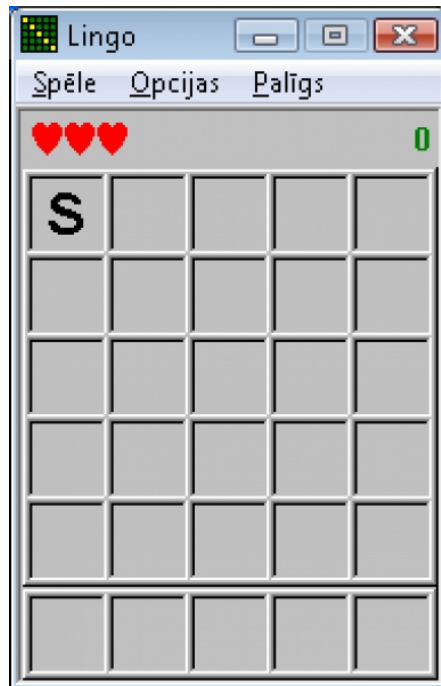


How Masterly Are People at Playing with Their Vocabulary?

Matīss Rikters, Sanita Reinsone

Word games

- Lingo (~1995)
- Wordle (Oct. 2021)
- Vārdulis (Jan. 2022)



– Estonian versions:

<https://uudis.net/wordle>

<https://sonuk.subscribe.ee>

<https://sonar.ajad.ee>

– Latvian versions:

<https://wordle.lielakeda.lv>

<https://ralfulis.vercel.app>

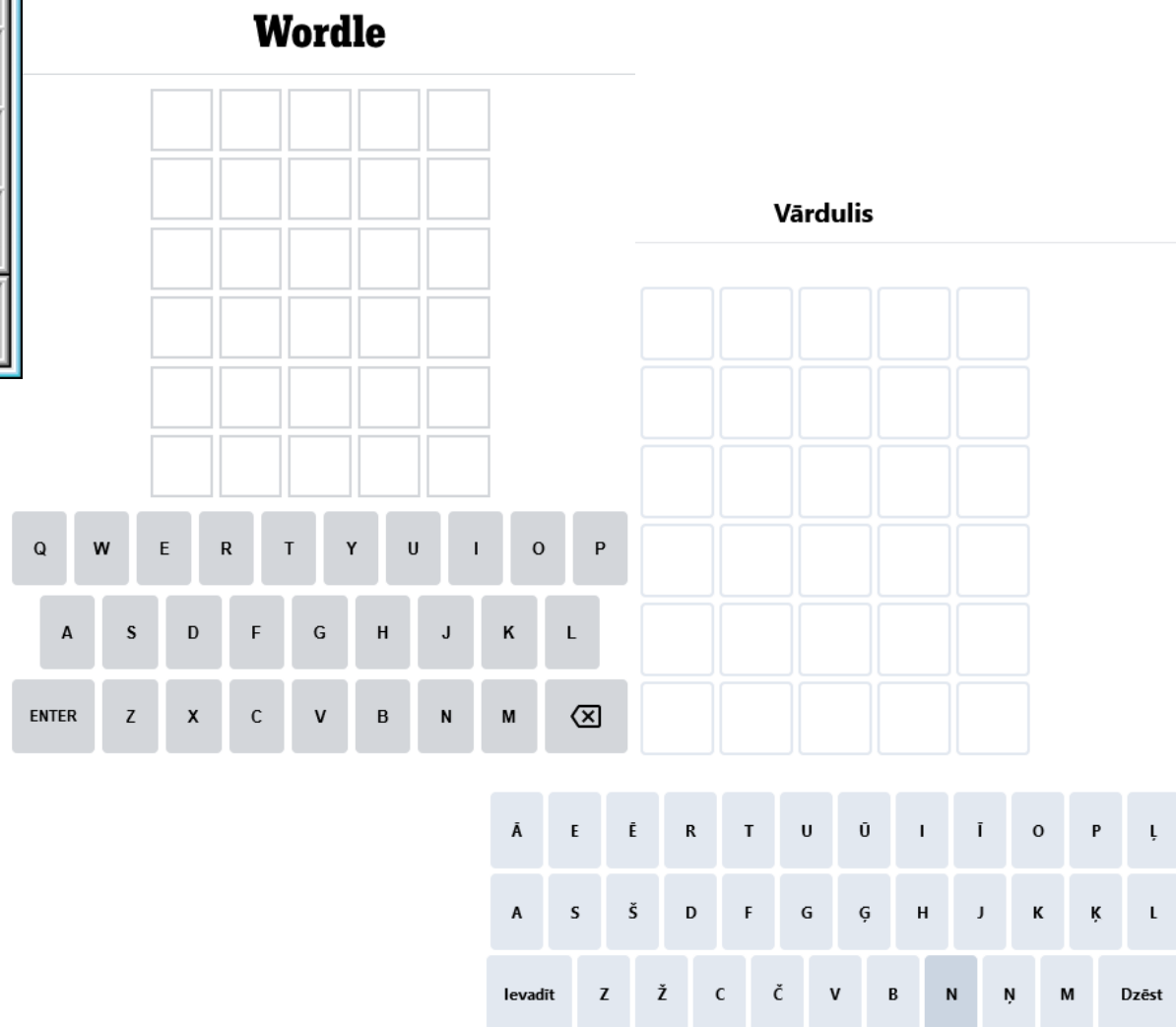
<https://vardulis.lv>

– Lithuanian versions:


