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Review of Motor Assessments for School-aged Children and Adolescents

Presented by Amy Schlenburg
Consultant OT - Pearson Clinical
Assessment (Aust & NZ)

Why assess motor skills?




- Establish baseline
- Funding eligibility
- Intervention planning
- To determine if motor skill deficits are impacting functional performance
- Outcome measure for assessing effectiveness of intervention

Potential challenges in assessing motor skills

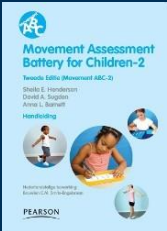


- Time to complete assessment
- Space to complete assessment
- Cognitive or communication delays
- Limited attention or challenging behaviours
- Severe motor impairment
- Performance on a standardised motor assessment might not accurately capture motor competence or deficit in functional activities





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Movement Assessment Battery for Children, 2nd edition (MABC-2)




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Overview





- Motor assessment
- "Identifies, describes and guides treatment of motor impairment"
- Subtests: Manual Dexterity, Aiming and Catching, Balance (8 items total per age band)
- Age Range: 3 yrs – 16 yrs 11 months divided into 3 age bands:
 - 3:0 – 6:11
 - 7:0 – 10:11
 - 11:0 – 16:11
- Teacher Checklist
- Separate intervention manual
- Administration time 20 – 30 minutes



Primary Uses

- Identification of delay or impairment in motor development
- Comparison of fine motor vs gross motor skills
- Plan intervention programs
- Measure change as a result of intervention
- Research involving motor development

Layout of manual

Balance 3 (Dynam) Age Band 1 (3-6 years)

Balance 2 Walking Heels Raised

Demonstration
While demonstrating the task, emphasise:
 • holding the metal tip of the lace
 • picking up the beads and threading them **one at a time**
 • working as quickly as possible.

Practice phase
Give the child **one** practice attempt, for 3- and 4-year-olds, use three beads, for 5- and 6-year-olds, use six. If the child picks up more than one bead at a time or tries to thread more than one at a time, interrupt immediately and give a reminder, or re-demonstrate.

Formal trials
A maximum of two. A second trial is required only if the child's first attempt takes longer than the time specified for their age group on the Record Form. **No assistance may be given during these trials.**

Age Band 1 tasks

Table 2a: Brief summary of changes made to AB1 – now covers ages 3 to 6 years

Task	Movement ABC AB1	Movement ABC-2 AB1
Manual Dexterity 1	Posting Coins	Posting Coins
Manual Dexterity 2	Threading Beads	Threading Beads
Manual Dexterity 3	Bicycle Trail	Drawing Trail 1*
Aiming & Catching 1	Catching Beanbag	Catching Beanbag
Aiming & Catching 2	Rolling Ball into Goal	Throwing Beanbag onto Mat**
Balance 1	One-Leg Balance	One-Leg Balance
Balance 2	Walking Heels Raised	Walking Heels Raised
Balance 3	Jumping over Cord	Jumping on Mats**

* Altered Item: shape of trail has changed
 ** New item

Posting Coins

- Each hand is tested
- 6 coins for 3-4 yr olds
- 12 coins for 5-6 yr olds
- Maximum of 2 trials

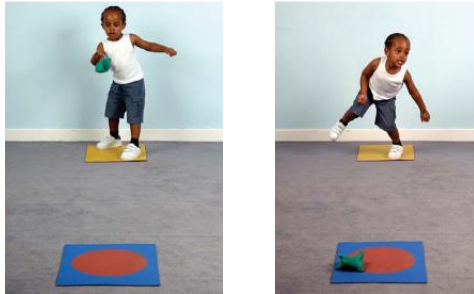
Threading Beads

- 6 beads for 3-4 yr olds
- 12 beads for 5-6 yr olds
- Maximum of 2 trials

Drawing Trail Age Band 1

Catching Beanbag (10 attempts)

Throwing Beanbag onto Mat (10 attempts)



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One-Leg Balance

- Each leg is tested
- Maximum time 30 seconds
- Maximum of 2 trials per leg



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Walking Heels Raised

- 4.5m line
- Maximum of 2 trials
- Maximum score = 15 steps or when child reaches end of line



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Jumping on Mats



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Age Band 2 tasks

Table 2b: Brief summary of changes made to AB2 and AB3 – now labelled AB2 and covers ages 7 to 10 years

