Toward Lexical Access Mechanisms for Regular and Irregular Forms

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Frequency effects and lexical access

• High frequency words are accessed faster, lower frequency words slower
• Countless findings of effects, but no large-scale examination of cause of frequency effects
• We present the first large-scale evidence for a single access mechanism for regular and irregular forms

Design

• Model lexical decision latencies from the English Lexicon Project (Balota et al., 2007): Regulars (ed, -ing, -s): 6,681 items, 201,758 trials, Irregulars (past tense): 58 items, 1,856 trials
• SUBTLEX frequencies (Brysbaert & New, 2009)
• Residualization to address multicollinearity
• Predict log reaction times (RTs) using mixed-effects linear models with predictors for base frequency, suffix conditional probability, word length, neighborhood density, number of syllables, trial number, subject number, gender, and education level

Results: regular forms

• Model: inflected forms always accessed decompositionally, retrieving base then adding affixes
• Rank of base predicts RT better than frequency
• Lexical decision latency linear in rank
• First evidence of serial access for complex forms, first evaluation of rank effects on large-scale data

Access for irregulars

• Elsewhere Condition-based models (e.g., SPE, Yang 2005): irregulars represented as list of exception classes traversed before the default form
• Class grouping predicts acquisition data (Yang, 2002)
• Predicts similar-frequency irregulars faster than regulars (Clahsen et al., 2004), rank effect for classes

Results: irregular forms

• Model: irregulars accessed serially by classes (e.g., rime → /aʊt/ for think, catch, etc.)
• After word frequency accounted for, class rank is significant predictor of RT (χ²,LR(1) = 7.27, p = 0.007)
• Traversal of irregular classes estimated to take 22ms

Extensions

• Exploring other models of irregulars to compare; few can generate appropriate predictions
• Minimum Generalization Learner (Albright & Hayes, 2002) does not learn English irregular patterns reliably

Conclusions

• Serial access predicts latencies observed in regular and irregular forms: one mechanism for both
• First large-scale study of access mechanisms for morphologically complex regulars and irregulars
• Results support models which group irregulars into classes, consistent with acquisition data

References

C. Yang, Knowledge and Learning in Natural Language. 2002.

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