

Dataset qc\_clock\_data2022\_cum.sas7 includes clock data collected between 06/09/2004 and 12/31/2022 from the NP group plus 187(66 from 2020,88 from 2021,33 from 2022) from the other group . When variable dpen=1 it means that variables from **Clock Drawing Test: Command Condition and Copy condition (exclude variable cl15\_02, cl15\_03, cc26\_02, cc26\_03)** were generated from the digital pen, when dpen=0, it means that all the variables were generated by hand scoring. We started using digital score method on 10/3/2011.

Variable intervalmin , intervalsec ("Command/Copy Latency" time in minutes/seconds), dpen\_command\_time, and dpen\_copy\_time are available only when dpen=1.

When "Time to completion" is available by both hand score and digital score, time by digital score should always be shorter than by hand score.

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paper_command_time=sum(cl15_02*60,cl15_03) when cl15_01=1;  
paper_copy_time=sum(cc26_02*60,cc26_03) when cc26_01=1;  
paper_command_time=. and dpen_command_time=. when cl15_01=0;  
paper_copy_time=. and dpen_copy_time=. when cc26_01=0;
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Clock Drawing Test: Command Condition				
<b>Outline</b> (Check here if no outer circle and skip to Numerals) <input type="checkbox"/>				
Longest radii	___ mm CL16_02	___ mm CL16_03		
Other radii	___ mm CL16_04	___ mm CL16_05		
Direction of longest diameter CL16_06	0 Horizontal	1 Vertical	2 Oblique	8 N/A
<b>Numerals</b> (Check here if no numeral array and skip to Center) <input type="checkbox"/>				
Medial deviation	#: ___ CL16_10B	___ mm CL16_10		
Anchor displacement	#: ___ CL16_11B	___·___ CL16_11		
Non-anchor displacement	#: ___ CL16_12B	___·___ CL16_12		
<b>Center</b> (Check here if no center and skip to next page) <input type="checkbox"/>				
Center (deviation of the origin of hands from center, template 3. If not deviated, enter 0 mm.)	___ mm CL15_1k	0 Left CL18_05	1 Center	2 Right
	___ mm CL15_2k	0 Down CL18_06	1 Center	2 Up
Instructions: Fold paper in half along the line. Present the other (blank) side to the participant. I'd like you to draw a clock, put in all the numbers, and set the hands to ten after eleven. <b>Remember to time drawing!</b>				
NP015				

**Clock Drawing Test: Command Condition** (*Examiner's Page*)

Check here if test NOT completed **CL15\_01**  
(record reason in *Factors Affecting Testing*  
section)



Top of Participant's Clock  
(circle one)



Time to completion: **CL15\_02** **CL15\_03**  
\_\_\_\_\_ : \_\_\_\_\_ (min:sec)

Outline formed by continuous line	<b>CL15_04</b>	0 No	1 <b>Yes</b>	8 N/A	9 Unknown		
Direction of motion in creating outline <b>CL15_05</b>	1 Clockwise	2 <b>Counterclockwise</b>	3 Mixed	8 N/A	9 Unknown		
Rotated paper while placing numerals/numeral substitutes	<b>CL15_06</b>	0 <b>No</b>	1 Yes	8 N/A	9 Unknown		
Anchor numerals or substitutes placed before any others	None <b>CL15_07</b>	12 position <b>CL15_08</b>	3 position <b>CL15_09</b>	6 position <b>CL15_10</b>	9 position <b>CL15_11</b>	8 N/A <b>CL15_12</b>	9 Unknown <b>CL15_12</b>
Attempt to self-correct significant error <b>CL15_13</b>	0 No	1 Yes, result correct	2 Yes, result NOT correct	8 <b>N/A</b>	9 Unknown		
Requested reminder of time for hand-setting	<b>CL15_14</b>	0 <b>No</b>	1 Yes	8 N/A	9 Unknown		

