

## “Inhibition & Theory of Mind” Interpretation Guide

### EXPLORING THE CONNECTION BETWEEN SKILLS DEVELOPED IN TODDLERHOOD

#### Background:

As children grow older and begin to interact with others, it becomes increasingly important for them to have control over their impulses. At the same time, children also begin to recognize that others have their own goals, emotions, and mental states. At the University of Washington, researchers investigated the connection between these two seemingly different abilities in developing toddlers.

A previous body of research looking at preschoolers (Carlson & Moses, 2001; Hughes, 1998a; Perner & Lang, 2000; Russell, Jarrold, & Potel, 1994) found a strong correlation between self-control and the ability to view different perspectives. The research toys in the Inhibition Box are based on a series of tasks done by researchers at the University of Washington to assess the presence of each skill and the link between them in children that are two and three years of age.



‘inhibition/theory of mind’ activity materials

This study looked at four main concepts:

- **Executive Functions:** Executive functions include higher order thinking skills such as planning, organizing, time management, and impulse control.
- **Impulse Control:** The ability to restrain and control yourself and your actions, especially from taking inappropriate actions.
- **Mental Representations:** Includes recalling, thinking about, and imagining perspectives that you are not observing directly. For example, you can imagine being a guest at a birthday party - thinking about what the decorations would look like, who might be present, and how the cake might taste - although you have not actually attended the party you can imagine what it might be like. The thoughts, beliefs, and perceptions related to a mental representation are referred to as “mental states”.
- **Theory of Mind:** The ability to recognize that the thoughts, beliefs, and goals of others may be different than our own. This skill is related to mental representations because in order to recognize that the thoughts of others are different than your own, you must understand that other people have thoughts that we can imagine but cannot observe directly.

Researchers recruited two-year-olds in metropolitan Seattle and gave them a series of tasks - first at 24 months, and then at 39 months of age. They were interested in exploring the relationship between children’s ability to control their impulses and their ability to view others’ perspectives, and how this impacts children’s development. In the first round of the experiment, researchers gave children five tasks designed to study impulse control and five designed to learn about their

mental representations. In the second round of the experiment, a year later, they delivered ten different tasks designed to look at the same skills.

Researchers found:

1. Children who demonstrated strong impulse control at age 2 showed a significantly higher ability to detect and comprehend different mental representations at age 3. However, the opposite - a high ability to detect different mental representations at age 2 - did not necessarily predict stronger impulse control at age 3.
2. During the first round of testing at 24 months, there was not a significant relationship between impulse control and the ability to pick up on others' mental states. However, during the second round of testing at 39 months, researchers found a significant link between the level of impulse control in toddlers and their ability to pick up on others' mental states.

Why is this important?

Prior to this study, the relationship between impulse control and theory of mind had only been explored in children as young as preschool age. By looking at children who were 24 and 39 months of age, the researchers were able to learn more about how these abilities first develop. Their findings indicate that children's ability to control their impulses at a young age may be an initial step in learning to view others as having their own goals, emotions, and mental states.

This research can be useful in occupations which involve working with children in a social setting, such as child psychology, daycare work, and preschool teaching. Some applications of these findings include learning more about how children develop sharing skills and the ability to follow directions. Children may struggle with following directions or taking turns, not because they are deliberately misbehaving, but because they have not yet fully developed a sense of impulse control. When telling you a story, young children may leave out vital information because they do not realize that they know information that you do not know. Parents and people who work with children may think about the results of this study when trying to provide directions or when teaching children to interact with one another.

Method:

*Recruiting Methods:*

1. Approach parents and explain that you are presenting an activity based on a research study done at the University of Washington looking at how children control their impulses and learn to understand those around them. Ask if their child would want to play a few games with you.
2. Approach children with an object from the box and ask if they would like to play a game with you (e.g. "Do you want to play a game with these puppets?" or "Do you want to play a game with these blocks?").

*Important Notes:*

The original study was done with children 24 and 39 months of age. We have developed four activities for use with a wider age range of visitors, based on the following tasks from the original study: *Bear/Dragon*, *Tower Building*, *Whisper*, and *False Belief*. Modifications made to each task to create a museum-style activity are described below.

