THE PHONETICS AND PHONOLOGY OF FOCUS MARKING
An Integrated Perspective

16th Conference of the Association for Laboratory Phonology, June 22 2018

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SFB 1252 PROMINENCE IN LANGUAGE

BACKGROUND

Gradience [1]

- Choice of category ~ phonological
- Physical realisation ~ phonetic

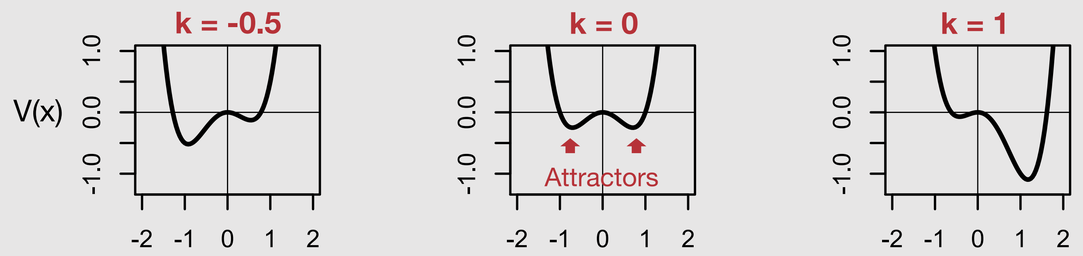
Previous work on nuclear pitch accents in German focus marking: Phonological + phonetic gradience seem to go in the same direction [2, 3].

Describe phonological + phonetic gradience in unified system?

DYNAMICS

Dynamic systems help to understand categories as attractors [4].

Everything in a dynamic system is continuous, but there are special stable states the system moves to.



$$V(x) = x^4 - \boldsymbol{k}x^3 - x^2$$

Control parameter **k** can be scaled to change the attractor landscape.

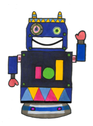
Dynamic systems have been used to model phonetic and phonological variation [e.g. 5, 6, 7, 8].

RESEARCH QUESTION

Can an attractor-based account model the phonological + phonetic gradience found in German focus intonation?

DATA

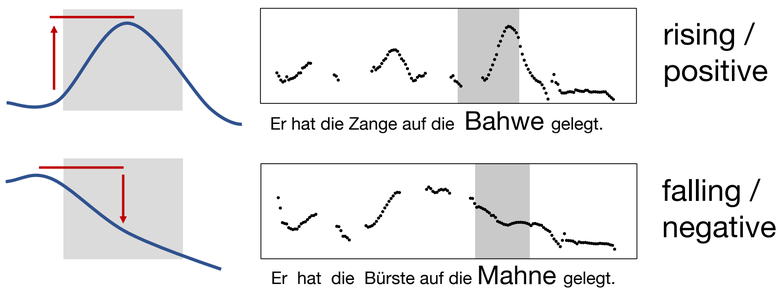
27 native German speakers produce focus structures in a game-like task.



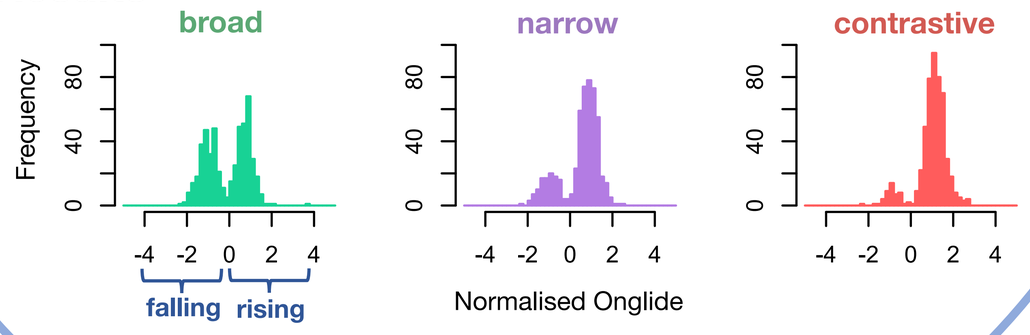
Sentence structure held constant, e.g. “Er hat den Hammer auf die Wohse gelegt”.

