Lab 2: Perception of Speech Signals

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Task 1: Phase Perception

Start the program **`phaseperception`**. There you see the sum `s` of two signals s_1 and s_2, where the phase ϕ of the second signal is lagging behind the first signal in the range of $0 \leq \phi \leq \pi$. You can change the frequencies of the two signals and the phase ϕ with the corresponding sliders.

Task:

Try out different frequency pairs. Look how the signal s in the plot changes its characteristic. Now listen to the signal, what do hear when you change the phase ϕ for 0 to π?

Task 2: Frequency Perception

Start the program **`frequencyperception`**. Determine your absolute threshold of hearing ("Ruhehörschwelle") at 2000 Hz by adjusting its slider so that the sound is just audible. Save the sound level as reference level by pressing "Set reference sound level".

Tasks:

1. Adjust the level of each frequency with the corresponding slider so that the perceived sound is as loud as the reference sound. When you adjust the slider you first hear the reference sound and just afterwards the sound whose level you are adjusting. Its frequency is indicated at the bottom of the corresponding slider.
2. After you have adjusted all sliders accordingly, press the button **`Plot`** in order to see the loudness plot that shows the signal amplitudes as a function of the signal frequency that are needed so that you perceive the same loudness. Press **`Hold`** in order to copy the plot into another figure.
3. Now set the reference level to a higher value, but **do not press** "Set reference level".
4. Adjust the level of each frequency as in Task 2.1.
5. After you have adjusted all sliders accordingly, press the button **`Plot`** in order to see the new loudness plot. Press `Hold` in order copy the new plot into the figure with the other plots.
6. You can save the collected plots by pressing the save icon at the top of the figure. Choose an appropriate format, e.g. "PNG"

Task 3: Masking Effect

Start the program **`maskingeffect`**. There you see and hear a bandlimited noise signal with center frequency 1000 Hz and bandwidth 80 Hz. In addition, you see and hear a sin-wave at 500 Hz with an amplitude about 20dB less than the noise signal.

Tasks:

1. Raise the frequency of the sin-wave with the slider or the text field until you no more notice the sin-wave. Note the frequency where this happens. Further increase the frequency until you again hear the sin-wave-signal. Note this frequency, too. From which to which frequency the sin-wave is masked by the noise?

2. Repeat Task 3.1 with another center frequency of the noise, e.g. 2000 Hz. Where do the frequency limits of the masking effect lie now?