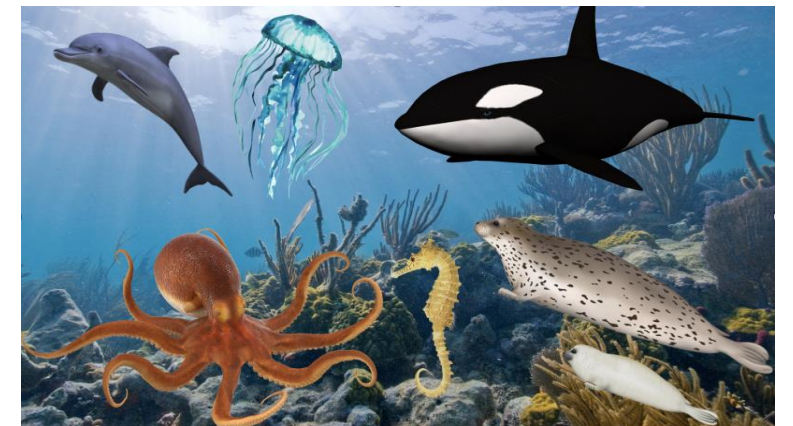
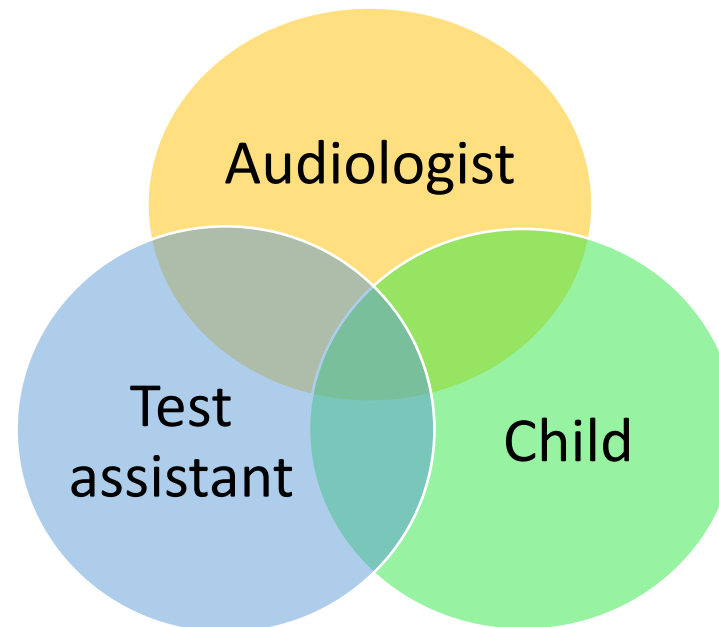


Improving Behavioral Hearing Assessment of Children

Katie Langford
UW LEND Audiology Trainee

UW LEND Faculty Mentor: Lisa Mancl



Background: Conditioned Play Audiometry (CPA)

Who

- Children with developmental age 2 to 6 years
- Older children & adults with developmental delays

Why

- Achieve accurate and complete assessment of hearing levels using behavioral methods
- Use fun tasks to engage and motivate children to complete assessment measures

When

- Individuals at risk for hearing loss
- Individuals with permanent hearing loss

CPA Method

Test assistant helps child get ready to listen and wait with game token

Child hears auditory stimulus

Child completes task with token

Test assistant provides reinforcement

Test Assistant Role

- Provides initial conditioning/training
 - Uses hand-over-hand technique to teach the child the task of wait, listen, and respond to auditory stimulus
 - Provides positive reinforcement
- Provides support throughout testing
 - Keeps the child ready to listen
 - Provides reinforcement
 - Positive reinforcement
 - Negative reinforcement

CPA Method

Background/Research on CPA

Success rate of CPA increases with age (Nielsen & Olsen, 1997)

2 years old

- Nearly 50% of children established 3 or more hearing thresholds in one visit

2 ½ years old

- More than 70% of children established 3 or more hearing thresholds in one visit


3 years old

- Nearly 75% of children established 6* or more hearing thresholds in one visit
 - *6 or more thresholds needed for complete diagnosis

Objectives of my LEND Project

Develop a toolbox for pediatric audiologists in Washington State for maximizing young children's participation in behavioral hearing assessment





