DIMENSIONAL CHANGE CARD SORT (DCCS)

Description of the Instrument:

- In the standard version of the DCCS task, children are required to sort first according to one dimension (e.g., color) and then according to another dimension (e.g., shape). The advance version of the DCCS adds a third sorting dimension (e.g., border vs. non-border). The standard version of the task requires that the child shift their attention to a new dimension of the card between phases (pre- and post-switch); the advance phase however requires that children shift the dimensional focus repeatedly across phase (i.e., from card to card). The standard version has been conceptualized as the simplest possible test of task-switch (Rogers & Monsell, 1995).

Base Reference/Primary Citation:


Learning Related Cognitive Self-Regulation Measures
Instrument Documentation

Psychometric Information (sample, reliability, validity):
Note that the studies listed used the advance DCCS sort. Studies that only used the standard sort are not included

- **Hongwanishkul, et al., (2005):** Study consisted of 98 children from age 3.0 to 5.9 years. The study had two separate sessions, which occurred approximately 2 weeks apart. Six of the initial 106 children did not return for the second session, and 2 refused to play during both sessions. Children were divided into three age groups, with the final sample consisting of 33 children at 3 years (16 girls; M = 41.02), 32 at 4 years (16 girls, M= 54.06), and 33 at 5 years (16 girls, M= 66.13). No information about SES was provided. Graph illustration highest level of performance on the DCCS by age is presented below.

![Graph illustration highest level of performance on the DCCS by age](image)

- **Carlson (2005):** Children were primarily middle-class and European American. Children younger than 5 were only given the standard DCCS, children 5 & 6 were only given the advance DCCS. In the post-switch phase of the task she used five cards, two were compatible with the first sorting rule and 3 were incompatible with the first sorting rule. She used only the performance on the incompatible post-switch trials for scoring pass/fail (3/3 based on binomial theorem). She does not indicate passing criteria for the advance trails; however, it is noted that for the advance there were 20 trials. Four cards had what is equivalent to a border and 16 did not. She used only used the bordered cards in her analysis. Assuming the probability of passing at chance was less than .05; pass should have been 3 out of 4.

- **Low (2010) Study 2:** The study used the Zelazo (2006) 0 to 3 coding scheme; however, they treated the variable as continuous, so only means and standard deviation were provided (i.e., do not know the breakdown of the percentage of children who passed each phase of the task). The sample consisted of 18 3-year-olds (5 females, mean age = 3.6) and 18 4-year-olds (6 females, mean age = 4.4). No
information about SES was provided. There were significant differences between 3- and 4-year-olds on the task, $F(1, 34) = 12.71^{**}$, $\eta^2 = .27$.

- **Low (2010) Study 3:** The sample consisted of 21 3-year-olds (13 females, mean age = 3.4) and 21 4-year-olds (9 females, mean age = 4.5). No information about SES was provided. There were significant differences between 3- and 4-year-olds on the task, $F(1, 40) = 21.32^{**}$, $\eta^2 = .35$.

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<thead>
<tr>
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<tbody>
<tr>
<td>&lt;3.5</td>
<td>10% ($N=29$)</td>
<td>1.11 (0.76)</td>
<td>1.33 (0.86)</td>
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<td>(standard sort only)</td>
<td>(range = 0-3)</td>
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<td>&gt;3.5</td>
<td>25% ($N=79$)</td>
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<td>&lt;4.5</td>
<td>48% ($N=65$)</td>
<td>1.94 (0.64)</td>
<td>2.38 (0.60)</td>
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<td>(standard sort only)</td>
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<td>&gt;4.5</td>
<td>76% ($N=38$)</td>
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<td>5 - 6</td>
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DCCS MATERIALS

Boxes: Two black plastic recipe boxes with hole cut into the top. Boxes measure 6 ¾” in length, 4¾” in height, and 4½” in depth. Hole on top measures 5” by 2”. Velcro is put on the front and the back of the box in order to adhere target card to each side.

Integrated Model Cards for Boxes: Each card measures 3 7/8” by 4” and is laminated. Velcro on the back of the card in order to place card on the box. Two cards have a red truck on a white background and 2 cards have a blue star with a white background. Note that there is no border on these cards.
**Cards for Color Game:** For the color game there are 4 cards with a blue truck on a white background and 4 cards with a red star on a white background. Each card measures $3\frac{7}{8}\text{"}$ by 4" and is laminated. Note that there is no border on these cards. Markings are made on the back of each card indicating its order in presentation (Blue Truck = P1, C2, C3, C6 and Red Star = P2, C1, C4, C5).

