

Description of On-line Supplemental Materials

Kello, C. T., Anderson, G. G., Holden, J. G., & Van Orden, G. C. (under review). The pervasiveness of $1/f$ scaling in speech reflects the metastable basis of cognition. Submitted to *Cognitive Science*.

Data from each of the ten participants are summarized by three pages of graphs. Each page contains the following:

Page 1: Line graphs showing eight sample pairs of intensity series, with intensities spaced evenly across the acoustic frequency range. Left- and right-side graphs show “buck” and “ket” series, respectively. Each x-axis spans a whole block of 1024 utterances and each y-axis is standardized intensity (Z scores). Runs of relatively high or low intensity values can be seen in each series, with some spanning dozens and even hundreds of trials. Runs cut across ranges of frequencies that vary in size.

Page 2: Four spectrograms, each showing all 45 intensity series for one syllable. The x-axis spans a whole block of utterances, and the y-axis is frequency. For the top pair of spectrograms, grayscale is used to represent intensity. The whiter strips roughly correspond to formants, although the long-term spectrum averaged across the formant transitions within each syllable. Trends in intensity fluctuations can be seen spanning dozens and hundreds of trials. The trends are non-uniform across frequency, but grayscale makes this difficult to see. The middle two spectrograms are designed to better compare intensity fluctuations across frequencies: Each measurement series is standardized to its own mean and standard deviation and displayed on a magenta-black-cyan scale. These spectrograms show more clearly the intricate structure of fluctuations in the time and frequency domains. As a visual contrast to highlight this structure, the bottom two spectrograms display trial series in a randomly shuffled order, with frequency intact.

Page 3: Color-coded correlation matrix showing all 90x90 pairings of intensity series per “bucket”, with intensities ordered by frequency and grouped by syllable. The patterns across frequencies are intricate and individualized, but four trends are consistent: 1) Correlations are mostly weak and positive; 2) correlations are weaker across syllables than within; 3) correlations weaken with separation in frequency space; and 4) some frequency bands are more intra-correlated than others.