<https://jakut.is/vordl>

<https://dienos-zodis.lt>

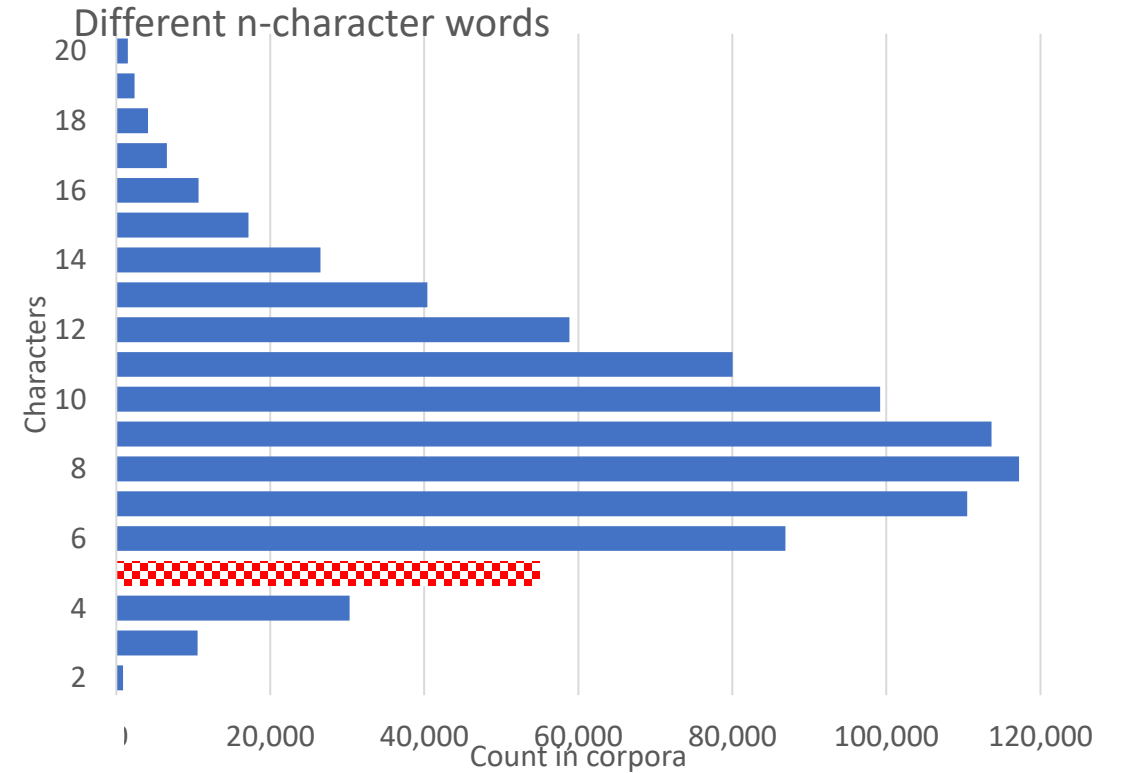
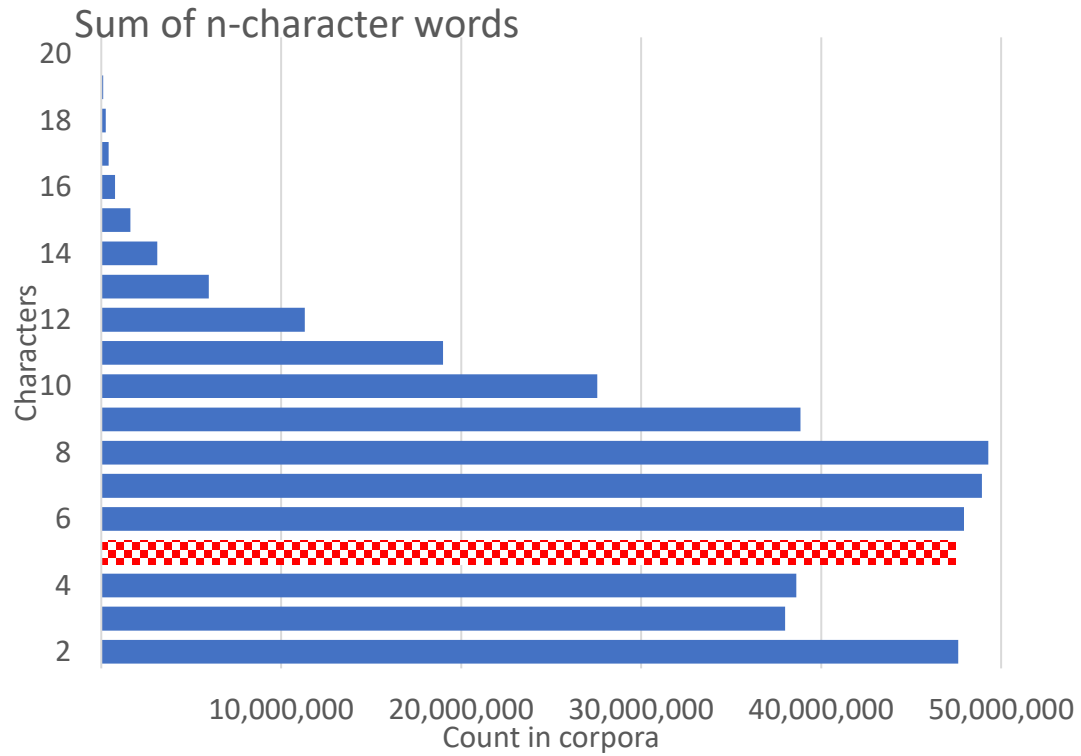
<https://wordle.dario.cat>



