**Supplemental Material A**

The Executive Function Challenge Task (EFCT)

Materials you need to purchase/prepare in advance:

1. Stopwatch or app on your phone (you won’t actually be recording the time) that beeps 
2. TWO 24-piece puzzles, that you have previously labeled on the back this way:
	1. The back of the pieces is labeled “C” for child or “E” for examiner to ensure that the pieces given to the child are not adjacent in the completed puzzle and to optimize the need for collaboration to complete the puzzle. Separate pieces prior to administration in plastic bags to distribute after directions. This is an example of how it should look: 

C

C

C

C

C

C

C

C

C

C

C

E

E

E

E

E

E

E

E

E

E

E

E

C

1. Clay or PlayDoh ©, 2 colors
2. Blank paper
3. Markers
4. Form A or B and a pen for writing/scoring as you administer.

General tips and tricks:

1. The whole task should take about 15 minutes.
2. Don’t help the child too much. For example, if the child is having a hard time handing over their sculpture, don’t reach over and take it from them.
3. *Each time* a child corrects or criticizes the examiner or activities OR repeatedly questions the examiner OR struggles with transitions before, during, or after any task, he/she automatically loses a point in the Flexibility coding for that task.
	* + 1. Examples, if a child says “you’re doing it wrong” or asks “How am I supposed to make it? Is it supposed to look like this? Am I doing it right?”
			2. Keep track of this at the bottom of each page.
4. It is easiest to score as you go, so you don’t forget. Use the check boxes as you go and make notes about what the child says.

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| **Puzzle Task:** The child has half of the pieces to a jigsaw puzzle and must collaborate with examiner to complete it.**Materials:** StopwatchStopwatch, 24-piece puzzle, pre-labeled an in instructions Use Puzzle A.

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| **Administration** | **Instructions** | **Reminders** |
| 1. Give the child the 12 pieces of the puzzle marked “C” on the back→ | **“We need to complete this puzzle. We each have half of the pieces and we can only put down our own pieces. Here is a picture of the completed puzzle. We are being timed, so we need to work as quickly as we can. Wait until I say go. Ready, set, go!”** |  |
| * If the child asks how much time they have, respond with→
 | * *“I am not allowed to say.”*
 |  |
| 2. Press the “Start” button on a loud beeping stopwatch that the child can hear and see. Attempt to solve the puzzle alone using only your 12 pieces labeled, “E”. |  | Stopwatch is to create time pressure and to help you with the guidelines, you aren’t recording the time. Do not initiate conversation further, except as noted.  |
| * If the child hasn’t initiated working together after about 1 minute has elapsed, prompt→
 | * *“This isn’t working.”*
 | Remind child of the rule if he/she breaks it (i.e., only put down your own pieces), *“Remember, you can only put down your pieces, not mine.”* |
| * If no response after 15 seconds, →
 | * *“What should we do?”*
 |  |
| 3. If child has made a clumsy attempt at a plan, give a responsive prompt. * If child puts one of his pieces in front of you without saying anything, you could ask →
* If child’s plan is vague, ask them to clarify→
 | * *“What should I do?”*
* *“What do you mean?”*
 | See if the child makes any suggestions or comes up with a plan, and if he/she does, follow those suggestions.  |
| 4. When puzzle is half done or after 3 minutes, say→ | **“Only one more minute left!”** |  |
| Before the puzzle is completed, say → | **“Time has run out! We have to clean up now.”** | Get the puzzle box, but don’t touch the puzzle pieces until you have coded the child’s response.  |

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| **Plan:** Code the degree to which the child spontaneously generates a plan.

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| --- | --- | --- |
| 0□ Child comes up with a clear collaborative plan with 0 or 1 prompts. | 1□ Child comes up with clear collaborative plan after 2 or 3 examiner prompts. | 2□ Child does not independently come up with a clear collaborative plan or plan remains vague. |

**Flexibility:** Code how flexible the child is generally, and in response to the taking rule and interruption of the task.