**Cards for Shape Game:** For the shape game there are 3 cards with a blue truck on a white background and 3 cards with a red star on a white background (see images for color game). Each card measures $3\frac{7}{8}\text{"}$ by 4" and is laminated. Note that there is no border on these cards. Markings are made on the back of each card indicating its order in presentation (Blue Truck = S1, S3, S4 and Red Star = S2, S5, S6).

**Card for Advance Sort:** For the advance sort there are 4 cards with a blue truck on a white background with no border (see image for color game), 4 cards with a blue truck on a white background with a thick black border, 3 cards with a red star on a white background with no border (see image for color game), and 3 cards with a red star on a white background with a thick black border. Each card measures $3\frac{7}{8}\text{"}$ by 4" and is laminated. Markings are made on the back of each card indicating its order in presentation (Blue Truck w/o Border = P[actice]AS2, AS6, AS9, AS12; Blue Truck with Border = P.AS1, AS3, AS7, AS8; Red Star w/o Border = AS2, AS5, AS10; Red Star with Border = AS1, AS4, AS11).
Here’s a red truck and here’s a blue star. Now, we’re going to play a card game. This is the color game. In the color game all the blue ones go here (pointing to the box on the left) And all the red ones go here (pointing to the box on the right).

See, here’s a blue one. So it goes here (place it in box on the left). If it’s blue it goes here, but if it’s red it goes here (pointing to boxes to identify them).

See, here’s a red one. So it goes here (place it in box on the right). If it’s blue it goes here, but if it’s red it goes here (pointing to boxes to identify them).

Now it’s your turn. So remember, if it’s blue it goes here, but if it’s red it goes here (pointing to boxes).

**Rule Check**
Can you show me where the blue ones go in the color game?

*If Correct:* Very good, that’s right.
*If Incorrect:* Uh oh. Remember, in the color game, all the blue ones go here, and all the red ones go here. (Point to appropriate boxes. Repeat question and reminder 1 more time, only then mark as incorrect & move on.)

**Response:** Correct(1)  Incorrect(0)

Can you show me where the red ones go in the color game?

*If Correct:* Very good, that’s right.
*If Incorrect:* Uh oh. Remember, in the color game, all the blue ones go here, and all the red ones go here. (Point to appropriate boxes. Repeat question and reminder 1 more time, only then mark as incorrect & move on.)

**Response:** Correct(1)  Incorrect(0)

Let’s try this game
**Color Test Trials**

**On each trial, say:** If it is a blue one, then put it here, but if it is a red one, put it here.

- *If the child points to the box Assessor may sort the card for him/her. Do not say “okay” in response to sort. Say, “Let’s do another one,” “Let’s do it again,” etc.*
- Point to boxes by touching the top with a finger.
- Do not bring out the card until the rule statement is complete.
- *Once card has been presented, Assessor CANNOT repeat the rule.*
- State “Here’s a ___” while simultaneously presenting the card.
- *Hold the card above both boxes in the center (not over one box or the other).*

1. *(red star)* Here’s a red one.
   
   **Blue ___  Red ___**

2. *(blue truck)* Here’s a blue one.
   
   **Blue ___  Red ___**

3. *(blue truck)* Here’s a blue one.
   
   **Blue ___  Red ___**

4. *(red star)* Here’s a red one.
   
   **Blue ___  Red ___**

5. *(red star)* Here’s a red one.
   
   **Blue ___  Red ___**

6. *(blue truck)* Here’s a blue one.
   
   **Blue ___  Red ___**

************CONTINUE if child gets at least 5/6 correct.************
Now we’re going to play a new game. We’re not going to play the color game anymore (Shake head no). We’re going to play the shape game. In the shape game, all of the stars go here (pointing to box on the left) and all of the trucks go here (pointing to box on the right).

**Rule Check**
Can you show me where the stars go in the shape game?
*If Correct: Very good, that’s right.*
*If Incorrect: Uh oh. Remember, in the shape game, all the stars go here, and all the trucks go here.
(Point to appropriate boxes. Repeat question and reminder 1 more time, only then mark as incorrect & move on.)*

**Response:** Correct(1) Incorrect(0)

Can you show me where the trucks go in the shape game?
*If Correct: Very good, that’s right.*
*If Incorrect: Uh oh. Remember, in the shape game, all the stars go here, and all the trucks go here.
(Point to appropriate boxes. Repeat question and reminder 1 more time, only then mark as incorrect & move on.)*

**Response:** Correct(1) Incorrect(0)

Let’s try this game!
**Shape Test Trials**

**On each trial, say:** If it is a star, then put it here, but if it is a truck, put it here.

- If the child points to the box Assessor may sort the card for him/her. Do not say “okay” in response to sort. Say, “Let’s do another one,” “Let’s do it again,” etc.
- Point to boxes by touching the top with a finger.
- Do not bring out the card until the rule statement is complete.
- Once card has been presented, Experimenter CANNOT repeat the rule.
- State “Here’s a ___” while simultaneously presenting the card.
- Hold the card above both boxes in the center (not over one box or the other).