Project: CPA Toolbox for Pediatric Audiologists

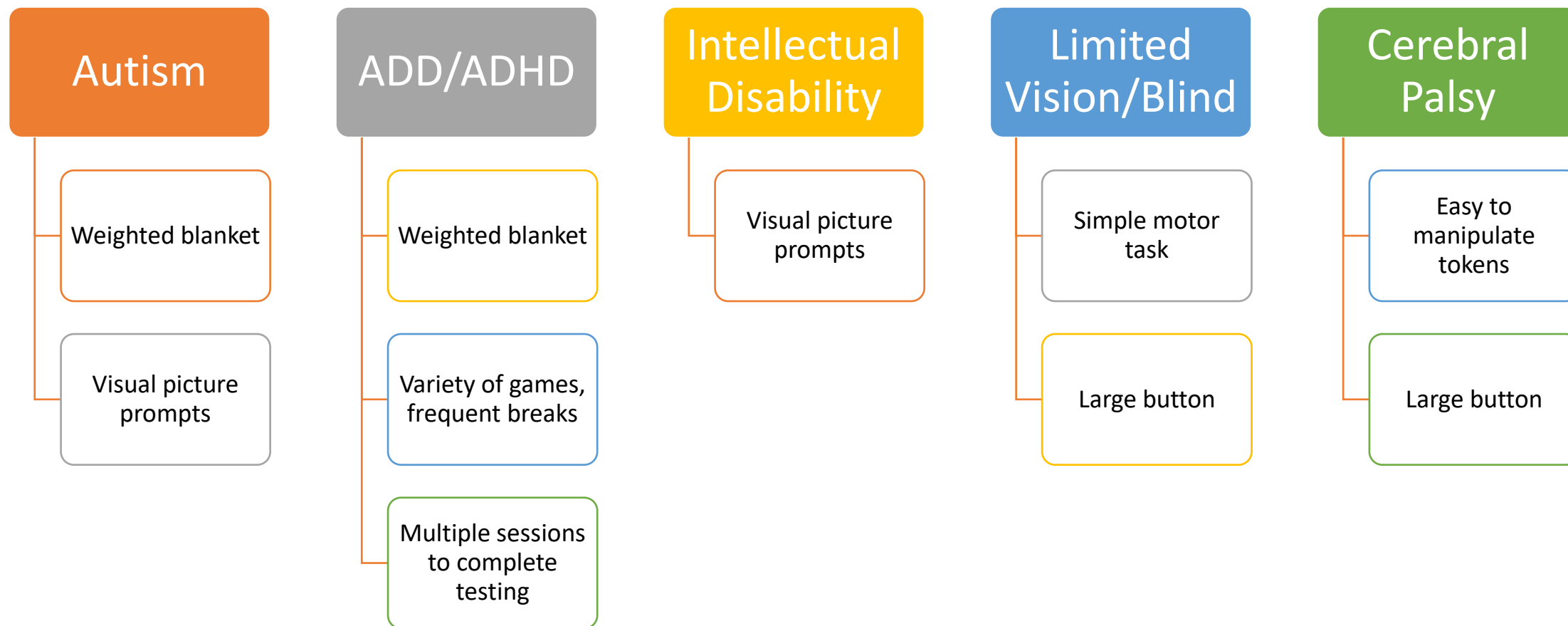
A variety of CPA games

- For a range of developmental ages
- For a range of motor ability levels
- To maintain engagement with different tasks

An electronic CPA game

A visual prompt picture for teaching/maintaining task

Considerations for Assessing Hearing in Children with Developmental Disabilities



Teaching the task to children with learning challenges and/or limited hearing

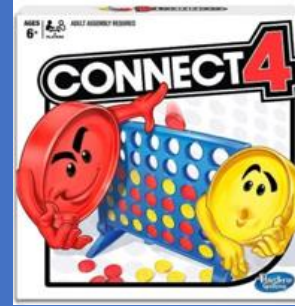
- Use visual prompt instruction
- Use sign language instruction