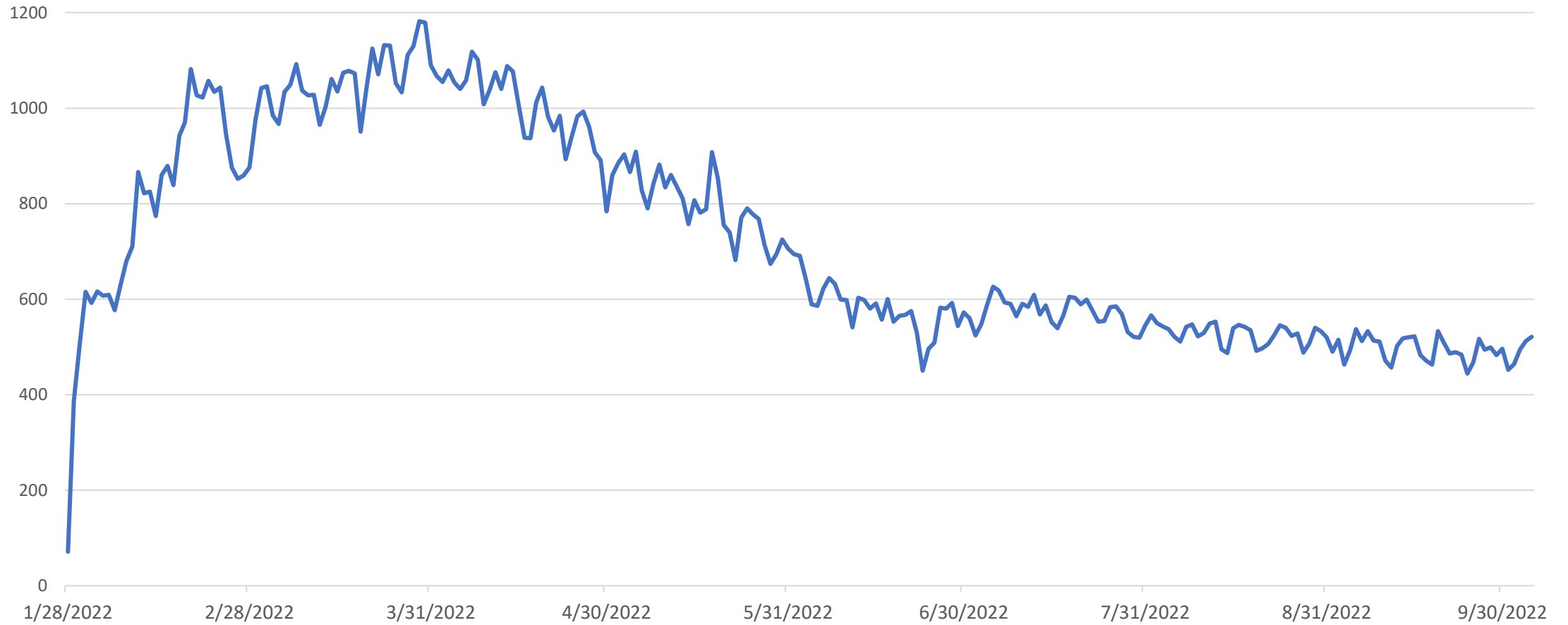
Game construction

- <https://github.com/cwackerfuss/react-wordle> 
 - Used to create alternatives in 49 different languages
 - Also, 36 special thematic, and 22 math, science or technology oriented versions
- Word lists for Latvian
 - Monolingual corpora from Opus
 - Tokenised, filtered out <>5char words and any containing non-alphabetical chars
 - 1500 most frequent 5char words used as the main list for daily guessing
 - 1430 after manual filtering
 - Remaining words cross-referenced with tezaurs.lv and kept as the valid guess list
 - Further 3-8char words automatically inflected to other wordforms, and all resulting 5char wordforms also added to the secondary list, resulting in a total of 22,341 unique 5 character words