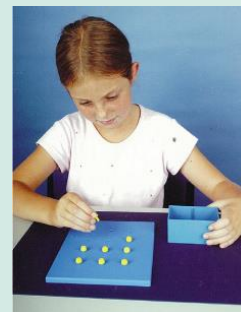
Task	Movement ABC AB2	Movement ABC AB3	Movement ABC-2 AB2
Manual Dexterity 1	Placing Pegs	Shifting Pegs by Rows	Placing Pegs--
Manual Dexterity 2	Threading Lace	Threading Nuts on Bolt	Threading Lace^
Manual Dexterity 3	Flower Trail	Flower Trail	Drawing Trail 2**
Aiming & Catching 1	One-Hand Bounce and Catch	Two-Hand Catch	Catching with Two Hands
Aiming & Catching 2	Throwing Beanbag into Box	Throwing Beanbag into Box	Throwing Beanbag onto Mat**
Balance 1	Stork Balance	One-Board Balance	One-Board Balance
Balance 2	Jumping in Squares	Hopping in Squares	Walking Heel-to-Toe Forwards
Balance 3	Heel-to-Toe Walking	Ball Balance	Hopping on Mats+

- New start position/layout
- ^ Lacing board now longer
- * Shape of trail has changed
- ** Mat with target now used instead of box
- + Mats used for this task

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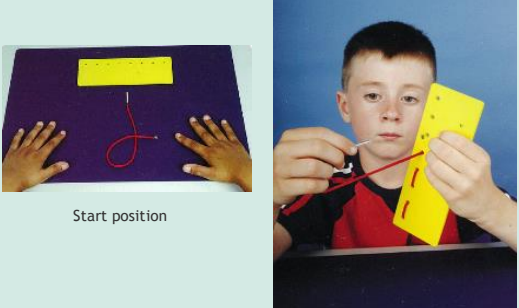
Placing Pegs

- Each hand is tested
- Dominant hand first
- Start timing when free hand leaves mat
- Pegs can be inserted in any order
- Maximum of 2 trials per hand



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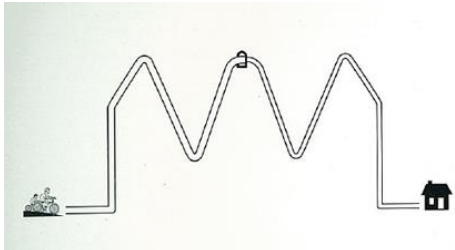
Threading Lace



Start position

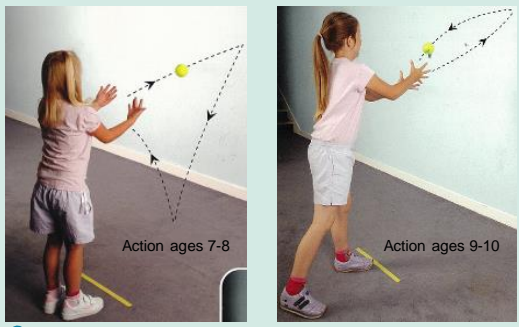
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Drawing Trail Age Band 2



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Catching with Two Hands




Action ages 7-8

Action ages 9-10

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Throwing Beanbag onto Mat

- Ten attempts
- A hit is counted when any part of the beanbag touches the circle
- A throw that bounces or slides onto circle after landing does not count




1.8 m

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One-Board Balance

- Each leg is tested
- Maximum score is 30 seconds
- Board must not tilt such that a side touches the floor
- Child **must** wear trainers



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Walking Heel-to-Toe Forwards

- 4.5m line
- Heel of front foot must touch toes of rear foot
- Maximum = 15 steps or when child reaches end of line
- Maximum of 2 trials



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Hopping on Mats

- Child starts by standing on one foot
- 5 continuous hops
- Must finish in a controlled manner
- Each leg is tested
- Maximum of 2 trials per leg



Age Band 3 tasks

Table 2c: Brief summary of changes made to AB4 – now labelled AB3, covering ages 11 to 16

Task	Movement ABC	Movement ABC-2
Manual Dexterity 1	Turning Pegs	Turning Pegs
Manual Dexterity 2	Cutting-Out Elephant	Triangle with Nuts and Bolts ^A
Manual Dexterity 3	Flower Trail	Drawing Trail 3*
Aiming & Catching 1	One-Hand Catch	Catching with One Hand
Aiming & Catching 2	Throwing at Wall Target	Throwing at Wall Target
Balance 1	Two-Board Balance	Two-Board Balance
Balance 2	Jumping and Clapping	Walking Toe-to Heel Backwards
Balance 3	Walking Backwards	Zig-Zag Hopping ^A

^A New task
* Shape of trail has changed

Turning Pegs

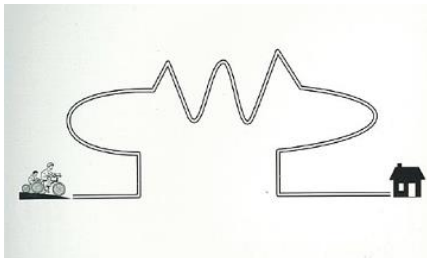
- Each hand is tested
- Start timing when free hand leaves mat
- Pegs can be placed in any order
- Maximum of 2 trials per hand