Toolbox: Variety of CPA Games



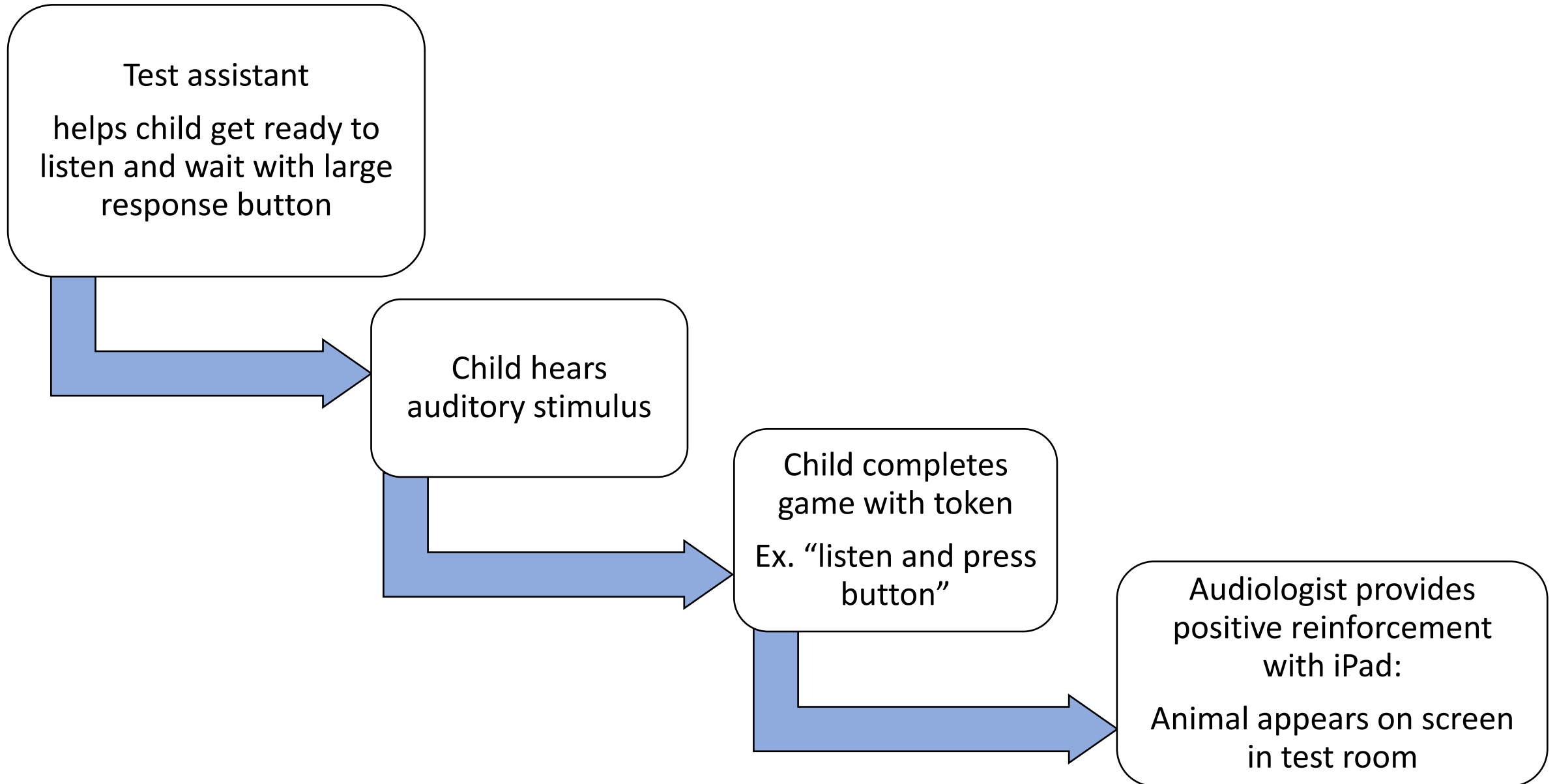
Game	Blocks and Bucket	Lite Brite	Connect 4	Banana Drop
Pros	<ul style="list-style-type: none"> ○ Easy fine motor ○ Good for children distracted by complex tokens (e.g., children with ASD) 	<ul style="list-style-type: none"> ○ Motivation= glow in the dark ○ Variety of shapes/color 	<ul style="list-style-type: none"> ○ Many tokens/trials 	<ul style="list-style-type: none"> ○ Easy fine motor
Cons	<ul style="list-style-type: none"> ○ Unmotivated due to simplicity 	<ul style="list-style-type: none"> ○ Fine motor challenges: small pieces: 	<ul style="list-style-type: none"> ○ Unmotivated due to simplicity 	<ul style="list-style-type: none"> ○ Small # of tokens
Consider	<ul style="list-style-type: none"> ○ Dev age 2+ ○ Fine motor skill: drop in large bucket 	<ul style="list-style-type: none"> ○ Dev age 3+ ○ Fine motor skill: grasp and press 	<ul style="list-style-type: none"> ○ Dev age 3+ ○ Fine motor skill: drop in slot 	<ul style="list-style-type: none"> ○ Dev age 3+ ○ Fine motor skill: drop in bucket



