Phonological Understanding: Modified cycles Approach (PUMA)

Program Manual

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Program Overview

Brief description of the Program

The Phonological Understanding: Modified cycles Approach (PUMA) program is designed for students in grades PK-2 with highly unintelligible speech due to a speech sound disorder characterized by many phonological impairments. These students are hard to understand, as they have profound difficulty forming the sound patterns used to communicate verbally. PUMA aims to help these students rapidly increase their speech intelligibility and subsequently improve their ability to succeed in school.

The PUMA program is a modified version of the Cycles Phonological Remediation Approach (Hodson & Paden, 1983) that has been shown to facilitate significant improvement in students with moderate to severe speech sound disorders (Bishop & Adams, 1990). PUMA's structure follows the developmental sequence of sounds (Figueira, 2019) and is organized by phonological process. Speech-Language Pathologists (SLPs) can tailor its use to individual student needs with the language sample and process-specific stimulability probes. PUMA's lessons include repeated and varied exposure to correct productions, speech sound production, and the development of metaphonological skills.

Individual phonological lessons are systematically provided in various formats which are engaging for students. These lessons include motivational activities, review, auditory discrimination, and metaphonological activities, which help students to be more successful on literacy tasks (Gillon, 2017), with the overarching goal of accurate sound production to increase speech intelligibility.

Students are guided through lessons designed to be completed in sequential order, that focus on the following components: Production Practice, in which the student practices the target words for the phonological process in drill activities; Auditory Bombardment, in which the student is auditorily exposed to the target words; Production Practice Again, in which the student practices the target words for the phonological process in drill activities again; Motivational Production Practice, which consists of fun sound-loaded scenes for production practice; Metaphonological Activity, which builds the student's phonological awareness skills; and Auditory Bombardment Again, in which the student is auditorily exposed to the target words again.

PUMA: Evidence in Action

Reviews the evidence supporting the Program

The Cycles Phonological Remediation Approach (Hodson & Paden, 1983) has been shown to facilitate significant improvement in students with moderate to severe speech sound disorders. Children with severe to profound Speech Sound Disorders are ideal candidates for the cycles approach (Hodson, 2010), where the aim is to expedite intelligibility gains in time to succeed in school (Bishop & Adams, 1990).

Evidence	Expression in Program
The cycles approach was designed primarily for young children with multiple speech errors and highly unintelligible speech who have major phonological deviations (Hodson & Paden, 1983, 1991; Velleman, 2003).	Activities are geared toward students in PK to 2nd grade.
The cycles approach targets a greater number of speech sounds and patterns over a shorter period of time than do other approaches, which is ideal for children with numerous phonological deviations (Hodson, 2006).	Lessons are created for all of the speech sounds and phonological patterns included in the Primary phonological processes.
Children achieve greater gains in intelligibility when stimulable sounds are targeted (Rvachew, 2005; Rvachew & Bernhardt, 2010; Rudolph & Wendt, 2014)	A stimulability screener is included for each process, and contains targets for each sound within the process, allowing educators to determine the sounds that are stimulable.
The methodology of the cycles approach specifies that the phoneme target for subsequent therapy sessions is the one that the child is most successful at producing (Hodson, 2011)	The stimulability screener and lesson structure allows the educator to choose the most appropriate sound/pattern combinations for their student.

Evidence-based Program Use
Use this Program with students who are highly unintelligible or have multiple phonological errors.
When working on a lesson, complete the materials in the order they are presented.
Use the stimulability screeners to determine which sounds are stimulable.

The principles in the evidence used to create this Program can be used across a variety of therapy sessions. For students struggling to acquire a speech sound, work on stimulability as a precursor to more intensive therapy targets.

Scope and Sequence

Suggests recommended learning paths

Traditional Program Path

The PUMA program begins with a language sample to determine a starting point. This language sample will serve as a benchmark of the student's language skills and intelligibility.

Next, the educator will determine which phonological process to begin in the cycle. Using the information from the language sample, or prior testing, the educator will identify which sounds are missing in the contexts of which phonological processes. The identified stimulable sounds make up the first starting point. Alternatively, if entire phonological processes are involved, the educator will use the language sample to determine the stimulability of the sounds in the process: those sounds that are stimulable are the starting point for the cycle.

Identifying the Starting Point

The following chart is arranged in order specified by the cycles approach, and the starting point of the program should be the earliest process+sound for which the child is stimulable, but does not yet produce in spontaneous speech.

