Remotely Assessing Visual Attention Online in Participants of Differing Ages

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Purpose

- *Discovering manipulations that affect how children attend to complex stimuli is important because of the presence of attentional deficits that many children possess which interfere with their learning and development. One attentional impairment that can interfere with a child's development is overselective attention. Overselective attention occurs when a child demonstrates restricted attention, as the child attends to only a limited number of stimulus elements in a compound display.*

- *Past research has shown one manipulation that affects which elements of stimulus compounds are attended to is prior reinforcement history. Prior reinforcement histories for separate stimulus components were examined to determine if they controlled which features of stimulus compounds four participants attended to when the procedures were administered online at remote sites where the author was not present.*

- *Because of the increase in children diagnosed with autism, it is difficult to provide adequate services at an early age. Online programs, such as the procedures in this study, could be provided to young children in the home with parental supervision to provide attentional assessments to both identify and reduce attentional impairments.*

Method

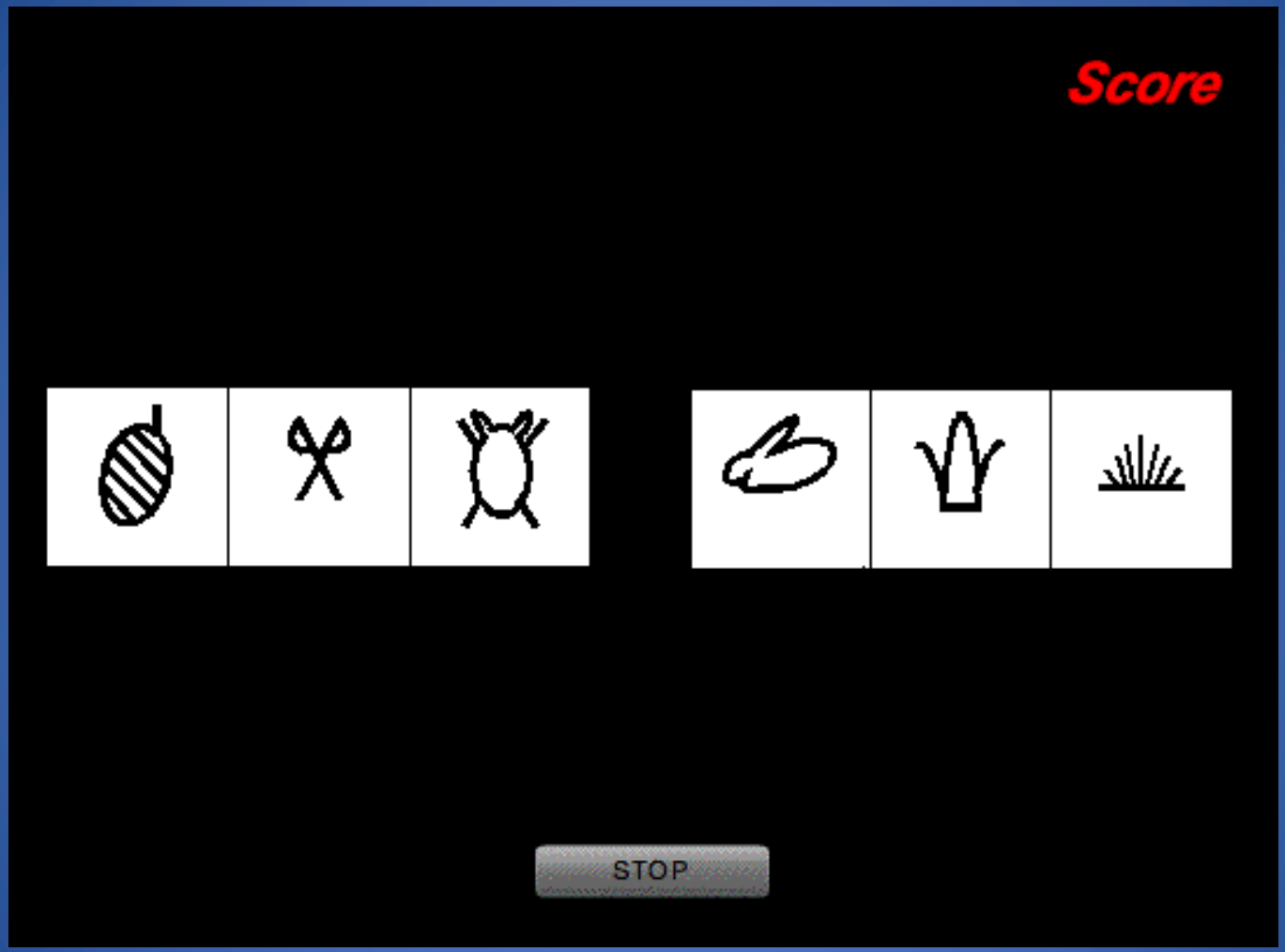
- *Two adults, an adolescent, and a young child participated in this study. The stimulus-control procedures were provided online, which were accessible from the author's website (www.ba-and-t.com). The procedures were administered automatically at remote sites, and all the participants used personal computers.*
- *Sessions consisted of approximately 100 trials in length. A trial began when symbols appeared on two white illuminated backgrounds on the computer screen. The trial ended when the participant touched either illuminated area. Each time the participant made a correct choice, he was reinforced with a flashing computer screen and a point was earned for each correct response.*
- *In the first step, each participant learned three separate visual discriminations, composed of six different symbols.*
- *The individual symbols were next combined to form a conflict compound. The conflict compound was created by keeping the prior reinforcement histories unchanged for only scissors and cane in the compound. The prior reinforcement histories were reversed for the remaining four symbols.*
- *After 90% accuracy was achieved for the conflict compound, 36 test trials were administered in which the three symbol pairs were presented 12 times each in a mixed sequence. The test was provided to determine which symbols the participant was attending to when criterion accuracy was achieved for the compound discrimination. The software also recorded which symbols the participant selected each time the conflict compound appeared on the screen.*
- *The young child was given additional exposure to the initial procedures to determine the effect of prior reinforcement histories on which symbols of the compound stimuli the child attended to when extended training was provided.*