Triangle with Nuts and Bolts



Drawing Trail Age Band 3




Catching with One Hand

- Each hand is tested
- Child stands behind line 2m from wall
- No bounces allowed
- Ten attempts with each hand



Throwing at Wall Target


- Child stands behind line 2.5m from wall
- Lower edge of target level with top of child's head
- Ten attempts



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Two-Board Balance


- Narrow part of board facing up
- Maximum time is 30 seconds
- Sides of feet should not touch base of boards
- Maximum of 2 trials
- Child must wear trainers



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Walking Toe-to-Heel Backwards


- 4.5m line
- Toe of rear foot must touch heel of front foot
- Maximum score = 15 steps or when child reaches end of line



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Zig-Zag Hopping

- Each leg is tested
- Child hops once on each mat
- No pausing between hops
- Must finish in a controlled manner
- Maximum of 2 trials per leg



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Example of Item Scoring

Manual Dexterity 1: POSTING COINS

Note: 6 coins for 3-4 years, 12 for 5-6 years

Record: Preferred hand: R / L (should be same as for Drawing Trail); Time taken (secs): F for failure; R for refusal; I if inappropriate (note reasons below)

Preferred hand	Only with one hand (preferred hand) or the ring hand (left hand longer than the right) (circle)	Non-preferred hand	Only with one hand (non-preferred hand) or the ring hand (left hand longer than the right) (circle)
Year 1	10-35 16-31 4-9-5 6-4-18 6-5-18 6-6-15 10-11 10-11 10-11 10-11	10-11	10-35 16-31 4-9-5 6-4-18 6-5-18 6-6-15 10-11 10-11 10-11 10-11
Year 2	15-sec 15-sec 13-sec 12-sec 22-sec 27-sec 10-11	10-11	21-sec 19-sec 15-sec 14-sec 25-sec 22-sec

Qualitative observations

Posture/body control

Sitting posture is poor Hand movements are jerky

Holds head too close to task Moves constantly/fidgets

Holds head at an odd angle Adjustment to task requirements

Does not look at slot while inserting coins Misjudges coins with respect to slot

Does not use pincer grip to pick up coins Uses excessive force when inserting coins

Exaggerates finger movements in releasing coins Is exceptionally slow/does not change speed from trial to trial

Does not use the supporting hand to hold box steady Goes too fast for accuracy

Does extremely poorly with one hand (asymmetry striking) Other


Changes hands or uses both hands during a trial

Comments: _____

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Scoring

- Colour coded record forms
 - Age Band 1 = red
 - Age Band 2 = green
 - Age Band 3 = blue
- Scores available
 - Item standard scores (mean 10, SD 3)
 - Component standard scores and percentiles
 - Total assessment standard score (mean 10, SD 3) and percentiles



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Scoring

Appendix B pages 167-176 of manual

- Percentile cut-offs:
 - <5th percentile = significant motor difficulty
 - 6 – 15th percentile = careful monitoring suggested
 - >15th percentile = no significant motor difficulty

Child's score	Total Test Score	Percentile range	Description
Red zone	up to and including 56	at or below the 5th percentile	denotes a significant movement difficulty
Amber zone	between 57 and 67 inclusive	between the 5th and 15th percentile inclusive	suggests the child is 'at risk' of having a movement difficulty monitoring required
Green zone	any score above 67	above the 15th percentile	no movement difficulty detected

- Can record qualitative observations and factors that may have affected performance
- Compare non-motor factors between school and therapist observations

Scoring

Item Scores and Equivalent Standard Scores

Item code	Name of Item	Raw score (Best attempt)	Item Standard Score
MD 1*	Posting Coins (vertical board)		
MD 2	Posting Coins (horizontal board)		
MD 3	Threading Beads		
MD 3	Drawing Trail 1		
ABC 1	Catching Beating		
ABC 2	Throwing Beating		
ABC 2	Throwing Beating (one foot)		
Bal 1*	One-Leg Balance (left leg)		
Bal 1*	One-Leg Balance (right leg)		
Bal 2	Walking Heels		
Bal 2	Raised Heels		
Bal 3	Jumping on Mat		

Three Component Scores**

- Manual Dexterity***** MD 1 + MD 2 + MD 3
- Aiming & Catching***** ABC 1 + ABC 2
- Balances**** Bal 1 + Bal 2 + Bal 3

Total Test Scores
Sum of 8 item standard scores

Total Test Score	Standard Score	Percentile Rank	95% Confidence Interval
			±2

* For Posting Coins and One-Leg Balance, tick up standard score for each item, and then divide by 2. If the result is above 10, round up; if below 10, round down.

