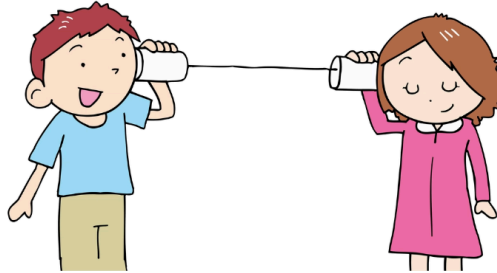




# FACILITATOR GUIDE

## Cup Phone Game



### Learning Objectives

1. Sound and radio waves can transfer energy that is reflected, absorbed, or passed through materials.

### Materials

- Small piece of paper with written messages various lengths

Prepare the following for each pair of learners:

- 2 paper cups
- 1 long piece of string (~ 5 feet) (yarn or baker's twine)
- 2 paper clips
- Masking tape
- Pen

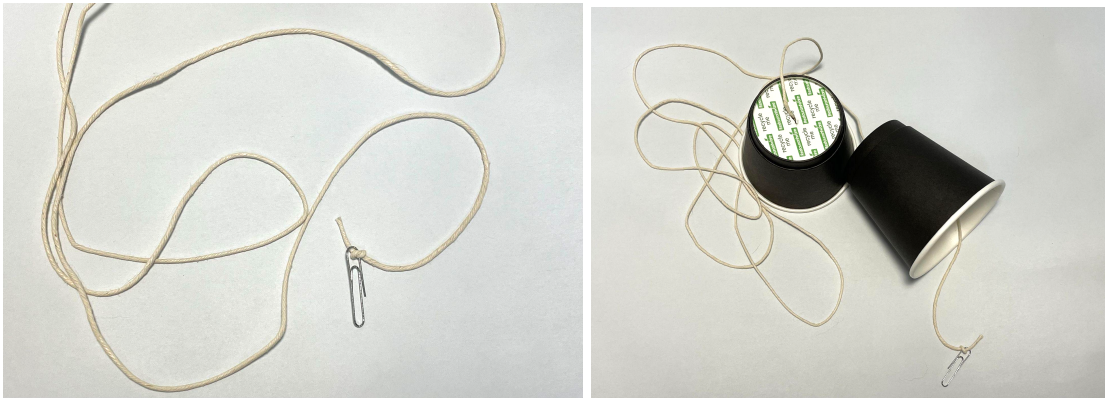
### Safety

- Mark with a pen which cup is used for speaking to prevent spread of germs. Have learners speak into the same cup in each round of the game.

### Advance Preparation

- Assemble Cup Phone (optional):
  - a. Using a pencil or other sharp point, poke a hole in bottom of each cup.
  - b. Use the string to tie a knot at one end of the paper clip. Push the open string end inside the cup.
  - c. Tie the other end of the string with a second paper clip.
  - d. Use masking tape to secure the string inside the cup.

- e. Do the same for the other end of the string and secure it to the second cup.
- Reduce background noise. The activity will work better in a quiet environment.



## Activity Procedure

1. Set out materials for learners to assemble their cup phones. Use the instructions above to show learners how to assemble or check the Internet for “cup phone activity” assembly instructions. This step can be skipped if the facilitator created the cup phones before the start of the activity.
2. Have each pair test their cup phones, sending each other a message. Have a learner say a message into one cup while the other listens for the message.
3. Introduce the concept of a communication network: A system of connected parts that allows information to flow from one point to another.
4. Tell learners that together they form a communication network and that each person plays a role in its success. You will now test whether this system can help transmit messages from the source that a receiver can understand.
5. Have each pair of learners stand about 5 feet apart from each other in two lines with their cups in hand.
6. Have each pair take their paper cup phones and walk away from each other until the string is taut (tight).
7. Have one learner be the “receiver” to listen to the incoming signal. Have one learner talk to be the “transmitter” as the person planning to talk into the cup.
8. Write a secret message on paper and give it to the first learner. Ask that learner to whisper that message into the cup phone. Have the next learner listen, then whisper in this message into the next cup down the line. Repeat this message passing until the last learner gets the message.
9. Instruct the last learner to say the message out loud.

10. Repeat the game with different messages with longer or more words, or using cups made with different types of string.
11. Ask learners to share what they noticed. Use the Conversational Prompts to facilitate a discussion.

## Troubleshooting

- Check how taut is the string. The more taut, the better the transmission.
- Check that the paperclip is well tied to the string and is touching the inside of the cup.
- Set expectations about how noisy the room should be when sending messages. Discuss how this can affect the quality of communication.

## Notes to the Presenter

### Extension:

- Try a different width or type of string.
- Try using different kinds of cups or cans.
- Have learners investigate how the distance between the cups affects the sound quality of the cup telephone.

## Supporting equitable participation

If there is a learner who has difficulty hearing, consider giving that learner the role of writing the message on a paper. The note is then read into the first cup by a second learner. The last learner in the line can also write the message on a paper, and have the first learner compare the results.

## Conversational Prompts

- Do you notice a difference if the spoken message is “smooth sailing” versus “crunchy corn chips” ?
- Will four cups work if the strings are crossed? What about six cups? Where do the sound waves travel in the cup telephone?
- Was the sent message the same as the received messages? What factors might have caused miscommunications?
- What can you do to make the sound better heard? How can you “boost the signal”?
- Is there a way to redesign the string telephone for longer distances?

- How does this cup phone compare to modern cell phones for our society? What are some of the differences between sound waves and radio waves?

## Content Background

**Cup phone communication:** When you talk into the cup, your voice sends sound waves inside the cup. This vibrates the bottom of the cup and along the string to the bottom of the other cup. Your ears hear the vibrations inside the second cup, transferring your voice's energy into a sound wave.

## List of Terms Related to this Activity

**Radio wave:** A type of electromagnetic radiation used for communication devices, e.g., televisions, mobile phones, radios, and Bluetooth. The longest wavelengths and lowest frequency waves on the electromagnetic spectrum with frequencies from 30 Hz to 300 GHz.

**Transmitter:** A place where a wave comes from such as a speaker or a radio device.

**Sound wave:** A mechanical energy wave that travels through a medium (such as air, water, or solid matter). Sound waves produce pressure waves and vibrations that our ears can hear. Humans with normal hearing can hear sounds between 20 Hz and 20,000 Hz.

**Vibration:** This is the energy from something (like a string) that moves very fast back and forth. This energy moves surrounding air to make a motion we can feel or hear as a sound wave.



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