

**Name of test:** Dimensional Change Card Sort Test

**Estimated time burden:** 7 minutes

**Estimated number of items:** up to 56 items

Materials:

iPad

Description:

The *Dimensional Change Card Sort Test* was based on work by Zelazo et al. (2003) and is a measure of cognitive flexibility. Two target pictures are shown that vary along two dimensions (e.g., shape and color). Participants are asked to match a series of bivalent test pictures (e.g., yellow balls and blue trucks) to the target pictures, first according to one dimension (e.g., color) and then, according to the other dimension (e.g., shape). The relevant dimension for sorting is indicated by a cue word (e.g., "shape" or "color") that is spoken by a prerecorded voice. Practice items use white and brown colors and a Rabbit and a Sailboat as shapes. Test items use blue and yellow colors and a Ball and a Truck as shapes. The downward extension (dext) items include an Elephant and a Fish (color and shape dimensions) and a Cat (varies in size: big vs. small dimension).

*All the instructions are on the screen. The examiner reads them to and/or with the participant and points out the relevant aspects of the stimuli on the screen. The next screen appears when either the examiner or participant makes a choice on the screen. To prevent inadvertent screen advancement by children, a touch-and-hold button will be implemented that will require a 1-second hold by the examiner to activate and advance the screen.*

Practice Trials:

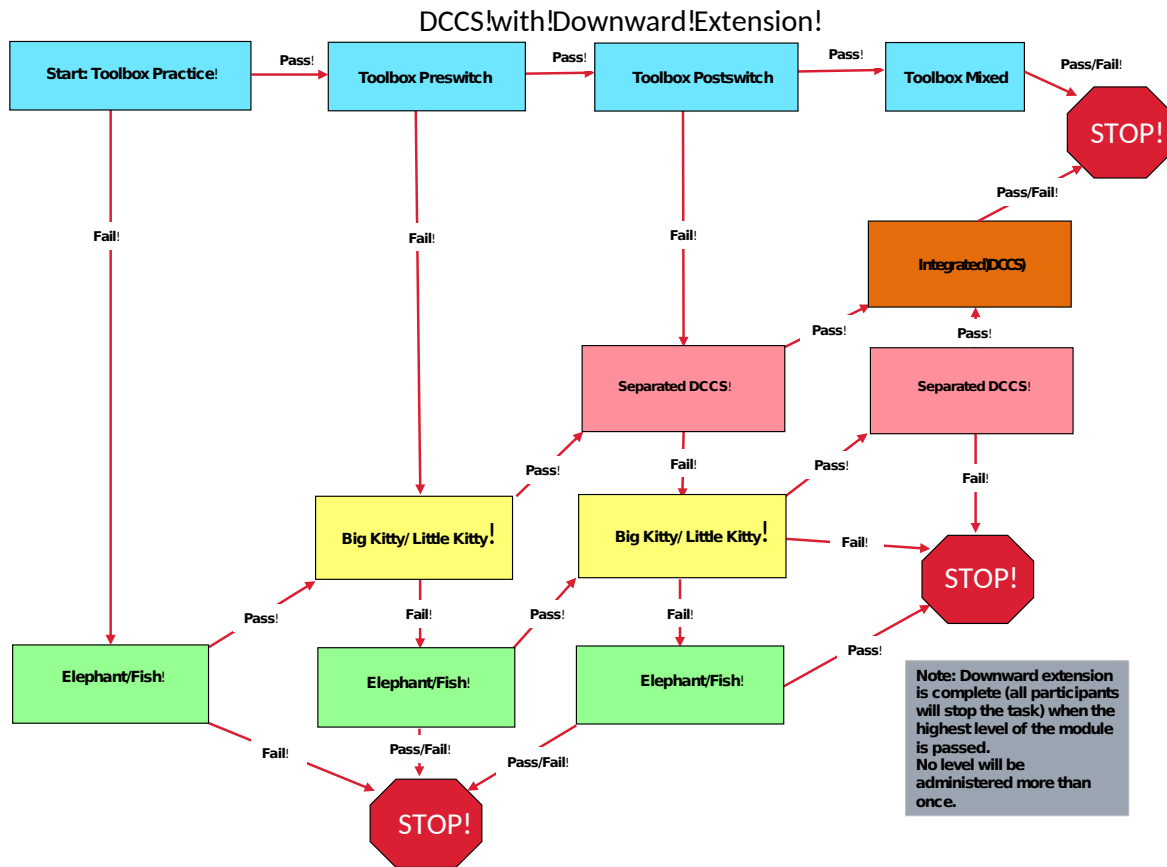
The participant is given four practice trials with each dimension. If the participant responds incorrectly, there is a prompt for him/her to choose the correct image. If the participant does not respond after 5 seconds, the examiner should prompt him/her to do so by saying, "**Choose one of the pictures.**"

The participant must get at least 3 out of 4 practice trials correct in order to advance to the test trials.

If the participant gets fewer than 3 out of 4 practice trials correct, he/she will complete a second set of 4 practice trials, with the same cutoff in order to advance to the test trials. If the participant does not meet the cutoff, the downward extension (Dext) part of the task will begin.

The Dext setup is illustrated below. The exact trial sequence of the Dext will depend upon which phases of the DCCS were failed. See the diagram below:

In the Elephant/Fish phase, pictures of Elephants and Fish must be matched with the target that matches the pictures on all dimensions. In the Big Kitty/Little Kitty phase, pictures of cats must be matched by size with either the “small” or the “large” cat target. In the Separated DCCS, color and shape dimensions are separately depicted (e.g., a black star on a pink background) for both the target and the sorting items. In the Integrated DCCS, both color and shape dimensions are integrated again, in a single item (e.g. a blue airplane), for both the target and the sorting items.



