Ludovic - "Cat in the Hat" speech imagery task

From KnightLab

Outdated, look on the Wiki!
→ auditory localizer need to be done before.
→ Athina's folder: listen attentively ~5 min
↳ run on Window.

Contents

Rationale

This task is our next step along the speech decoding research line. Previous speech-imagery tasks have assessed single phoneme or word decoding, and found that these imagined-speech representations could be decoded with prediction accuracy higher than chance; we can then wonder to what extent these exciting results would hold for a more natural representation of speech, such as sentences. Another previous task did assess natural sentence decoding, which worked in most patients; however, it used a decoding model trained on overt speech to do so, and this model was based on a spectrotemporal representation of speech.

Thus, we can wonder how a model trained directly on covert/imagined speech would perform (as for its use in actual patients, they wouldn't be able to produce speech for the purpose of model training!), and whether the use of more abstract representations of speech in such model would improve its prediction accuracy. We could do such analysis (use of covert speech only, and use of other representations of speech) on this dataset, but the sentence presentation paradigm (scrolling) doesn't give us clear time-windows to look at the covert production of specific sentences. Therefore, the present task consists of natural sentences part of a story (thus more able to involve the speech processing network to its full extent) that are displayed one-by-one (thus gives us a time-window within which a sentence is meant to be imagined).

Materials

one Zoom H2n microphone → use it for continous recording.

(no photodiode nor loudspeakers) Just turn it off then on before starting the task.

runs on Windows 7

or maybe 2 microphones Nico for task:
_ close to computer
Nico for continous:

Procedure

1. Launch the task

- either with the shortcut in the _TASK-LAUNCHPAD_ Dropbox folder

- or launching a windows terminal (shortcut "Windows button + r", type "cmd", then press ENTER), change driver to D: by typing "D:", then go the the directory by typing "cd PATHTODROPBOXTOBEEDITED\", and finally launch the task by typing "python ORspeechImagery.py"

(1.5 Launch the microphone and the ECoG recording, if it's not already done for the continuous recording setup; the instruction reading makes very interesting data we want to get)

2. Read instructions to the patient

- you will read a story, both out loud and sounding it out in your head

- this story is divided into paragraphs of 10 sentences each

- you will read each paragraph 3 times, first sounding it out in your head, then out loud, and last sounding it out in your head (there are cues)

- please speak at a regular pace, not too fast nor too slow, and focus on articulating well

- also, try to sound it out in your head the same way it sounds when you say it out loud

- the sentences of a paragraph will be displayed one after the other, and you can move on to the next sentence by pressing the space bar

- by the way, the two first sentences of each paragraph are the same ("The sun did not shine, it was too wet to play")

- do you have any question?

- please finish speaking reading before moving on to the next sentence
do not move lips or jaws while imagining"
or whisper

3. Do a training on the first block (one block = one paragraph read 3 times), or two if necessary, until you see that the patient speaks at a regular pace and clearly articulates in the overt speech condition, and that the patient takes the same time to sound the sentences out in his/her head (if s/he is moving through sentences faster in the covert condition than in the overt condition, then s/he might just be reading without sounding the sentences out in his/her head, which is not good for us!)

4. Start the task from the first block. As this task was designed for OR, it's highly modular (one can stop after every block). In the epilepsy-monitoring ECoG setup, it can be easier to mentally group blocks into runs. Thus, let's consider 1 run as 5 blocks (~7.5 minutes, according to the patient's pace). Having 3 runs recorded is our minimum goal (~22.5 minutes). There are 36 blocks total, which would take 7 runs (the last one having 6 blocks). If patient is fast (but still articulates well), please record more runs.

5. Ask the patient what did s/he understood about the story, who were the characters, etc.. while still recording ECoG and audio activities. If patient is not speaking a lot, try to have him/her talk more with open questions (e.g., what do you think happens next? what do you think is the moral of this story?). Answers doesn't really matter: we just want to have some speech perception/production activity to locate electrodes encoding speech sounds ;)

- one block : paragraph × 3 times
- 1 run = 5 blocks.

We want at least 3 runs.

done on real on mean 15 blocks ?