## **Puppet Play (the “Bear/Dragon” task)**

*Materials:*

- tiger puppet
- cow puppet



*Modifications from original study:*

In this task, participants responded to commands of two separate puppets in a Simon Says-like game. In the museum, we have chosen to use a cow puppet in place of the dragon used in the original study and a tiger in place of the bear. The original study included ten trials with a reminder of the rules every fifth turn - we modified this to six trials with a reminder every three in order to decrease the length of the activity and keep children engaged. The puppets’ names have been changed from the “nice” bear and the “naughty” dragon to the “teacher” tiger and the “confused” cow in order to help clarify the roles of the puppets.

*Activity Instructions (the “study method”):*

**\*Script is included in Appendix A at the end of the guide\***

1. Show the child two puppets, a “teacher” tiger and a “confused” cow.
2. Tell the child to copy ONLY the “teacher” tiger, NOT the “confused” cow.
3. Give directions to the child through the puppets (“The tiger says ‘touch your nose’” or “The cow says ‘put your hand on your head’”) while also modeling the directions by having the puppet’s hand touch his/her nose, head, etc.
4. Remind the child of the directions once at the beginning, and also halfway through the procedure, but don’t correct the child if s/he makes a mistake.

Commands used in the museum version of the activity:

- |                                 |                       |
|---------------------------------|-----------------------|
| - touch your nose               | - wiggle your fingers |
| - put your hand on your head    | - cross your arms     |
| - touch your ear/raise your arm | - wiggle your arms    |
| - clap your hands               | - give a high-five    |

## Taking Turns (the “Tower Building” task)

### *Materials:*

- 20 wooden blocks of any size



### *Activity Instructions (the study method):*

#### ***\*Script is included in Appendix C at the end of the guide\****

1. Present the child with the 20 blocks in a pile and ask them if they would like to build a tower with you. If they say yes, tell them you are going to see how high you can build a tower together before it falls over!
2. Clarify that you are going to build this tower by taking turns. Ask the child: “Do you know how to take turns?” If the child says “yes”, ask them if you can practice taking turns together, just to be sure. If the child says “no”, tell them it’s okay, you can practice taking turns together before you build the tower.
3. Say: “First, it’s my turn, so I am going to place a block! Now you can take your turn, and you get to place a block!” After a couple of turns, disassemble the tower so you can begin the real building process.
4. Tell the child to take the first turn and place the first block. After the child places the first block, *do not* take a turn unless the child gives some sort of verbal cue—a noise, or a few words—that it is your turn.
5. If the child provides a nonverbal cue, look confused or gesture for further information, maybe asking, “What comes next?” Do not take your turn until they provide a verbal cue you should do so.
6. If the child does not provide a verbal cue and instead continues building on his or her own, do not intervene.
7. Continue building until all blocks are used/the tower is complete. Then congratulate the child on the completion of the tower or on good turn taking. Thank the child for playing with you.

### *Keeping Kids Engaged:*

- If the child looks to you for further direction, or looks confused, offer words of encouragement or praise on how the tower looks so far: “Great job!” or “Our tower looks great so far!” or “You did a really good job taking your turn!”
- If the child looks to you, makes nonverbal gestures, but does not speak, you can say: “Is something wrong?” to try and prompt them to give you a verbal cue that it’s your turn.

### *For Older Visitors:*

After two turns for both interpreter and child, stop giving the child verbal cues when it is their turn and see if they continue to give you verbal cues when it is your turn. Still, do not place a block unless they verbally tell you it is your turn.

## Keeping Quiet (the “Whisper” task)

*Materials:*

- 10 Animal Cards (printable from Appendix E)

*Modifications from the original study:*

The original study used cards with images of cartoon characters; in the museum version we use pictures of cartoon animals. The cartoon characters set included some very recognizable and some less recognizable pictures, to examine whether or not children would whisper when they were uncertain of the characters’ identities. In the museum version, all of the animals are recognizable to children, facilitating sustained engagement with the activity.



