

**Pearson**

**Bayley Scales of Infant and Toddler Development™, Fourth Edition (Bayley™-4)**

Presented by  
Anise Flowers, PhD

### Purpose of the Bayley-4

Conduct developmental assessment to identify infants and toddlers who have a **developmental delay** so that we can provide early intervention services.

Pearson Bayley-4

### Early Intervention: Federal Mandate

**IDEA Part C (2004)**

Early Intervention Program for Infants and Toddlers with Disabilities

Pearson Bayley-4

### IDEA Part C and Bayley-4

Early Intervention services are designed to identify and meet a child's needs in five developmental areas:

- physical development (including vision and hearing),
- cognitive development,
- communication,
- social or emotional development, and
- adaptive development.

Bayley-4 assesses development in these five domains.

Pearson Bayley-4

### Overview of Bayley-4

Format	Administration	Scores
Core battery of five domains: <ul style="list-style-type: none"> <li>• Cognitive</li> <li>• Language</li> <li>• Motor</li> <li>• Social-Emotional</li> <li>• Adaptive Behavior</li> </ul>	<ul style="list-style-type: none"> <li>• Individual</li> <li>• Paper/Pencil and Online (Q-Global)</li> <li>• Administration Time: 30-70 minutes (depending on age of child)</li> </ul>	<ul style="list-style-type: none"> <li>• Scaled Scores</li> <li>• Composite Scores</li> <li>• Percentile Ranks</li> <li>• Confidence Intervals</li> <li>• Developmental Age Equivalents</li> <li>• Growth Scale Values</li> </ul>

Ages: 16 days to 42 months      **Qualification Level: B**

Scoring Options: Q-Global (Web-based); Manual

Pearson Bayley-4

### Incorporate Three Interrelated Elements in Assessing Developmental Delay

Administration of structured test items

Direct observation of behaviors and milestones

Active participation of parent or caregiver in the evaluation process

**Cognitive, Language, and Motor Scales**

Pearson Bayley-4

### Maintain Basic Qualities of Bayley-III

Bayley Scales of Infant and Toddler Development, Third Edition  
 (BSID-III, Bayley: 2006)

Bayley Scales of Infant and Toddler Development, Fourth Edition  
 (Bayley-4: 2019)

Assess level of performance of infants and toddlers by observing the child's interaction with stimuli designed to engage him or her.



Bayley-4

### Maintain Basic Format of Bayley-III

... an individually administered instrument that assesses the **developmental functioning** of infants and young children ages 16 days to 42 months.

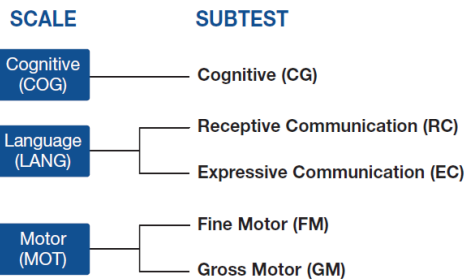


Five Developmental Domains



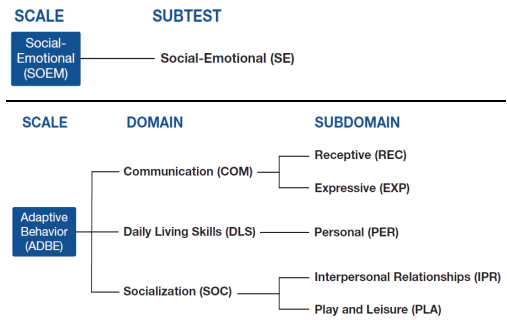
Bayley-4

### Structure of Bayley-4



Bayley-4

### Structure of Bayley-4



Bayley-4

### Bayley-4: Polytomous Scoring

Scoring for Items on Cognitive, Language, and Motor Scales	
Bayley-III	Bayley-4
<p><b>Dichotomous Scoring</b></p> <p><b>1:</b> the child demonstrates the behavior assessed by the item.</p> <p><b>0:</b> the child's behavior does not meet the criteria specified for an item.</p>	<p><b>Polytomous Scoring</b></p> <p><b>2:</b> the response or behavior indicates <b>Mastery</b>.</p> <p><b>1:</b> the response or behavior indicates the skill or behavior is <b>Emerging</b>.</p> <p><b>0:</b> the response or behavior indicates the skill or behavior is <b>Not Present</b>.</p>



Bayley-4

### Include Caregivers in Evaluation/Scoring

Bayley-4 includes:

- Structured test items with associated caregiver questions.
- Caregiver questions to provide additional information.
- Items scored entirely based on information provided by caregiver.

