“Greedy Monkey” or “Less is More”
IMPULSE CONTROL IN PRESCHOOLERS

Background:
Researchers from the University of Washington explored how impulse control develops in preschool children. Impulse control is one of a number of executive functions; a group of processes in the brain that allow individuals to control their thoughts and actions. In addition to impulse control, executive functions also include: planning, focused attention, organization, emotional control, flexibility, and the ability to consider multiple viewpoints or solutions to a problem. Some aspects of executive function start developing in infancy, but most begin developing in the preschool and early elementary years and continue to develop into the mid-20s.

In developing this study, researchers adapted a previous study that had measured executive function in chimpanzees. In the present study, children were shown one tray with two treats and another with five. Children were then introduced to a “greedy” monkey puppet that wants to get all the treats for itself. They were also told that they could keep any treats they accumulate while playing the game. Next, children were told the rule of the game; every time they point to a tray the monkey will receive the treats in that tray, and they will get the treats in the other tray. Finally, children were asked to point to a tray. The monkey took the treats on whichever tray the child pointed to and the child received the treats on the remaining tray. The treats went into clear plastic cups, one for the monkey and one for the child, so the child could see the treats accumulate. The game was played sixteen times, with a verbal rule reminder halfway through. The researchers hypothesized that children’s impulse would be to point to the tray with the larger number of treats since that is the tray they want; however, they would have to point to the opposite tray in order to obtain the contents of the desired tray. By controlling their impulse, and pointing to the tray with the smaller number of treats, children would have obtained a larger total number of treats.

Researchers Found:
• Most three-year-olds have trouble with the game: they either point randomly or impulsively point at the tray with the larger number of treats.
• Most four-year-olds are better at playing the game: they are able to step back from the situation, remember the rule, and keep their impulses in check.
• Children with better verbal abilities (as determined by a standardized vocabulary measure) often accumulate more treats. They are more likely to choose the correct tray than other children of the same age.
• The majority of the children are able to tell the researcher that the monkey will get the treats they point to, but are nonetheless unable to use that information when pointing to a tray. In other words: they can tell you the rule, but their desire for the larger number of treats is so strong that they are unable to use the rule to their own positive reward.
Why is this important?
Impulse control is an important executive function in adults. Adults are controlling their impulses when they say no to a second piece of dessert or when they speak calmly to a person who is aggravating them. Impulse control is also an important executive function that children need to master as they develop cognitively and socially.

Although impulse control starts developing in the preschool years, it is not fully developed for many years. Because their impulse control is only just starting to develop, preschool age children can make mistakes that seem odd to adults. For example, in the study, many of the children were able to tell the researcher that the monkey would get the treats they pointed to, but still pointed to the tray with the larger number of treats. They knew what the rule was, but were unable to use the rule to their advantage. Impulsivity, distractibility, or difficulty planning could all play a part in explaining why preschoolers struggle with this task.

Parents and other adults observe this kind of behavior in children all of the time. A preschooler might know the cookies on the tray are for dessert, but cannot keep himself from eating them before dinner. Another child might know the rule is “no hitting,” but in the moment is unable to keep herself from hitting someone who is a source of frustration. This is normal behavior for preschool children, even if it is not especially desirable. Children at this age often have difficulty following rules—although they may know a rule, they may not consistently follow it if they have a strong impulse to do otherwise. This study supports the idea that young children have trouble controlling their impulses, and that a child’s impulse control improves with age.

Method:
Recruiting Methods:
1. Introduce yourself to the parents. Explain that you are doing an activity based on a study originally done by researchers from the University of Washington. The study looked at how children learn to control their impulses. Ask if their child would like to play a game with shapes.
2. Ask the child if he or she would like to play a game with some cool shapes. One way to get the child’s attention is to show him or her some of the shapes used in the game.