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| --- | --- | --- |
| 0□ Child ends task when requested without hesitation. AND | 1□ Child asks for extra time or places an additional piece after interrupted. OR | 2□ Child places more than one piece after interrupted. OR |
| □ Child follows the taking rule (does not take one of the examiner’s pieces). | □ Child breaks the taking rule once. | □ Child breaks the taking rule more than once.  |

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| **Clay Task:** The child and examiner pick a figure to make out of clay, but must trade clay halfway through and finish each other’s figures.**Materials:** Clay (2 colors)

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| **Administration** | **Instructions** | **Reminders** |
| 1. Put clay on table but do not hand to child→
 | **“We are each going to make a food item out of clay. Choose the type of food you would like to make. We cannot make the same item of food. What food did you choose?”**  |  |
| 1. Wait for response→
 | “**I wanted to make that**! **We can’t have the same food.”** | Wait for response. |
| * No solution, Prompt→
 | * *“What should we do?”*
 | *Pause 15 seconds for response.* |
| * Still no solution, Suggest→
 | * *“I’ll make \_\_\_.”*
 |  |
| 1. Once child and examiner have a food item→
 | **“Great. Now we both have an item of food to make. I have a plan to make mine, how will you make yours?”** | Wait for response. |
| * No response, Prompt→
 | * *“What will you do first/next?”*
 |  |
| * If needed, 2nd Prompt→
 | * *“What will you do after that?”*
 |  |
| 1. Give child the clay→
 | **“Start making your food now. Make it the very best you can.”** | Work on sculpture and watch to see if child follows plan. |
| 1. 50% of sculpture done→
 | **“Stop. Let’s switch our items. Now finish making my item and I will finish making yours.”**  | Pause 15 seconds. |
| * No response, Prompt→
 | * *“You need to give me your item and finish making mine.”*
 | End task if child does not switch after 15 sec. |

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| **Plan:** Code the degree to which the child spontaneously generates a plan.

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| --- | --- | --- |
| 0 | 1 | 2 |
| 🗌Child spontaneously comes up with initial food item. AND | 🗌Child spontaneously comes up with initial food item.OR | 🗌Child does not generate initial food itemOR |
| 🗌Child states clear, 2 + step plan with no prompting or 1 prompt from examiner.  AND | 🗌Child requires two or more prompts to state a 2 + step plan. OR | 🗌Child does not generate a plan with more than 1 step or plan is vague. |
| 🗌Plan is followed.  | 🗌Child does not follow plan. |  |

**Flexibility:** Code how flexible the child is in response to the examiner wanting to create the same food item and trade clay sculptures.

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| --- | --- | --- |
| 0 | 1 | 2 |
| 🗌Child chooses another food item when same idea is picked by examiner. AND | 🗌 Child’s solution to having the same food item is for the examiner to pick another food item. OR | 🗌Child does not come up with a solution to same item being picked by examiner.OR |
| 🗌Child switches sculptures easily, without protest or perseveration after the first request.  | 🗌 Child shows some difficulty switching sculptures or needs the prompt to switch. | 🗌Child is unwilling to switch sculptures.  |

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| **Drawing Task:** The child is assigned one magic marker and has to work with the examiner to make a picture.**Materials:** Paper, 2 markers (red/blue)

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| **Administration** | **Instructions** | **Reminders** |
| 1. Put 1 sheet of paper on table. Hold the markers→
 | **“We each get one magic marker. On this piece of paper, we have to work together to make a zoo. Let’s try to fill up the whole paper. How shall we do it together**?”  | Wait for response. |
| * Child does not divide task OR child does not list items/steps, prompt→
 | * *“What should we do first to complete the drawing together?”*
 | Pause 15 seconds for response. |
| 1. (Intrusion 1) Let child choose a marker. Immediately, say→
 | **“I want that one.”** | Wait for response. Draw. |
| 1. Encroachment: 1 minute into task, draw over child’s drawing in illogical way.
 |  | Draw & wait for response. |
| 1. (Intrusion 2) Take child’s marker while child is using it→
 | **“I need this for a minute.”** | Draw & wait for response. |

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| **Plan:** Code the degree to which the child generates a plan for completing drawing together/dealing with examiner’s encroachment.

|  |  |  |
| --- | --- | --- |
| 0 | 1 | 2 |
| 🗌 Child spontaneously comes up with a collaborative plan (before or during task). AND🗌Plan includes specific tasks for both child and examiner. AND🗌 Child comes up with an alternative plan spontaneously following encroachment OR the encroachment is not a problem so verbalization of plan wasn’t necessary.  | 🗌Child comes up with collaborative plan after prompt. OR🗌 Child’s plan lacks specificity.OR🗌 Child has trouble coming up with an alternative plan after encroachment. | 🗌 Child does not come up with plan to work together. OR🗌 Child requires examiner to come up with an alternative plan following encroachment. |

**Flexibility:** Code how flexible the child is in response to intrusions 1 and 2 described above.

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| --- | --- | --- |
| 0 | 1 | 2 |
| 🗌 Child may notice and verbally address intrusions, but does not perseverate or let it interrupt the task.  | 🗌 Child perseverates on intrusions 2 times or less.OR🗌Child appears annoyed, but continues task. | 🗌 Child perseverates on intrusions more than twice. OR🗌Child becomes very frustrated and has difficulty continuing task. |

