

# **Infant and Toddler Three-Task Assessment of Attention**

## **Manual**

### **1. INTRODUCTION AND PURPOSE**

The following assessment and data extraction procedures were developed by Professor John Colombo from the developmental psychology literature. This manual and the data extraction template were developed by Jacqueline Gould, under the supervision of Professor John Colombo and Associate Professor Lisa Smithers.

Standardisation in measurement techniques is crucial to ensure consistent and accurate results. The objective of this manual is to detail the procedures for assessment of attention and distractibility in early childhood. These procedures should be followed for all assessments associated with SAHMRI HMBC studies.

## 2. ASSESSMENT PROCEDURE

### 2.1 Equipment

- Small desk and chair for parent and child
- Stool or chair for research staff
- Flat screen TV and DVD player with remote(s)
- Camcorder and Tripod
- Hand-held timer
- Sleeve for study ID and date
- Sterile disposable wipes
- Toys for each task (age-appropriate for sample)
  - **Task 1:** one age-appropriate complex toy with multiple functions such as buttons, music, lights, wheels to turn or flaps to lift, sufficient to entertain a child for 5 mins-see below for examples

18-month assessment



24-30-month assessment



- **Task 2:** five age-appropriate small unrelated toys, each with a different function such as wheels or a button (for example a toy car, rubber duck) - see below for examples

18-month assessment



24-30-month assessment



- **Task 3:** four age-appropriate large toys, each but silent (no music or other noise from buttons) but complex (i.e. shape sorter, blocks, train set) -see below for examples

18-month assessment





24-30-month assessment



## **2.2 Assessment Preparation**

- Assemble equipment required;
  - Small desk and chair (in corner of room for mother and child to sit at)
  - TV placed 1m away from the child at a 45° viewing angle and remote placed where researcher has easy access to it
  - Set up camcorder on tripod to film the child's hand and eye movements when sitting at the desk
  - Set up stool/chair for researcher to sit on next to the tripod so that they can see what the camcorder is recording
  - Mirror placed to shine reflection of TV to the camera
  - Hand held timer kept on researcher
  - Toys close at hand but out of view from the desk and chair (such as in drawers)
  - Pin or tape up sleeve on the wall behind desk, in view of the camera when parent and child are seated at the desk
    - Write study ID and date of assessment on the sleeve, readable on the videorecording
- Ensure no distractions in the room (such as posters or toys, any windows should be covered with curtains or blinds) and the temperature is comfortable

## **2.3 At the appointment**

- Consent form must be signed and a copy provided to the caregiver
- Explain the assessment procedure as per the script below

*“(child name) will be seated on your lap, given some toys to play with and (child name) will be videorecord to measure their eye movements.*

*There will be a few parts to this, first I'm going to give (child name) one toy to play with for 5 minutes, then 5 toys for five minutes, and lastly 4 toys for 3 minutes each while that TV goes on and off in the background.*

*We'll be looking at (child name) eye movements to and from the toy, between the toys and between the toys and TV. We videorecord this to get the split-second timings of eye movements.*

*It's important during this assessment not to interact with (child name), as it will influence their behaviour. Instead, if they turn around to you, smile reassuringly. Please sit down on the chair behind the desk, with (child name) on your lap so that they are facing forward. If any toys fall down I will pick them up so you can sit back and watch them play.”*

- Make sure parent is seated at the chair behind the desk, with the child on their lap
  - Ensure child's face and hands are clearly visible on the camcorder
- Once ready, press record on the camcorder and ensure no issues with the recording
- Important notes for the assessment
  - During the assessment, abstain from interacting with the child or making any distracting sounds or movements
  - If a toy falls on the floor, pick it up and put it back on the desk.
    - If a toy falls to the ground during the Multiple Object task, after putting the toy back on the desk, touch each toy lightly with the same hand so as not to introduce favouritism
    - If a toy falls to the ground during the Distractibility task, press pause on the DVD before retrieving the toy, however do not interrupt a distractibility segment. If a segment is playing when the toy falls to the ground, wait until the segment finishes before pressing pause and retrieving the toy
  - If a child is shy or becomes disinterested in the toy(s), try to encourage them to play by demonstrating a feature of the toy again and inviting them to play with the following script
 