Caregiver questions are not utilized for items that involve performance on test-specific tasks.



Bayley-4

### Simplify Administration and Reduce Administration Time

- Developed Bayley-4 on Q-global
- Combined items
- Eliminated redundant items
- Incorporated caregiver questions



Bayley-4

### Improve Content Coverage

#### Included items to assess

- neurodevelopment, and
- precursors to executive functioning.



Bayley-4

### Improve Clinical Utility

#### Special Group Studies

Conditions that place children at <b>developmental risk</b> (e.g., extremely preterm and very preterm infants).	Children with <b>clinical diagnoses</b> (e.g., Autism Spectrum Disorder, Down syndrome, language impairment, motor impairment).
---	---



Bayley-4

### Evidence Based on Special Group Studies

Developmental Delay Compared to Matched Control					
Score	DD Mean	Matched Control Mean	Diff.	p value	Std. Dff.
CG	6.5	9.4	2.88	<.01	1.03
RC	6.5	9.3	2.77	<.01	0.91
EC	6.1	9.5	3.39	<.01	1.23
FM	7.0	9.3	2.37	<.01	0.84
GM	6.7	9.5	2.81	<.01	1.02
LANG	78.8	96.5	17.74	<.01	1.15
MOT	81.5	96.7	15.21	<.01	1.15



Bayley-4

### Update Normative Data: Standardization Sample

Sample 1	Sample 2	Sample 3
Cognitive, Language, and Motor Scale Normative Sample	Social-Emotional Scale Normative Sample	Adaptive Behavior Scale Normative Sample



Bayley-4

### Reliability of Normative Sample

Score	Average $r_{xx}$
Cognitive	.95
Receptive Communication	.93
Expressive Communication	.93
Fine Motor	.93
Gross Motor	.94
LANGUAGE	.96
MOTOR	.95



Bayley-4

### Increase Sensitivity

Excluded from normative sample children identified as at-risk.

Introduced polytomous scoring approach.

Included some additional easier items.



Bayley-4

### Correlations with Bayley-III

Score	Bayley-4 Mean	Bayley-III Mean	Standard difference
<b>CG</b>	10.4	10.5	-0.04
<b>RC</b>	10.3	10.4	-0.04
<b>EC</b>	10.3	10.5	-0.08
<b>FM</b>	10.1	10.0	0.04
<b>GM</b>	10.3	10.8	-0.19
<b>LANG</b>	101.9	102.4	-0.04
<b>MOT</b>	101.0	102.3	-0.11



Bayley-4

### Cognitive Scale (COG)



- Retained most items from Bayley-III.
- Added new items.
- Deleted items.
- Combined several items to reduce administration time.

Cognitive Subtest (CG) 81 items  
 Bayley-III 91 items



Bayley-4

### Language Scale (LANG)



- Added new items to reflect traditional language milestones and related speech processes.
- Combined several items.
- Dropped items that were determined to be redundant based on construct overlap.

Receptive Communication (RC) 42 items  
 Bayley-III 49 items

Expressive Communication (EC) 37 items  
 Bayley-III 48 items



Bayley-4

### Motor Scale (MOT)



- Added new items to expand age and content coverage, and to measure neurodevelopmental functions.
- Combined items.
- Dropped items that were determined to be redundant.

Fine Motor (FM) 46 items  
 Bayley-III 66 items

Gross Motor (GM) 58 items  
 Bayley-III 72 items



Bayley-4

### Social-Emotional Scale (SOEM)



Adaptation of *Greenspan Social-Emotional Growth Chart: A Screening Questionnaire for Infants and Young Children*.

- Items unmodified from Bayley-III.
- Items assess child's mastery of functional emotional skills.



Bayley-4

### Adaptive Behavior Scale (ADBE)




Composed of select items and skill areas derived from the Comprehensive Parent/Caregiver Form of the Vineland-3.

- Communication
- Daily Living Skills
- Socialization
- **Adaptive Behavior**

(Vineland Adaptive Behavior Scales, Third Edition (Vineland-3, 2016).