N-character n-grams



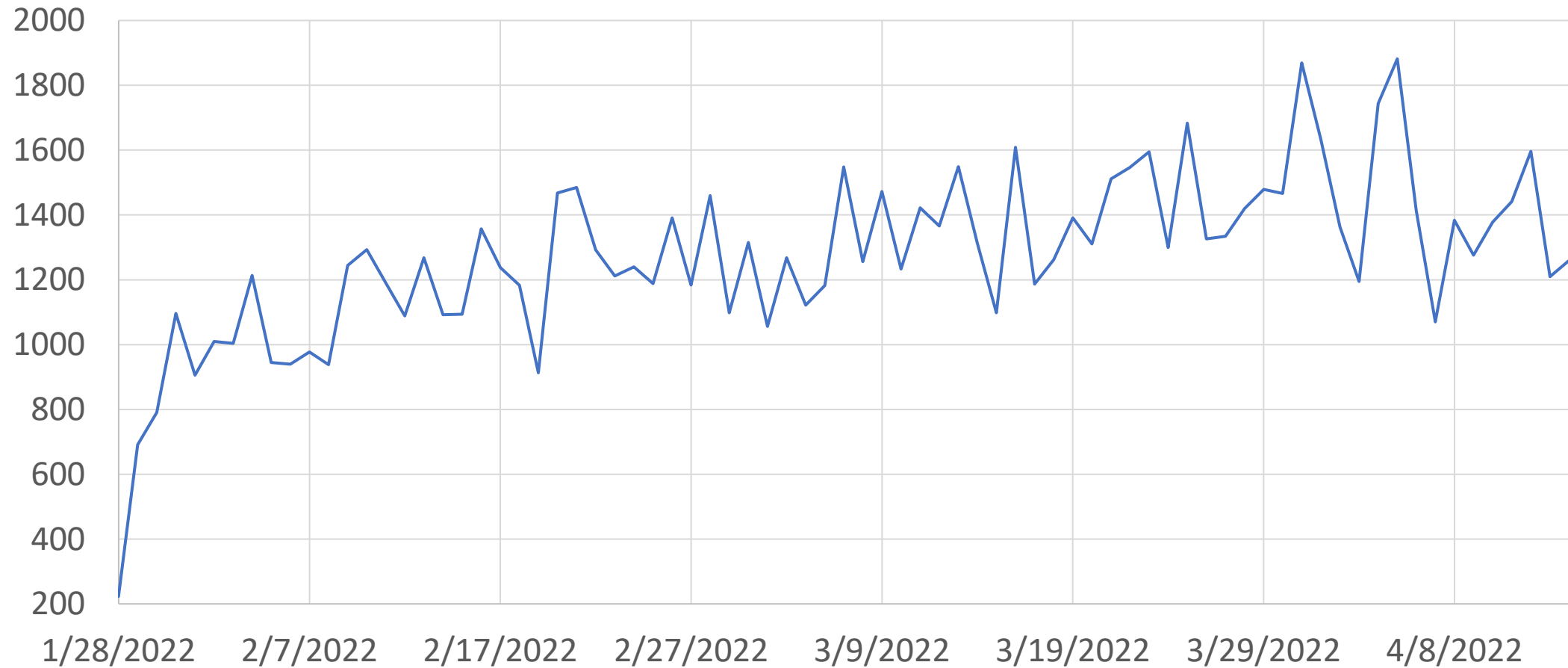
Plays per day



Top 15 guesses at each turn

| First guess | | | | Second guess | | | | Third guess | | | |
|--------------|---------|----------|-------|--------------|--------|----------|-------|--------------|---------|--------------|-------|
| LV | EN | Tag | Count | LV | EN | Tag | Count | LV | EN | Tag | Count |
| SAULE | Sun | N nom sg | 5341 | LAIKS | Time | N nom sg | 412 | LAIKS | Time | N nom sg | 433 |
| SIENA | Wall | N nom sg | 3179 | SAULE | Sun | N nom sg | 355 | TIESA | Court | N nom sg | 334 |
| TIESA | Court | N nom sg | 1579 | DIENA | Day | N nom sg | 337 | TAUKI | Fat | N nom pl | 295 |
| DIENA | Day | N nom sg | 1476 | LIEPA | Linden | N nom sg | 290 | LIETU | Thing | N acc sg | 273 |
| LAIME | Luck | N nom sg | 1449 | KAĶIS | Cat | N nom sg | 284 | PUSEI | Half | N dat sg | 271 |
| PIENS | Milk | N nom sg | 1237 | PIENS | Milk | N nom sg | 266 | LAIKU | Time | N acc sg | 247 |
| MAIZE | Bread | N nom sg | 1217 | ĀBOLS | Apple | N nom sg | 262 | PRECE | Product | N nom sg | 230 |
| LIEPA | Linden | N nom sg | 1159 | SAULĒ | Sun | N loc sg | 207 | DIEVS | God | N nom sg | 225 |
| SAITE | Link | N nom sg | 958 | SIENA | Wall | N nom sg | 205 | LIKTS | Put | V ptcp pst m | 224 |
| KASTE | Box | N nom sg | 952 | LIETA | Thing | N nom sg | 204 | PUSES | Halves | N nom pl | 214 |
| ĀBOLS | Apple | N nom sg | 950 | MAIZE | Bread | N nom sg | 203 | TIRGU | Market | N acc sg | 214 |
| KAĶIS | Cat | N nom sg | 869 | RIEPA | Tire | N nom sg | 192 | TĒRPU | Outfit | N acc sg | 206 |
| IELAS | Streets | N nom pl | 676 | LAIME | Luck | N nom sg | 188 | MIERU | Peace | N acc sg | 201 |
| SKOLA | School | N nom sg | 673 | TAUKI | Fat | N nom pl | 175 | REIZĒ | At once | Adv | 200 |