** For confidence intervals, see Examiner's Manual p129 (Chapter 7)

*** In each case sum the item standard scores.

Teacher Checklist

- Section A – Static/Predictable environments
 - Self care skills
 - Classroom skills
 - PE / recreational skills
- Section B – Dynamic/Unpredictable environment
 - Self care / Classroom skills
 - Ball skills
 - PE / recreational skills
- Section C
 - Non-motor factors that influence movement e.g. impulsivity, distractibility, persistence, anxiety

Section A: Movement in a Static and/or Predictable Environment

	0 = Very Well	1 = Just OK	2 = Almost	3 = Not Close	ND = Not Observed
A.1 Self-Care Skills					
A.1.1					
A.1.2					
A.1.3					
A.1.4					
A.1.5					
A.2 Classroom Skills					
A.2.1					
A.2.2					
A.2.3					
A.2.4					

Checklist Scoring

Norms for 5-12 year olds

- Calculate totals for each section:

If >3 items marked 'Not Observed' you cannot obtain total score

- Total Motor Score = Section A + Section B
- Total Motor Cut scores:
 - Red Zone – definite movement difficulties
 - Amber Zone – 'at risk' or needs further investigation
 - Green Zone – no apparent movement difficulties

Red Zone	≥ 42																																								
Amber Zone	41	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Green Zone	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Age	5	6	7	8	9	10	11	12																																	

Motor Competence: Section A Section B Total Motor Score: A + B =

Find the child's Total Motor Score in the column appropriate for his/her age and determine whether it falls in the Red Amber or Green zone (tick one)

Non-motor factors that might affect movement


(a) Do you think the characteristics noted in Section C prevent the child from demonstrating his/her true movement capability? (circle one): **not at all / a little / a great deal.**

(b) How important will it be to consider these factors when planning an intervention programme? (circle one): **not at all / somewhat / very.**

Ecological Intervention Handbook

Planning a motor task

Motor tasks are designed to be suitable for a variety of ages. They may be selected to suit the needs of a particular age group or to be suitable for a range of ages. The handbook provides a range of tasks that can be used in a variety of settings. The handbook provides a range of tasks that can be used in a variety of settings. The handbook provides a range of tasks that can be used in a variety of settings.




Help the child explore a task that is just beyond their level.

The handbook provides a range of tasks that can be used in a variety of settings. The handbook provides a range of tasks that can be used in a variety of settings. The handbook provides a range of tasks that can be used in a variety of settings.

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Reliability and Validity


- Takes into account studies from Movement ABC-1 and studies with Movement ABC-2 (items with the lowest reliability were removed)
- Test-retest reliability 0.73-0.84 (total test score 0.80)
- Content validity established via expert panel
- Discriminative validity study showed differentiation of children with DCD and Asperger's Syndrome
- Correlation studies for criterion-related validity with M-ABC considered to be relevant to M-ABC2:
 - Bruininks-Oseretsky Test of motor proficiency (1978)
 - Peabody Developmental Motor Scales – second edition (2000)
 - Beery Test of Visual Motor Integration (1967)



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Advantages


- Different tasks depending on age
- No standardised verbal instructions (bullet-point guidelines)
- Short admin time
- Teacher checklist to take into account performance in typical environment
- Observations check boxes to guide clinical observations
- Separate Intervention manual
- Contrasting colours to assist children with visual impairment
- Floor mats for reduced set up time (still some use of tape)



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Examples of clinical use


- Screening purposes (is there a clinically significant problem?)
- Children with receptive language issues
- Children with limited cognitive ability
- Children with poor attention
- Children who are guaranteed to fail but need a standardised score for funding
- When time is limited
- Research



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Potential drawbacks


- Only 8 items per age band
- Missing common tasks e.g. cutting
- Component skill focused
- UK norms
- Requires clinical experience to assess underlying factors e.g. tone



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Bruininks-Oseretsky Test of Motor Proficiency - 2

Robert H Bruininks & Brett D Bruininks
Published: 2005



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Overview

Age range: 4 to 21 years


Administration time 45-60 min for entire assessment, 10-15 min per composite

Purpose:

- Comprehensive and reliable assessment of fine and gross motor skills

Core areas assessed:


- Fine Manual Control
 - Fine motor precision
 - Fine motor integration
- Manual Coordination
 - Manual dexterity
 - Upper-limb coordination
- Body Coordination
 - Bilateral coordination
 - Balance
- Strength and Agility
 - Running speed & agility
 - Strength



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Primary Uses

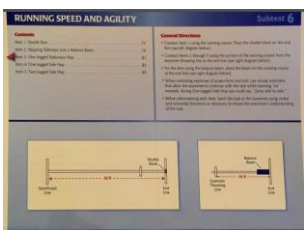
- Assess the motor proficiency of all children, ranging from those who are typically developing to those with mild to moderate motor control problems
- Support diagnosis of motor impairments
- Develop and evaluate motor training programs
- Screen individuals who may have certain deficits in motor ability and who might benefit from further evaluation or interventions (short form)
- Research