*Activity Instructions (the study method):*

**\*Script is included in Appendix B at the end of the guide\***

1. First, ask the child whether they can whisper. If yes, then ask the child to whisper his or her name. If not, show them by whispering your name and asking them to imitate you.
2. Ask “Do you want to play a game with me? I’m going to show you some animals and you are going to tell me what they are. Make sure that you whisper all your answers.” Let the child know that if s/he doesn’t know an animal, just whisper, “I don’t know.”
3. Proceed to show one card at a time and ask in a whisper voice what the animal is. If the child is younger and doesn’t know the names of the animals, you can instead ask them what color they are.
4. After 5 cards, give the child a reminder to whisper all the answers, and then continue with the last 5 cards.

## Band-Aid/Candle (the “False Belief” task)

*Materials:*

- A Bandage Box
- Five Candles

*Modifications from the original study:*

In the original study, the researchers placed crayons inside the box. In the museum version, we chose to put candles in the box in order to prevent the possibility of getting crayon on our exhibit components. Also, in the second part of the original activity, children were shown a puppet and asked what it might think is in the box. In our activity we instead ask children what someone who is not at the museum might think is in the box. We made this change in order to decrease the number of materials needed for the research toy, and to more closely relate the activity to the behaviors parents may see their children exhibiting on a daily basis.



*Activity Instructions (the study method):*

***\*Script is included in Appendix D at the end of the guide\****

1. Show the child the bandage box and ask them what they think is inside.
2. Open the box and reveal to the child that it actually contains candles. Close the box.
3. Ask the child, “When you first saw this box, before we opened it, what did you think was inside, bandages or candles?”
4. Ask the child to give you the name of someone they know, but who did not come with them to the museum today.
5. Ask them if that person came into the room right now, whether that person would think there were bandages or candles in the box.

### Activity Tips

*Help Parents Observe:*

- Is the child able to control his/her impulses or is this a skill s/he is still developing?
- Was it more difficult for the child to control his/her impulses at some times than others? What do you think made some instances more challenging?
- Does the child understand that they might know something about the contents of the bandage box that another person might not know?

*Keeping Children Interested:*

- If a child is not interested in one of the activities, feel free to move on to the next one. Let parents know that you are going to try one of the other activities, but if they want they can always try any of the activities later at home!
- If a child is still interested in playing after you have finished an activity, take turns building another tower, or come up with some additional commands for the puppet activity.

*Engaging Older Visitors and Parents:*

- Use the activities to talk to older children about who psychologists are, what questions the research psychologists had about young children in this study, and how those scientists might use these activities to answer their questions. Do older children think that younger children might respond to these activities differently than they did? What do they think younger children might do differently?
- Each of the four activities that are part of this interpretation can be done at home! Encourage parents to try these activities at home and observe whether their children react the same way when engaging in these activities with their caregivers or other adults (especially if the child lost interest before playing all the activities). If the child is young, parents might be able to see him or her get better at the tasks over time if they play every few weeks/months. This shows they are developing skills they will need to effectively control their impulses later in life.

### Questions Parents May Ask:

*Why is my child listening to the wrong puppet?*

At this stage in their development, children are just beginning to learn to control their impulses. Other research (Novel Toy) has found that children look to adults as teachers, so when they are given an instruction from an adult, their first instinct is to follow that instruction. When they are told not to listen to some of the directions that adult gives, children attempt to control the impulse to listen, however, they do not always succeed. Your child is still working on this skill, which is completely normal (even as adults we sometimes struggle with controlling our impulses).

*Did my child do well/Is something wrong with my child?*

The study found that *most* children did/performed \_\_\_\_\_, but that does not mean that every child necessarily performs this way! In addition, we are in a very busy environment, so it is great that your child stuck with us through the whole activity! If you have a serious concern, we recommend you consult your pediatrician.

*My child has ADD/ADHD/other type of attention disorder. How does this affect their performance in this study?*

ADD, ADHD, and other attention disorders directly interfere with a child's impulse control, so it is to be expected that they may take longer to develop and refine these skills. If you have any serious concerns about your child's ability to complete these tasks, you should make sure to consult your pediatrician.

*When will my child learn to (take turns, follow instructions, etc)?*

Every child develops at their own rate! Many children learn to take turns as the skill becomes more necessary, i.e. as they start interacting with other people in a social setting, somewhere like daycare or preschool. These are social skills which develop naturally as the need emerges! Of course, if you have any serious concerns, you should make sure to contact your pediatrician.