Online Single Symbol Training

Single Symbol Training

(+)	(-)
Rabbit	Plum
Scissors	Cane
Grasses	Mule

Conflict Compound



(+)

Plum (R)

Scissors (U)

Mule (R)

(-)

Rabbit (R)

Cane (U)

Grasses (R)

Results & Discussion

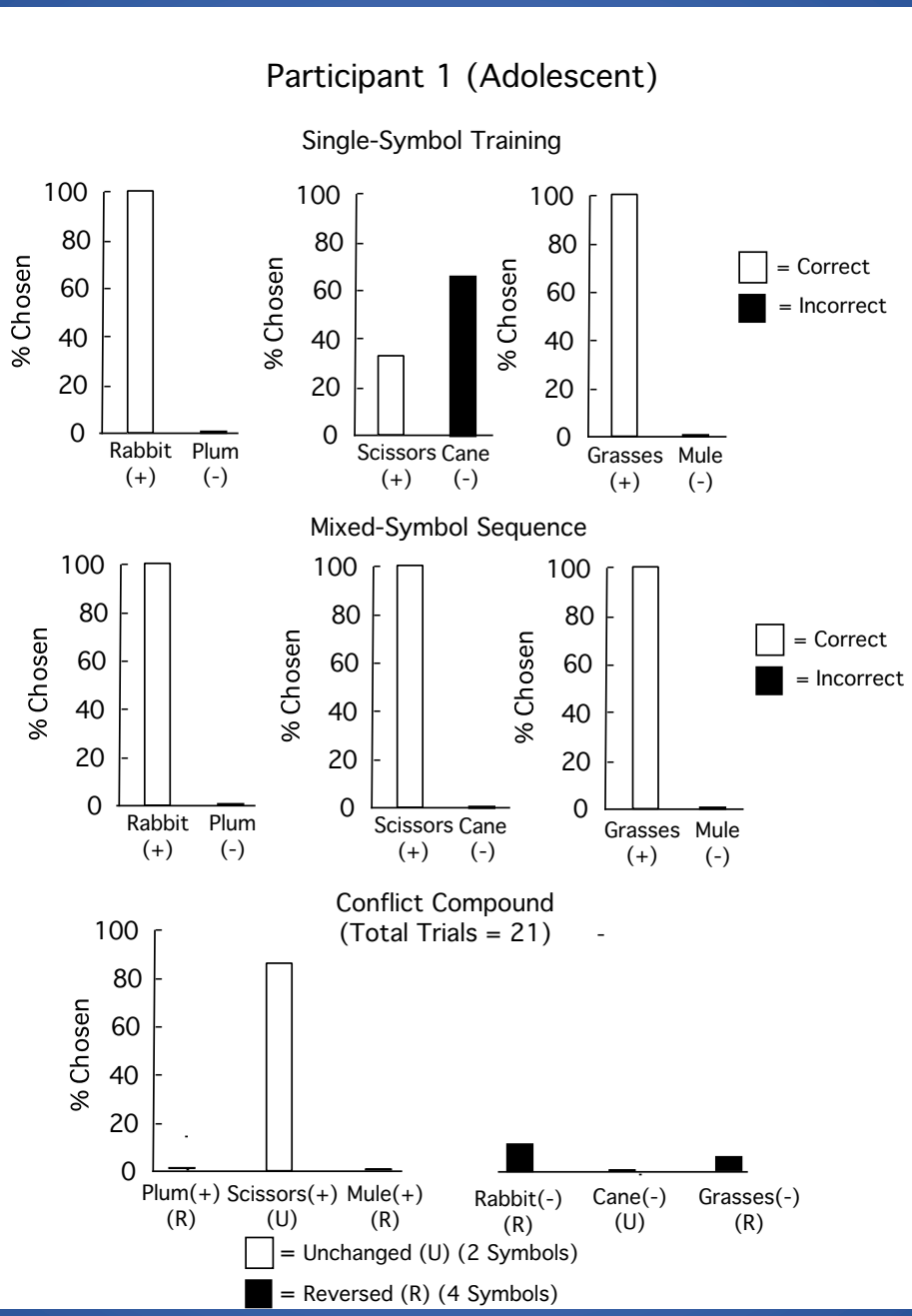
- *Establishing prior reinforcement histories for separate stimulus components was effective in determining which features of compound visual cues participants of differing ages attended to when the stimulus-control procedure was administered online at remote sites.*