Phonological Process	Sounds Targeted	Example
Final Consonant Deletion	p, t, k	"cah" instead of 'cat'
Initial Consonant Deletion	b, d, g, p, t, k	"at" instead of 'cat'
Final Cluster Reduction	-ts, -ps, -ks	"cat" instead of 'cats'
Initial Cluster Reduction	sp, sn, st, sm, sk, sl	"peak" or "eak" instead of "speak"
Fronting	k, g	"tat" instead of 'cat'
Backing	t, d	"kak" instead of 'cat'
Gliding	l, r	"yike" instead of 'like'

During the Session

Each phoneme (e.g., final /k/) within a phonological process (e.g., fronting) is targeted for 60 minutes (e.g., one 60-minute session, two 30-minute sessions, or three 20-minute sessions). In any given process, at least two sounds are targeted. After one hour per

sound per process, the Speech-Language Pathologist (SLP) then probes stimulability for sounds from the next process and moves on according to the order laid out in the chart above. Sounds for which the student is not stimulable are skipped.

A single cycle is completed after each of the phonological processes and sounds have been targeted in therapy for an hour, or skipped due to a lack of stimulability. A new assessment is then conducted in order to document progress and to determine the sounds and patterns that need to be recycled.

Progression through a cycle is based on time (i.e., 60 minutes per sound/process), rather than mastery criteria. Research has shown that highly unintelligible students will make quicker gains in overall intelligibility using a time-based cycle than using a traditional single-phoneme-oriented approach (Rvachew & Nowak, 2001; Rudolph & Wendt, 2014).

Session Structure: A Time-Based Progression

The sessions are designed to be completed within one 45-minute therapy session; however, the amount of time spent in any given area can be adjusted by the SLP, based on the daily therapy time and any student-specific factors that may arise. Sessions are structured as follows:

Production Practice	The students will practice producing targeted phonemes.
Auditory Bombardment	The students will watch a short video containing correct productions of target words.
Production Practice - Again	The students will once again practice producing targeted phonemes.
Motivational Production Practice	The students will participate in an activity that contains their target words in a motivating context.
Metaphonological Activity	The students will be presented with their targeted sounds and phonological patterns in the context of a metaphonological activity.
Auditory Bombardment - Again	The students will again watch a short video containing correct productions of target words.

Each activity detailed above has direct instructions to guide the educator through the various aspects of therapy using a modified Cycles approach, with each lesson ending with auditory bombardment. In the next treatment session, the educator will repeat the lesson with the same sound/phonological process combination until it has been targeted for a total of 60 minutes. The educator will then proceed to start the lesson with the next sound from the phonological process for which the child is stimulable.

After each stimulable sound in a given process has been targeted for 60 minutes, the educator conducts a stimulability assessment for the sounds in the next phonological process detailed in the Phonological Processes chart above. The lessons continue for the sounds in the process that the child was able to produce. Sounds for which the student is not stimulable are skipped. When all sounds for a particular phonological process have either been targeted for 60 consecutive minutes or skipped, the educator moves on to the next phonological process. When all processes and stimulable sounds have been targeted, a new language sample is taken, gains in intelligibility are assessed, and the targets for the next cycle are selected.

Educators can also decide to use the components of PUMA “a la carte” by selecting activity types that correspond to specific language or sound production skills.

Traditional Articulation: Educators can use PUMA’s Production Practices, Production Practice-Again, and Motivational Production Practices as drill activities for articulation sessions and as a complement to the WOW program.

Auditory Bombardment: Educators can use the Auditory Bombardment component to improve the auditory discrimination skills in those students with articulation delays.

Metaphonological Awareness: The Metaphonological Awareness activities in PUMA can be used with students who need to improve their literacy skills, specifically in the areas of phonological awareness. These activities are a great complement to LASSO’s phonological awareness lessons.

Goals Addressed

Associates Amplio skill taxonomy with student goals

The following chart contains the focus areas, skill sets, target skills, and potential goals that can be targeted with the PUMA program:

Focus Areas	Skill Sets	Target Skills	Potential Goals
Speech Production	Phonological Processes	Final Consonant Deletion	The student will extinguish final consonant deletion.
		Initial Consonant Deletion	The student will extinguish initial consonant deletion.
		Cluster Reduction	The student will extinguish cluster reduction.
		Fronting	The student will extinguish fronting.
		Backing	The student will extinguish backing.
		Gliding	The student will extinguish gliding.
	Auditory Processing	Auditory Bombardment	The student will listen to the target sound.
Literacy	Phonological Awareness	Rhyme Identification	The student will identify words that rhyme.