*My child performed the activity correctly. Does this mean that s/he is ahead developmentally? Is s/he abnormal for his/her age group? Is my child a genius?*

Each child develops his or her impulse control skills differently, so it is to be expected that some will be developmentally farther "ahead" of others at any given time. Your child may be slightly better at this activity than other children of the same age, but still developmentally in sync with his/her age group. Alternatively, s/he may just be especially familiar with this activity. If you do have any questions or concerns about your child's development, we recommend that you consult your pediatrician.

### Activities for parents to try at the Museum:

#### *Children's Gallery:*

Use the puppets in the Children's Gallery to find out how your child understands different perspectives. Cover your eyes and ask your child to show you a puppet. See how they show it to you. Do they object to your covered eyes? Very young children will simply hold up the puppet to show you, while older children may attempt to move your hands or ask you to open your eyes so you can see.

#### *Physical Science:*

Try the taking turns game with your child when working on the ball maze together; ask if you can take turns putting pieces of tubing onto your tunnel. After a few turns, 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 tunnel alone when you do not immediately step in for your turn.

### Activities for Parents to Try at Home:

#### *Play Simon Says:*

Games like Simon Says are great for developing executive function. 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 they might have different food preferences than other people. Try offering a child a choice between two snacks, such as broccoli and goldfish crackers, noting which the child prefers. Then, take some of the child's less preferred snack and eat it, saying "Mmm, I love broccoli" (or other snack). Then, present both snacks to the child and ask, "Can you give me some?" Which snack does the child offer? The food s/he prefers or the food you prefer?

### Sources & Resources:

Carlson, S.M., Mandell, D.J., & Williams, L. (2004). Executive function and theory of mind: Stability and prediction from ages 2 to 3. *Developmental Psychology, 40*, 1105-1122. doi: 10.1037/0012-1649.40.6.1105

### *Appendix A – “Puppet Play” Script*

Say to the child “I have two puppets here- the teacher tiger and the confused cow, and they want to play a game with us. They are going to give us some instructions, but we are only going to listen to the teacher tiger, not the confused cow, okay?”

“Can you point to the puppet that you are going to listen to?” (child points to the tiger) “and which puppet are we not going to listen to?” (child points to the cow).

If child has difficulty with this, repeat the above steps so that they clearly understand which puppet’s directions they should follow..

“Great, let’s play! The tiger says...” Pick one of the motions from the list above and model it the tiger puppet. Do the same with the other puppet, saying “The cow says...” and modeling with the cow puppet instead.

Alternate tiger, cow, tiger. After the third instruction given, remind the child which puppet they should be listening to: “Remember, we only want to listen to the tiger, not the cow.” Then continue to alternate cow, tiger, cow. After the child has finished, thank them for playing with you: “Thanks so much for playing my game with me!”

Parent Debrief: This game is one of a number of activities researchers asked children to play in their study. This particular activity looked at how children controlled their impulse to follow directions and found that children of preschool age generally just follow the instructions, and do not recognize when they are following an instruction that they are not supposed to follow. In the study, the researchers were interested in learning about whether a child’s development of impulse control is related to their development of a concept called theory of mind, which helps us understand that the thoughts and ideas of others may be different than our own. They found that the two abilities were related, that two year olds who were really good at tasks like the one I just did with your child, tended to do really well on theory of mind tasks at age 3. It’s interesting to see how these skills develop in young children entering preschool, who may be learning and using these important social skills for the first time!

## ***Appendix B - "Keeping Quiet" Script***

Ask the child, "Can you whisper?"

If the child says yes, follow up with: "Can you whisper your name to me?"

If child says no, follow up by showing the child how to whisper, and then to confirm they understand by asking them to whisper their name.

Tell the child, "We are going to play a game where I will show you some pictures of animals. If you know what the animal is, then I want you to whisper the animal's name to me. If you don't know what the animal is, you can just whisper, 'I don't know.' Ready?"

Go through the cards one at a time, after five cards, stop and remind the child, "Remember you have to whisper!" Continue with the remaining five cards.