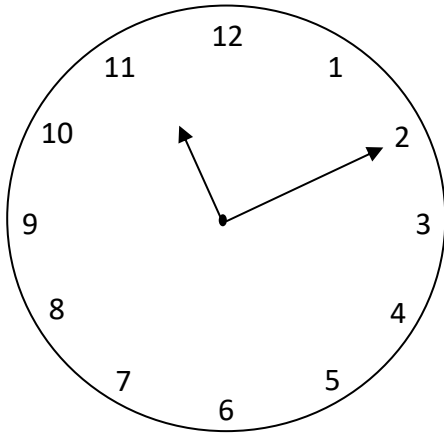
**Clock Drawing Test: Command Condition (continued)**

<b>Clock Outline</b>					
Clock outline is present <i>(If only numbers are used to make the circle, mark "no.")</i>	<b>CL16_01</b>	0 No	Leave rest of <u>Clock Outline</u> blank; go to <u>Numerals</u>	<b>1 Yes</b>	2 Outline is not a circle Leave rest of <u>Clock Outline</u> blank; go to <u>Numerals</u>
Clock outline is clearly irregular, angular, lumpy, or has indentations <i>Note: Elongation of circle (i.e. an oval) should NOT be coded here unless above characteristics are also displayed.</i>	<b>CL16_07</b>	<b>0 No</b>		1 Yes	8 N/A due to tremor
Clock outline perseveratively overdrawn <i>(more than two times around)</i>	<b>CL16_08</b>	0 No		<b>0 No</b>	1 Yes
Reduplication of clock outline <i>(do NOT include self-correction)</i>	<b>CL16_08B</b>	0 No		<b>0 No</b>	1 Yes
<b>Numerals</b>					
Numerals or numeral substitutes are: <i>(circle all that apply; I=yes)</i>	1 Absent Leave rest of <u>Numerals</u> blank; go to <u>Time Setting</u> <b>CL16_09</b>	1 No numerals present; only substitutes <b>CL16_09A</b>	1 Written Out <b>CL16_09B</b>	<b>1 Arabic CL16_09C</b>	1 Roman <b>CL16_09D</b>
Numbers/substitutes are placed <u>on or outside</u> the outline	<b>0 No</b>	1 Yes, at least one number/ substitute, but not all	2 Yes, all number/substitutes	8 N/A	9 Unknown
Dots, words, symbols, or other marks substituted for one or more numerals	<b>CL17_01</b>	<b>0 No</b>	1 Yes	8 N/A	9 Unknown
Two 12's are present	<b>CL17_02</b>	<b>0 No</b>	1 Yes	8 N/A	9 Unknown
Duplication of number(s) other than 12	<b>CL17_03</b>	<b>0 No</b>	1 Yes	8 N/A	9 Unknown
Omission of number(s)	<b>CL17_04</b>	<b>0 No</b>	1 Yes	8 N/A	9 Unknown
Numerals (or substitutes) beyond 12 are present	<b>CL17_05</b>	<b>0 No</b>	1 Yes	8 N/A	9 Unknown
Sequencing error(s) present <i>NOTE: This does NOT include counter-clockwise order, omission of number(s), or duplication of number(s).</i>	<b>CL17_06</b>	<b>0 No</b>	1 Yes	8 N/A	9 Unknown
NP017					