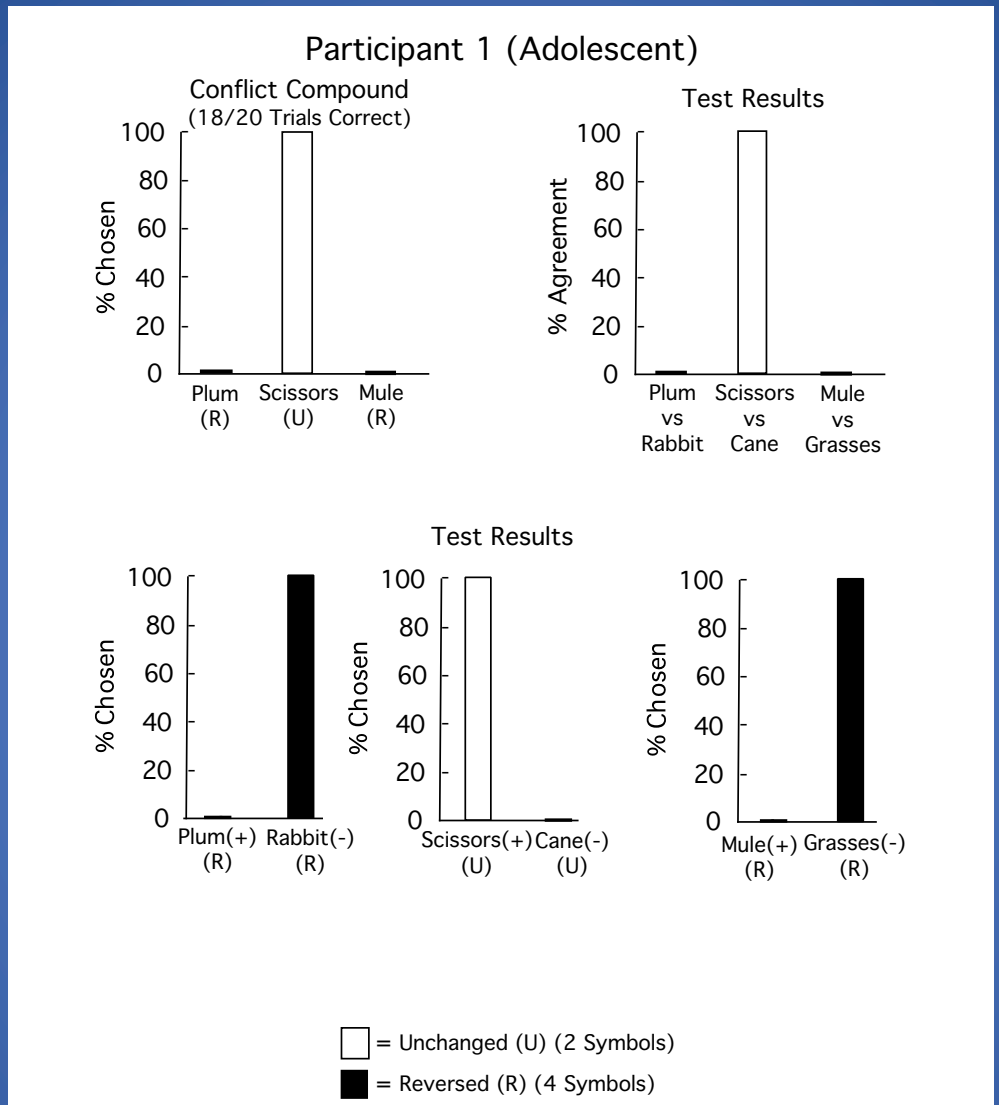
- *The response topographies and test performance of two of the participants (an adolescent and an adult) indicated that they selectively attended to only the symbol with an unchanged prior reinforcement history in the compound when criterion accuracy was achieved. The two symbols with a reversed prior reinforcement history in the compound were ignored.*