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Layout of the Administration Easel


- Each subtest has an introductory page in the administration easel which includes:
 - Content: All of the items that make up the subtest, in the order they should be administered
 - General directions: Specific instructions that pertain to administering the items of that subtest
 - Diagrams and photos: This info is included when parts of the running course or targets are used to show proper set-up



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Layout of the Administration Easel Continued


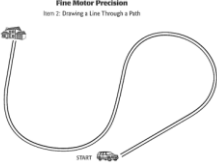
- Each item of each subtest has its own page which includes:
 - Dashboard: a quick snapshot of number of trials, maximum raw score, time limit and equipment needed
 - Procedure: detailed instructions for administration
 - Scoring: detailed instructions for scoring
 - Administration: after teaching the item (can use any means necessary for teaching), follow the exact text (in purple)
 - Scoring Diagrams and Scoring examples: for drawing/tracing tasks
 - Photos: These are on both sides of the easel (the child sees just the pictures) and supplement verbal instructions when teaching the item.



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Subtest 1: Fine Motor Precision

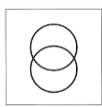
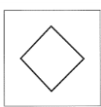
- 7 items
- 5 drawing items including filling in shapes, drawing lines through paths and connecting dots
- 1 folding item
- 1 cutting item
- Subtests are untimed as focus is on precision

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Subtest 2: Fine Motor Integration

- 8 items
- Child copies shapes of increasing complexity from circle up to overlapping pencils
- Multi-faceted scoring:
 - Basic shape
 - Closure
 - Edges
 - Orientation
 - Overlap
 - Overall Size

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Subtest 3: Manual Dexterity

- 5 items
- Goal-directed activities that involve reaching, grasping and bi-manual coordination with small objects.
- Making dots in circles
- Transferring coins
- Threading beads
- Sorting cards
- Pegs in a pegboard
- Emphasis is on accuracy but items are timed to differentiate levels of dexterity.



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Subtest 4: Upper-Limb Coordination

- 7 items
- Designed to measure visual tracking with coordinated arm and hand movements
- Catching
- Dribbling
- Throwing
- 4 items require the use of one hand
- 3 items require coordination of both hands



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Subtest 5: Bilateral Coordination

- 7 items
- Tasks require body control and sequential and simultaneous coordination of upper and lower limbs
- Pivoting fingers and thumbs (itsy bitsy spider)
- Touching nose with index fingers
- Tapping feet and fingers
- Jumping jacks
- Jumping in place same side/alternate side synchronised
- Measures motor skills involved in sports and recreation
- Some will likely be familiar tasks while some will be novel



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Subtest 6: Balance

- 9 items
- Measures stability of trunk, static balance and movement and proprioception or use of visual cues
- Standing on both feet
- Standing on one foot
- Standing on floor
- Standing on balance beam
- Walking forward on a line
- 3 items require eyes to be closed



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Subtest 7: Running Speed & Agility

- 5 Items
- Shuttle run
- Hopping tasks
- Lateral movements
- Provides opportunity to observe gait in running v. walking



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Subtest 8: Strength

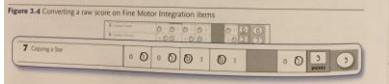
- 5 items
- Designed to measure trunk, upper and lower body strength
- Standing long jump
- Push-ups (knee or full)
- Sit-ups
- Wall sit
- V-up
- Included because often motor delay is impacted by underlying weakness



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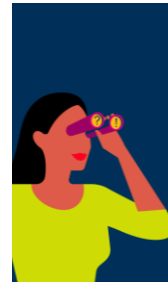
- All items within a subtest are administered to all children (no basal or ceiling)
- A raw score is recorded for each item and could be:
 - A number of points
 - A number of correct activities performed (steps, jumps, catches, sit-ups, etc.)
 - A number of seconds
- After recording the raw score for each item, you must convert the raw score into a point score. For items on which two trials were administered, always convert the better of the two raw scores.



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Additional Observations

- The authors of the assessment encourage clinicians to document observations in addition to the scores in the notes and observations section at the end of each subtest. Some ideas of observations are:
 - Examinee's attitude
 - Examinee's effort
 - Examinee's behaviour
 - Specific strategies the examinee used to complete the task
- Additionally on the back of the record form is a space to make behavioural observations including attention, fluidity of movement, effort and understanding.