**Clock Drawing Test: Command Condition** *(continued)*

**Time Setting**

Is one hand correctly pointing to “11” AND the 11 is approximately in the correct location? <b>CL17_07</b>					0 No	<b>1</b> Yes	8 N/A
<i>(If yes, go to <u>One hand correctly represents “ten after.”</u>)</i>							
<i>If no, is the “11” location OR numeral “11” (not in correct location) targeted correctly in some manner? (See Scoring Manual for examples.)</i> <b>CL17_08</b>					0 No	1 Yes	
Is one hand correctly pointing to “2” AND the 2 is approximately in the correct location? <b>CL17_09</b>					0 No	<b>1</b> Yes	8 N/A
<i>(If yes, go to <u>Number of hands.</u>)</i>							
<i>If no, is the “2” location OR numeral “2” (not in correct location) targeted correctly in some manner? (See Scoring Manual for examples.)</i> <b>CL17_10</b>					0 No	1 Yes	
One straight line is drawn connecting two numerals <b>CL17_11</b>	#: <b>CL17_12_</b> #: <b>CL17_13_</b>		<b>0</b> No	1 Yes			
<i>(If yes, record the target numbers.)</i>							
Number of hands <b>CL18_01</b>	0 None	1 One	<b>2</b> Two	3 Three	4 Four or more		
One hand incorrectly points to the 10 <b>CL18_02</b>			<b>0</b> No	1 Yes			
Length of hour versus minute hands <b>CL18_03</b>		0 Minute hand shorter	1 Equal	<b>2</b> Hour hand shorter	8 N/A		
Two hands are present AND they essentially meet (i.e., there is a “center”) <b>CL18_04</b>			0 No	<b>1</b> Yes			
<b>Other Observations</b>							
Extraneous marks in clock <b>CL18_07</b>					<b>0</b> No	1 Yes	
<i>(e.g., bisecting, criss-crossing, or radiating line(s); tick marks NOT used as number place marks; etc.)</i>							
Other observations <i>(please describe below):</i> <b>CL18_08</b>					<b>0</b> No	1 Yes	
<i>(e.g., are in counterclockwise order; neglect of an area; human hands drawn; blatant difference in size of numerals; etc.)</i>							
<b>Tester’s clinical assessment of clock drawing</b> <b>CL18_09</b>							
<b>0</b> Normal	1 Mild impairment	2 Moderate impairment	3 Severe impairment	4 Cannot determine			
Describe Other Observations: <b>CL18_10</b>							
_____							
_____							



	Odd ID number		Even ID number	
Cohort (0)	AT	<b>back-to-back clocks</b>	AT	<b>split clocks</b>
Offspring (1)	both: JG first	<b>back-to-back clocks</b>	both: AT first	<b>split clocks</b>
Gen 3 (3)	JG only	<b>back-to-back clocks</b>	AT only	<b>split clocks</b>

Clock Drawing Test: Copy Condition				
<b>Outline</b> (Check here if no outer circle and skip to Numerals) <input type="checkbox"/>				
Longest radii	___ mm CC27_02	___ mm CC27_03		
Other radii	___ mm CC27_04	___ mm CC27_05		
Direction of longest diameter CC27_06	0 Horizontal	1 Vertical	2 Oblique	8 N/A
<b>Numerals</b> (Check here if no numeral array and skip to Center) <input type="checkbox"/>				
Medial deviation	#: ___ CC27_11	___ mm CC27_12		
Anchor displacement	#: ___ CC27_13	___ . ___ CC27_14		
Non-anchor displacement	#: ___ CC27_15	___ . ___ CC27_16		
<b>Center</b> (Check here if no center and skip to next page) <input type="checkbox"/>				
Center (deviation of the origin of hands from center, template 3. If not deviated, enter 0 mm.)	___ mm CC26_1k	0 Left CC29_05	1 Center	2 Right
	___ mm CC26_2k	0 Down CC29_06	1 Center	2 Up
Instructions:  Fold paper in half along the line. Present the other (blank) side to the participant.  Please copy this clock.  <b>Remember to time drawing!</b>				
NP026				

**Clock Drawing Test: Copy Condition** (*Examiner's Page*)

Check here if test NOT completed **CC26\_01**  
(record reason in *Factors Affecting Testing* section)



Top of Participant's Clock  
(circle one)

