

Package ‘NDRa’

April 7, 2019

Title Generate Simulated Naming Latencies and Pronunciations in the NDRa Model

Version 1.0

Description The NDRa model is a single-route model of response times in the reading aloud task. This package allows users to generate simulated naming latencies and pronunciations for words and nonwords in the NDRa model.

Depends R (>= 3.3.3), ndl, pbapply, parallel

Imports ndl, pbapply, parallel

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Encoding UTF-8

LazyData yes

RoxygenNote 6.1.1.9000

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elp	<i>Input lexicon ELP simulations</i>
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Description

The input lexicon used for the ELP simulations in Hendrix (2018).

Usage

elp

Format

A data frame with 2,510 rows and 4 columns:

Word a mono-syllabic mono-morphemic word

Pron the pronunciation of the word in DISC format

Gestures an approximation of the acoustic gestures required for the pronunciation of the word through demi-syllables (see Klatt, 1979)

RTnaming the naming latency for the word in the English Lexicon Project (ELP, Balota et al. (2007)

Source

Balota, D. A., Yap, M. J., Hutchison, K. A., Cortese, M. J., Kessler, B., Loftis, B., Neely, J. H., Nelson, D. L., Simpson, G. B., & Treiman, R. (2007). The English lexicon project. *Behavior research methods*, 39(3), 445-459.

References

Hendrix, P, Ramscar, M., & Baayen, R. H. (2019). NDRa: a single route model of response times in the reading aloud task based on discriminative learning. Manuscript.

Klatt, D. H. (1979). Speech perception: a model of acoustic-phonetic analysis and lexical access. *Journal of Phonetics*, 7, 279-312.

gestures

Define gestures

Description

Generate gestures for a word or nonword.

Usage

```
gestures(pron = "b8r")
```

Arguments

pron The pronunciation of a word or nonword in DISC notation

Examples

```
# Load data for the ELP simulations in Hendrix (2018)
data(elp)

# Define gestures
elp$Gestures = sapply(elp$Phon, gestures)
```

simulateNDRa

*Generate simulated naming latencies and pronunciations***Description**

Generate simulated pronunciation for a set of words or nonwords. `lexicon` A dataframe with the columns "Word" and "Gestures". "Gestures" are demi-syllables (see Klatt, 1979).

Usage

```
simulateNDRa(lexicon = lex, weightsSem = weights_sem,
  weightsPhon = weights_phon, parameters = list(wSem = 0.2, wPhon1 =
    0.05, wPhon2 = 0.098, wH = 0.152, wCompl = 1.27, backoff = 0.01, wlex =
    4.7, N = 20, wAct = 0.055, rtConst = 450), parallel = TRUE,
  numCores = detectCores(), verbose = TRUE)
```

Arguments

<code>weightsSem</code>	An orthography-to-semantics weight matrix with letter unigrams and bigrams as cues and words as outcomes. The default, "weights_sem" uses the weight matrix from Hendrix et al. (2018).
<code>weightsPhon</code>	A phonology-to-semantic weight matrix. The default, "weights_phon" uses the weight matrix from Hendrix (2018).
<code>parameters</code>	A list with the model parameters "wSem", "wPhon1", "wPhon2", "wH", "wCompl", "backoff", "wlex", "N", "wAct", and "rtConst". The default values are the values used by Hendrix (2018). For more information, also see Hendrix (2018).
<code>parallel</code>	Should computations be carried out in parallel? Defaults to TRUE.
<code>numCores</code>	The number of cores to use for parallel computation. By default all available cores are used.

References

Hendrix, P, Ramscar, M., & Baayen, R. H. (2019). NDRa: a single route model of response times in the reading aloud task based on discriminative learning. Manuscript.

Klatt, D. H. (1979). Speech perception: a model of acoustic-phonetic analysis and lexical access. *Journal of Phonetics*, 7, 279-312.

Examples

```
# Load data for the ELP simulations in Hendrix (2018)
data(elp)

# Generate simulated naming latencies and pronunciations
elp = simulateNDRa(elp)
```

simulatePronunciations

Generate simulated pronunciations

Description

Generate simulated pronunciation for a set of words or nonwords.