Important Modifications:
• In the original study, food treats were used. Due to a variety of issues with using food treats in a museum setting, we use square and heart shaped foam cutouts. At the end of the game, children are given a piece of yarn to string their shapes onto in order to create a bracelet.
• In the original study, the monkey puppet was called Chris the naughty monkey. We took away his proper name and instead refer to the monkey using the more general name “greedy monkey” because children may meet many young children named Chris and we did not want them associating the name Chris with “greedy” in other situations. In addition, naughty may be a word that parents/caregivers use to describe their child, however, it is less likely that parents/caregivers will refer to their child as greedy. We therefore chose to call the monkey greedy in order to lessen the chance of a child making a connection between themselves and the monkey.
• We reduced the number of times the game is played in order to decrease the total time required for the game and thereby keep children interested for the whole activity.
Activity Instructions (the “study method”):

**Please reference Study 1 of the original study (Carlson, Davis, & Leach, 2005)**

1. Present the child with a choice of two different shapes (hearts or squares). Have the child pick his/her favorite. Put the rest of the shapes away.
2. Put two of the selected shapes on one tray and five on the other. Place the trays next to one another in front of the child (in the original study, the two trays were placed equidistant from the child, to avoid the participant’s potential impulse to just choose the nearest tray).
3. Ask the child which tray they’d like to have. Then, introduce the child to the greedy monkey. “This monkey is greedy because he likes to get all the shapes for himself and he does not like to share.”
4. “You and the monkey are going to play a game with these shapes”. Give the child a clear plastic cup and put one in front of the monkey. “Every time you point to a tray, the monkey gets the shapes in that tray and they will go in his cup. You’ll get the shapes in the other tray and they will go in your cup. Let’s try a practice round.”
5. Push the trays forward. Tell the child: “Point to a tray.” Remove the shapes from the selected tray and put them in the monkey’s cup, then put the shapes from the unselected tray in the child’s cup.
6. Say to the child, “See, the monkey gets [this many] shapes and you get [this many].” Check to see if the child understands the rule: “So when you pick a tray, who gets those shapes? Does the monkey get them or do you get them?” Give feedback as needed until the child understands the rule.
7. Let’s play! Repeat steps 2 and 5 four times with the child. Use two shapes in one tray and five shapes in the other the whole time, alternating which tray has more shapes.
8. Congratulate the child on a job well done. Give them a tipped yarn lace to string their shapes and make a bracelet. You can put a few shapes on the piece of yarn to demonstrate how the shapes go on.
9. While children assemble their bracelet, talk with parents/caregivers about the original study and what the researchers found. Use the graph to help explain. After debriefing, ask the parents or caregivers if they have any questions. Have the parent or caregiver tie off the bracelet on the child’s wrist. Be careful about giving the bracelets to young children as they may try to tie the yarn around their neck, which can be dangerous.

Note: In both the original study and the interpretation, children do not receive explicit verbal feedback during test trials (e.g., anytime after the practice round). Instead, children receive implicit feedback as they observe Greedy Monkey receiving more and more shapes in his cup.

Activity Tips:
Help Parents Observe:
• Which tray does your child point to? Does s/he point consistently at one of the trays or randomly at both?
• Look at your child’s face. Does s/he seem happy with his/her choices or does s/he look confused or frustrated?
• Does your child point faster or slower when they make a choice that makes them happy?


Keeping Kids Interested:

- Remind the child that at the end of the game s/he will get to make a bracelet of the shapes and take it home.
- For younger children (who may not willingly point to a tray) – you can try to determine their “choice” of tray by observing whether the child looked at one tray longer than the other.
- Older children will likely find this activity very easy. Talk with them about what research psychology is and about how scientists played this game with young children to learn about how they think and learn. Ask children to pretend to be a three-year-old while they play the game with you. You may also try introducing older children to the terms “impulse” and “executive function,” explaining that an impulse is something you have an urge to do while executive function is your ability to manage your thoughts and actions.

Results of the Original Study:

Main Results: This task required children to use two different aspects of executive function. They had to use their working memory to remember the rule/how to apply it to each trial, and they had to use their impulse control to stop themselves from pointing at the tray they desired (the one with the larger number of items). Although this might seem like an easy task to adults, it can be difficult for preschool children. As children age, both their working memory and impulse control improve.