Game	Honey Bee Tree	Pizza Pile-Up	Pop up Pirate	Crocodile Dentist
Pros	<ul style="list-style-type: none"> ○ Motivation= keep bees inside ○ Many tokens/trials 	<ul style="list-style-type: none"> ○ Motivation: Child chooses toppings 	<ul style="list-style-type: none"> ○ Motivation = pirate surprise ○ Many tokens/trials 	<ul style="list-style-type: none"> ○ Motivation= Surprise of crocodile mouth ○ Easy set up
Cons	<ul style="list-style-type: none"> ○ Child may become frustrated if bees keep falling 	<ul style="list-style-type: none"> ○ Pizza prone to falling (assistant must reset) 	<ul style="list-style-type: none"> ○ Time delay to reinsert pirate 	<ul style="list-style-type: none"> ○ Crocodile mouth shutting may scare young children
Consider	<ul style="list-style-type: none"> ○ Dev age 3+ ○ Fine motor skill: pull leaves out gently 	<ul style="list-style-type: none"> ○ Dev age 3+ ○ Fine motor skill: drop topping gently on crust 	<ul style="list-style-type: none"> ○ Dev age 4+ ○ Fine motor skill: pull out sword 	<ul style="list-style-type: none"> ○ Dev age 4+ ○ Fine motor skill: press down teeth

Game	<h3 style="text-align: center;">Feed the animal</h3> 	<h3 style="text-align: center;">Piggy Bank</h3> 
Pros	<ul style="list-style-type: none"> ○ Motivation: Child chooses animal to feed ○ Many trials with multiple tokens and animals 	Motivation: money
Cons	<ul style="list-style-type: none"> ○ Fine motor challenges <ul style="list-style-type: none"> ○ Small pieces to grasp ○ Small animal mouth opening 	<ul style="list-style-type: none"> ○ Fine motor challenges <ul style="list-style-type: none"> ○ Small slot to insert coins ○ Small # of tokens
Consider	<ul style="list-style-type: none"> ○ Dev age 3+ ○ Fine motor skills: <ul style="list-style-type: none"> ○ Place token in narrow mouth ○ Place token in wider opening if small slot is too difficult for child 	<ul style="list-style-type: none"> ○ Dev age 3+ ○ Fine motor skills: <ul style="list-style-type: none"> ○ Place token in narrow slot ○ Place token in open side door if small slot is too difficult for child

CPA iPad Task



CPA Electronic Task



Task



Response=press button when child hears the sound
Reward=activation of electronic visual reward

Pros

- Simple game for easily distracted children
- Variety of video reinforcements
- Extinguish false positive responses more easily (audiologist controls activation of visual reward)

Cons

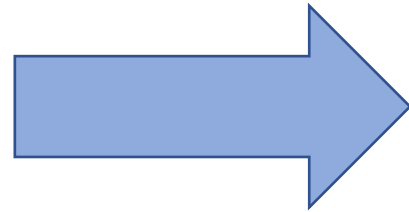
- Less motivation due to simplicity of game