Unique word forms used



Easiest words to guess

| Latvian | LAIKS | TIESA | TAUKI | GARĀM | PUSEI | LIKTS | DIEVS | TĒRPU | PRECE | MIERU | AVG |
|---------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|------------|
| English | Time | Court | Fat | Past | Half | Put | God | Outfit | Product | Peace | |
| Tag | N nom sg | N nom sg | N nom pl | Adv | N dat sg | V ptcp pst m | N nom sg | N acc sg | N nom sg | N acc sg | |
| In the corpus | 176,409 | 88,330 | 8,474 | 23,569 | 10,574 | 6,699 | 31,497 | 4,961 | 22,387 | 15,178 | 38,808 |
| Guess 1 | 1.97% | 3.41% | 1.95% | 0.58% | 0.85% | 0.83% | 2.58% | 0.76% | 1.06% | 1.16% | 1.52% |
| Guess 2 | 17.53% | 10.71% | 7.39% | 2.31% | 3.02% | 3.43% | 7.27% | 1.70% | 5.66% | 3.87% | 6.29% |
| Guess 3 | 31.84% | 28.63% | 27.93% | 14.45% | 25.14% | 20.04% | 19.31% | 14.84% | 21.21% | 18.47% | 22.19% |
| Guess 4 | 28.00% | 30.96% | 31.62% | 34.10% | 35.54% | 31.26% | 29.92% | 35.20% | 31.77% | 29.69% | 31.81% |
| Guess 5 | 13.69% | 15.38% | 18.89% | 30.83% | 20.98% | 26.99% | 22.08% | 28.33% | 23.03% | 27.37% | 22.76% |
| Guess 6 | 4.65% | 6.72% | 7.08% | 12.24% | 8.79% | 11.69% | 13.00% | 12.89% | 10.56% | 12.48% | 10.01% |
| Failed | 2.33% | 4.19% | 5.13% | 5.49% | 5.67% | 5.75% | 5.83% | 6.28% | 6.72% | 6.96% | 5.44% |

What makes it easy?

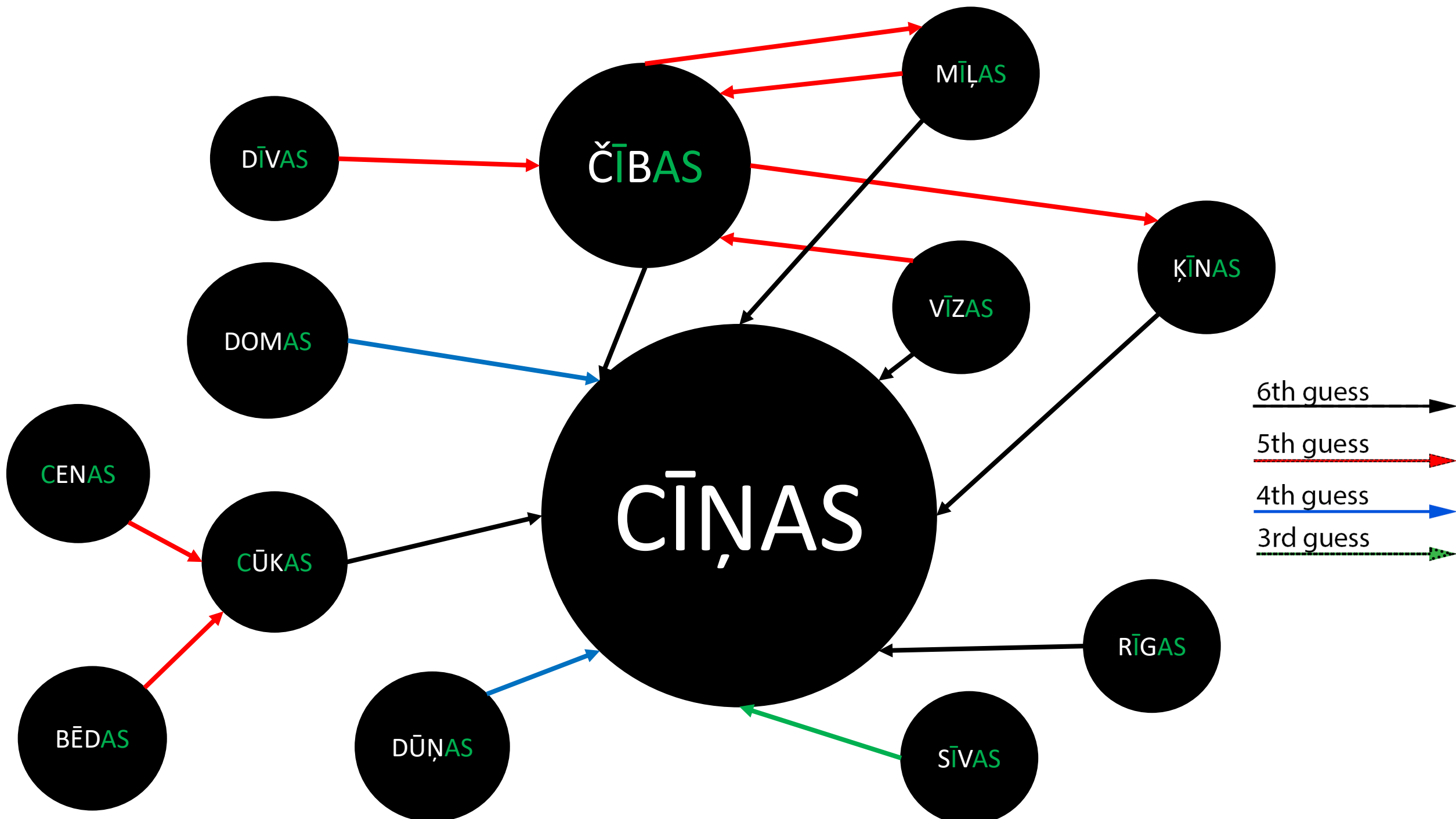
- No repeating characters
- Basic inflections
- Nominative
- Singular