*"Hey look at the toy here, see what it can do? It's a great toy-now you can have a play with it. Here, it's your turn"*

#### **2.4 Task 1: Single Object**

- Retrieve Single Object toy, turn the toy on and present it to the child
  - Hold toy up to the child and demonstrate a few of the features, such as pressing a few buttons
  - While demonstrating the features, offer the toy with the following script
 

*"Here's a toy, it's got all these buttons and all these pages to flip. Look at all these pictures...and you can press this button in the middle here too-here. Here you can have a turn to play with the toy."*
- Place the toy on the desk in front of the child and sit down next to the camcorder
- Press start on the stop watch/timer, and watch the assessment through the camcorder but do not make eye contact directly with the child
- After 5 minutes, retrieve the toy from the child with the following script
 

*"How did you like that toy? Have you got one of those at home? Now it's time for a new toy"*
- Put toy away out of sight of the child

#### **2.5 Task 2: Multiple Object**

- Retrieve Multiple Object toys (may take more than 1 trip), line them up on the desk in front of the child

- Demonstrate a few of the features of a few of the toys, such as moving a moveable part, and pressing a button
- While demonstrating the features, offer the toys with the following script  
*“Look I have lots of toys for you this time. One, two, three four five. Look what they can do. Now you can play with these toys.”*
- Once all toys are on the desk and have demonstrated a few features, touch all toys briefly with the same hand from left to right so as not to indicate favouritism to any toy and sit down next to the camcorder
- Press start on the stop watch/timer, and watch the assessment through the camcorder but do not make eye contact directly with the child
- After 5 minutes, use the remote to turn the TV on and retrieve the toys from the child with the following script  
*“How did you like those toys? Have you got any of those at home? Now it’s time for a new toy”*
- Put toys away out of sight of the child

### **2.6 Task 3: Distractibility**

#### Toy 1

- Press play on the DVD
- Retrieve the first Distractibility toy, and present it to the child
  - Hold toy up to the child and demonstrate a few of the features, such as pressing a few buttons
  - While demonstrating the features, offer the toy with the following script  
*“Here’s a toy. Look at what you can do with this toy. Here you can have a turn to play with the toy.”*
- Place the toy on the desk in front of the child and sit down next to the camcorder
- Press start on the stop watch/timer, and watch the assessment through the camcorder but do not make eye contact directly with the child
- After 3 minutes, press pause on the DVD and retrieve the toy from the child with the following script  
*“How did you like that toy? Have you got one of those at home? Now it’s time for a new toy”*
- Put toy away out of sight of the child

#### Toy 2

- Retrieve the second Distractibility toy, and present it to the child
  - Hold toy up to the child and demonstrate a few of the features, such as pressing a few buttons
  - While demonstrating the features, offer the toy with the following script

*“Here’s a toy. Look at what you can do with this toy. Here you can have a turn to play with the toy.”*

- Place the toy on the desk in front of the child and sit down next to the camcorder, press play on the DVD
- Press start on the stop watch/timer, and watch the assessment through the camcorder but do not make eye contact directly with the child
- After 3 minutes, press pause on the DVD and retrieve the toy from the child with the following script

*“How did you like that toy? Have you got one of those at home? Now it’s time for a new toy”*
- Put toy away out of sight of the child

#### Toy 3

- Repeat procedure from Toy 2, using Toy 3

#### Toy 4

- Repeat procedure from Toy 2, using Toy 4
- When retrieving the fourth toy from the child, stop the DVD and turn the TV off
- Retrieve the last toy with the following script

*“How did you like that toy? Have you got one of those at home? That was the last toy for today. Thank you for coming in-I hope you had fun with these toys”*
- Once retrieved the toy, turn the camcorder off

### **2.8 After the appointment**

- Wipe down the toys and desk with the sterile wipes and put away for next appointment
- Clean the study ID and date from the sleeve
- Download the videorecording for storage and data extraction
  - label recording with “studyID\_date of assessment” (i.e. 123456\_24.12.2012) and save in study folder