Parent Debrief: In this activity, researchers found that most three to five year olds were able to control their impulse to loudly speak the names of animals they liked and instead whisper. Occasionally though, children spoke or shouted the name of an animal they really liked. This shows that, in most cases, three to five year old children have developed the ability to control their impulses when it comes to whispering. In the study, the researchers were interested in learning about whether a child's development of impulse control is related to their development of a concept called theory of mind, which helps us understand that the thoughts and ideas of others may be different than our own. They found that the two abilities were related, that two year olds who were really good at tasks like the one tended to also do really well on theory of mind tasks at age 3. It's interesting to see how these skills develop in young children entering preschool, who may be learning and using these important social skills for the first time!

### *Appendix C - "Taking Turns" Script*

Say to the child, "Wow, look at all of these blocks I have! Do you want to help me build a tower with all of these blocks? Let's see how tall we can build it before it falls over!"

Continue, by letting the child know, "We're going to build our tower by taking turns. Do you know how to take turns?" If the child says no, explain how to take turns, if the child says yes say, "Let's practice taking turns before we build our tower."

To practice say to the child, "Alright, I will take the first turn, so I am going to put a block down. Now, it is your turn, so you can place a block!"

After repeating once or twice, say to the child, "Great job taking turns with me! Are you ready to see how high we can build our tower now?" Disassemble the blocks used for demonstration.

Let the child know, "You can take the first turn. It's your turn, place a block!" *Wait for child to put their block down, and then wait for a verbal cue from the child before you take your turn. Don't try to stop the child if they continue building without giving you a turn.*

Only if child makes a verbal cue for you to take your turn, place a block. "Great, now it's your turn again!" Again, wait for verbal cue before taking your next turn.

Build until the tower falls or you have used all the blocks.

- *If tower falls down mid-build:* "Oh no, it fell! We built a really tall tower, though, great job! Thank you for building with me. Do you want to play with these blocks while I talk with your grown-up?"
- *If tower is completed:* "Great job! Look how tall our tower is! Thank you so much for building with me. Do you want to play with these blocks while I talk with your grown-up?"

Parent Debrief: The tower game specifically looks at impulse control, asking: are children able to exercise self-restraint and resist taking an unlimited number of turns if not explicitly instructed to stop and let the other person take his turn? Younger children typically had a more difficult time restraining themselves, while older children were able to have an easier time holding back. In the study, the researchers were interested in learning about whether a child's development of impulse control is related to their development of a concept called theory of mind, which helps us understand that the thoughts and ideas of others may be different than our own. They found that the two abilities were related, that two year olds who were really good at tasks like the one I just did with your child, tended to do really well on theory of mind tasks at age 3. It's interesting to see how these skills develop in young children entering preschool, who may be learning and using these important social skills for the first time!

### *Appendix D - “Band-Aid/Candle” Script*

Show the child the Band-Aid box and ask them, “What do you think is inside this box?” (child probably answers: “Band-Aids”)

Open the box and reveal it’s contents to the child, “Look! What was really inside the box?” (child responds: “candles”). Close the box.

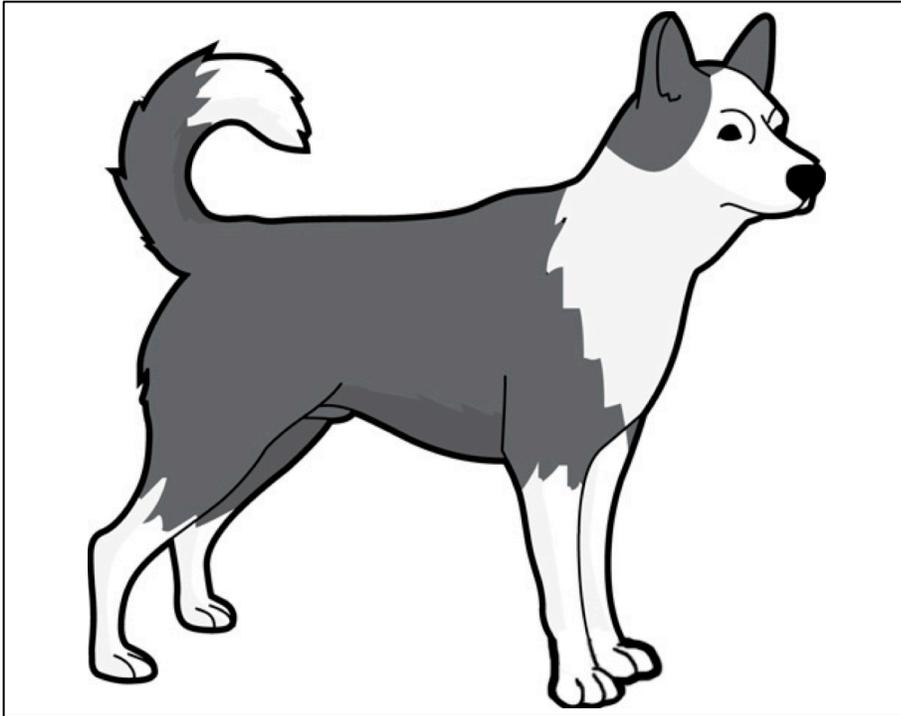
Ask the child, “When you first saw this box, before we opened it, what did you think was inside, Band-Aids or candles?” (child responds) “And what was really inside?” (child responds)