Top  
↓ ↑  
Top

**Time to completion:** **CC26\_02** : **CC26\_03**

<b>Outline formed by continuous line</b> <b>CC26_04</b>	0 No	1 Yes	8 N/A	9 Unknown			
<b>Direction of motion in creating outline</b> <b>CC26_05</b>	1 Clockwise	2 Counterclockwise	3 Mixed	8 N/A	9 Unknown		
<b>Rotated paper while placing numerals/numeral substitutes</b> <b>CC26_06</b>	0 No	1 Yes	8 N/A	9 Unknown			
<b>Anchor numerals or substitutes placed before any others</b>	None <b>CC26_07</b>	12 position <b>CC26_08</b>	3 position <b>CC26_09</b>	6 position <b>CC26_10</b>	9 position <b>CC26_11</b>	8 N/A	9 Unknown <b>CC26_12</b>
<b>Attempt to self-correct significant error</b> <b>CC26_13</b>	0 No	1 Yes, result correct	2 Yes, result NOT correct	8 N/A	9 Unknown		

**Clock Drawing Test: Copy Condition (continued)**

<b>Clock Outline</b>					
Clock outline is present <b>CC27_01</b> <i>(If only numbers are used to make the circle, mark "no.")</i>	0 No	1 Yes	2	Outline is not a circle Leave rest of <u>Clock Outline</u> blank; go to <u>Numerals</u>	
Clock outline is clearly irregular, angular, lumpy, or has indentations <b>CC27_07</b> <i>Note: Elongation of circle (i.e. an oval) should NOT be coded here unless above characteristics are also displayed.</i>	0 No	1 Yes	8	N/A due to tremor	
Clock outline perseveratively overdrawn <b>CC27_08</b> <i>(more than two times around)</i>	0 No	1 Yes	1	Yes	
Reduplication of clock outline <b>CC27_09</b> <i>(do NOT include self-correction)</i>	0 No	1 Yes	1	Yes	
<b>Numerals</b>					
Numerals or numeral substitutes are: <i>(circle all that apply; 1=yes)</i>	1 Absent Leave rest of <u>Numerals</u> blank; go to <u>Time Setting</u> <b>CC27_10</b>	1 No numerals present; only substitutes <b>CC27_10A</b>	1 Written Out <b>CC27_10B</b>	1 <b>Arabic</b> <b>CC27_10C</b>	1 Roman <b>CC27_10D</b>
Numbers/substitutes are placed <u>on or outside</u> the outline <b>CC27_17</b>	0 No	1 Yes, at least one number/substitute, but not all	2 Yes, all number/substitutes	8 N/A	9 Unknown
Dots, words, symbols, or other marks substituted for one or more numerals <b>CC28_01</b>	0 No	1 Yes	8 N/A	9 Unknown	
Two 12's are present <b>CC28_02</b>	0 No	1 Yes	8 N/A	9 Unknown	
Duplication of number(s) other than 12 <b>CC28_03</b>	0 No	1 Yes	8 N/A	9 Unknown	
Omission of number(s) <b>CC28_04</b>	0 No	1 Yes	8 N/A	9 Unknown	
Numerals (or substitutes) beyond 12 are present <b>CC28_05</b>	0 No	1 Yes	8 N/A	9 Unknown	
Sequencing error(s) present <i>NOTE: This does NOT include <u>counter-clockwise</u> order, <u>omission of number(s)</u>, or <u>duplication of number(s)</u>.</i> <b>CC28_06</b>	0 No	1 Yes	8 N/A	9 Unknown	



