

Science Education Collection

Dichotic Listening

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Overview

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It is a well-known fact that the human ability to process incoming stimuli is limited. Nonetheless, the world is complicated, and there are always many things going on at once. Selective attention is the mechanism that allows humans and other animals to control which stimuli get processed and which become ignored. Think of a cocktail party: a person couldn't possibly attend to all of the conversations taking place at once. However, everyone has the ability to selectively listen to one conversation, leading all the rest to become unattended to and nothing more than background noise. In order to study how people do this, researchers simulate a more controlled cocktail party environment by playing sounds to participants dichotically, *i.e.*, by playing different sounds simultaneously to each ear. This is called a dichotic listening paradigm.

This experiment demonstrates standard procedures for investigating selective auditory attention with a paradigm called dichotic listening.

Procedure

1. Apparatus and stimuli

1. Use two sets of headphones and two pieces of hardware for playing auditory stimuli. Ultimately, the experiment requires the ability to play two separate auditory signals through separate headphones. This can be done with a sound mixer or with a computer. But it can be done easily and without technical expertise by using two separate pieces of hardware.
2. Select three different recordings with informational content that can be tested for comprehension. These recordings are the stimuli for dichotic listening. Comprehension questions are also necessary.
 1. A good source for this kind of material is publicly available reading comprehension texts and questions from exams like the Scholastic Aptitude Test. For this demonstration, two pieces of text and their associated questions selected can be found in [Appendix 1](#).
3. Record one person reading each of the selected pieces, and create three individual audio files.
4. Print out the questions for each passage for the participant to complete after hearing the relevant recordings.

2. Procedure

1. Keep in mind that the goal of this experiment is to compare the ability to retain information for selectively attended stimuli compared to unattended stimuli. Set up the experiment to include two listening and test sessions.
 1. The first session is a baseline, with only a single audio passage intended to measure baseline listening comprehension without a second stimulus present.
 2. The second session involves two different passages played simultaneously, one to each ear, with instructions to attend to one of them.
2. Explain the instructions for the baseline condition to the participant, as follows:
 1. "In a moment, I will ask you to put one headphone in each of your ears. I will press play, and a short passage will be read aloud to you through the headphone in your right ear. Nothing will come from the other. Please pay attention and listen carefully while the passage is read. Afterwards, you will be asked to answer some questions about the passage."
3. Play one of the passages through the headphone attached to the right ear. For control purposes, the participant should have a headphone in the left ear as well, but nothing should play through it.
4. Once the passage has finished playing, give the participant the set of questions associated with it, and allow them 15 min to answer as many as possible.
5. For the dichotic condition, explain the procedure to the participant, as follows:
 1. "In a moment, I will ask you to place a headphone in each of your ears again. And again, a passage will be read aloud through the headphone played to your right ear. Please pay close attention to that passage because you will be asked questions about it after. But this time, a different passage will be read aloud through the headphone in your left ear. You should do your best to ignore that passage, and direct your attention to your right ear."
6. Once the participant has the headphones placed in their ears, press play simultaneously on each.
7. When the passages are done, give the participant the questions for the two passages. They should be in the same document and randomly intermixed. Explain this to the participant:
 1. "Now, I'd like you to answer as many questions as you can about the passages you just heard. About half of the questions are from the passage I asked you to pay attention to. But the other half will be from the other passage. Please do your best. And if you feel like you don't know an answer, just guess."
8. Allow 30 min for the participant to answer the questions. Once the participant has left, score the answers.
9. Once the questions are scored, calculate the proportion correct associated with each individual passage. Graph the scores.

Results

The graph in **Figure 1** shows the percent of questions answered correctly by condition. The red dotted line (at 20%) shows expected guessing performance (chance), given that each question included five choices. The participant was able to answer more questions correctly for the attended compared to the unattended passage, reflecting the ability to attend selectively to a single stimulus when more than one is present. But the participant also answered more questions correctly in the one passage baseline condition compared to the attended condition. This demonstrates the difficulty of attending selectively, and the limited capacity of human attention.

