Package 'NDRa'

April 6, 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

Imports ndl, pbapply

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Encoding UTF-8

LazyData yes

RoxygenNote 6.1.1.9000

R topics documented:

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elp	*Input lexicon ELP simulations*

Description

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

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Usage

```
elp
```

Format

A data frame with 2,524 rows and 3 columns:

Word a mono-syllabic mono-morphemic word

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.

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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$SimRT = sapply(elp$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 colums "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), parallel = TRUE, numCores = detectCores(),
  verbose = TRUE)
```

Arguments

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. The default, "weigths_phon" uses the weight matrix from Hendrix (2018).
parameters	A list with the model parameters "wSem", "wPhon1", "wPhon2", "wH", "wCompl", "backoff", "wlex", and "N". The default values are the values used by Hendrix (2018). For more information, also see Hendrix (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 naming latencies and pronunciations
elp$SimPron = simulate(elp$Word)
```

---

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 colums "Word" and "Gestures". "Gestures" are demi-syllables (see Klatt, 1979) and can be generated using gestures().
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, "weigths_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$SimPron = simulatePronunciations(elp$Word)
```

simulateRTs	*Generate simulated naming latencies*

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), verbose = TRUE)
```

Arguments

lexicon	A dataframe with the colums "Word" and "Gestures". "Gestures" are demi-syllables (see Klatt, 1979) and can be generated using gestures().
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, "weigths_phon" uses the weight matrix from Hendrix et al. (2018).
parameters	A list with the model parameters "wSem", "wPhon1", "wPhon2", "wH", "wCompl", "backoff", "wlex", and "N". 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   *Phonology to semantics weight matrix*

Description

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

Usage

```
weights_phon
```

Format

A matrix with 1,358 rows and 3,908 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.

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weights_sem   *Orthography to semantics weight matrix*

Description

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

Usage

```
weights_sem
```

Format

A matrix with 664 rows and 6,768 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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