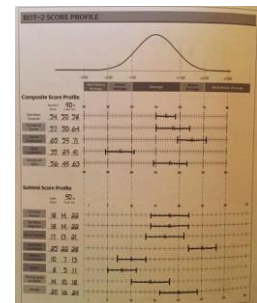
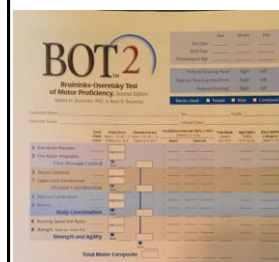


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Score Reporting

- Note: When converting point scores into scaled scores or standard scores, you need to decide if you want to use gender-specific norms or combined-gender norms. The authors advise using gender-specific norms.
- On the cover of the record form, there are spaces to report on:
 - Subtest Scores**
 - Point Score
 - Scaled Score (Mean=15, SD=5)
 - Confidence Interval
 - Age Equivalent
 - Descriptive category
 - Composite Scores (Fine Manual Control, Manual Coordination, Body Coordination, Strength & Agility, Total Motor)**
 - Standard Scores (mean of 50, SD of 10)
 - Confidence Interval
 - Percentile Rank
 - Descriptive Category

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Score Reporting Continued

- Pairwise comparison
 - Allows comparison between two subtest scaled scores or composite standard scores to determine if there is a statistical difference between performance areas.
 - Also allows for comparison to the frequency of that particular difference in the normed population.

BOT-2 PAIRWISE COMPARISONS					
Composite Comparisons	Standard Score	Standard Score Difference	Statistical Significance Level (p < .05)	Frequency of Difference (Percent of Normed Population)	Handed Scale
Fine Manual Control	15.00	15.00	0.00	0.00	Manual Coordination
Fine Manual Control	15.00	15.00	0.00	0.00	Body Coordination
Fine Manual Control	15.00	15.00	0.00	0.00	Strength and Agility
Manual Coordination	15.00	15.00	0.00	0.00	Body Coordination
Manual Coordination	15.00	15.00	0.00	0.00	Strength and Agility
Body Coordination	15.00	15.00	0.00	0.00	Strength and Agility
Subtest Comparisons	Scale Score	Scale Score Difference	Statistical Significance Level (p < .05)	Frequency of Difference (Percent of Normed Population)	Scale Score
Fine Motor Precision	15.00	15.00	0.00	0.00	Fine Motor Integration
Manual Strength	15.00	15.00	0.00	0.00	Manual Coordination
Manual Coordination	15.00	15.00	0.00	0.00	Body Coordination
Strength and Agility	15.00	15.00	0.00	0.00	Strength and Agility

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Score Reporting Continued

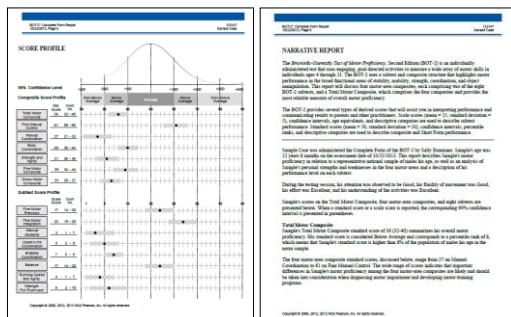
- Scaled scores and standard scores provided the clearest indication of an examinee's performance.
 - Allows comparison to the norm (how far above/below the mean the client is performing)
 - Allows comparison between subtests
 - Allows comparison for an individual's performance over time.
- Age equivalents and percentiles should be reported using extreme caution because they are often misleading.
- Using confidence intervals allows for a less rigid interpretation of scores and helps prevent misinterpretation.



Table 4.8 Descriptive Categories Corresponding to Scale Scores, Standard Scores, Percentile Ranks, and Standard Deviations from the Mean

Descriptive Category	Scale Score Range	Standard Score Range	Percentile Rank Range	Standard Deviations from the Mean
Well Above Average	75-100	1.94-3.09	97.5-100	2.00-3.00
Above Average	60-74	1.65-1.93	80-96	1.00-2.00
Average	40-59	0.00-1.64	50-79	0.00-1.00
Below Average	20-39	-1.65 to -0.00	20-49	-1.00 to 0.00
Well Below Average	0-19	-3.09 to -1.94	0-19	-3.00 to -2.00

Q-Global Online Scoring & Reporting

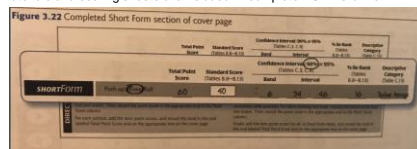


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BOT-2 Short Form

(Note: this is different than the BOT-2 Brief)

- Contains 14 total items
- Used as a motor screener for further evaluation/assessment or can be used as a program re-evaluation or when only a single score is necessary
- At least one item from each of the BOT-2 Subtests
- Yields one total score of motor proficiency reported as:
 - Standard score
 - Confidence interval
 - Percentile rank
 - Descriptive category
- Takes 15-20 minute to complete
- All required materials and scoring sheets are included in complete BOT kit/forms



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Statistical properties of BOT-2: Reliability

	Internal Consistency	Test-Retest Reliability	Inter-rater Reliability
Fine manual Control	.85-.90	.52-.82	.92
Manual Coordination	.86-.89	.68-.76	.98
Body Coordination	.87-.89	.65-.83	.99
Strength & Agility	.86-.92	.88-.95	.99
Total Motor Composite	.95-.96	.80-.88	.98
Short Form	.82-.87	.84-.91	.97

Note: These are reported in ranges because they broke down the reliability studies by age and also by whether the examinees did knee push-ups or full push-ups.