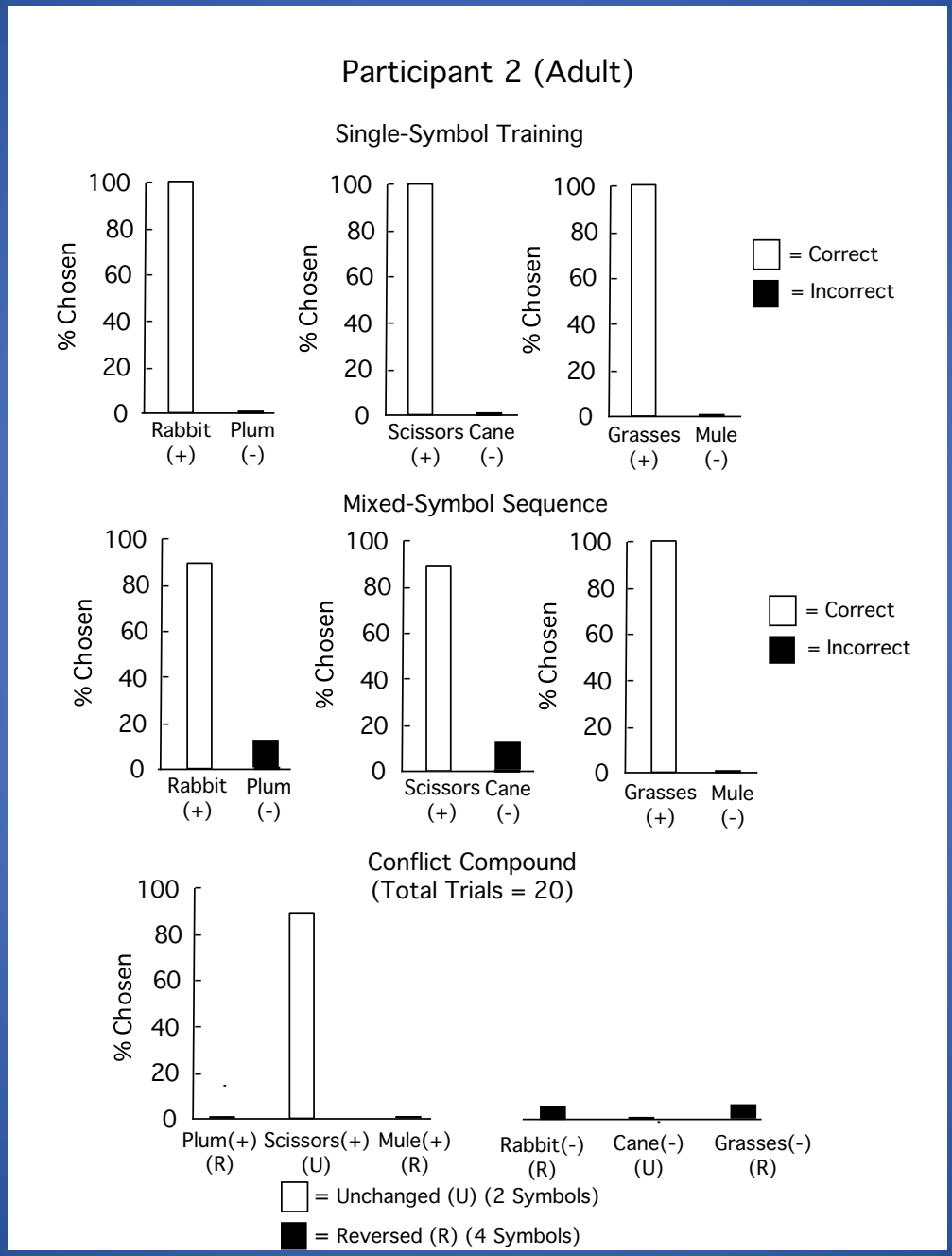
- *A third participant (adult) had opposing response topographies and test results. Although she responded to both the unchanged symbol and reversed symbols in the conflict compound when criterion accuracy was achieved, her test performance indicated that she selectively attended to the unchanged symbol. The importance of recording response topographies in addition to response accuracy to adequately determine how stimulus compounds are attended to confirms earlier investigations.*

- *After extended training was provided, both the response topographies and the test performance of the fourth participant (a young child) revealed he shifted his attention to the unchanged symbol in the conflict compound when he achieved criterion accuracy.*

