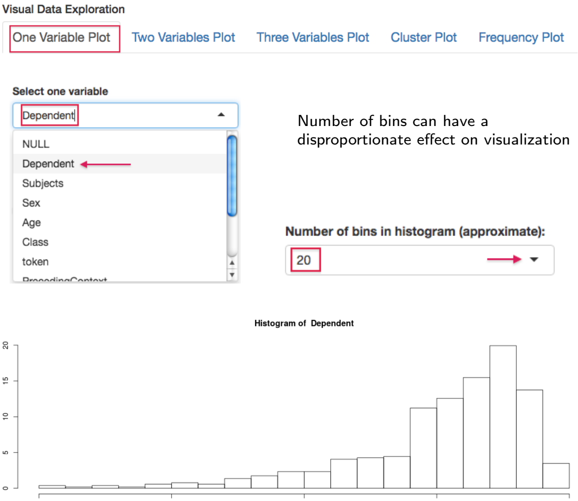


Select a number for top frequent words (ex. 10 top frequent words)

10

10
20
30
40
50
60
70
80

Appendix 1: Density



Visual Data Exploration

Select one variable

Dependent

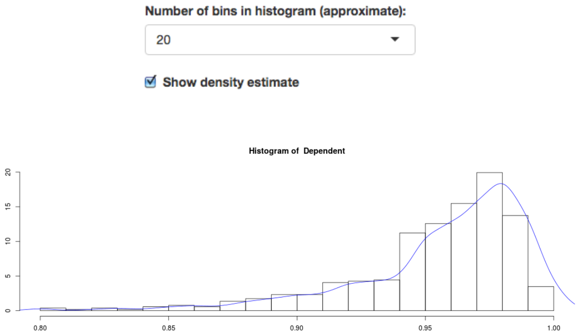
Number of bins in histogram (approximate):

20

Number of bins can have a disproportionate effect on visualization

Histogram

Density: a non-parametric model of the distribution of points based on a smooth density estimate



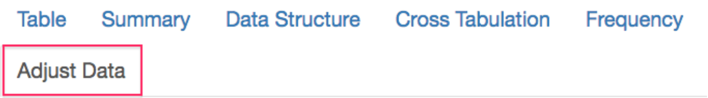
Number of bins in histogram (approximate):

20

☑ Show density estimate

http://scikit-learn.org/stable/modules/density.html

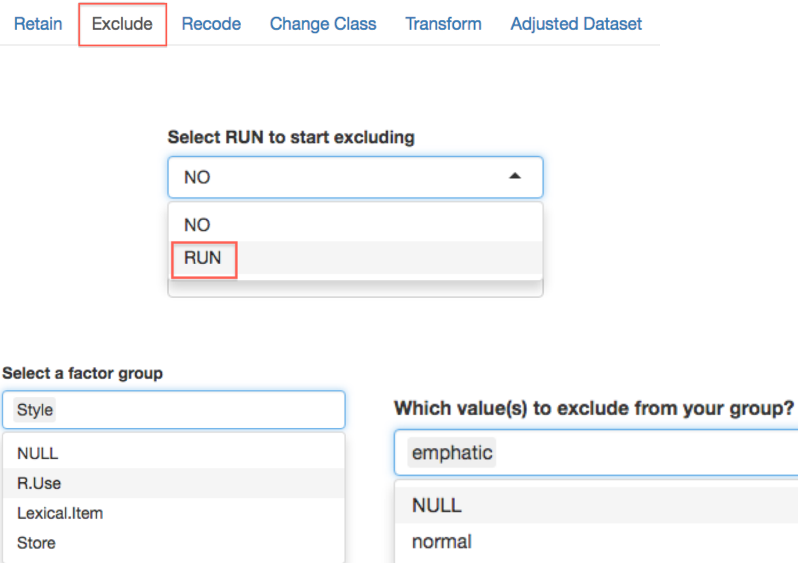
Appenix 2 - Data Modification



Adjust Data

- **Retain**: Select data subset
- **Exclude**: Exclude variables from a factor group
- **Recode**: Combine and rename variables
- **Change class**: Numeric → factor; factor → numeric
- **Transform**: Apply log transformation to a specific column
- **ADJUSTED DATASET**:
  - **Run** - to apply all above changes
  - **Reset** - to reset to the original dataset