3 focus types: broad, narrow, contrastive

Measure:
Tonal Onglide
Speaker-normalised



Results

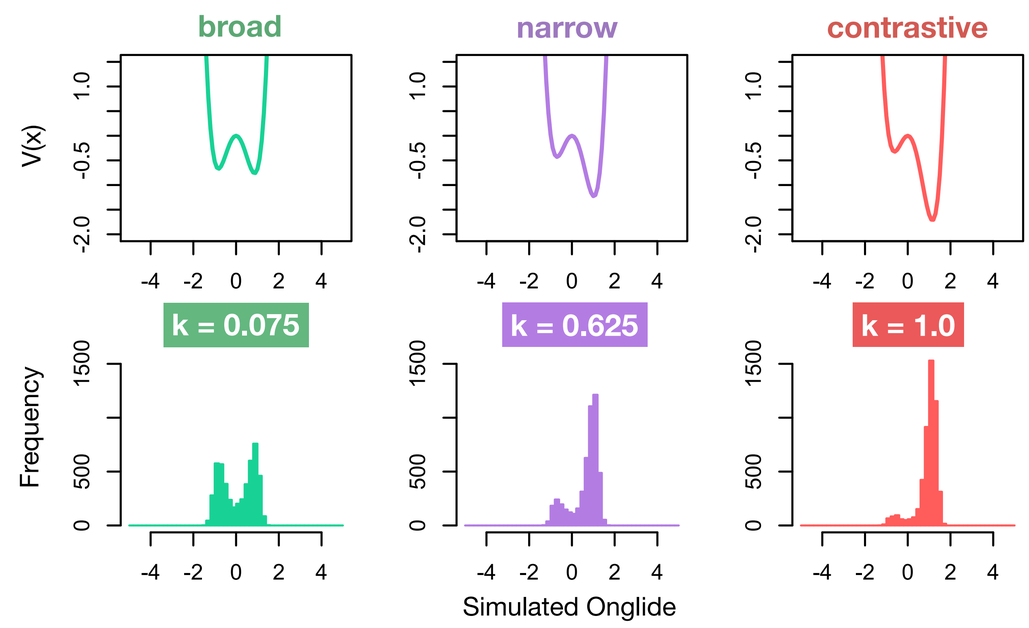


SIMULATION

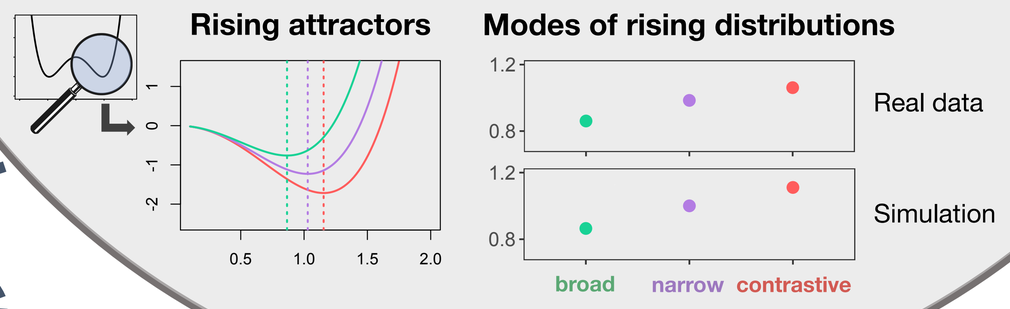
Code based on [9], implemented in R & C++.

Find best **k** by calculating overlap with real data.

$$V(x) = 1.4x^4 - \boldsymbol{k}x^3 - 2x^2$$



Phonetic gradience: Scaling of rising onglides



CONCLUSION

Nuclear pitch accents of our focus data can be modelled in a dynamic framework.

Both phonological and phonetic variation is accounted for in a unified system.

REFERENCES **[1]** Ladd, D. R. (2014). Simultaneous structure in phonology. Oxford University Press. **[2]** Grice, M., S. Ritter, H. Niemann & T. Roettger (2017). Integrating the discreteness and continuity of intonational categories. Journal of Phonetics, 64, 90–107. **[3]** Mücke, D. & M. Grice (2014). The effect of focus marking on supralaryngeal articulation – Is it mediated by accentuation? Journal of Phonetics, 44, 47-61. **[4]** Iskarous, K. (2017). The relation between the continuous and the discrete: A note on the first principles of speech dynamics. Journal of Phonetics, 64, 8-20. **[5]** Gafos, A. I. and Benus, S. (2006). Dynamics of phonological cognition. Cognitive Science, 30, 905-943. **[6]** Tuller, B., P. Case, D. Mingzhou & J. A. S. Kelso. (1994). The nonlinear dynamics of speech categorization. Journal of Experimental Psychology, 20(1), 3-16. **[7]** Nava, Emily. (2010). Connecting phrasal and rhythmic events. Evidence from second language speech. Ph. D. dissertation. University of Southern California. **[8]** Goldstein, L., D. Byrd & E. Saltzman. (2006). The role of the vocal tract gestural action units in understanding the evolution of phonology. In M. Arbib (ed.). Action to language via the mirror neuron system, 215-249. Cambridge: Cambridge University Press. **[9]** Gafos, A. I. (2006). Dynamics in grammar. In Goldstein, L., D. Whalen & C. Best. Laboratory Phonology 8: Varieties of phonological competence (eds.), 51-79. Berlin/New York: Mouton de Gruyter.