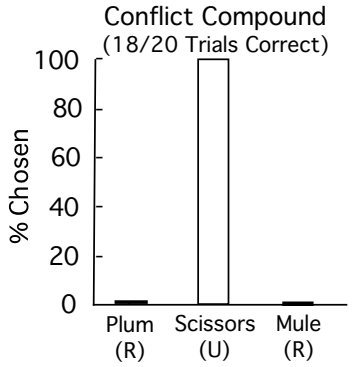
- *Despite individual differences, manipulating prior reinforcement histories of individual stimuli was effective in controlling how the participants, who differed in age, attended to a stimulus compound even when the procedures were provided online at remote sites. Unlike earlier studies, this also occurred with laptop computers, where touch screens were not utilized, and where social and monetary reinforcement were not provided.*

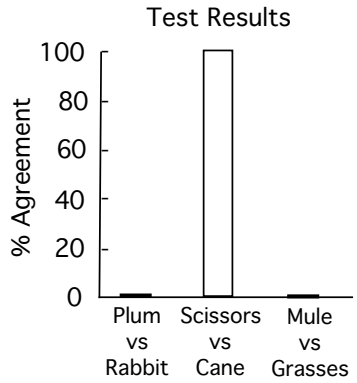

Participant 1 (Adolescent)
Single-Symbol Training
% Chosen
100
80
60
40
20
0
Rabbit (+)
Plum (-)
Scissors (+)
Cane (-)
Grasses (+)
Mule (-)
= Correct
= Incorrect
Mixed-Symbol Sequence
Conflict Compound
(Total Trials = 21)
Plum(+) (R)
Scissors(+) (U)
Mule(+) (R)
Rabbit(-) (R)
Cane(-) (U)
Grasses(-) (R)
= Unchanged (U) (2 Symbols)
= Reversed (R) (4 Symbols)

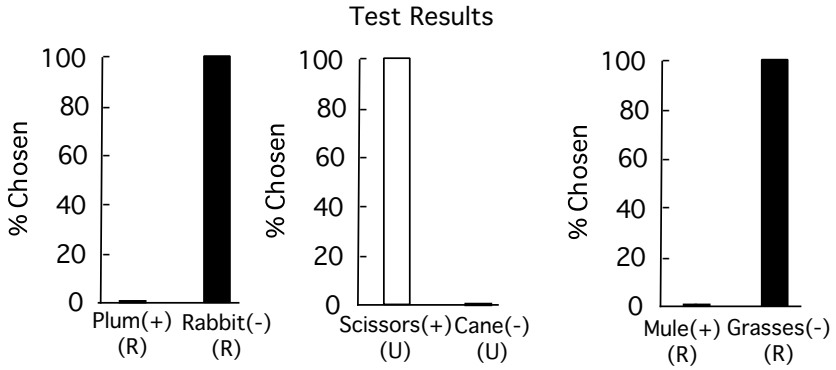

Participant 1 (Adolescent)
Conflict Compound
(18/20 Trials Correct)
% Chosen
100
80
60
40
20
0
Plum (R)
Scissors (U)
Mule (R)
Test Results
% Agreement
Plum vs Rabbit
Scissors vs Cane
Mule vs Grasses
Test Results
% Chosen
Plum(+) (R)
Rabbit(-) (R)
Scissors(+) (U)
Cane(-) (U)
Mule(+) (R)
Grasses(-) (R)
= Unchanged (U) (2 Symbols)
= Reversed (R) (4 Symbols)


Participant 2 (Adult)
Single-Symbol Training
% Chosen
100
80
60
40
20
0
Rabbit (+)
Plum (-)
Scissors (+)
Cane (-)
Grasses (+)
Mule (-)
= Correct
= Incorrect
Mixed-Symbol Sequence
Conflict Compound
(Total Trials = 20)
Plum(+) (R)
Scissors(+) (U)
Mule(+) (R)
Rabbit(-) (R)
Cane(-) (U)
Grasses(-) (R)
= Unchanged (U) (2 Symbols)
= Reversed (R) (4 Symbols)

Participant 2 (Adult)