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| **Planning Task:** The child is asked to come up with a realistic and socially appropriate plan and priorities based on information provided by examiner**Materials:** None1st Scenario Planning:1. “**Let’s say that you need to do a big project for school, like an art project or a science experiment. What would you pick?”**
* No response: **“What (**art or science**) project would you pick?”**

# of steps in the plan:1. **“What would your plan be?”**
* No response:“*What should you do first?”*

1st Scenario Setbacks (check if child gives new plan):* **“What if another kid in your class is doing that project and everyone has to do something different?”**
* **“What if the \_\_\_\_ is not working?”** OR **“What if you realize you didn’t buy enough \_­\_ to finish your project)?”**

2nd Scenario Planning:1. **“Here’s a different question: let’s say that you want a friend to come over. How would you make that happen?”**
* No response: *“What should you do first?”*

# of steps in the plan:2nd Scenario Setbacks (check if child gives new plan):* **“What if your friend cannot come over that day?”**
* **“What if you wanted to play video games and the video game system is not working?”** OR **“What if your friend does not want to play the game you want to play?”**

3rd Scenario Planning:1. **“Daniel wants to treat his friend to a movie and popcorn in one week, but there are a lot of things to arrange before this can happen. Can you help Daniel figure out what steps he needs to take to do this?**
* No response: *“What should you do first?”*

# of steps in the plan:3rd Scenario Setbacks (check if child gives new plan):* **“What if Daniel wants to see \_\_\_\_, but his friend hates that movie?”**
* **“What if Daniel and his friend get mad at each other the day before they are supposed to go to the movies?”** OR **“What if Daniel doesn’t have any money and his parents won’t pay for him?”**
 |
| **Plan:** Code the degree to which the child generates a plan (*do not code set-backs*).

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| 0 | 1 | 2 |
| 🗌 Child spontaneously comes up with a plan for all 3 scenarios (without prompt). AND🗌 Plans have 3+ steps linked to goal. Plans must be in a logical order, realistic, & socially appropriate.  | 🗌 Child comes up with a plan for at least 2 scenarios (with or without prompt).AND🗌 At least 2 plans have 2 or more steps linked to the goal.  | 🗌 Child comes up with a plan for 1 scenario (with or without the prompt**).** OR🗌 More than 1 plan has fewer than 2 steps that are linked to goal. |

**Flexibility:** Code how flexible the child is in response to the set-backs.

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| --- | --- | --- |
| 0 | 1 | 2 |
| 🗌 Child can resolve both setbacks in all 3 scenarios. AND | 🗌 Child can resolve at least 1 setback in all 3 scenarios. OR | 🗌 Child has difficulty resolving both setbacks in 1+ scenarios.OR |
| 🗌Child does not perseverate or become frustrated with the set-backs.  | 🗌 Child perseverates or resists once. | 🗌 Child perseverates more than once or becomes agitated. |

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| **Puzzle Task:** The child has half of the pieces to a jigsaw puzzle and must collaborate to complete it.**Materials:** Stopwatch Stopwatch ; 24 piece puzzle. Use Puzzle B.

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| **Administration** | **Instructions** | **Reminders** |
| 1. Give the child the 12 pieces of the puzzle marked “C” on the back→ | **“We need to complete this puzzle. We each have half of the pieces and we can only put down our own pieces. Here is a picture of the completed puzzle. We are being timed, so we need to work as quickly as we can. Wait until I say go. Ready, set, go!”** | If the child asks, “How much time do we have,” respond with, “I am not allowed to say.” |
| 2. Press the “Start” button on a loud beeping stopwatch that the child can hear and see.Attempt to solve the puzzle alone using only your 12 pieces labeled, “E”. |  | Do not initiate conversation further, except as noted.  |
| * If the child hasn’t initiated working together after about 1 minute has elapsed, prompt→
 | * *“This isn’t working”*
 | Remind child of the rule if he/she breaks it (i.e., only put down you’re your own pieces), “Remember, you can only put down your pieces, not mine.” |
| * If no response after 15 seconds, →
 | * *“What should we do?”*
 |  |
| 3. If child has made a clumsy attempt at a plan, give a responsive prompt. * If child puts one of his pieces in front of you without saying anything, you could ask →
* If child’s plan is vague, ask them to clarify→
 | * *“What should I do?”*
* *“What do you mean?”*
 | See if the child makes any suggestions or comes up with a plan, and if he/she does, follow those suggestions.  |
| 4. When puzzle is half done or after 3 minutes, say→ | **“Only one more minute left!”** |  |
| 5. Before the puzzle is completed, say→ | **“Time has run out! We have to clean up now.”** | Get the puzzle box, but don’t touch the puzzle pieces until you have coded the child’s response.  |

 |
| **Plan:** Code the degree to which the child spontaneously generates a plan.