**Clock Drawing Test: Copy Condition** *(continued)*

**Time Setting**

Is one hand correctly pointing to “11” AND the 11 is approximately in the correct location? <i>(If yes, go to <b>One hand correctly represents “ten after.”</b>) CC28_07</i>		0 No	<b>1</b> <b>Yes</b>	8 N/A
<i>If no</i> , is the “11” location OR numeral “11” (not in correct location) targeted correctly in some manner? <i>(See Scoring Manual for examples.)</i> CC28_08		0 No	1 Yes	
Is one hand correctly pointing to “2” AND the 2 is approximately in the correct location? <i>(If yes, go to <b>Number of hands.</b>)</i> CC28_09		0 No	<b>1</b> <b>Yes</b>	8 N/A
<i>If no</i> , is the “2” location OR numeral “2” (not in correct location) targeted correctly in some manner? <i>(See Scoring Manual for examples.)</i> CC28_10		0 No	1 Yes	
One straight line is drawn connecting two numerals <i>(If yes, record the target numbers.)</i> CC28_11	#: ____ CC28_12	#: ____ CC28_13	<b>0</b> <b>No</b>	1 Yes
Number of hands CC29_01	0 None	1 One	<b>2</b> <b>Two</b>	3 Three 4 Four or more
One hand incorrectly points to the 10 CC29_02			<b>0</b> <b>No</b>	1 Yes
Length of hour versus minute hands CC29_03		0 Minute hand shorter	1 Equal	<b>2</b> <b>Hour hand shorter</b> 8 N/A
Two hands are present AND they essentially meet (i.e., there is a “center”) CC29_04			0 No	<b>1</b> <b>Yes</b>
<b>Other Observations</b>				
Extraneous marks in clock CC29_07 <i>(e.g., bisecting, criss-crossing, or radiating line(s); tick marks NOT used as number place marks; etc.)</i>			<b>0</b> <b>No</b>	1 Yes
Other observations <i>(please describe below):</i> CC29_08 <i>(e.g., are in counterclockwise order; neglect of an area; human hands drawn; blatant difference in size of numerals; etc.)</i>			<b>0</b> <b>No</b>	1 Yes
<b>Tester’s clinical assessment of clock drawing</b> CC29_09				
<b>0</b> <b>Normal</b>	1 Mild impairment	2 Moderate impairment	3 Severe impairment	4 Cannot determine
Describe Other Observations: CC29_10 _____ _____				
NP029				

<b>Clock Drawing Test: Pre-drawn (Number Placement)</b>					Check here if test NOT completed <b>CDT41_01</b> (record reason in <i>Factors Affecting Testing</i> section)				
<b>Real Time Observations</b>									
Participant rotated paper while inserting numerals/numeral substitutes <b>CDT41_02</b>					0=No		1=Yes	8=N/A	
Anchor numerals or substitutes placed before any others (circle "1" for all that apply; see scoring manual for details)			None <b>CDT41_03</b>	12 position <b>CDT41_04</b>	3 position <b>CDT41_05</b>	6 position <b>CDT41_06</b>	9 position <b>CDT41_07</b>	8 = N/A <b>CDT41_08</b>	9 = unknown
<b>Numerals (If there are no numerals or numeral substitutes present, leave this section blank and skip ahead to "Time Setting")</b>									
Measurement of the most medially deviated number (**use templates) <b>CDT41_09</b> (if no deviation enter 0) NUMBER MEASURED, OR CLOCK LOCATION IF DUPLICATE NUMBER _____					_____ mm <b>CDT41_10</b>				
Displacement of <b>anchor</b> (i.e., 12-3-6-9) numerals/numeral substitutes from correct hour position (**use templates) If no displacement write "0.0" ANCHOR MEASURED: _____ <b>CDT41_11</b>					Number of 30 minute increments: ____ . __ <b>CDT41_12</b>				
Displacement of <b>non-anchor</b> numerals/numeral substitutes from correct hour position (**use templates) If no displacement write "0.0" NON-ANCHOR MEASURED: _____ <b>CDT41_13</b>					Number of 30 minute increments: ____ . __ <b>CDT41_14</b>				
Numerals/substitutes are placed <u>on or outside</u> the outline <b>CDT41_15</b>			0 no	1 yes, at least one number/substitute, but not all		2 yes, all numbers/substitutes		8 n/a	9 unknown
Dots, words, symbols, or other marks <i>substituted</i> for one or more numerals <b>CDT41_16</b>					0 = No	1 = Yes	8 = n/a	9=unknown n	
Two 12's are present <b>CDT41_17</b>					0 = No	1 = Yes	8 = n/a	9=unknown n	
Duplication of number(s) ( <i>other than 12</i> ) <b>CDT41_18</b>					0 = No	1 = Yes	8 = n/a	9=unknown n	
Omission of number(s) <b>CDT41_19</b>					0 = No	1 = Yes	8 = n/a	9=unknown n	
Sequencing error(s) present ( <i>Note: This does NOT include counter-clockwise order (i.e., 1 in 11 position; 2 in 10 position, etc.), omission of number(s), or duplication of numbers(s).</i> ) <b>CDT41_20</b>					0 = No	1 = Yes	8 = n/a	9=unknown n	
<b>Other Observations</b>									
Other observations: (please describe below) ( <i>e.g., numbers in counterclockwise order &lt;i.e., "1" in 11 position, "2" in 10 position&gt;; human hands drawn; smiley face; blatant difference in size of numerals; etc.</i> ) <b>CDT41_21</b>							No 0	Yes 1	
<b>Tester's clinical assessment of clock drawing CDT41_22</b>									
0 Normal		1 Mild impairment		2 Moderate impairment		3 Severe impairment		4 Cannot Determine	
Describe Other Observations: <b>CDT41_23</b> _____									
NP041									