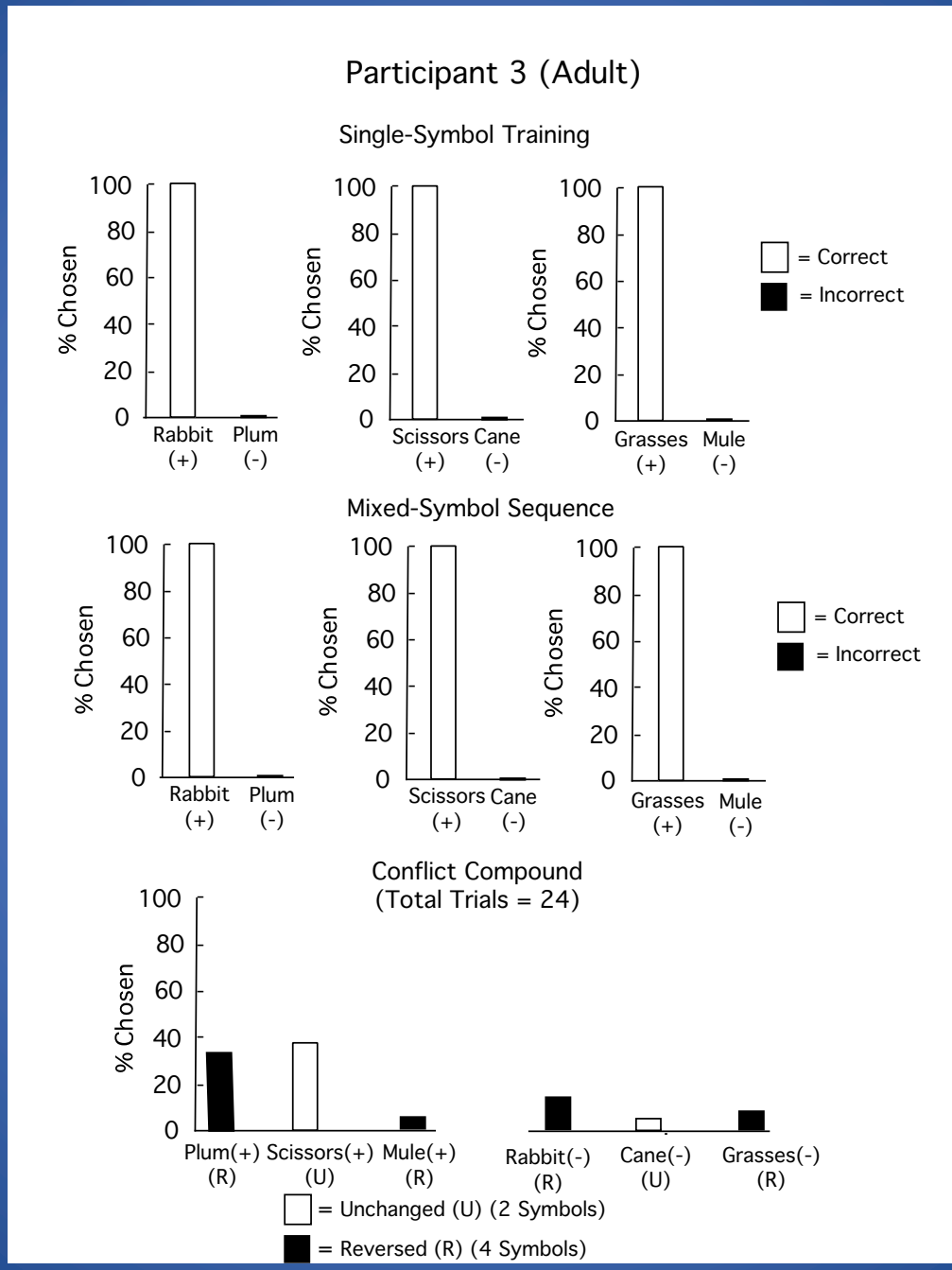




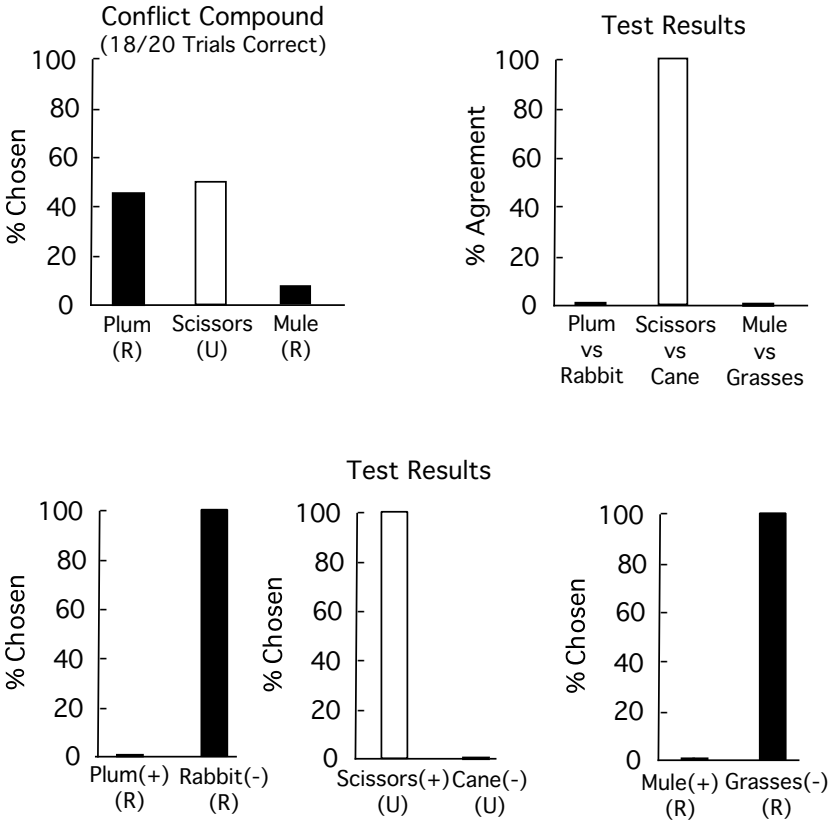


