THE SCIENCE OF SOCCER

ENGINEERED BY THE FRANKLIN INSTITUTE

Activity 3

THINK FAST!

Activity 3: **Think Fast!**

Audience: Children ages 6-10

Time Frame: 30-45 minutes

Summary: In this activity, learners will test their reaction times through a series of fast-paced challenges. They'll explore how focus, visual cues, and surprise affect the speed at which they can move, just like soccer players in real games.

Guiding Questions:

- How can we explore, understand, and improve our reaction time?
- What factors make it easier or harder to react quickly?

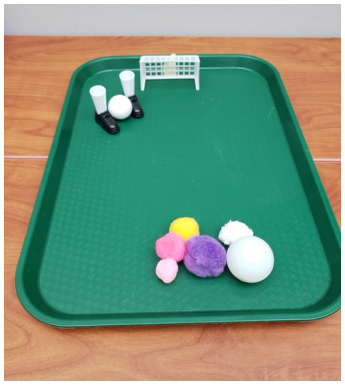
Science Concepts:

Reaction Time: The time it takes for your brain to see something, decide what to do, and send the message to your body to do it.

For more information about these concepts, see the Background section at the end of this guide.

MATERIALS

- Large plastic tray (1 per group of 3-4 learners)
- Mini soccer net (1 per group)
- Mini soccer feet (2 sets per group)
- Mini soccer ball (1 per group)
- Other small round objects (ping pong balls, pompoms) (4-6 per group)
- Masking tape
- *Think Fast!* photo printouts
- *Think Fast!* challenge cards (1 set per group)
- Optional: Internet access, computer, and screen for showing video clips



SET-UP

1. Set up soccer field models (one per group of 3-4 learners):
   - Secure a mini goal at the short end of each tray using tape so it remains stable during play.
   - Check that all fields are on level surfaces to ensure consistent ball movement.
2. Where possible, set up video equipment and cue up one or more of the video clips listed in the Video Resources section at the end of this guide.

ENGAGE (10 MIN)

1. Gather the group and show images or short clips (*if possible*) of soccer players making incredible saves. Ask:
   - What sport do you think this is?
   - What comes to mind when you think about soccer?
   - Who has played or watched soccer before?
2. Ask learners to observe the goalkeeper in the images or videos:
   - What do you think helps them react so quickly?
   - Have you ever had to move super-fast to catch or kick something? What happened?
   - When is it important to have quick reactions in soccer?
3. Describe that **reaction time** is the time it takes for your brain to see something, decide what to do, and send the message to your body to do it. In soccer, quick reactions can make the difference between scoring a goal and stopping one.
4. Explain that today, they will be soccer scientists by testing how quickly they can react and discovering what makes it easier or harder to move in time. Also explain that instead of playing on a real soccer field, they will use a **model**, a smaller version that represents the real game, to test reaction.

You may want to mention that in 2026, the US, Mexico, and Canada are hosting the Men's World Cup, where men's soccer teams from countries across the world come to compete for the title of World Cup Champion. The next Women's World Cup will take place in Brazil in 2027.

EXPLORE (30 MIN)

1. Divide the group into teams of 3-4 and distribute the miniature soccer fields and challenge cards.
2. Briefly introduce the first challenge scenario, science goals, and instructions (see below).
3. As teams are exploring the challenge, ask guiding questions such as:
   - What else can you try to stop the ball faster?
   - What do think makes a kick easier or harder to react to?
   - What's one thing you want to test the next time you do this?
4. After about five minutes, or as groups seem ready, suggest that they try the next challenge. Older learners may be able to read the challenge card independently. For younger learners, describe the challenge and help them set up the model field as needed.
5. Encourage groups to try Challenge 3 as time and interest permit.

CHALLENGE 1: READY OR NOT?