Usage

```
simulatePronunciations(lexicon = lex, weightsSem = weights_sem,
  weightsPhon = weights_phon, parallel = TRUE,
  numCores = detectCores(), verbose = TRUE)
```

Arguments

lexicon	A dataframe with the columns "Word" and "Gestures". "Gestures" are demi-syllables (see Klatt, 1979) and can be generated using <code>gestures()</code> .
weightsSem	An orthography-to-semantics weight matrix with letter unigrams and bigrams as cues and words as outcomes. The default, "weights_sem" uses the weight matrix from Hendrix et al. (2018).
weightsPhon	A phonology-to-semantic weight matrix with demi-syllables as cues and words as outcomes. The default, "weights_phon" uses the weight matrix from Hendrix et al. (2018).
parallel	Should computations be carried out in parallel? Defaults to TRUE.
numCores	The number of cores to use for parallel computation. By default all available cores are used.

References

- Hendrix, P, Ramscar, M., & Baayen, R. H. (2019). NDRa: a single route model of response times in the reading aloud task based on discriminative learning. Manuscript.
- Klatt, D. H. (1979). Speech perception: a model of acoustic-phonetic analysis and lexical access. *Journal of Phonetics*, 7, 279-312.

Examples

```
# Load data for the ELP simulations in Hendrix (2018)
data(elp)

# Generate simulated pronunciations for a lexicon
elp$SimPron = simulatePronunciations(elp)
```

simulateRTs	<i>Generate simulated naming latencies</i>
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Description

Generate simulated naming latencies for a set of words or nonwords.

Usage

```
simulateRTs(lexicon = lex, weightsSem = weights_sem,
  weightsPhon = weights_phon, parameters = list(wSem = 0.2, wPhon1 =
    0.05, wPhon2 = 0.098, wH = 0.152, wCompl = 1.27, backoff = 0.01, wlex =
    4.7, N = 20, wAct = 0.055, rtConst = 450), verbose = TRUE)
```

Arguments

lexicon	A dataframe with the columns "Word" and "Gestures". "Gestures" are demi-syllables (see Klatt, 1979) and can be generated using <code>gestures()</code> .
weightsSem	An orthography-to-semantics weight matrix with letter unigrams and bigrams as cues and words as outcomes. The default, "weights_sem" uses the weight matrix from Hendrix et al. (2018).
weightsPhon	A phonology-to-semantic weight matrix with demi-syllables as cues and words as outcomes. The default, "weights_phon" uses the weight matrix from Hendrix et al. (2018).
parameters	A list with the model parameters "wSem", "wPhon1", "wPhon2", "wH", "wCompl", "backoff", "wlex", "N", "wAct", and "rtConst". The default values are the values used by Hendrix (2018). For more information, also see Hendrix et al. (2018).

References

Hendrix, P, Ramscar, M., & Baayen, R. H. (2019). NDRa: a single route model of response times in the reading aloud task based on discriminative learning. Manuscript.

Klatt, D. H. (1979). Speech perception: a model of acoustic-phonetic analysis and lexical access. *Journal of Phonetics*, 7, 279-312.

Examples

```
# Load data for the ELP simulations in Hendrix (2018)
data(elp)

# Generate simulated naming latencies
elp$SimRT = simulateSimRTs(elp)

# Evaluate simulated naming latencies
cor(elp$SimRT, -1000/elp$RTnaming)
```

weights_phon	<i>Phonology to semantics weight matrix</i>
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Description

Phonology to semantics weight matrix generated with version 0.2.18 of the ndl package.

Usage

weights_phon

Format

A matrix with 1,228 rows and 3,198 columns:

rows demi-syllables (see Klatt, 1979)

columns words

Source

Hendrix, P, Ramscar, M., & Baayen, R. H. (2019). NDRa: a single route model of response times in the reading aloud task based on discriminative learning. Manuscript.

References

Klatt, D. H. (1979). Speech perception: a model of acoustic-phonetic analysis and lexical access. *Journal of Phonetics*, 7, 279-312.

weights_sem	<i>Orthography to semantics weight matrix</i>
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Description

Orthography to semantics weight matrix generated with version 0.2.18 of the ndl package.

Usage

weights_sem

Format

A matrix with 754 rows and 3,198 columns:

rows letter unigrams and bigrams

columns words

Source

Hendrix, P, Ramscar, M., & Baayen, R. H. (2019). NDRa: a single route model of response times in the reading aloud task based on discriminative learning. Manuscript.

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