 Bayley-4


### Administration and Scoring Options


**Paper** Administration and Scoring

**Paper** Administration and **Digital** Scoring

**Digital** Administration, Scoring, and Reporting




Q-global<sup>®</sup>

 Bayley-4


### Paper Administration: Bayley-4 Kit

- Administration Manual
- Technical Manual
- Cognitive, Language, and Motor Record Forms
- Motor Response Booklets
- Social-Emotional and Adaptive Behavior Questionnaires
- Caregiver Reports
- Stimulus Book
- Observation Checklist
- Manipulative Set


 Bayley-4

### Digital Administration

- Items on Cognitive, Language, and Motor scales can be administered and scored using an internet-based mobile device, laptop, or PC.
- The digital administration is optimized for screen size of tablet (iPad) or larger.




Q-global<sup>®</sup>

 Bayley-4


### Features of the Digital Administration

- Combines information from the Record Form and Administration Manual in one place for easy accessibility during testing.
- Is designed to support **non-linear** administration of items on Cognitive, Language, and Motor scales.

 Bayley-4

### Administration Rules

<b>Start Point</b>	<ul style="list-style-type: none"> <li>• Age-based</li> <li>• Correction for prematurity through age 24 months</li> </ul>
<b>Basal</b>	<b>3 consecutive scores of 2</b>
<b>Reverse</b>	Previous Start Point
<b>Discontinue</b>	5 consecutive scores of 0

 Bayley-4

### Series Items

Series items are items that have the same administration directions but require varying levels of performance to meet the scoring criteria.

Paper Administration		Digital Administration
S 40 47	S 20 24	S 21 26 29 45
		The Bayley-4 on Q-global configures series items to allow for a single administration, to record a single response, and to automatically score all the items in the series.

### Related Items

- Many items have different administration directions but require the use of the same test materials, or that the child participate in similar activities.
- When possible, it is beneficial to administer and score these items in succession even when they do not appear consecutively in the subtest.

### Caregiver Question Item Scoring (CG, RC, EC, FM, GM)

Skill level	Caregiver Response*	Score
Mastery	Almost Every Time or Often	2 points
Emerging	Some of the Time or Not Often	1 point
Not Present	None of the Time or Not at All	0 points

\*For items with Caregiver Question

### Incidental Observation

- During testing, the examiner may observe that the child exhibits behaviors that satisfy the scoring criteria for certain items.
- If the behavior is not observed spontaneously, follow the directions to elicit the behavior.
- Items that can be scored through incidental observation are scored at any time during testing.

Observation Checklist

### Questionnaire: Paper



Scales of Infant and Toddler Development™ Fourth Edition



#### Social-Emotional and Adaptive Behavior Questionnaire

Child's name: \_\_\_\_\_  
 Sex:  M  F  
 Completed by: \_\_\_\_\_  
 Relationship to child: \_\_\_\_\_  
 Examiner's name: \_\_\_\_\_  
 Reason for referral: \_\_\_\_\_

### Questionnaire: Digital

Remote On-Screen Administration



## Social-Emotional and Adaptive Behavior

### Social-Emotional

Behavior frequency				
All of the time	Most of the time	Half of the time	Some of the time	None of the time Can't tell
5	4	3	2	1 0

- Start with Item 1.
- Stop when you reach stop point based on child's age.

### Adaptive Behavior

Behavior frequency			
Usually or often	Sometimes	Never	Estimated
2	1	0	<input type="checkbox"/>

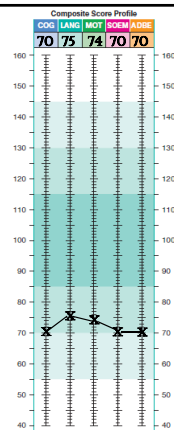
- Start with Item 1 for each section.
- Stop the section when you've circled five scores of 0 in a row.