Ask the child, “Who is someone you know who didn’t come with you to the museum today?” (child names a person). “Has that person ever seen inside this box before?”

Ask the child, “If that person were to walk in right now, and we showed him/her this box, what do you think s/he would say is inside?”

Parent Debrief: This activity is one of a number of activities researchers used in their study. This particular activity was looking at how children develop the ability to understand that there may be information they know that others do not know—a concept called Theory of Mind. The researchers found that whether or not children could control their impulses in a handful of tests at age two closely predicted how well they would understand the perspectives of others at age three. As children age, they are able to understand that even though they know there are candles in the box that does not necessarily mean that others will know there are candles in the box.

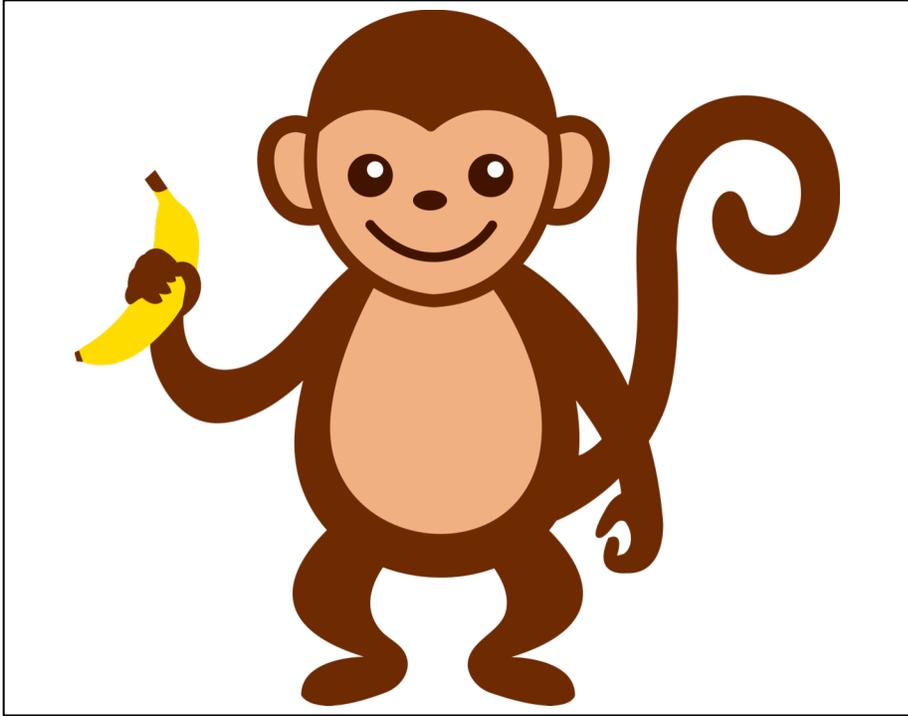
Appendix E – Activity Cards for the “Keeping Quiet” task