Most difficult words to guess

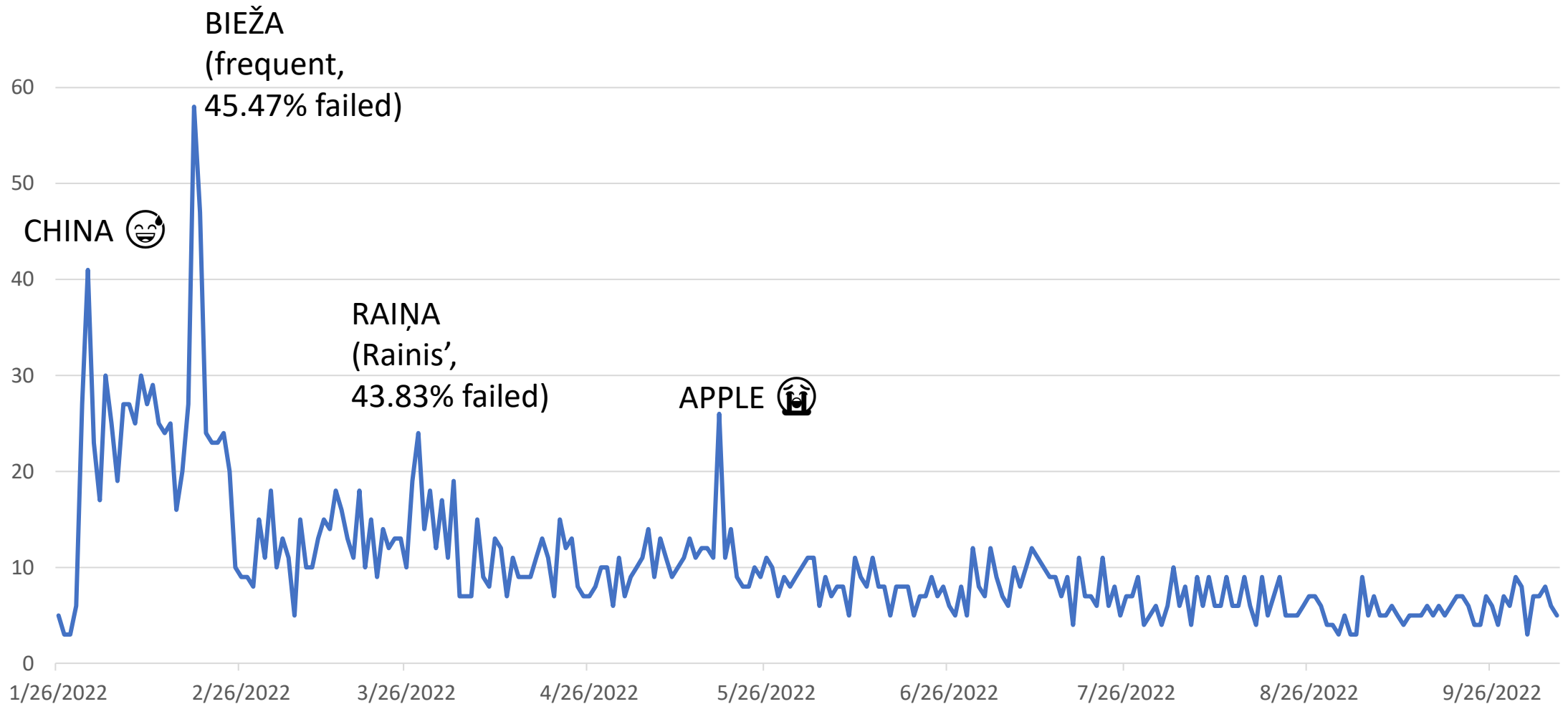
| Latvian | CĪŅAS | KOKUS | KĀRĻA | SEŠAS | BIEŽA | RAIŅA | ŠUVES | DZIĻU | FLĪŽU | JĒGAS | |
|---------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|------------|
| English | Battle | Trees | Carl's | Six | Frequent | Rainis' | Stiches | Deep | Tiles | Sense | AVG |
| Tag | N nom pl | N acc pl | N gen sg | Num nom pl | Adj nom sg | N gen sg | N nom pl | Adj acc sg | N acc pl | N gen sg | |
| In the corpus | 22,832 | 3,582 | 6,726 | 14,564 | 3,732 | 12,752 | 3,535 | 4,535 | 6,690 | 5,371 | 8,432 |
| Guess 1 | 1.33% | 1.01% | 2.44% | 1.47% | 0.65% | 1.89% | 3.25% | 1.15% | 1.56% | 2.82% | 1.76% |
| Guess 2 | 0.76% | 1.69% | 1.14% | 1.18% | 1.39% | 0.63% | 2.44% | 0.49% | 0.73% | 2.82% | 1.33% |
| Guess 3 | 2.29% | 2.70% | 3.08% | 2.65% | 2.68% | 2.43% | 6.18% | 2.46% | 1.56% | 1.41% | 2.74% |
| Guess 4 | 6.29% | 9.97% | 5.36% | 9.56% | 7.95% | 8.01% | 13.01% | 13.46% | 8.72% | 8.45% | 9.08% |
| Guess 5 | 14.11% | 14.36% | 13.31% | 15.29% | 16.73% | 17.10% | 19.51% | 20.69% | 23.12% | 19.72% | 17.39% |
| Guess 6 | 20.21% | 20.44% | 26.62% | 23.97% | 25.14% | 26.10% | 14.80% | 25.78% | 31.47% | 32.39% | 24.69% |
| Failed | 55.00% | 49.83% | 48.05% | 45.88% | 45.47% | 43.83% | 40.81% | 35.96% | 32.84% | 32.39% | 43.01% |