## **3. DATA EXTRACTION PROCEDURE**

### **3.1 Equipment**

- Laptop or computer with Pinnacle Studio Plus (12th Edition) Video Editing Software (software that allows viewing of recordings frame by frame, and has frame by frame time stamp)

- Flat screen TV, that can be connected to the laptop or computer to play the video recording
- Shuttle Jog (device that allows slowing down videorecording for frame-by-frame viewing)
- Microsoft Excel data extraction template developed by J Gould

### **3.2 Data Extraction Preparation**

- Video recording to be extracted needs to be saved on laptop/computer with Pinnacle software
  - Connect Shuttle jog to laptop/computer
- Open up Pinnacle Studio Plus (12th Edition) Video Editing Software
  - Open the assessment recording to be viewed
- Connect laptop/computer to television
  - Display the Pinnacle video viewing frame on the TV screen
- Open Microsoft Excel® data extraction template and save the file as “studyID\_date of assessment” (i.e. 123456\_24.12.2012) in study folder

### **3.3 Data Extraction Rules**

- All data can be entered directly into the data extraction template, and all calculations are programmed
- All times are displayed as min.sec.frames by the pinnacle software. Frames need to be converted into milliseconds (25 frames per second) to be entered into the data extraction template, according to the Table. Hours are also present in the data extraction template so will need to be entered as “00” so that time is entered as hours:min:sec.ms (i.e. 00:00:00.00)

#### Eye movements

- Eye movements must be watched frame by frame
- An eye movement starts
  - **time at which child *starts* looking at the toy (eyes *start* to move in the direction of the toy)**
  - **time at which child *starts* looking away from the toy (eyes *start* to move in a direction away from the toy)**

The start of an eye movement is when the child can no longer be said to be looking at the object on which the eyes were previously focused on. Therefore, if the child was looking at the toy, then turns to look at their parent, the time at which the child *starts looking at away from the toy* is the point at which the eyes can no longer be said to be looking at some part of the toy. This can be difficult to spot as the eyes will seem to stop at various point when watched frame by frame as they turn from one object to another.

There will be times when a child stops and fixates, briefly, on something in the room during the turn of the head. This must be verified by watching the motion in normal speed. If it is clear that the child fixates on, for example the

experimenter as they look down from the parent and look to the toy, consider *starts looking at the toy* from when the child can no longer be said to be looking at the experimenter.

Keep in mind that children and adults often close their eyes as they turn their heads. In some cases, a child orienting in a new direction will close their eyes as the turn. In such cases the *start of looking* is recorded as the time at which they can no longer see what they were previously looking at as their eyes close.

#### Interference

- Do NOT include any of the following:
  - A portion of data that involves experimenter (E) or parent (P) interaction with child that **influences** or **changes** the child's behaviour (i.e. talks/makes sound/points/holds and child looks away from/to toy)
  - Noises from outside the room attract the child's attention i.e. child looks up from toy
  - E or P holding toy, beyond stabilising it, and child looks at it
  - E or P talking to child and draw their attention to or away from the toy (including talking that is responding to question asked by the child)
  - Any portion of the recording where both of the child's eyes are obscured, i.e. by hands, toy etc.
- Do include the following:
  - Any interaction occurs that does not change the child's behaviour
  - A child initiating conversation with E or P (but only include the time when the child is talking, stop data extraction if/when E or P reply)
  - Very shy child who will not participate without E or P encouraging briefly (rare)
  - Child looking at toy when E or P speaks but child continues to look at toy, does not react to speaking
- Make a note when Experimenter Interference (EI) or Parent Interference (PI) takes place. Write 'PI' and 'EI' in the space between the Time column and the Look at Toy column and note times the interference began and ended.