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Statistical Properties of BOT-2: Validity

Content Validity	Criterion Validity	Construct Validity
Content development influenced by focus groups, surveys, professional consultation, research and motor development theory	Correlation b/w BOTMP and BOT-2 Total Motor Composite = .80	Subtests correlate to composite scores: .75-.90
Additional content validity evidenced through measures of item fit through factor analysis.	Correlation b/w PDMS-2 Total Motor Quotient and BOT-2 Total Motor Composite = .73	Factor analyses provide strong support for the four motor-area composites for all age groups. All values >.95
Additional evidence supporting link b/w BOT-2 subtests and the construct of motor skills achieved through natural progression of motor skills by age and differences in performance based on sex.		Evidence of validity for identifying motor performance deficits in children with: DCD, Mild - Mod ID, High functioning autism/Asperger's



Advantages

- Comprehensive assessment of motor skills
- Uses goal-directed activities to assess skills
- Can pick & choose subtests (don't need to administer complete assessment to get scores)
- Task instructions can be tailored depending on child's needs
- Strong psychometric properties. In particular, inter-rater reliability makes for consistent results
- Scoring and reporting can be done online
- Can use short form as a screener without needing to buy anything additional

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Examples of clinical use

- A child has been flagged as delayed on a screening assessment and you need something more comprehensive
- When you need to support a diagnosis of motor impairment
- To develop highly tailored intervention plans
- To assess the efficacy of an intervention
- To support funding applications
- Can use Short Form as a screening tool
- Research




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Limitations of the BOT-2

- Takes a long time to administer if you are doing all sections
- All items within a subtest need to be administered (no cut-off or stop point) can be frustrating for younger or severely delayed children
- Does not include a questionnaire to assess functioning in typical environment (need to do separate clinical observations)
- Does not have an intervention guide that goes along with it


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Introducing the Goal-Oriented Assessment of Lifeskills (GOAL)


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Overview


- "An evaluation of fundamental motor abilities needed for daily living"
- For ages 7 – 17
- 45-60 minute administration time
- Originates from theory/research in sensory integration and motor development
- Seven activities:
 - Utensils
 - Locks
 - Paper Box
 - Notebook
 - Clothes
 - Tray Carry
 - Ball Play



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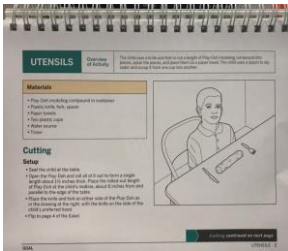
Primary Uses

- Designed to facilitate effective assessment and treatment of sensory and motor difficulties affecting function
- Functional goal setting and measuring progress against functional tasks
- Recommended for therapists with background knowledge of SI approach
- Often yields useful information regarding praxis
- When a child is functioning developmentally at the lower end of the age range
- Complement more bottom-up tools e.g. BOT-2 or Movement ABC-2

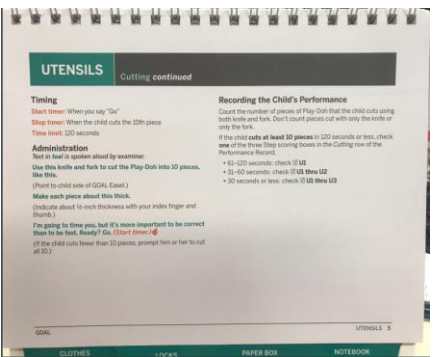


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What the Administration Easel Looks Like (Therapist's View)



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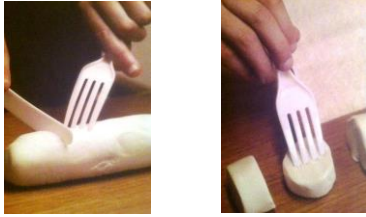


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Activities in the GOAL

Utensils

- Child uses a knife and fork to cut a length of play-dough into 10 pieces
- Child spears each piece and places on a paper towel



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Activities in the GOAL

Utensils

- Child uses a spoon to sip water and scoop it from one cup into another



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Activities in the GOAL

Locks

- Child opens a keyed padlock and a combination padlock



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Activities in the GOAL

Paper Box

- Child constructs a paper box by colouring in pictures, cutting along lines, folding and taping the box together



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Activities in the GOAL

Notebook

- Child opens a 3-ring binder, organises colour-coded dividers with corresponding coloured paper and closes binder.