Exclude: Emphatic Style



Select RUN to start excluding

NO

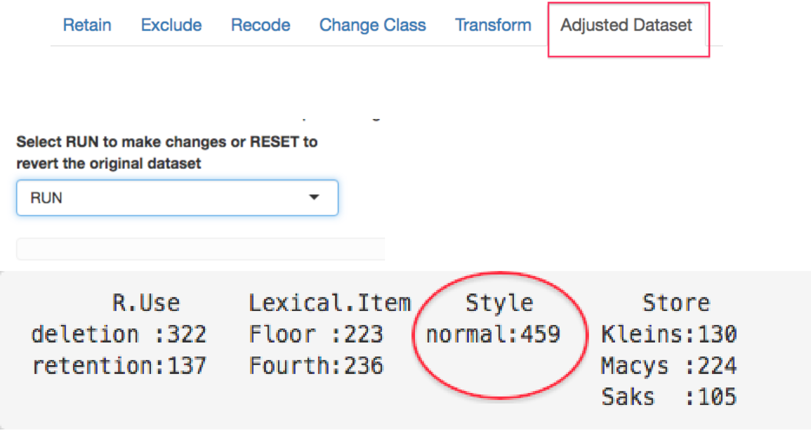
Select a factor group

Style

Which value(s) to exclude from your group?

emphatic

Adjusted Dataset

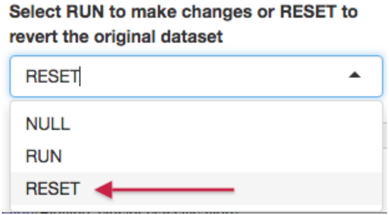


Select RUN to make changes or RESET to revert the original dataset

```
      R.Use       Lexical.Item    Style        Store
 deletion :322   Floor :223    normal:459   Kleins:130
 retention:137   Fourth:236                 Macys :224
                                            Saks  :105
```

Adjusting Dataset

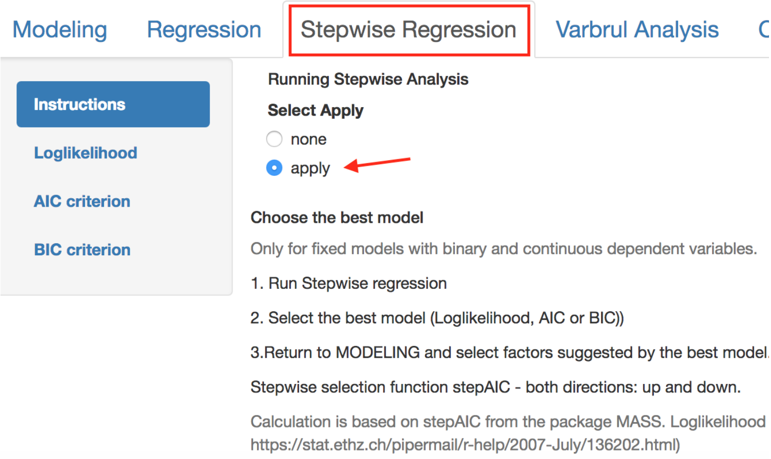
To revert to the original data, select **RESET**:



Select RUN to make changes or RESET to revert the original dataset

RESET

Appendix 3 - Model Comparison



Running Stepwise Analysis

Select Apply

○ none

● apply

Choose the best model

Only for fixed models with binary and continuous dependent variables.

1. Run Stepwise regression

2. Select the best model (Loglikelihood, AIC or BIC))

3.Return to MODELING and select factors suggested by the best model.

Stepwise selection function stepAIC - both directions: up and down.

Calculation is based on stepAIC from the package MASS. Loglikelihood https://stat.ethz.ch/pipermail/r-help/2007-July/136202.html)

Thank you!

obscrivn@indiana.edu

What features/analyses would you like to see in LVS?

References I

[1] Baayen, Harald. 2008. *Analyzing linguistic data: A practical introduction to statistics*. Cambridge: Cambridge University Press

[2] Bentivoglio, Paola and Mercedes Sedano. 1993. Investigación sociolingüística: sus métodos aplicados a una experiencia venezolana. Boletín de Lingüística 8. 3-35

[3] Gries, Stefan Th. 2015. *Quantitative designs and statistical techniques*. In Douglas Biber Randi Reppen (eds.), The Cambridge Handbook of English Corpus Linguistics. Cambridge: Cambridge University Press

[4] Labov, W. 1966. The Social Stratification of English in New York City. Washington: Center for Applied Linguistics

[5] Schnapp, Jeffrey, and Peter Presner. 2009. Digital Humanities Manifesto 2.0.

[6] http://gifsanimados.espaciolatino.com/x_bob_esponja_8.gif

[7] https://daniellestolt.files.wordpress.com/2013/01/are-you-ready1.gif

[8] http://www.martijnwieling.nl/R/sheets.pdf