The researchers were specifically looking at performance in relation to age, sex, verbal ability, and established measures of executive function. They found that:

- Four-year-olds had a tendency to perform better on this game than three-year-olds.
- Sex did not play a role in the participants’ performance.
- Children with better verbal skills had a tendency to accumulate more shapes, as compared to other children of the same age.
- When researchers conducted a rule check (children were asked who receives the treats in the tray they pick), 90.2% were able to correctly respond by saying that Greedy Monkey would receive the contents of the tray they pointed to. This implies that children understood the rule, even if their actions made it appear as though they did not.

![Figure 1](image)

*Figure 1.* This graph illustrates the finding that as children grow older they are more likely to point to the correct cup—the cup that will provide them with more treats. As the graph shows, three-year-old children were only likely to choose the correct cup around 50% of the time, while four-and-a half-year-old children tended to choose the correct cup almost 80% of the time.
Questions Parents May Ask:

*What age does my child have to be in order to participate?*

The original study looked at participants ages 3-4 years. For this demonstration in the museum, children of any age are welcome to participate. See “Keeping Kids Interested” (above).

*Did my child “pass”?*

The results of the study were based on findings drawn from the responses of many children. Everyone develops at a different rate, so there is no ‘right time’ for children to be able to succeed at this game—even within the study, not all of oldest children responded to the problems “correctly” (see Figure 1). And, even as adults we sometimes have trouble controlling our impulses. The purpose of this activity is to help us discuss how impulse control develops in preschool children.

*Why is this important?*

We think this study is interesting because it shows how young children think differently than adults. Children are still learning to control their thoughts and actions, while in adults these abilities are normally automatic and subconscious. Young children in museum settings have their impulse control tested when they are asked to walk instead of run, when they have to wait their turn to play with an exhibit component (or a research toy), or even when they are asked not to touch a fragile object.

*Where can I learn more about this study?*

Citation for the original study can be found below. In addition, this study is discussed in Ellen Galinsky’s *Mind in the Making: Seven Essential Life Skills Every Child Needs*. More information about Ellen Galinsky’s Essential Life Skills can be found in her workshop videos on the Big Think Mentor channel on youtube (see “Sources & Resources”).

Activities for Families to Try at the Museum:

*Physical Science:* Try a taking turns game with your child when working at the ball ramp together; ask your child if you can take turns putting pieces together to create the path the ball will follow. After taking a few turns back and forth, wait until your child prompts you to take your turn. See if your child can resist the impulse to simply build the rest of the path on his or her own when you do not immediately step in for your turn.

Activities for Families to Try at Home:

*Play Simon Says:*

Games like Simon Says are great for developing executive functions. In Simon Says, one person is Simon and they give directions such as, “Simon says touch your nose” or “Wiggle your fingers.” The other players have to follow only the directions that start with the phrase “Simon Says.” The game requires children to remember the rule, focus on the person in charge, and control their actions.

*Understanding Different Points of View with Food:*

Parents can see whether their children understand that their own food preferences may be different than those of other people. Try offering your child a choice between two snacks, such as broccoli and goldfish crackers, noting which your child prefers. Then, take some of your
child’s less preferred snack and eat it, saying “Mmm, I love broccoli” (or other snack). After, present both snacks to your child and ask, “Can you give me some?” Which snack does your child offer? The food s/he prefers or the food you prefer?

Sources & Resources:


Mind in the Making videos available at: http://www.youtube.com/watch?v=Id1RLehSb24&feature=share&list=PLii66kkyf4Nh4EavA27VTginA9HBE71sJ

Materials

Monkey Puppets
Folkmanis “Mini Monkey”

Foam Shapes*
hand-cut from foam sheets (we use squares and hearts, but any two discernable shapes work)

*large beads could be used in place of foam shapes in some settings

Tipped Lacing Yarn (cut each lace in half and tie a knot at one end for bracelets)
Oriental Trading Company

Discount School Supply

Acknowledgements:
This activity was originally developed for Living Laboratory® by the Maryland Science Center.