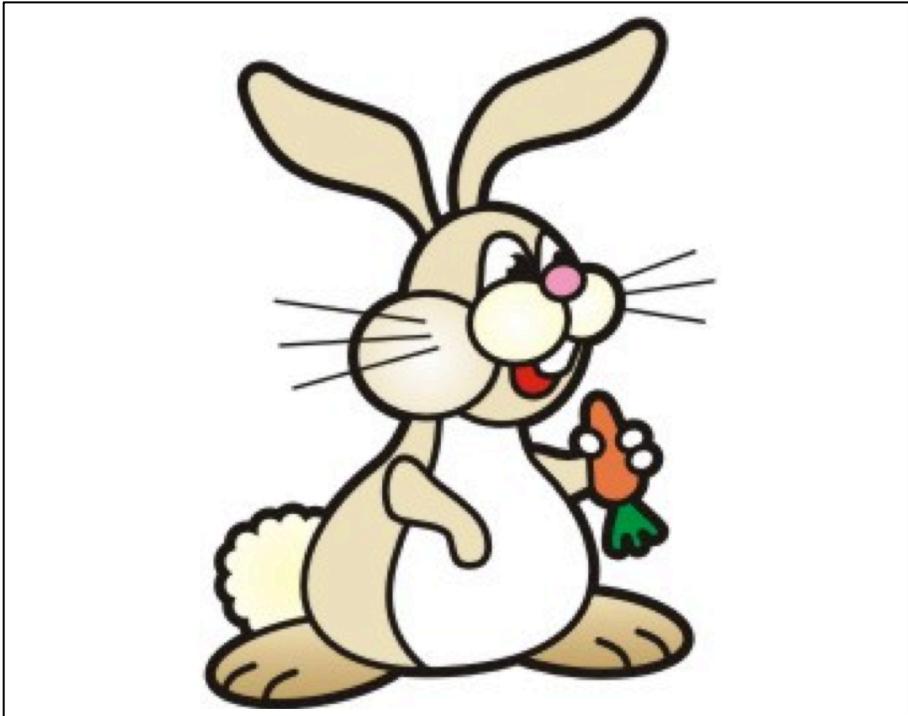
Dog



Dolphin



**Monkey**



**Rabbit**



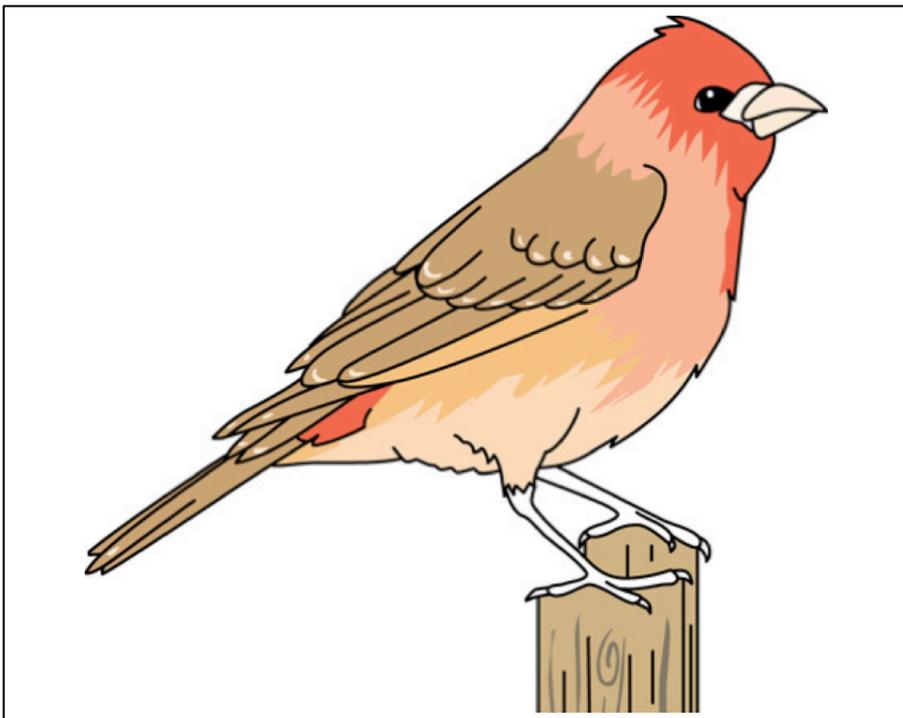