What makes it difficult?

- Diacritics
- Repeating characters
- Various cases
- Plural form



Public Tweets



Public reactions



#vārdulis

- Initial criticism over including words of any inflection
- Also, person names, place names and others
- When difficult words appear, many flock to tezaurs.lv for lookup
 - For example, 'adobe' which means air-dried clay brick



Ilze Apine
@ilzhainis

Viennozīmīgi labāk nekā gānīt valdību vai Elīnu Didrihsoni! :D

11:01 PM · Jan 29, 2022 · Twitter for iPhone

definitely better than being angry at the government or Elina Didrihsone



Alise ✨
@veermeles

Tviterim vajadzētu vienkārši nomierināties un uzspēlēt vārduli 📌

Twitter should just calm down and play Vārdulis.



Signe Gulbe @signegulbe · Jan 29

Replying to @_skabarga

Ja te nečukstētu priekšā, nekad dzīvē neuzminētu.



1



Some accounts you follow often like this Tweeter



Sigita @Sigita1979 · Jan 29

Replying to @_skabarga

Piekrītu. Es arī vienkārši jau tēzaurā meklēju, kādi vispār vārdi var būt Vārdulis 28 5/6

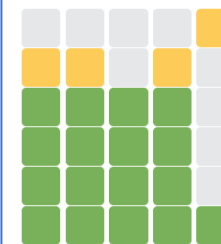


1: If someone hadn't prompted here, I would never guess
2: I agree. I also simply looked up in Tēzauris to see what this could be



Dāvis Vīlums
@DavisVilums

Spēle "Uzmini pareizo locījumu". 🙄
Vārdulis 34 6/6

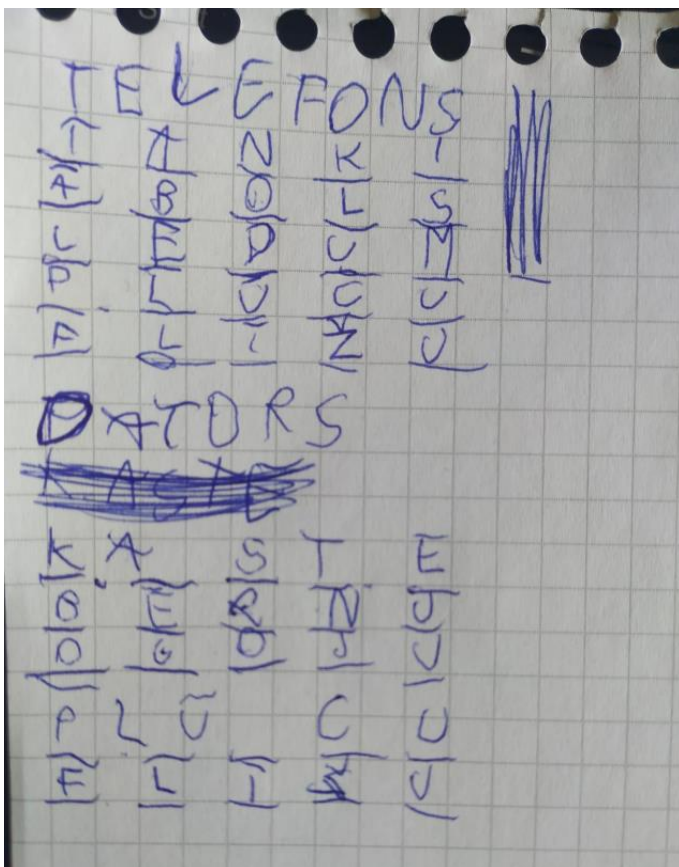


"Guess the correct inflection" game.