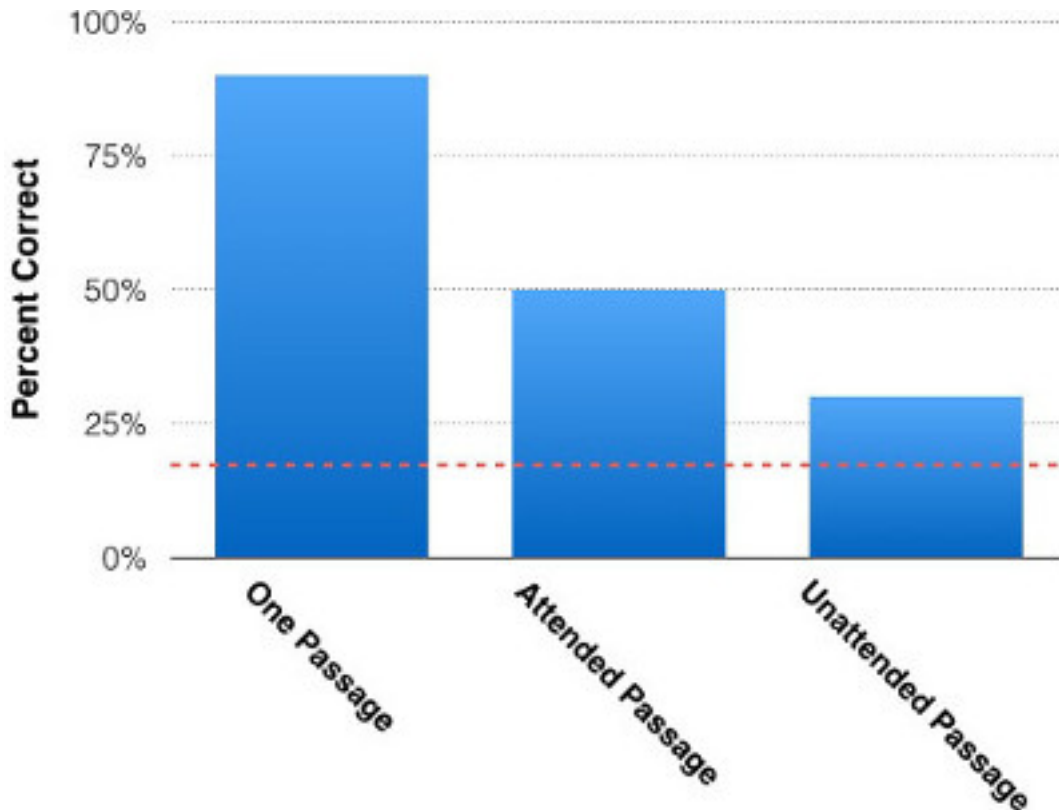


Figure 1. Results from dichotic listening experiment. Shown are the percent of questions answered correctly by condition.

Applications and Summary

Dichotic listening has been used for many purposes to understand the nature and capacities of selective attention. For example, it has been used with a concurrent visual task to investigate the extent to which visual and auditory attention compete with one another—an important issue for understanding when and how humans are able to multitask.

One of the most influential applications of the paradigm has been in the study of the human brain's lateralization for processing language. The human brain is divided into two hemispheres. Generally speaking, the right hemisphere is wired to the left side of the body, and the left hemisphere is wired to the right. This means that auditory stimuli played exclusively to one ear will be routed, first, to the opposite brain hemisphere. It is also known that the left hemisphere is generally specialized for language processing. Therefore, the prediction is that stimuli played to the right ear should be processed more effectively than stimuli played to the left ear. This has been confirmed in many dichotic listening studies, and it makes dichotic listening a useful paradigm for investigating language deficits thought to be associated with left hemisphere brain damage, as often occurs after a stroke, but without using a brain scan.