|  |  |  |
| --- | --- | --- |
| 0 | 1 | 2 |
| 🗌Child spontaneously comes up with a clear collaborative plan with 0 or 1 prompts. | 🗌Child spontaneously comes up clear collaborative plan after 2 or 3 prompts  | 🗌Child does not independently come up with a clear collaborative plan or plan remains vague  |

**Flexibility:** Code how flexible the child is generally, and in response to the taking rule and interruption of task.

|  |  |  |
| --- | --- | --- |
| 0 | 1 | 2 |
| 🗌Child ends task when requested without hesitation. AND | 🗌 Child asks for extra time or places an additional piece after interrupted.OR | 🗌Child places more than one piece after interrupted.OR |
| 🗌Child follows the taking rule (does not take one of the examiner’s pieces). | 🗌 Child breaks the taking rule once. | 🗌Child breaks the taking rule more than once.  |

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| **Clay Task:** The child and examiner pick a figure to make out of clay, but must trade clay halfway through and finish each other’s figures.**Materials:** Clay (2 colors)

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| --- | --- | --- |
| **Administration** | **Instructions** | **Reminders** |
| 1. Put clay on table but do not hand to child→
 | **“We are each going to make an animal out of clay. Choose the type of animal you would like to make. We cannot make the same animal. What animal did you choose?”**  |  |
| 1. Wait for response→
 | “**I wanted to make that**! **We can’t have the same animal.”** | Wait for response. |
| * No solution, prompt→
 | * *“What should we do?”*
 | *Pause 15 seconds for response.* |
| * Still no solution, suggest→
 | * *“I’ll make \_\_\_.”*
 |  |
| 1. Once child and examiner have an animal→
 | **“Great. Now we both have an animal to make. I have a plan to make mine, how will you make yours?”** | Wait for response. |
| * No response, prompt→
 | * *“What will you do first?”*
 |  |
| * If needed, 2nd prompt→
 | * *“What will you do after that?”*
 |  |
| 1. Give child the clay→
 | **“Start making your animal now. Make it the very best you can.”** | Work on sculpture and watch to see if child follows plan. |
| 1. 50% of sculpture done→
 | **“Stop. Let’s switch our animals. Now finish making my animal and I will finish making yours.”**  | Pause 15 seconds. |
| * No response, prompt→
 | * *“You need to give me your animal and finish making mine.”*
 | End task if child does not switch after 15 sec. |

 |
| **Plan:** Code the degree to which the child spontaneously generates a plan.

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| --- | --- | --- |
| 0 | 1 | 2 |
| 🗌Child spontaneously comes up with initial animal. AND | 🗌Child spontaneously comes up with initial animal.OR | 🗌Child does not generate initial animal OR |
| 🗌Child states clear, multi-step plan with no prompting or 1 prompt from examiner.  AND | 🗌Child requires two or more prompts to state a 2 + step plan. OR | 🗌Child does not generate a plan with more than 1 step or plan is vague. |
| 🗌Plan is followed.  | 🗌Child does not follow plan. |  |

 **Flexibility:** Code how flexible the child is in response to the examiner wanting to create the same animal and trade clay sculptures.

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| --- | --- | --- |
| 0 | 1 | 2 |
| 🗌Child chooses another animal when same idea is picked by examiner. AND | 🗌 Child’s solution to having the same animal is for the examiner to pick another animal. OR | 🗌Child does not come up with a solution to same animal being picked by examiner.OR |
| 🗌Child switches sculptures easily, without protest or perseveration after the first request.  | 🗌 Child shows some difficulty switching sculptures or needs the second request to switch.  | 🗌Child is unwilling to switch sculptures.  |

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| **Drawing Task:** The child is assigned one magic marker and has to work with the examiner to make a picture.**Materials:** Paper, 2 markers (red/blue)