**Elephant**



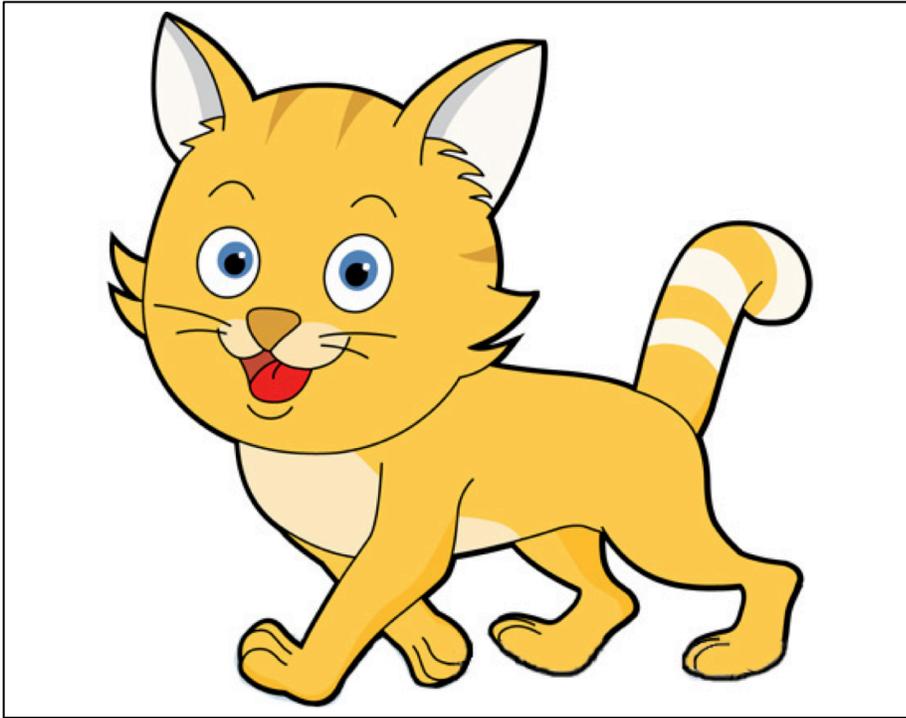
**Giraffe**



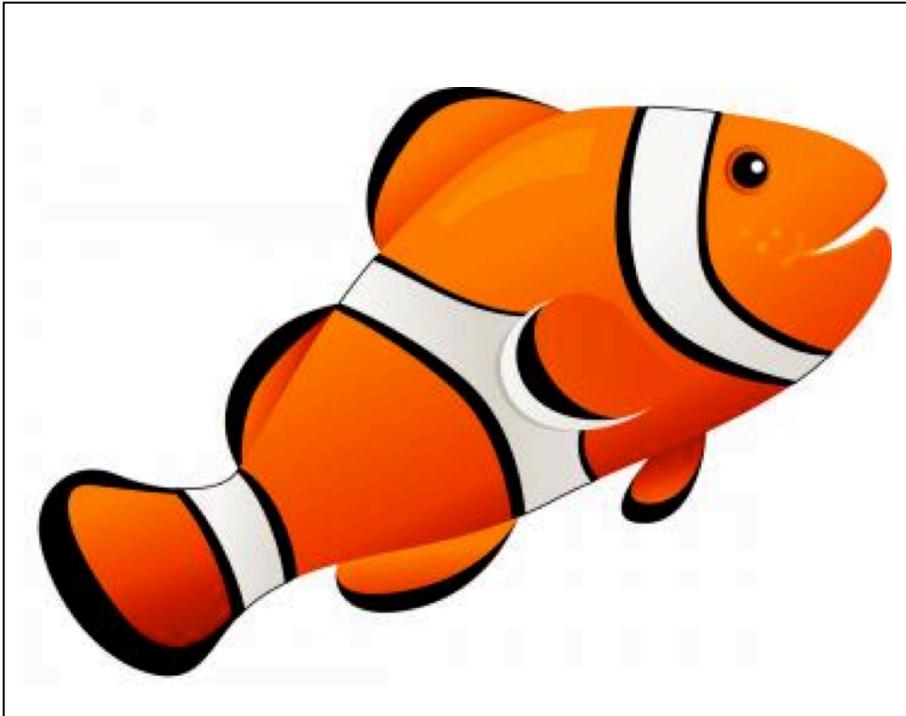
**Bear**



**Bird**



Cat



Fish