Shape Test Trials:

1. **(blue truck)** Here’s a truck.  
   Star _____  Truck _____
2. **(red star)** Here’s a star.  
   Star _____  Truck _____
3. **(blue truck)** Here’s a truck.  
   Star _____  Truck _____
4. **(blue truck)** Here’s a truck.  
   Star _____  Truck _____
5. **(red star)** Here’s a star.  
   Star _____  Truck _____
6. **(red star)** Here’s a star.  
   Star _____  Truck _____

*************CONTINUE if child gets at least 5/6 correct*************
Learning Related Cognitive Self-Regulation Measures
Instrument Documentation

Card Sort - Advanced

Note: NEVER START HERE- Only after integrated level.

Assessor is using the same target cards as in the integrated level.
Leave sorted cards in boxes.

Let’s try one more game with cards!
Say all of these rules very slowly and deliberately!
In this game, you sometimes get cards that have a black border around it just like this one (show a blue truck card with a border. Draw your finger around the border of the card). If you see cards with a black border, you have to play the color game. In the color game, blue ones go here and red ones go here (point to respective boxes). This one’s blue, so I’m going to put it right here (placing it down in the appropriate box).

But if the cards have no black border, like this one (show them a blue truck card without a border. Draw your finger around the outside of a card to show that there is no border.), you have to play the shape game. In the shape game, if it’s a star, we put it here, but if it’s a truck, we put it here (point to the respective boxes). This one’s a truck, so I’m going to put it right here (place it down in the appropriate box).

Rule Check (Assessor is not showing a card during these checks)
So what game do you play if there is a border? (color game).

If Correct: Very good, that’s right.

If Incorrect: Uh oh. Remember, if there’s a border, play the color game. If there is no border, play the shape game. (Repeat question and reminder 1 more time, only then mark as incorrect & move on.)

Response: Correct(1) Incorrect(0)

What game do you play if there is no border? (shape game).

If Correct: Very good, that’s right.

If Incorrect: Uh oh. Remember, if there’s a border, play the color game. If there is no border, play the shape game. (Repeat question and reminder 1 more time, only then mark as incorrect & move on.)

Response: Correct(1) Incorrect(0)

Let’s try this game!
Advanced Trials

On each trial, say: If there’s a border, play the color game. If there is no border, play the shape game.

- If the child points to the box Assessor may sort the card for him/her. Do not say “okay” in response to sort. Say, “Let’s do another one,” “Let’s do it again,” etc.
- Point to boxes by touching the top with a finger.
- Do not bring out the card until the rule statement is complete.
- Once card has been presented, Experimenter CANNOT repeat the rule.
- State “Here’s a ___” while simultaneously presenting the card.
- Hold the card above both boxes in the center (not over one box or the other).

1. (red star border) Here’s one with a border. Blue ___ Red ___
2. (red star) Here’s one without a border. Star ___ Truck ___
3. (blue truck border) Here’s one with a border. Blue ___ Red ___
4. (red star border) Here’s one with a border. Blue ___ Red ___
5. (red star) Here’s one without a border. Star ___ Truck ___
6. (blue truck) Here’s one without a border. Star ___ Truck ___
7. (blue truck border) Here’s one with a border. Blue ___ Red ___
8. (blue truck border) Here’s one with a border. Blue ___ Red ___
9. (blue truck) Here’s one without a border. Star ___ Truck ___
10. (red star) Here’s one without a border. Star ___ Truck ___
11. (red star border) Here’s one with a border. Blue ___ Red ___
12. (blue truck) Here’s one without a border. Star ___ Truck ___

“Great job!” Put away all boxes & cards. “Now we’re ready for a new game.”
DCCS Record Form

Color Game

Rule Check Color Game

Can you show me where the blue ones go in the color game?

