



# NIH Toolbox

Assessment of Neurological and Behavioral Function

## “Importance of Toolbox to Pediatrics---And Importance of Pediatrics to the Toolbox”

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For more information, please visit [www.nihtoolbox.org](http://www.nihtoolbox.org)  
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# Initial Mandate of the NIH Toolbox



- ◆ The mandate of the NIH Toolbox was to develop a battery that could be used across the lifespan----ages 3-85
- ◆ Developing assessments for young children presents a significant challenge
- ◆ But providing assessment tools across domains will have a significant impact on the field of pediatric assessment
- ◆ As well, including pediatric assessment adds important value to the Toolbox

# Current Status of Pediatric Assessment



- ◆ While there are many pediatric assessments, particularly in the area of Cognition, and to some extent in the area of Emotion:
  - ◆ These measures are expensive
  - ◆ They are normed on homogeneous non-diverse populations
  - ◆ They are not brief and easily administered
  - ◆ They do not easily link up to their adult counterpart

# Current Status of Pediatric Assessment *(continued)*



- ◆ There is a paucity of instruments to assess “normal children” for Motor and Sensation
- ◆ In many of these domains there is a general reliance on proxy reporting
- ◆ These measures are rarely based in the current thinking in neuroscience
- ◆ National norms are typically based upon Caucasian, English speaking samples

# Importance of a Developmental Perspective



- ◆ Developmental conceptualizations necessary for understanding etiology of chronic diseases in children and adults
- ◆ Many chronic mental and physical illnesses begin in early childhood
- ◆ Treatments, interventions and prevention targeting children may offer best hope of reducing long-term morbidity

# Importance of a Developmental Approach



- ◆ In order to understand developmental processes involved in illness etiology we need:
  - ◆ Longitudinal research starting and targeting pediatric populations
  - ◆ Assessment of normative functioning across multiple domains of behavior

# Example



## ◆ National Children's Study

- ◆ 105,000 children and families
- ◆ 21 years
- ◆ Examines details of exposure to environmental toxins and looks at etiology of disease and psychopathology
- ◆ Needs reliable, validated instruments for assessment across multiple domains of behavior



# Challenges Presented by Pediatric Assessment



- ◆ There are significant changes in children's motor abilities that must be taken into account when requiring motor responses during assessment
- ◆ Young children need non-written language stimuli
- ◆ Interactions between test administrator and subject should be crafted to the age of the child

# Dealing with the Challenges of Pediatric Assessment



- ◆ Pediatric consultants were identified and recruited for all of the domains and by sub-domain
- ◆ State-of-the-art assessment measures were identified and selected for validation
- ◆ A working group was formed to develop guidelines for administration of pediatric assessments

# SUBDOMAIN WORK GROUPS in Cognition---

**bolded names are Pediatric Consultants**



## **Executive Function**

*Adele Diamond*

*Phil Zelazo*

Joel Kramer

Beth Borosh

## **Episodic Memory**

Sureyya Dikmen

**Patricia Bauer**

Gordon Chelune

Dean Delis

Joni Machamer

## **Language**

Sandy Weintraub

Jennifer Manly

**Jean Berko Gleason**

**Kathy Hirsch-Pasek**

**Roberta Golinkoff**

Beth Borosh

## **Processing Speed**

Nancy Chiaravalloti

David Tulsky

**Timothy Salthouse**

**Keith Yeates**

Amanda O'Brien

## **Attention**

Sandy Weintraub

**Nathan Fox**

**Koraly Perez-Edgar**

Frank Zelko

Dick Havlik

## **Working Memory**

David Tulsky

Nancy Chiaravalloti

Bob Heaton

Amanda O'Brien

**Timothy Salthouse**

**Keith Yeates**

# Pediatric Assessment in Toolbox



- ◆ Allows measurement of same constructs through developmental ages
- ◆ Provides validated measures that are brief, reliable, and normed across diverse populations
- ◆ One example follows from the Cognition Domain---Executive Functioning

# Dimensional Change Card Sort Task



- ◆ Developed by Phil Zelazo (University of Minnesota)
- ◆ Designed to assess set shifting abilities in young children
- ◆ Similar to adult measures such as the Wisconsin Card Sort
- ◆ Science based link to neuroscience data on brain development