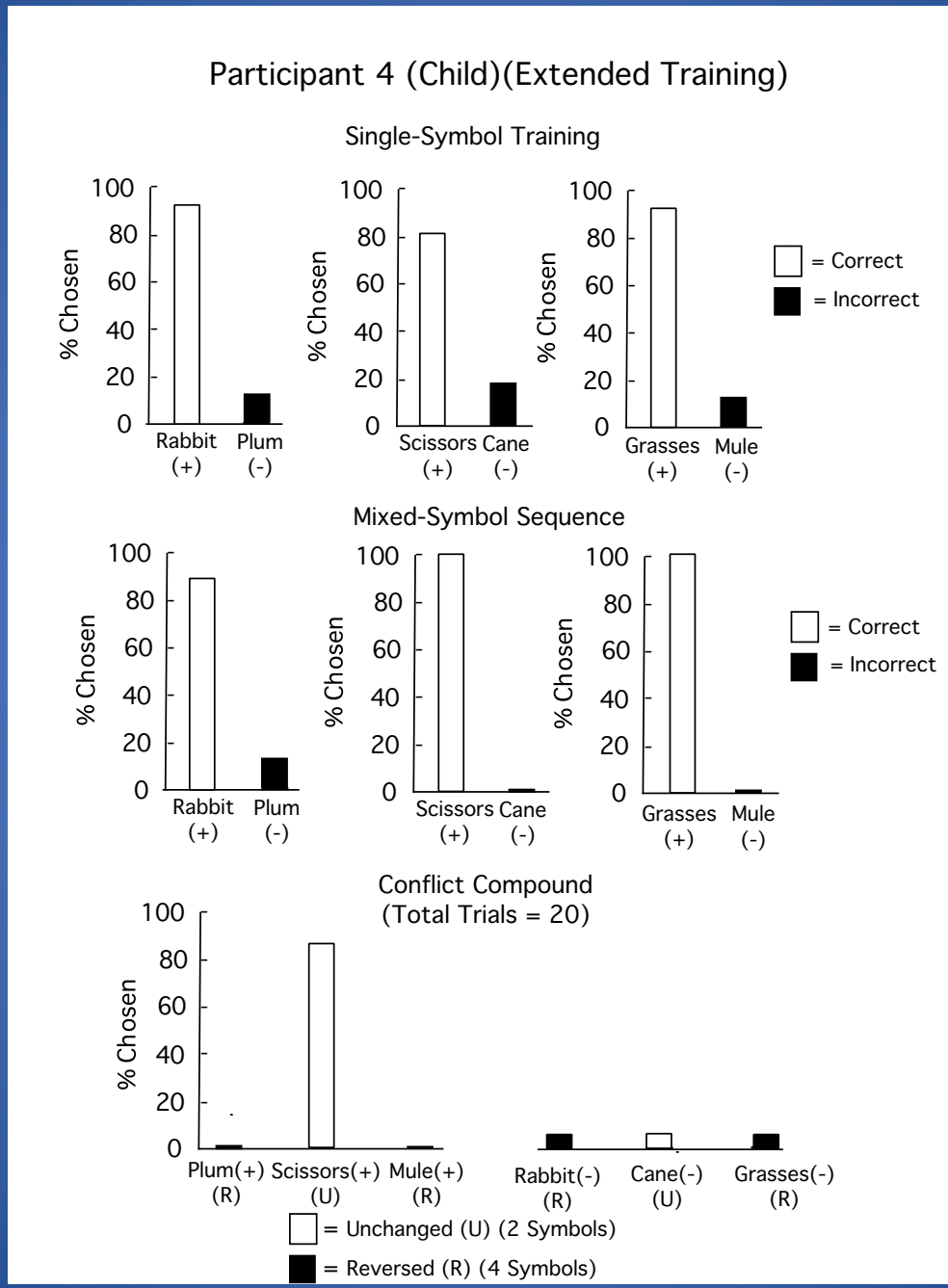
= Unchanged (U) (2 Symbols)