<table>
<thead>
<tr>
<th>Circle Response:</th>
<th>1st attempt</th>
<th>2nd attempt (if 1st incorrect)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Correct (1)</td>
<td>Incorrect (0)</td>
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<td></td>
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</tr>
</tbody>
</table>

Color Test Trials:

1. *(red star)* Here’s a red one.  
   Blue ____  Red ____

2. *(blue truck)* Here’s a blue one.  
   Blue ____  Red ____

3. *(blue truck)* Here’s a blue one.  
   Blue ____  Red ____

4. *(red star)* Here’s a red one.  
   Blue ____  Red ____

5. *(red star)* Here’s a red one.  
   Blue ____  Red ____

6. *(blue truck)* Here’s a blue one.  
   Blue ____  Red ____

*****Continue if child gets at least 5/6 correct******

Total Color (0-6):______

Pass/Fail Color (0-1):______

(0 if < 5 correct, 1 if ≥ 5)
Shape Game

**Rule Check Shape Game**

Can you show me where the stars go in the shape game?

<table>
<thead>
<tr>
<th>1st attempt</th>
<th>2nd attempt (if 1st incorrect)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correct (1)</td>
<td>Incorrect (0)</td>
</tr>
<tr>
<td>Incorrect (0)</td>
<td>Correct (1)</td>
</tr>
</tbody>
</table>

Can you show me where the trucks go in the shape game?

<table>
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</thead>
<tbody>
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<td>Correct (1)</td>
<td>Incorrect (0)</td>
</tr>
<tr>
<td>Incorrect (0)</td>
<td>Correct (1)</td>
</tr>
</tbody>
</table>

**Shape Test Trials**

1. *(blue truck)* Here’s a truck.  
   Star ____ Truck ____

2. *(red star)* Here’s a star.  
   Star ____ Truck ____

3. *(blue truck)* Here’s a truck.  
   Star ____ Truck ____

4. *(blue truck)* Here’s a truck.  
   Star ____ Truck ____

5. *(red star)* Here’s a star.  
   Star ____ Truck ____

6. *(red star)* Here’s a star.  
   Star ____ Truck ____

******Continue if child gets at least 5/6 correct******

Total Shape (0-6): ____

Pass/Fail Shape (1-2): ____
   (1 if < 5 correct, 2 if ≥ 5)
**Advanced Sort**

**Rule Check**
So what game do you play if there is a border? *(color game).*

<table>
<thead>
<tr>
<th>1st attempt</th>
<th>2nd attempt (if 1st incorrect)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Response:</strong> Correct (1)</td>
<td>Incorrect (0)</td>
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<tr>
<td></td>
<td>Correct (1)</td>
</tr>
</tbody>
</table>

What game do you play if there is no border? *(shape game).*

<table>
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<tr>
<th>1st attempt</th>
<th>2nd attempt (if 1st incorrect)</th>
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<tbody>
<tr>
<td><strong>Response:</strong> Correct (1)</td>
<td>Incorrect (0)</td>
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<td></td>
<td>Correct (1)</td>
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</tbody>
</table>

2. *(red star border)* Here’s one with a border.       Blue ____  Red ____
3. *(red star)* Here’s one without a border.            Star ____  Truck ____
4. *(blue truck border)* Here’s one with a border.     Blue ____  Red ____
5. *(red star)* Here’s one without a border.            Star ____  Truck ____
6. *(blue truck)* Here’s one without a border.          Star ____  Truck ____
7. *(blue truck border)* Here’s one with a border.     Blue ____  Red ____
8. *(blue truck border)* Here’s one with a border.     Blue ____  Red ____
9. *(blue truck)* Here’s one without a border.          Star ____  Truck ____
10. *(red star)* Here’s one without a border.           Star ____  Truck ____
11. *(red star border)* Here’s one with a border.      Blue ____  Red ____
12. *(blue truck)* Here’s one without a border.         Star ____  Truck ____

Total Advanced (0-12):_______

Pass/Fail Advanced (2-3):_______
(2 if < 9 correct, 3 if ≥ 9)
DCCS SCORING

Each item is coded as follows:
0 = Incorrect sort
1 = Correct sort

Final Score: Zelazo’s (2006) pass/fail coding scheme
0 = did not pass color sort
   (Less than 5/6 items correct on color sort)

1 = pass of color sort, fail on shape sort
   (At least 5/6 items correct on color sort but less than 5/6 items correct on shape sort)

2 = pass shape sort, fail advance trials
   (At least 5/6 items correct on both color and shape sort but less than 9/12 items correct on advance/border sort)

3 = pass advance trails
   (At least 5/6 items correct on both color and shape sort and at least 9/12 items correct on advance/border sort)