#### **3.4 Task 1: Single Object**

- Outcomes to be extracted
  - The proportion of time spent looking at the toy
  - The total amount (of time) of looks to the toy
  - The total number of episodes of attention (looks to the toy)
  - The average length (of time) of episodes of attention
  - Longest look (in time) to the toy
- Start extraction the task when experimenter finishes introducing the toy and their hand has left the toy (and experimenter is not blocking the view of the child's face)

- looks to/from the toy are only counted as episodes of attention or inattention if they go for at least **one second** or longer. Therefore any looks to or away from the toy that last for less than one second are not counted.

For example;

(remember time is noted in the following format “mm:ss.00”)

00:00.00 The assessment begins and the child is looking at the toy

01:00.00 The child plays with the toy for a full minute, then looks away from the toy

01:00.12 The child looks back to the toy after less than one second.

As the child’s look away from the toy lasted for less than 1 second it is not counted as an episode of inattention. It is counted as still being in attention so the look away from the toy does not need to be recorded or entered into the data file.

Note: this only applies episodes of attention and inattention. Episodes of interference are always coded for, no matter how long or short they last.

- End extraction exactly 5 minutes after the start time for the task
  - You will need to keep track of this and make sure you end extraction at the right time
  - If the play time is less than 5 mins, end extraction when the experimenter interferes in order to take away the toy
    - ie. As the experimenter stands up the child usually looks at them, especially when they reach out to take the toy away. This is interference as they are distracting the child. Interference is not used in any of the calculations so write END as the time that the experimenter interferes

### **3.5 Task 2: Multiple Object**

- Outcomes to be extracted
  - The number of shifts in attention between toys
  - The amount (in time) of attention to the toys
  - The amount (in time) of inattention to the toys
  - The average length (in time) of episodes of attention
  - The proportion of time spent looking at the toys
  - Longest look (in time) at a toy
- Start data extraction the task when experimenter finishes introducing the toys and their hand has left the last toy (and experimenter is not blocking the view of the child’s face)
- looks to/from a toy are only counted as episodes of attention or inattention if they go for at least **half a second (.5 s)** or longer. Therefore any looks to or away from a toy that last for less than half a second are not counted.

For example;

(remember time is noted in the following format “mm:ss.00”)

00:00.00 The assessment begins and the child is looking at the blocks

- 06:00.00 The child plays with the blocks for a full minute, then looks at the frog.
- 06:00.12 The child looks back to the blocks after less than half a second.

As the child's look to the frog lasted for less than half a second it is not counted as a shift in attention. It is counted as a continuous episode of attention to the blocks so the look to the frog does not need to be entered into the data file.

Note: this only counts for episodes of attention, inattention and shifts between toys. Episodes of interference are always coded for, no matter how long or short they last.

- End data extraction exactly 5 minutes after the start time for the task
  - You will need to keep track of this and make sure you end extraction at the right time
  - If the play time is less than 5 mins, end extraction when the experimenter interferes in order to take away the toy
    - ie. As the experimenter stands up the child usually looks at them, especially when they reach out to take the toy away. This is interference as they are distracting the child. Interference is not used in any of the calculations so write END as the time that the experimenter interferes

### **3.6 Task 3: Distractibility**

- Outcomes to be extracted
  - The latency (in time) to turn from the toy to the distractor (for focused attention)
  - Proportions of turns when the child was in focused attention across all trials
  - The latency (in time) to turn from the toy to the distractor (for casual attention)
  - Proportions of turns when the child was in casual attention across all trials
  - The duration of looking at the TV (when it is on)
  - The duration of looking at the TV (when it is off)
- Start data extraction for each part of the task (4 parts-one for each toy) when experimenter finishes introducing the toy and their hand has left the toy (and experimenter is not blocking the view of the child's face)
- End extraction for each part of the task when the experimenter pauses the DVD (pause symbol displays on the TV)
  - Each part of the task should last approximately 3 minutes (total 12 mins)
- During the Distractibility task there is no minimum duration of time for a look to be counted (unlike the Single Object and Multiple Object tasks)

#### Attention state

- Purpose is to make a judgement about the child's state of attention when the distractor comes on (focused attention, casual attention or look other)