Extended Applications

Details alternate Program uses or learning paths

The PUMA program has several components that can be used with a wide range of students aside from those that would benefit from the Traditional Learning Path. Educators can pick and choose activities from the program to complement other programs or target specific goals. The program will not collect data for an extended application that changes the target skill. The following are suggestions on alternative ways to use PUMA:

Vocabulary: The Practice Production section from the PUMA program can be used to work on vocabulary knowledge. The educator can target noun identification and noun production by presenting the image and the student to label it.

Social Communication: The Motivational Activity from the PUMA program can be used to target the following skills: labeling/naming, commenting, describing, and conversations and collaborations such as initiation, participation, and turn taking.

Fluency: The Motivational Activity from the PUMA program can be used to work on speech fluency and flow of speech. The educator can use the activity as a stimulus to target the repetition of sounds, syllables, or words; prolongation of sounds; and interruptions in speech while teaching fluency strategies such as fluency shaping and fluency modification.

Common Core Standards

Associates CCSS with activity types

Skill	Common Core Standard	CCSS Description
Sound Production	ELA-LITERACY.SL.K.6	Speak audibly and express thoughts, feelings, and ideas clearly.
Auditory Bombardment	ELA-LITERACY.RF.K.1.b	Recognize that spoken words are represented in written language by specific sequences of letters.
Rhyming	ELA-LITERACY.RF.K.2.a	Recognize and produce rhyming words

Quick Reference Sheet

Recommends "Tips and Tricks"

The Phonological Understanding: Modified cycles Approach (PUMA) program is a modified Cycles Approach designed for students in grades PK-2 with highly unintelligible speech due to a speech sound disorder characterized by many expressive phonological impairments.

When/How do I take a language sample?

When:

- A language sample is available to be used at any time. However, it is recommended to be used at the beginning of each cycle.

How:

- Explain to the students what is expected from them during the Language Sample: "We are going to tell a story while we look at this picture book together. We'll try our best to say something about each page."
- There are two wordless picture books. The first is available to model telling a story with a wordless picture book, if necessary.
- The student will use the second book to tell a story as you flip through the pages for them.
- Give nonspecific feedback or prompting if necessary. Try not to provide hints as to whether the student is right or wrong. This is to be used for benchmarking to see students' independent abilities.

What is the order of phonological processes targeted?

Phonological processes are targeted in their developmental order as shown below.

Phonological Process	Sounds Targeted	Example
Final Consonant Deletion	p, t, k	“cah” instead of ‘cat’
Initial Consonant Deletion	b, d, g, p, t, k	“at” instead of ‘cat’
Final Cluster Reduction	-ts, -ps, -ks	“cat” instead of ‘cats’
Initial Cluster Reduction	sp, sn, st, sm, sk, sl	“peak” or “eak” instead of “speak”
Fronting	k, g	“tat” instead of ‘cat’
Backing	t, d	“kak” instead of ‘cat’
Gliding	l, r	“yike” instead of ‘like’

How do I use a stimulability probe?

- Explain to the students what is expected from them during the stimulability probe: 'Say what you see in the picture. Remember to use your best sounds!'
- If the student cannot produce a sound independently, try scaffolding up until the student is able to produce the target sound (ex., Pause, indirect nonverbal prompt, indirect verbal prompt, request a response, gestural cue, partial verbal prompt, model, direct model, and physical assistance). After exhausting all scaffolding options, if the student is unable to create a target sound, it is not stimulable and you will need to move on to the next sound within that phonological process.
- Stimulability probes may be skipped if it is known that the child is not stimulable for the target sounds within that probe.
- These probes will tell you what you will be able to target during your modified Cycles therapy sessions.

What is the lesson cycle and what will students be doing?

For each sound you are working on in a particular phonological process, this is the sequence of activities.

Activity in Lesson	What students are doing
Production Practice	Practicing producing targeted phonemes in particular phonological patterns.
Auditory Bombardment	Watching a short video containing the proper production of target words.
Production Practice - Again	Students will once again practice producing targeted phonemes in particular phonological patterns.
Motivational Production Practice	Students will participate in an activity that contains their target words in a motivating context.
Metaphonological Activity	Students will be presented with their targeted sounds and phonological patterns in the context of a metaphonological activity.
Auditory Bombardment - Again	Students will again watch a short video containing the proper production of target words.