# Dimensional Change Card Sort Task

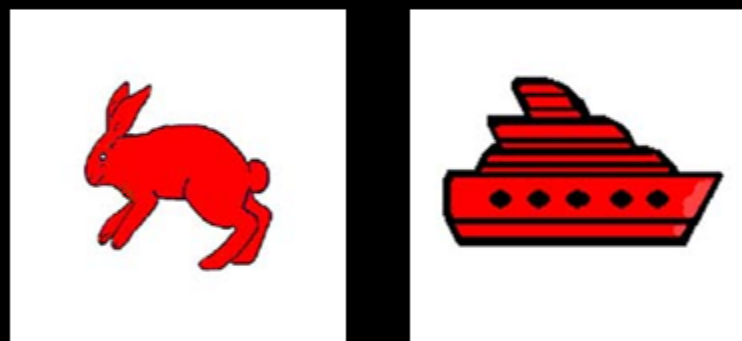


## -Structure

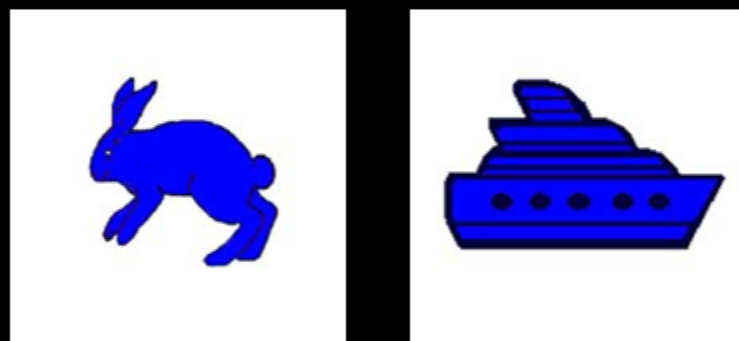
- 1 block of 10 Shape trials
- 1 block of 10 Color trials
- 1 block of 40 Mixed trials (20 Shape, 20 Color)
- Relevant dimension cued by written and spoken word ('Shape' or 'Color')
- Order of dimensions counterbalanced (i.e., half of participants complete shape trials first, other half complete color trials first.)

We're going to play a game! If you hear the word  
COLOR press the button that is the  
same color as the picture in the middle of the screen.

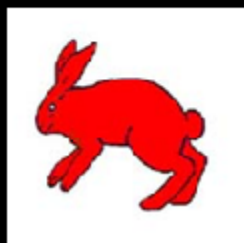
If it is RED like these two



If it is BLUE like these two

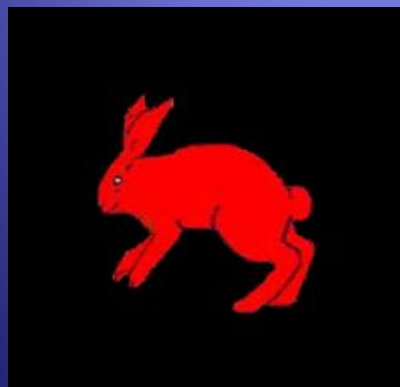
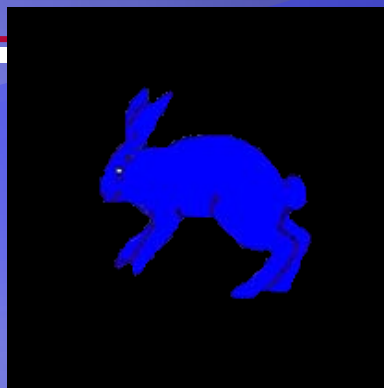


Press this button



Press this button





SHAPE



# Meeting the Challenge of Pediatric Assessment



- ◆ Working group established to identify issues specifically important to testing young children
  - ◆ Clarity of instructions
  - ◆ Appropriate feedback
  - ◆ Stop rules
  - ◆ Attention to varying motor and language abilities
  - ◆ Training of test administrators

# Pediatric Assessment Summary



- ◆ Pediatric Assessment – *to date*:
  - ◆ Instruments that assess children in all four domains have been reviewed
  - ◆ Choices have been made for reliable, brief, inexpensive instruments
  - ◆ A good deal of thought, care and work has gone into this effort and selection

# Validating the Pediatric Assessments



Validation of the measures in a pediatric sample is about to begin. It will ultimately enable:

- ◆ Accurate assessment at *all* age levels across diverse populations
- ◆ Tracking of function changes across the lifespan
- ◆ Easy comparisons between studies



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