- No set line separating focused from casual attention, they are on a continuum, try to gauge what side of the continuum a child's state is
  - If hard to determine attention states for a particular child, watch the whole task for that child and watch changing facial expressions or eye gaze
- **Focused Attention**
    - Defined as concentration and active learning
    - Child must be looking at toy
    - Child is concentrating on the toy
    - Child has serious/interested facial expression ie:
      - Slowing of movement, concentrated look (furrowed eyebrows, pursed lips), fingering of toy, constant gaze
      - Child's eyes directed to toy and child oriented toward a goal (building)
      - Child is gaining information, learning or thinking about the toy
    - Generally not in focused attention if
      - Fussy child
      - When child looking at toy without engaging in any activity
      - Child doing stereotyped repetitive behaviour eg. pushing train back and forth
      - Child moving eyes over toys or picking up different pieces successively
      - Child talking to experimenter/parent/themselves
  - **Casual Attention**
    - Defined as looking at the toy but not engaged in active learning
    - Child must be looking at toy
    - Child is not as concentrated on the toy, ie getting an overall view
    - Child casually engaged with the toy
    - Generally;
      - Child looks happy or is smiling/laughing
      - Child has quick or large motor movements
      - Child constantly looks at toy in daze or blank stare
  - **Look Other**
    - Defined as child looking at something other than the toy (ie. parent, experimenter, camera)
    - Toy is not visible
    - Child is not looking at toy
    - Child has toy in his/her mouth
    - Child's eyes are closed
  - **Error**
    - EI or PI during onset of distractor
    - Toy falls off table during distractor onset (nothing for child to attend to)

### **3.7 Quality Assurance of Data Extraction**

- To check internal consistency of data extraction, at least 25% of all assessments must be independently checked by a second trained extractor
- 1. Minimal acceptability criteria for data extraction are;
  - Correlation between extractors must be  $r \geq 0.9$  on 3 consecutive assessments (on each task of each assessment)
  - Mean difference between extractors  $\leq 1$  s on 3 consecutive assessments (on each task of each assessment)
- 2. If the minimum criteria are met, both extractors only need to check 25% of assessments for consistency
- 3. If the minimum criteria are not met:
  - Both extractors should rec-extract one of the 3 assessments together using the manual and resolve any differences
  - Both extractors should continue to extract all assessments independently until the minimal criteria is met for 3 consecutive assessments, then return to checking 25% of assessments

TABLE. Conversion of frames to milliseconds

<b>Time</b>		
(as displayed on the time stamp generator)		
<b>Minutes</b>	<b>Seconds</b>	<b>Frames</b>
00	00	<b>01</b>
00	00	<b>02</b>
00	00	<b>03</b>
00	00	<b>04</b>
00	00	<b>05</b>
00	00	<b>06</b>
00	00	<b>07</b>
00	00	<b>08</b>
00	00	<b>09</b>
00	00	<b>10</b>
00	00	<b>11</b>
00	00	<b>12</b>
00	00	<b>13</b>
00	00	<b>14</b>
00	00	<b>15</b>
00	00	<b>16</b>
00	00	<b>17</b>
00	00	<b>18</b>
00	00	<b>19</b>
00	00	<b>20</b>
00	00	<b>21</b>
00	00	<b>22</b>
00	00	<b>23</b>
00	00	<b>24</b>

<b>Converted Time</b>		
(to be entered in Excel)		
<b>Minutes</b>	<b>Seconds</b>	
00	00	<b>04</b>
00	00	<b>08</b>
00	00	<b>12</b>
00	00	<b>16</b>
00	00	<b>20</b>
00	00	<b>24</b>
00	00	<b>28</b>
00	00	<b>32</b>
00	00	<b>36</b>
00	00	<b>40</b>
00	00	<b>44</b>
00	00	<b>48</b>
00	00	<b>52</b>
00	00	<b>56</b>
00	00	<b>60</b>
00	00	<b>64</b>
00	00	<b>68</b>
00	00	<b>72</b>
00	00	<b>76</b>
00	00	<b>80</b>
00	00	<b>84</b>
00	00	<b>88</b>
00	00	<b>92</b>
00	00	<b>96</b>