Clock Drawing Test: Pre-drawn (Time Setting)			Check here if test NOT completed <b>CDT42_01</b> (record reason in <i>Factors Affecting Testing</i> section)		
<b>Time Setting</b>					
Is one hand correctly pointing to "7"? <b>CDT42_02</b> <i>(If yes, go to One hand correctly points to "4.")</i>			0 No	1 Yes	8 N/A
<i>If no</i> , is the "7" targeted correctly in some manner? <i>(See Scoring Manual for examples.)</i> <b>CDT42_03</b>			0 No	1 Yes	
Is one hand correctly pointing to "4"? <b>CDT42_04</b> <i>(If yes, go to Number of hands.)</i>			0 No	1 Yes	8 N/A
<i>If no</i> , is the "4" targeted correctly in some manner? <i>(See Scoring Manual for examples.)</i> <b>CDT42_05</b>			0 No	1 Yes	
One straight line is drawn connecting two numerals <i>(If yes, record the target numbers.)</i> <b>CDT42_05b</b>		#: ____ <b>CDT42_05c</b>	#: ____ <b>CDT42_05d</b>	0 No	1 Yes
Number of hands <b>CDT42_06</b> <i>(If NONE, leave rest of "Time Setting" blank; go to "Other Observations")</i>		0 None	1 One	2 Two	3 Three
Length of hour versus minute hands <b>CDT42_07</b>		0 Minute hand shorter	1 Equal	2 Hour hand shorter	4 Four or more
Two hands are present AND they essentially meet (i.e., there is a "center") <b>CDT42_08</b> <i>(If "no" go to Other Observations"; leave skipped items blank.)</i>			0 No	1 Yes	
On the horizontal axis, the point of intersection of the hands is: <i>deviation of the origin of hands from center, template 3, if not deviated enter 0 mm</i>		<b>CDT42_09</b> _____ mm	0 Left	1 Center <b>CDT42_10</b>	2 Right
On the vertical axis, the point of intersection of the hands is: <i>deviation of the origin of hands from center, template 3, if not deviated enter 0 mm</i>		<b>CDT42_11</b> _____ mm	0 Down	1 Center <b>CDT42_12</b>	2 Up
<b>Other Observations</b>					
Extraneous marks in clock <b>CDT42_13</b> <i>(e.g., bisecting, criss-crossing, or radiating line(s); tick marks NOT used as number place marks; etc.)</i>			0 No	1 Yes	
Other observations <i>(please describe below):</i> <b>CDT42_14</b> <i>(e.g., are in counterclockwise order; neglect of an area; human hands drawn; blatant difference in size of numerals; etc.)</i>			0 No	1 Yes	
<b>Tester's clinical assessment of clock drawing</b> <b>CDT42_15</b>					
0 Normal	1 Mild impairment	2 Moderate impairment	3 Severe impairment	4 Cannot determine	
Describe Other Observations: <b>CDT42_16</b> _____ _____					
NP042					