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| --- | --- | --- |
| **Administration** | **Instructions** | **Reminders** |
| 1. Put 1 sheet of paper on table. Hold the markers→
 | **“We each get one magic marker. On this piece of paper, we have to work together to make an underwater scene. Let’s try to fill up the whole paper. How shall we do it together**?”  | Wait for response. |
| * Child does not divide task OR child does not list items/steps, prompt→
 | * *“What should we do first to complete the drawing together?”*
 | Pause 15 seconds for response. |
| 1. (Intrusion 1) Let child choose a marker. Immediately, say→
 | **“I want that one.”** | Wait for response. Draw. |
| 1. Encroachment: 1 minute into task, draw over child’s drawing in illogical way.
 |  | Draw & wait for response. |
| 1. (Intrusion 2) Take child’s marker while child is using it→
 | **“I need this for a minute.”** | Draw & wait for response. |

 |
| **Plan:** Code the degree to which the child generates a plan for completing drawing together/dealing with examiner’s encroachment.

|  |  |  |
| --- | --- | --- |
| 0 | 1 | 2 |
| 🗌 Child spontaneously comes up with a collaborative plan (before or during task). AND🗌Plan includes specific tasks for both child and examiner. AND🗌 Child comes up with an alternative plan spontaneously following encroachment OR the encroachment is not a problem so verbalization of plan wasn’t necessary.  | 🗌Child comes up with collaborative plan after prompt. OR🗌 Child’s plan lacks specificity.OR🗌 Child has trouble coming up with an alternative plan after encroachment. | 🗌 Child requires examiner to come up with plan to work together. OR🗌 Child requires examiner to come up with an alternative plan following encroachment. |

**Flexibility:** Code how flexible the child is in response to intrusions 1 and 2 described above.

|  |  |  |
| --- | --- | --- |
| 0 | 1 | 2 |
| 🗌 Child may notice and verbally address intrusions, but does not perseverate or let it interrupt the task.  | 🗌 Child perseverates on intrusions 2 times or less.OR🗌Child appears annoyed, but continues task. | 🗌 Child perseverates on intrusions more than twice. OR🗌Child becomes very frustrated and has difficulty continuing task. |

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| **Planning Task:** The child is asked to come up with a realistic and socially appropriate plan and priorities based on information provided by examiner**Materials:** None1st Scenario Planning:“**“Let’s say that your teacher wants everyone in your class to do a presentation on their favorite animal. What would you pick?”** * No response: **“What (**animal**) would you pick?”**

# of steps in the plan:**“What would your plan be?”*** No response:“*What should you do first?”*

1st Scenario Setbacks (check if child gives new plan):* **“Another kid in your class is doing that animal and everyone has to do something different.”**
* **“After typing your speech on the computer, you accidentally exit out of the speech before you hit ‘save’ and you lose all your work.”**

2nd Scenario Planning: **“Here’s a different question: let’s say that you want to invite a friend to the park. How would you make that happen?”** * No response: *“What should you do first?”*

# of steps in the plan:2nd Scenario Setbacks (check if child gives new plan):* **“What if your friend cannot hangout that day?”**
* **“What if it starts to rain?**

3rd Scenario Planning:**“Connor wants to take his friend to get pizza and ice cream next weekend, but there are a lot of things to arrange before this can happen. Can you help Connor figure out what steps he needs to take to do this?** * No response: *“What should you do first?”*

# of steps in the plan:3rd Scenario Setbacks (check if child gives new plan):* **“What if Connor wants to go on Saturday, but his friend can’t go until Sunday?”**
* **“What if Connor and his friend get into a fight the day before they are supposed to go out to eat?”**
 |
| **Plan:** Code the degree to which the child generates a plan (*do not code set-backs*).

|  |  |  |
| --- | --- | --- |
| 0 | 1 | 2 |
| 🗌 Child spontaneously comes up with a plan for all 3 scenarios (without prompt). AND🗌 Plans have 3+ steps linked to goal. Plans must be in a logical order, realistic, & socially appropriate.  | 🗌 Child comes up with a plan for at least 2 scenarios (with or without prompt).AND🗌 At least 2 plans have 2 or more steps linked to the goal.  | 🗌 Child comes up with a plan for 1 scenario (with or without the prompt**).** OR🗌 More than 1 plan has fewer than 2 steps that are linked to goal. |

**Flexibility:** Code how flexible the child is in response to the set-backs.

|  |  |  |
| --- | --- | --- |
| 0 | 1 | 2 |
| 🗌 Child can resolve both setbacks in all 3 scenarios. AND | 🗌 Child can resolve at least 1 setback in all 3 scenarios. OR | 🗌 Child has difficulty resolving both setbacks in 1+ scenarios.OR |
| 🗌Child does not perseverate or become frustrated with the set-backs.  | 🗌 Child perseverates or resists once. | 🗌 Child perseverates more than once or becomes agitated. |

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