What do I do for each activity of the lesson cycle?

Step 1: Direct Instructions

- Introduce the topic of the activity.
- Direct instructions can be repeated and revisited as frequently as the student requires.
- Modify, model, and prompt as much as necessary to support the student.

Step 2: Exercises

- Exercises can be directly presented on the educator's device or assigned to the student to be completed on their device.
- Emphasize and use the most effective prompts for each student and model as much as necessary during the activity.
- Data is collected only when the activity is assigned to the student.

How do I give feedback for Speech Sound Activities?

Give feedback based on the outcome and the student's support needs (acquisition = needs significant support/prompting to produce the sound in a word; generalization = needs minimal support/prompting).

Outcome	Level of Support	Feedback Strategy & Examples
Correct	Minimal (Generalization)	Results-based feedback given every 2-3 trials - "T" Example: "That was a clear /t/ sound!"
	Maximal (Acquisition)	Performance-based feedback given every trial - "S" Example: "I saw you pull your tongue in to make your /s/ sound."
Incorrect	Minimal (Generalization)	Results-based feedback given every 2-3 trials - "R" Example: "I didn't hear your /r/ sound on the last two."
	Maximal (Acquisition)	Performance-based feedback given every trial - "TH" Example: "Remember to stick your tongue out between your teeth."

How do I give feedback for Language Activities?

Effective feedback is tailored to the student's needs. Use the strategy that corresponds to the outcome of the exercise and student support level.

Outcome	Level of Support	Feedback Strategy & Examples
Correct	N/A	Metacognitive: Prompt the student to self-reflect on something related to the program - Example Question: [example from program] - Correct Answer: [example answer] - Feedback: [meta question]
Incorrect	Minimal	Self-Reflection: Prompt the student to see if they can catch their mistake. - "Take a look at your answer and see if you can figure out why it's wrong."
	Moderate	Visual: Guide the student to reference the question and images for clues about what the answer should be. - [context/target skill] - [example from the program]
	Maximal	Topic Review: Give a brief refresher or reminder about the topic. - [context/target skill] - [example from the program]

How do I get students to say a particular sound?

Sounds	Tips and Tricks
ɹ	• "Roll" an /l/ sound from the front of the mouth to the middle and then to the back of the mouth. • Make a growling noise to feel where the /r/ sound is made in the throat. Practice some 'growling words' (e.g., grrr-rate - great). • Make an "ee" sound before the /r/ sound to prevent a sneaky /w/ sound (e.g., ee-run, He-runs, She-runs • For /r/ sounds that come after a vowel, focus on making the vowel sound perfectly before adding the /r/ sound (e.g., cah-r - car; dough-r -door). • Imagine the tongue sliding into /r/ from the vowel sounds; Move the tongue backward and tighten up while making the vowel sound.
iɹ,æɹ,ɑɪɹ,ɑɹ,ɔɹ,ɛɹ,ɝ,ɪɹ,ʊɹ	• "Roll" an /l/ sound from the front of the mouth to the middle and then to the back of the mouth. • Make an "ee" sound before the /r/ sound to prevent a sneaky /w/ sound (e.g., ee-run, He-runs, She-runs). • For /r/ sounds that come after a vowel, focus on making the vowel sound perfectly before adding the /r/ sound. (e.g., cah-r - car; dough-r -door). • Imagine the tongue sliding into /r/ from the vowel sounds; Move the tongue backward and tighten while making the vowel. sound.
bɹ,dɹ,fɹ,gɹ,kɹ,pɹ,tɹ,ʃɹ,θɹ	• "Roll" an /l/ sound from the front of the mouth to the middle and then to the back of the mouth. • Make a growling noise to feel where the /r/ sound is made in the throat. Practice some 'growling words' (e.g., grrr-row -grow; grrr-rate - great).

s	• Tongue placement will vary:
	  ○ Put your tongue behind your front teeth.
	  ○ Put your tongue down behind the bottom of your teeth.
	  ○ Put your tongue in the middle behind your teeth.
	• Put your teeth together, blow air across your tongue, and make an /s/ sound.

st,sk,sl,sm,sn,sp, skw,skɹ,spl, spɹ,stɹ	• Tongue placement will vary:
	  ○ Put your tongue behind your front teeth.
	  ○ Put your tongue down behind the bottom of your teeth.
	  ○ Put your tongue in the middle behind your teeth.