## Bayley-4 Scores

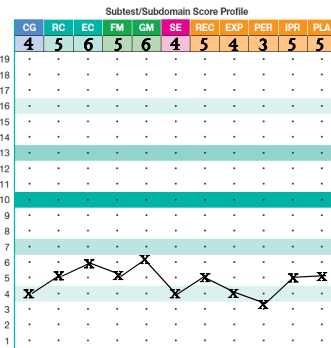
Scale subtest	Scaled score	Standard score	Percentile rank	Confidence interval	Age equivalent	Growth scale value
Cognitive (COG)	✓	✓	✓	✓	✓	✓
Language (LANG)	✓	✓	✓	✓	✓	✓
Receptive Communication (RC)	✓	✓	✓	✓	✓	✓
Expressive Communication (EC)	✓	✓	✓	✓	✓	✓
Motor (MOT)	✓	✓	✓	✓	✓	✓
Fine Motor (FM)	✓	✓	✓	✓	✓	✓
Gross Motor (GM)	✓	✓	✓	✓	✓	✓
Social-Emotional (SOEM)	✓	✓	✓	✓	✓	✓
Social-Emotional (SE)	✓	✓	✓	✓	✓	✓
Adaptive Behavior (ADBE)	✓	✓	✓	✓	✓	✓
Communication (COM)	✓	✓	✓	✓	✓	✓
Receptive (REC)	✓	✓	✓	✓	✓	✓
Expressive (EXP)	✓	✓	✓	✓	✓	✓
Daily Living Skills (DLS)	✓	✓	✓	✓	✓	✓
Personal (PER)	✓	✓	✓	✓	✓	✓
Socialization (SOC)	✓	✓	✓	✓	✓	✓
Interpersonal Relationships (IPR)	✓	✓	✓	✓	✓	✓
Play and Leisure (PLA)	✓	✓	✓	✓	✓	✓

## Standard Scores

COG	LANG	MOT	SOEM	ADBE
70	75	74	70	70



## Scaled Scores



## Diagnosing Developmental Delay

Several different criteria used:

Percent (%) Delay

Standard Deviation

Performing a certain number of months below chronological age

## Bayley-4 Indicators of Developmental Problems

Indicators of motor and movement abnormalities

- Movement and muscle tone indicators
- Eye movement and coordination
- Hand movements

Indicators of Attention/Executive Function Deficit

Indicators of Autism Spectrum Disorder

### Autism Spectrum Disorder Indicator Items

Subtest	Item
Cognitive	5. Recognizes Caregiver Note. Also included in Receptive Communication Item 4.
	6. Reaction to Caregiver Note. Also included in Receptive Communication Item 6.
	7. Reacts to Departure of Caregiver
	16. Interacts With Image
	20. Pats Table
	29. Stirs Spoon
	36. Squeezes Object
	57. Imitates 2-Step Action
	59. Imaginary Play

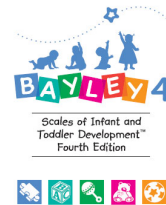
### Autism Spectrum Disorder Indicator Items

Subtest	Item
Receptive Communication	2. Calms When Spoken To
	12. Responds to Name
	15. Attends to Play Routine
	29. Understands Pronouns (Her, Me, You, My, Your)
	35. Understands Pronouns (They, She, Me)

### Autism Spectrum Disorder Indicator Items

Subtest	Item
Expressive Communication	2. Social Smile
	4. Social Vocalizing/Laughing
	6. Solicits Attention/Interaction
	9. Uses Gestures
	10. Jabbers Expressively
	12. Directs Attention of Adult to Object
	13. Imitates Word
	14. Initiates Play
	19. Combines Gesture and Words
	26. Uses Pronouns
	28. Poses Questions
	32. Answers Questions

### Sharing Results with Families



#### Caregiver Report

- Describe Bayley-4 and what the subtests and subdomains measure
- Present child's test results
- List activities parents/caregivers can use with their child.

### Key Features of Bayley-4

<b>Administration and Scoring</b>	<ul style="list-style-type: none"> <li>• Flexible administration</li> <li>• Series items</li> <li>• Related items</li> </ul>
<b>Content Updates</b>	<ul style="list-style-type: none"> <li>• Retains five domains</li> <li>• Adaptive Behavior from Vineland-3</li> </ul>
<b>Administration Format</b>	<ul style="list-style-type: none"> <li>• Manual Admin and Scoring</li> <li>• Manual Admin and Digital Scoring</li> <li>• Digital Admin and Scoring</li> </ul>
<b>Item Scoring (CG, LANG, MOT)</b>	<ul style="list-style-type: none"> <li>• 2 = Mastery</li> <li>• 1 = Emerging</li> <li>• 0 = Not Present</li> </ul>

Questions  
 anise.flowers@pearson.com

