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Sound Location (Active)

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Date:

Objective:

In this exercise participants use sound to determine the direction and range of targets.

Vocabulary Words:

Materials:

Blind fold

Background Information:

This is an exercise for 5 to 10 participants although as few as 2 may successfully complete the demonstration.

The basic concept of this exercise is based on the game "Marco Polo" usually played in a pool.

Activity Instructions:

- One person is chosen as the "ship" and stands in the center of a circle. This person faces one direction and never moves.
- The others all stand at the edge of the circle spaced equally apart and play the part of targets. Move some of the targets closer to the ship at various distances.

- Place the blindfold over the "ship's" eyes and then hold both arms out in front with palms facing each other - this forms the ship's bow.
- The ship should imagine they are standing in the center of a clock with their hands facing 12:00, 3:00 is on their right, 6:00 o'clock directly behind them and 9:00 on their left.
- The "ship" now says "ping" every 5 seconds.
- Depending on how far away the "targets" are, they respond "bip" with the closer targets responding quicker than the further targets. These bips represent the echoes that bounce off the targets when the pings hit them.
- The "ship" should be able to determine the directions the "targets" are by using either their left or right arm to point at them - always maintaining their "bow" pointed at 12:00 as well as which ones are closer or further away.
- Try having some the "targets" vary their distance from the "ship" to see if the "ship" can determine which, if any, are getting closer or further.

Conclusion/wrap up:

This exercise demonstrates how active Sonar systems search for other ships while at sea using echo location. With all of the ships at sea you'll begin to understand how difficult it could be to distinguish between civilian and military ships.

Ask yourself, so how does Sonar know how deep a submarine is? Sonar systems are sophisticated enough to be able to determine the angle the sound entering the sonar array and the time between emitting the ping and the responding bip to determine approximate depth of the submarine.

How can you make better use of passive systems and active systems? Keep in mind that active systems also give your location away to others via the loud ping generated. Can you use a web of listening devices used in synch to determine a course (direction) of a target?

Further Investigations:

You can further your knowledge of sound and sonar systems by using the US Navy archives and searching online for "sound", "passive sonar", "active sonar" or "sonobuoy".

Sources:

Good to use on fantail