- **The scene:** Sometimes in soccer, you know the ball is coming. Other times, it surprises you! Can you react just as quickly in both situations?
- **The science:** Explore how preparation affects a player's reaction time.
- **What to do:**
  - Choose one person to be the goalkeeper. They will try to stop the ball from entering the goal.
  - Round 1 (Preparation): Other players take turns using the soccer feet or their fingers to "kick" the ball toward the goal. **They kick from the same spot each time, and say "1–2–3–kick" before kicking each time.**
  - Round 2 (No preparation): Other players take turns **kicking the ball with no warning, or kicking at different random numbers.**
  - Switch roles until everyone has a chance to play the goalkeeper.
- **Questions to think about:**
  - Were you better at stopping the ball with warning or without warning? Why do you think that is?
  - Did it change over time? Did surprise stops get easier or harder as you went along?
- **Level Up:** Players can change both the timing and the direction of the ball to make it more unpredictable.

CHALLENGE 2: FOCUS ON THE BALL

- **The scene:** In a real soccer game, there's a lot happening at once—teammates moving, fans cheering, coaches shouting. Can you stay focused and react to the right ball?
- **The science:** Explore how distraction affects a player's reaction time.
- **What to do:**
  - Choose one person to be the goalkeeper. They will try to stop the ball from entering the goal.
  - Other players all "kick" different decoy objects toward the goal (pompoms, ping pong balls) at the same time as the "real" soccer ball.
  - The goalkeeper must quickly pick out and stop the soccer ball while ignoring everything else.
- **Questions to think about:**
  - What was the hardest part about stopping the soccer ball?
  - Where some objects easier to ignore than others?
  - Did you get better at spotting the real ball over time?
- **Level Up:** Add a "Distractor Coach" (another player) who shouts directions or counts loudly while the objects are rolled.

CHALLENGE 3: KEEPER'S CHOICE

- **The scene:** Goalkeepers don't always react the same way—sometimes they catch the ball, sometimes they block it, sometimes they swat it away. Can you change your reaction as quickly as they do?
- **The science:** Explore how decisions affect a player's reaction time.
- **What to do:**
  - Choose one person to be the goalkeeper.
  - Another player "kicks" the ball toward the goalkeeper.
  - As they kick it, they call out an action:
    - **"Catch!"** → Goalkeeper uses cupped hands to catch the ball.
    - **"Stop!"** → Goalkeeper uses one finger to stop the ball in place.
    - **"Swat!"** → Goalkeeper swats the ball aside without catching it.
  - After a few tries, switch to giving choices, like **"Catch or swat!"** or **"Your choice!"**
  - Switch roles after a few rounds.
- **Questions to think about:**
  - Which reaction was easiest for you? Which was hardest?
  - Did choosing your move make it easier or harder to react in time?
- **Level Up:** Add speed by rolling the ball faster or mixing in "fake calls" (calling a made-up action or nonsense word).

REFLECT (5 MIN):

1. Gather the group and ask:
   - Which challenge was easiest? Which was hardest? Why?
   - How did your reaction time change when you knew what was coming versus when it was a surprise?
   - If you were training to be a World Cup player, what would you do to improve your reaction time?
2. Discuss how students felt like scientists. Ask:
   - How did you feel like a scientist today?
   - What did you test, observe, or try more than once?
   - How did you use evidence to make decisions or improve your reaction time?

BACKGROUND:

Reaction time is how quickly your brain notices something and tells your body to respond. In soccer, fast reactions can mean the difference between stopping a goal and letting one in. Goalkeepers, defenders, and players adjusting to sudden changes all rely on quick reflexes.

In this activity, learners will be exploring reaction time by responding to surprises, following fast instructions, and reacting to visual cues—just like soccer players do in real games. Their brains will see the signal, decide on a response, and send messages to muscles to move, helping them understand how focus, practice, and distractions affect reaction speed.

Reaction time is influenced by focus, surprise, fatigue, and distractions. By testing and observing their own responses, learners gain hands-on experience with a fundamental science concept while connecting it to real-world soccer performance.

VIDEO RESOURCES:

Men's Soccer Highlights:

https://www.youtube.com/watch?v=aTTOQtSOX3I

Women's Soccer Highlights:

https://www.youtube.com/watch?v=m5IXs5ASt3c

Goalkeeper Saves Women's Soccer:

https://youtu.be/wFt269ckFgs?feature=shared

Goalkeeper Saves Men's Soccer:

https://youtu.be/NwRk7KRlTVo?feature=shared