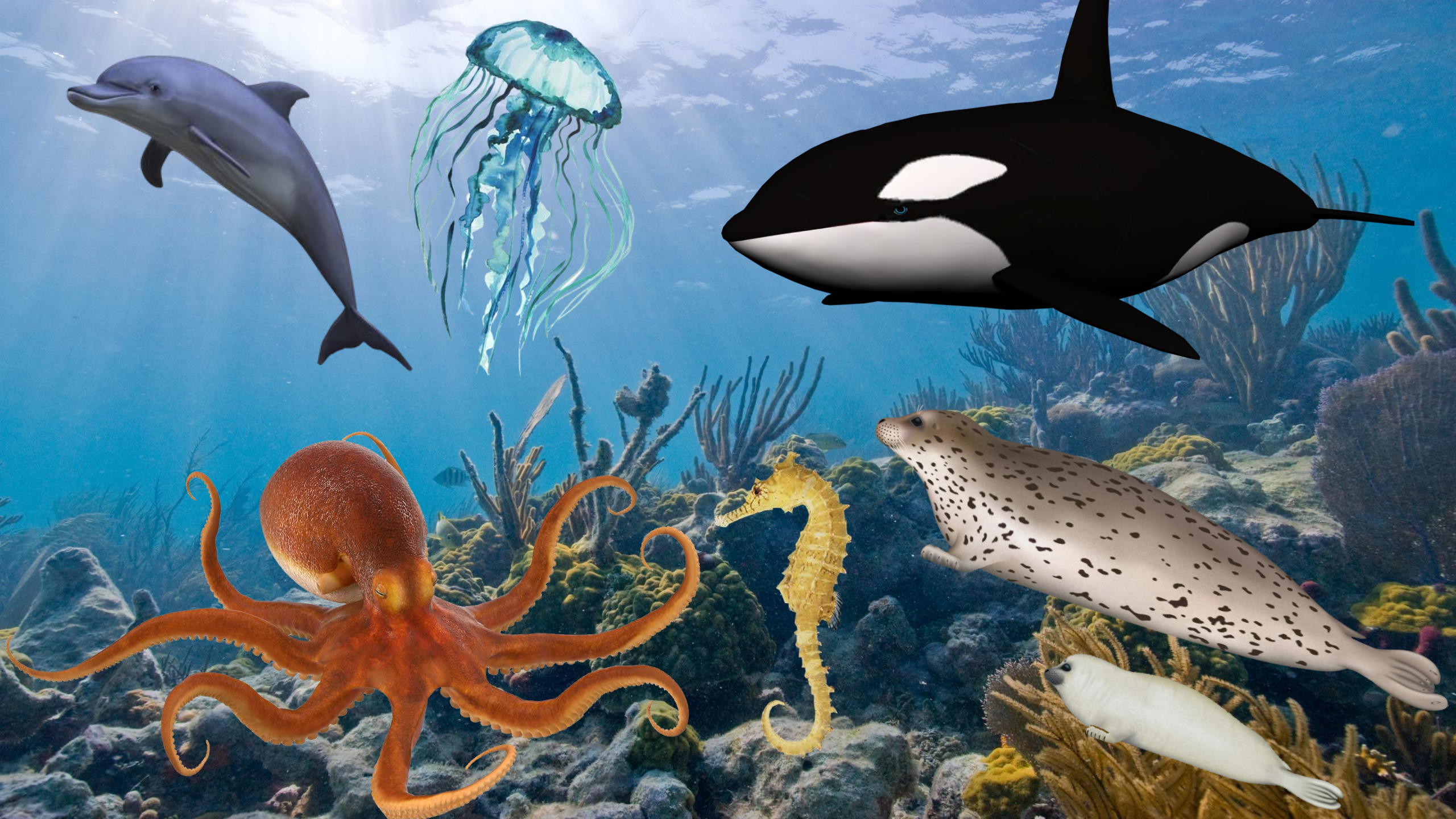
Consider

- Developmental age 2+
- Hand mat: promotes waiting, decreases false positive responses



Demo of iPad CPA Reinforcement







Conclusions

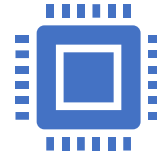


CPA is an appropriate audiological test method for assessing hearing children with developmental age of 2-6 years



Completeness of assessments are impacted by:

- motivation of the child
- reward of the CPA games



A variety of CPA tasks are crucial for pediatric audiologist toolboxes:

- Electronic -games
- Toy games



Considerations when choosing a CPA task include:

- Developmental age
- Motor skill level
- Sensory interests
- Attention level
- Child's interests

Future LEND projects and research

- Use CPA games and electronic games in CHDD Pediatric Audiology clinical assessments
- Distribute resources to WA state audiologists through the WA EHDDI Learning Community website (wselc.org)
- Compare children's participation and completeness of assessment across ages and across tasks



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- Anna Caballero, MD, AuD Utah State University Hear to Learn Webinar: Hearing Evaluation: Conditioned Play Audiometry. Nov 15 2017.

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