	• Put your teeth together, blow air across your tongue, and make an /s/ sound.
l	• Make an ‘ah’ sound and lift the tongue up behind the top teeth. • Make an /n/ sound and push the tongue up to create more pressure for the /l/ sound. • Say the /t/, /d/, /n/, and /l/ sounds quickly to practice making tiny changes to the tongue placement to make each sound different.
bl,fl,gl,kl,pl	• Make an ‘ah’ sound and lift the tongue up behind the top teeth. • Make an /n/ sound and push the tongue up to create more pressure for the /l/ sound. • Say the /t/, /d/, /n/, and /l/ sounds quickly to practice making tiny changes to the tongue placement to make each sound different.
z	• Make the /s/ sound and hum to turn your voice on to say /z/.
k	• Cough to feel where the /k/ sound is made in your throat. • Whisper a /g/ sound. • Practice making a /t/ sound in the front of the mouth and then move it toward the back of the throat.
g	• Make a /k/ sound while you hum so your voice is on. • Make an “ing” sound and release the tongue. • Make an “ee” sound to help the tongue move to the back of the throat. • Practice making a /d/ sound in the front of the mouth and then move it toward the back of the throat.
θ	• Rest the tongue tip between the front teeth and blow air over the tongue.
ð	• Rest tongue tip between front teeth. Hum - voice on. Blow air over the tongue.
tʃ	• Bite down on the back teeth to keep the jaw still. • Make a /t/ sound and round the lips.
dʒ	• Make a /tʃ/ sound, hum to turn the voice on, and drop the jaw open. • Make a /z/ sound, round the lips, and drop the jaw open. • Stretch out a /d/ sound and make a “ya” sound quickly.
ʃ	• Bite down on the back teeth to keep the jaw still. • Make an /s/ sound, round the lips, and pull the tongue back slightly.

	• Make an /s/ sound then slide into a whispered “ya.” The /ʃ/ sound is usually produced in the transition.
ʒ	• Make a /ʃ/ sound, and hum to turn the voice on. • Make a /z/ sound, round the lips, and pull the tongue back slightly. • Make a /r/ sound, close the teeth together, round lips, and lift the tongue up to touch the bumpy part.
f	• Make an /h/ sound and bite the bottom lip. • Whisper the /v/ sound.
v	• Make an /f/ sound and hum to turn the voice on. • Make an “Ah” sound and bite the bottom lip gently.
h	• Mouth open, tongue stays down, direct air over the tongue.
j	• Mouth open, sides of tongue move up and spread towards the molars. Hum - Voice on - and drop the tongue to a neutral position.
t	• Whisper the /d/ sound. • Tap tongue behind top teeth while pushing air forward.
d	• Make a /t/ sound and hum to turn on the voice. • Make a /l/ sound and push the tongue up to create pressure before releasing the tongue. • Make a /n/ sound and release the tongue.
p	• Whisper the /b/ sound. • Make a /h/ sound and close your lips. • Make an ‘uh’ sound, bring your lips together, and then pop them open.
b	• Make an /m/ sound and pop open the lips. • Make a /p/ sound and hum to turn the voice on.
w	• Lips rounded, back of the tongue is up. Hum - voice on. Release lips and tongue.
m	• Press lips together and hum - voice on.
n	• Place the tongue behind the top teeth. Push the tongue up to create pressure. Hum - voice on.
ŋ	• Open your mouth and move your tongue to the back of your throat. Tighten your throat and start to hum with your voice on.

Are there any specific types of modifications that need to be made based on student needs?

Children with cognitive delays typically require double the length of time to target and remediate their speech sounds (i.e., phonemes per pattern targeted for 2 hours rather than 1 hour). It should also be noted that 3 or more years may be required before intelligibility gains are observed in children with lower cognitive abilities (Hodson, 2010).

Students with hearing loss may require eliciting suprasegmental aspects (e.g. phrasing, intonation) and morphological rule instruction in addition to specific phonological pattern targets in treatment (Hodson, 2010). Examples of morphological rules paired with phonological pattern targets are listed below. It is recommended to use best clinical judgment and evaluation information (e.g. audiogram in comparison to speech banana) to best determine this course of instruction.

Phonological Process	Sounds Targeted	Morphological Rules and Pronunciations
Cluster Reduction	-ts, -ps, -ks	Plural -s pronunciations (e.g. /s/ in cats versus /z/ in tools)
Backing	t, d	Past tense -ed pronunciations (e.g. /t/ in booked versus /d/ in gathered)

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