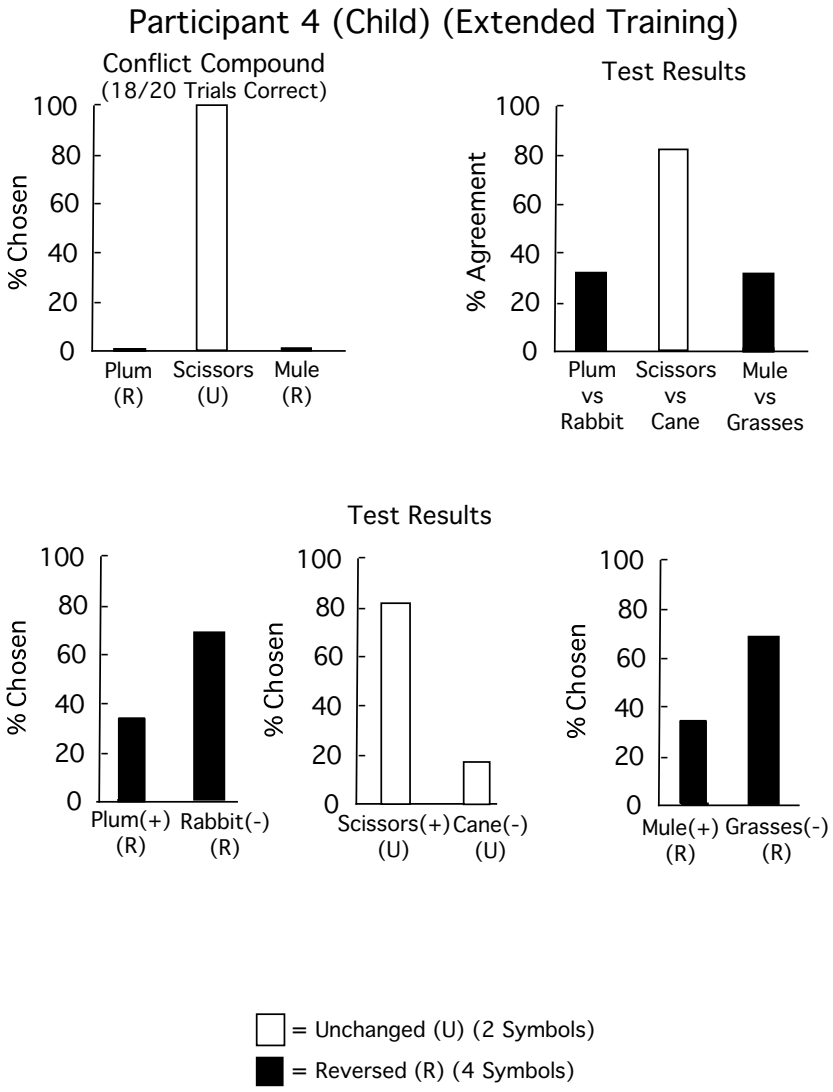
= Reversed (R) (4 Symbols)


Participant 3 (Adult)
Single-Symbol Training
% Chosen
100
80
60
40
20
0
Rabbit (+)
Plum (-)
Scissors (+)
Cane (-)
Grasses (+)
Mule (-)
= Correct
= Incorrect
Mixed-Symbol Sequence
Conflict Compound
(Total Trials = 24)
Plum(+) (R)
Scissors(+) (U)
Mule(+) (R)
Rabbit(-) (R)
Cane(-) (U)
Grasses(-) (R)
= Unchanged (U) (2 Symbols)
= Reversed (R) (4 Symbols)

Participant 3 (Adult)




Participant 4 (Child)(Extended Training)
Single-Symbol Training
% Chosen
100
80
60
40
20
0
Rabbit (+)
Plum (-)
Scissors (+)
Cane (-)
Grasses (+)
Mule (-)
= Correct
= Incorrect
Mixed-Symbol Sequence
Conflict Compound
(Total Trials = 20)
Plum(+) (R)
Scissors(+) (U)
Mule(+) (R)
Rabbit(-) (R)
Cane(-) (U)
Grasses(-) (R)
= Unchanged (U) (2 Symbols)
= Reversed (R) (4 Symbols)


Participant 4 (Child) (Extended Training)
Conflict Compound
(18/20 Trials Correct)
% Chosen
100
80
60
40
20
0
Plum (R)
Scissors (U)
Mule (R)
Test Results
% Agreement
Plum vs Rabbit
Scissors vs Cane
Mule vs Grasses
Test Results
% Chosen
Plum(+) (R)
Rabbit(-) (R)
Scissors(+) (U)
Cane(-) (U)
Mule(+) (R)
Grasses(-) (R)
= Unchanged (U) (2 Symbols)
= Reversed (R) (4 Symbols)