Translate Tweet

11:51 AM · Feb 4, 2022 · Twitter Web App

5 y.o. kid's training notes for Vārdulis



Vārdulis as a group / family challenge and daily ritual (curated via WhatsApp groups)

Gaiss @ZaneGaisa

Un cik nopietni jūs spēlējat VĀRDULI @vardulis? Mums ir ģimenes sacensību tabula un arī ceļojošais kauss! 🏆

| | | | | | | | | | |
|----|------------|-----|-----|-----|-----|-----|-----|-----|-----|
| 2 | 01.06./151 | 2 | 3 | 3 | 5 | 7 | 4 | 4 | 3 |
| 3 | 02.06./152 | 4 | 5 | 7 | 6 | 7 | 5 | 5 | 6 |
| 4 | 03.06./153 | 3 | 4 | 5 | 3 | 3 | 4 | 4 | 5 |
| 5 | 04.06./154 | 4 | 7 | 7 | 5 | 7 | 7 | 3 | 5 |
| 6 | 05.06./155 | 3 | 4 | 3 | 4 | 7 | 5 | 4 | 5 |
| 7 | 06.06./156 | 4 | 6 | 3 | 3 | 7 | 5 | 5 | 5 |
| 8 | 07.06./157 | 3 | 4 | 6 | 2 | 7 | 6 | 5 | 7 |
| 9 | 08.06./158 | 3 | 4 | 4 | 3 | 7 | 4 | 4 | 4 |
| 10 | 09.06./159 | 3 | 5 | 4 | 4 | 4 | 6 | 4 | 4 |
| 11 | 10.06./160 | 4 | 3 | 4 | 3 | 7 | 4 | 3 | 3 |
| 12 | 11.06./161 | 6 | 5 | 4 | 3 | 7 | 2 | 4 | 3 |
| 13 | 12.06./162 | 4 | 7 | 5 | 4 | 7 | 6 | 4 | 4 |
| 14 | 13.06./163 | 5 | 4 | 5 | 4 | 7 | 4 | 5 | 4 |
| 15 | 14.06./164 | 4 | 7 | 6 | 3 | 7 | 5 | 4 | 5 |
| 16 | 15.06./165 | 3 | 5 | 5 | 5 | 7 | 4 | 3 | 3 |
| 17 | 16.06./166 | 5 | 4 | 6 | 4 | 7 | 3 | 4 | 4 |
| 18 | 17.06./167 | 4 | 4 | 3 | 3 | 5 | 4 | 5 | 3 |
| 19 | 18.06./168 | 4 | 4 | 3 | 4 | 7 | 3 | 4 | 5 |
| 20 | 19.06./169 | 5 | 4 | 4 | 4 | 7 | 4 | 4 | 4 |
| 21 | 20.06./170 | 4 | 3 | 5 | 4 | 3 | 3 | 1 | 3 |
| 22 | 21.06./171 | 4 | 5 | 4 | 4 | 7 | 5 | 5 | 4 |
| 23 | 22.06./172 | 4 | 5 | 2 | 3 | 7 | 4 | 4 | 4 |
| 24 | 23.06./173 | 5 | 3 | 4 | 2 | 7 | 6 | 4 | 2 |
| 25 | 24.06./174 | 4 | 4 | 7 | 3 | 7 | 6 | 4 | 6 |
| 26 | 25.06./175 | 5 | 4 | 6 | 4 | 7 | 4 | 4 | 5 |
| 27 | 26.06./176 | 4 | 3 | 3 | 5 | 7 | 4 | 4 | 3 |
| 28 | 27.06./177 | 6 | 4 | 5 | 4 | 7 | 4 | 5 | 5 |
| 29 | 28.06./178 | 5 | 4 | 5 | 4 | 4 | 6 | 4 | 5 |
| 30 | 29.06./179 | 4 | 6 | 5 | 4 | 7 | 4 | 5 | 4 |
| 31 | 30.06./180 | 3 | 3 | 3 | 3 | | | 2 | 3 |
| 32 | | | | | | | | | |
| 33 | | | | | | | | | |
| 34 | | 121 | 133 | 136 | 112 | 187 | 131 | 120 | 126 |

And how seriously do you play Vārdulis? We have a family competition table and also a travelling cup!

Vārduļa banda
The Vārdulis Gang

Inita 31/08/2022
Labrīt!
Vārdulis 242 4/6

Good morning!

Ritvars
Labrīt!
Vārdulis 242 2/6*

Mamma
😱
08:20

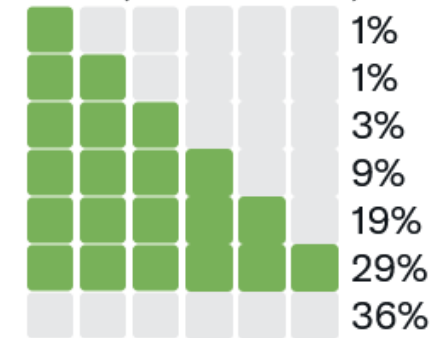
Vārdulis 242 5/6
Labrīt!
08:24

Future work

- Make one day per week particularly challenging
- Perhaps also one easy day with only simple forms?
- Explore changing strategies over time after the first year
- Automatically predict the difficulty of guessing each word
- Predict the daily guess distribution for each next word



Vakar, 27.09.2022, #Vārdulis spēlēts 494x.



Izskatās, ka bija izaicinoša minēšana.

<https://wordle.lielakeda.lv>

Vārdulis

Vārds netika atrasts

| | | | | |
|----------|----------|----------|----------|----------|
| T | H | A | N | X |
| | | | | |