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Activities in the GOAL

Clothes

- Child puts on and takes off an over-sized t-shirt and shorts

CLOTHES	Overview of Activity	The child puts on and takes off an oversized T-shirt and shorts.
Materials <ul style="list-style-type: none"> • Large T-shirt • Medium T-shirt • Small T-shirt • Large short pants • Small short pants • Toner 		
Setup <ul style="list-style-type: none"> • Ask the child to remove ties or hair elastics. • Lay the smallest pair of shorts and T-shirt that fits easily over the child's clothing. • Turn the shorts and shirt inside-out before presenting them to the child. • Lay the shorts and shirt flat on the table as in the drawing at the right. • The child can put on and take off the shorts and shirt in any order. • The child must dress and undress in a standing position. 		

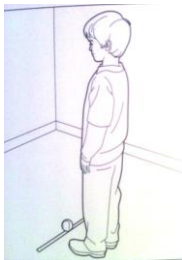
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Activities in the GOAL

Ball Play

- Child dribbles a ball, bounces ball from hand to hand, bounces ball against wall and catches it, kicks ball against wall

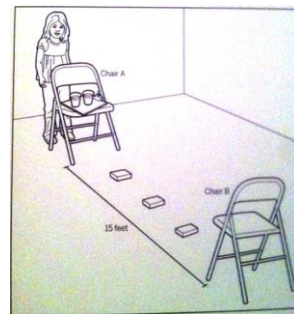


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Activities in the GOAL

Tray Carry

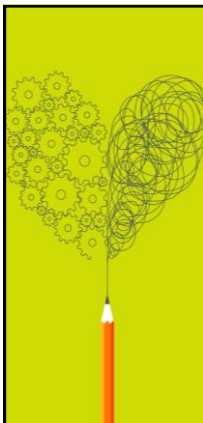
- Child picks up a tray with two full cups of water and carries it across the room, stepping over obstacles, sitting down, standing back up and then kicks the obstacles out of the way on the way back before placing the tray back on the chair.



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Scoring the GOAL

- Basic Step criterion must be achieved in order to register a score for that item (pass/fail)
- The child receives no credit if you provide any assistance
- Basic Step criteria are time-based
- The child may also gain credit for Bonus Steps on some tasks
- Items are scored according to criteria and corresponding box ticked on record form



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Scoring the GOAL

- Scores are based on 54 Steps – small units of observable functional behaviour within the 7 activities
- Each Step is scored as pass or fail
- Step scores are summed to yield raw and standard scores for Fine Motor, Gross Motor and Progress scores
- Percentiles and Confidence Intervals provided
- Separate gender norms



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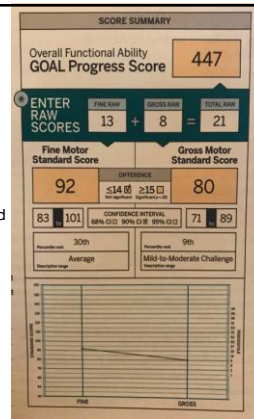
Scoring the GOAL

ACTIVITY		BASIC STEP	BONUS STEPS
UTENSILS			
Cutting	Uses knife and fork to cut Play-Doh into at least 10 pieces ...	63–120 sec ☐ U1	31–63 sec ☐ U2 thru U2 30 sec or less ☐ U3 thru U3
Spreading	Uses knife and fork to spear 10 pieces of Play-Doh and place them on paper towel ...	31–120 sec ☐ U4	30 sec or less ☐ U4 thru U5
Scooping	Uses spoon to scoop, tip, and transfer at least 10 spoonfuls of water ...	46–120 sec ☐ U6	45 sec or less ☐ U6 thru U7
LOCKS			
Keyed	Opens keyed lock ...	30 sec or less ☐ L1	30 sec or less ☐ L2 thru L3
Combination	Opens combination lock ...	63–120 sec ☐ L2	63–90 sec ☐ L2 thru L3 60 sec or less ☐ L2 thru L4
PAPER BOX			

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Interpreting the GOAL

- GM and FM scores have a mean of 100 and SD of 15
- Determine whether differences between GM and FM are statistically significant
- Progress score is a single score representing overall performance and can be used to measure progress over time on successive administrations



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Examples of clinical use

- If a child is having difficulty with functional tasks such as feeding/dressing this can highlight the motor areas impacting function
- If a child has a more significant delay they may have an easier time participating in these tasks as they are familiar
- For a lower functioning child where you want to measure progress over time in relation to tasks as opposed to norms
- If you are using other SI based assessments or interventions (e.g. SIPT, SPM)



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Limitations

- Limited scoring system (only yields standardised scores for gross motor/line motor – no subtest or composite scores.)
- Potential ceiling effect
- Flimsy manipulatives
- Some items are very "American"
- Intervention targets limited to SI-based approach



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Any questions?



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ALWAYS LEARNING