Test Trials:

The examiner should not prompt the participant to respond during the test trials. If the participant does not respond after 10 seconds, the program will automatically advance to the next test trial.

During the test trials, children first complete a set of 5 trials sorting according to color. If the participant succeeds in 4 of the 5 test trials, the program advances to a set of 5 trials sorting according to shape. If the participant does not get 4 out of 5 test trials correct, the program will enter the Big Kitty/Little Kitty phase of Dext, as demonstrated in the diagram above. If participants do meet criterion on the second test set (pass 4 out of 5 trials), they will then complete the mixed block, consisting of 30 shape/color trials.

This table outlines the item content of the practice and test items as well as the actions for the examiner:

Phase	Screen -- written content	Examiner Actions
Practice-Intro	We're going to play a matching game with colors and shapes.	Examiner touches the TOUCH-AND-HOLD button to advance to

Phase	Screen -- written content	Examiner Actions
		next screen
SHAPE intro	We'll play the SHAPE game first. In the SHAPE game, choose the picture that's the same SHAPE as the picture in the middle of the screen. If it's a BOAT, choose this picture.	Examiner points to BOAT and then demonstrates the use of the index finger on the arrow.
	If it is a RABBIT, choose that picture.	Examiner points to RABBIT and then demonstrates response device.
Transition	Now you try. Keep your eyes on the star in the middle of the screen. Remember: put your finger back on HOME BASE after you answer.	Examiner touches the TOUCH-AND-HOLD button to advance to next screen
Shape Practice	4 items sorted by shape	
More practice, if needed	Let's practice that some more. In the SHAPE game, choose the picture that's the same SHAPE as the picture in the middle of the screen. If it's a BOAT, choose this picture.	Chooses BOAT.
	If it's a RABBIT, choose that picture.	Chooses RABBIT.
Transition	Now you try. Keep your eyes on the star in the middle of the screen. Remember: put your finger back on HOME BASE after you answer.	Examiner touches the TOUCH-AND-HOLD button to advance to next screen.
Shape Practice again	4 items sorted by shape	
COLOR intro	We can also match by COLOR. In the COLOR game, choose the picture that's the same COLOR as the picture in the middle of the screen. If it's BROWN, choose this picture.	Examiner points to and then chooses BROWN picture.
	If it's WHITE, choose that picture.	Examiner points to and then chooses WHITE picture.
Transition	Now you try. Keep your eyes on the star in the middle of the screen. Remember: put your finger back on HOME BASE after you answer.	Examiner touches the TOUCH-AND-HOLD button to advance to next screen
Color Practice	4 items sorted by color	
More practice, if needed	Let's practice some more. In the COLOR game, choose the picture that is the same COLOR as the picture in the middle of the screen. If it's WHITE, choose this picture.	Chooses WHITE picture.
	If it's BROWN, choose that picture.	Chooses BROWN

Phase	Screen -- written content	Examiner Actions
		picture.
Transition	Now you try. Keep your eyes on the star in the middle of the screen. Remember: put your finger back on HOME BASE after you answer.	Examiner touches the TOUCH-AND-HOLD button to advance to next screen.
Color Practice again	4 items sorted by color	
Pre-switch intro	Now we are going to play with different shapes and colors. This time we'll use BALLS and TRUCKS that are YELLOW and BLUE.	Examiner touches the TOUCH-AND-HOLD button to advance to next screen.
	Let's start with the COLOR game. Remember the COLOR game? In the COLOR game, choose the picture that's the same COLOR as the picture in the middle of the screen. If it's a BLUE one, choose this picture.	Chooses BLUE picture.
	And if it's a YELLOW one, choose that picture.	Chooses YELLOW picture.
Transition	Now you try. Keep your eyes on the star in the middle of the screen. Remember: put your finger back on HOME BASE after you answer.	Examiner touches the TOUCH-AND-HOLD button to advance to next screen
Color items	5 items sorted by color (repeated with pre-switch intro if child does not get 4 of 5 correct)	
Post-switch	Now we're going to play the SHAPE game. Remember the SHAPE game? In the SHAPE game, choose the picture that's the same SHAPE as the picture in the middle of the screen. If it's a TRUCK, choose this picture.	Chooses TRUCK.
	And if it's a BALL, choose that picture.	Chooses BALL.
Transition	Now you try. Keep your eyes on the star in the middle of the screen. Remember: put your finger back on HOME BASE after you answer.	Examiner touches the TOUCH-AND-HOLD button to advance to next screen
Shape items	5 items sorted by shape (repeated with pre-switch intro if child does not get 4 of 5 correct)	
Intro Mixed Items	We can also play both games together. Remember, when you see or hear the word SHAPE, choose the picture that's the same SHAPE as the picture in the middle of the screen. If it's a TRUCK, choose this picture.	Chooses TRUCK.
	And if it's a BALL, choose that picture.	Chooses BALL.
	When you see or hear the word COLOR, choose the	Chooses BLUE picture.

Phase	Screen -- written content	Examiner Actions
	picture that's the same COLOR as the picture in the middle of the screen. If it's a BLUE one, choose this picture.	
	And if it's a YELLOW one, choose that picture.	Chooses YELLOW picture.
	Now you try. Keep your eyes on the star in the middle of the screen. Remember: put your finger back on HOME BASE after you answer.	Examiner touches the TOUCH-AND-HOLD button to advance to next screen.
Test items	30 mixed items	

Sample screenshot:

