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Neuropsychological tests in ADHD disorder: d2 and Stroop

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Aim of the session

- To get in touch with two very commonly used neuropsychological tests (d2 and Stroop), that can be very useful to assess children with ADHD/ADD. We will conduct the administration, scoring and clinical interpretation of scores on both tests.

- Culturally inappropriate!!!! Only academic purposes
  - Western stimuli (letters, reading…)

- In the next session you will be presented with a clinical case of ADHD with these two tests administered

Structure of the session

- DSM-5 Diagnostic criteria of ADHD and subtypes
- Why use neuropsychological tests?
- Basic neuropsychological characteristics of ADHD
- D2 Test of Attention
- Classical Stroop
- D-KEFS Color-Word Interference Test

Diagnostic Criteria DSM-5

- **CRITERION A1. Inattention:** Six (or more) of the following symptoms have persisted for at least 6 months to a degree that is inconsistent with developmental level and that negatively impacts directly on social and academic/occupational activities:

a. Often fails to give close attention to details or makes careless mistakes in schoolwork, at work, or during other activities (e.g., overlooks or misses details, work is inaccurate).

b. Often has difficulty sustaining attention in tasks or play activities (e.g., has difficulty remaining focused during lectures, conversations, or lengthy reading).

c. Often does not seem to listen when spoken to directly (e.g., mind seems elsewhere, even in the absence of any obvious distraction).

d. Often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace (e.g., starts tasks but quickly loses focus and is easily sidetracked).

e. Often has difficulty organizing tasks and activities (e.g., difficulty managing sequential tasks; difficulty keeping materials and belongings in order; messy, disorganized work; has poor time management; fails to meet deadlines).

f. Often avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort (e.g., schoolwork or homework; for older adolescents and adults, preparing reports, completing forms, reviewing lengthy papers).

g. Often loses things necessary for tasks or activities (e.g., school materials, pencils, books, tools, wallets, keys, paperwork, eyeglasses, mobile telephones).

h. Is often easily distracted by extraneous stimuli (for older adolescents and adults, may include unrelated thoughts).

i. Is often forgetful in daily activities (e.g., doing chores, running errands; for older adolescents and adults, returning calls, paying bills, keeping appointments).

- **CRITERION A2. Hyperactivity and impulsivity**: Six (or more) of the following symptoms have persisted for at least 6 months to a degree that is inconsistent with developmental level and that negatively impacts directly on social and academic/occupational activities:

a. Often fidgets with or taps hands or feet or squirms in seat.

b. Often leaves seat in situations when remaining seated is expected (e.g., leaves his or her place in the classroom, in the office or other workplace, or in other situations that require remaining in place).

c. Often runs about or climbs in situations where it is inappropriate. (Note: In adolescents or adults, may be limited to feeling restless.)

d. Often unable to play or engage in leisure activities quietly.

e. Is often "on the go," acting as if "driven by a motor" (e.g., is unable to be or uncomfortable being still for extended time, as in restaurants, meetings; may be experienced by others as being restless or difficult to keep up with).

f. Often talks excessively.

g. Often blurts out an answer before a question has been completed (e.g., completes people's sentences; cannot wait for turn in conversation).

h. Often has difficulty waiting his or her turn (e.g., while waiting in line).

i. Often interrupts or intrudes on others (e.g., butts into conversations, games, or activities; may start using other people's things without asking or receiving permission; for adolescents and adults, may intrude into or take over what others are doing).

Types

- **Combined presentation:** If both Criterion A1 (inattention) and Criterion A2 (hyperactivity-impulsivity) are met for the past 6 months.
- **Predominantly inattentive presentation:** If Criterion A1 (inattention) is met but Criterion A2 (hyperactivity-impulsivity) is not met for the past 6 months.
- **Predominantly hyperactive/impulsive presentation:** If Criterion A2 (hyperactivity-impulsivity) is met and Criterion A1 (inattention) is not met for the past 6 months.

Diagnosis: Why use neuropsychological tests?

- Clinical interview with child and parents/teachers
- Specific ADHD scales
  - Conners' Rating Scales – Revised; CRS-R; (Conners, 1997)

- Why neuropsychological assessment?
  - Discover afected and unafected cognitive processes (characterize the person)
  - Design a more appropiate intervention/treatment
  - Measure changes (after medication, developmental changes)

Basic neuropsychological characteristics of ADHD

- Innatention
  - Sustained attention or concentration (maintain attention on a task for a long period of time)* (combined subtype)
  - Selective attention (response capacity when appropriate or relevant stimulus are presented)* (inattentive subtype)
- Impulsivity (executive functioning or cognitive control)
  - Inhibitory control or resistance to interference (hyperactive/impulsivity subtype)*
  - Cognitive flexibility*
  - Executive control (delay of gratification, planning, self-regulation…)
  - Working memory
  - Decision-making
  - …

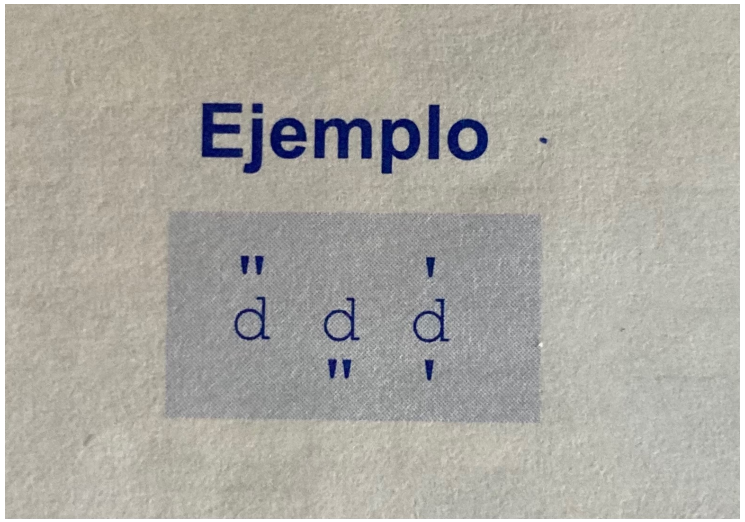
d2 Test of attention

General description

- Author: Rolf Brickenkamp (1962)
- Application: individual and group
- Administration ages: 8 to 88 years
- Administration time: 8-10 minutes
- It is a cancelation test that measures selective and sustained attention

Instructions

This test tries to know your ability to concentrate on a given task. On this page you are presented with an example and training line to familiarize you with the task.

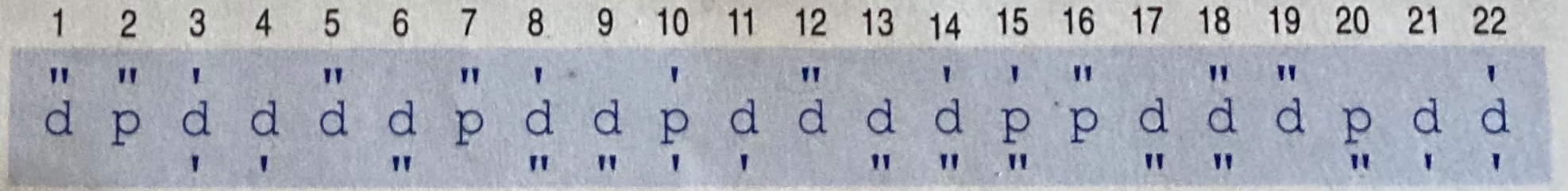


Notice the three lowercase letters in the example. It is the letter **d** accompanied by two small dashes. The first **d** has the two small dashes on top, the second has them underneath, and the third **d** has one small dash above and one below. Note that in these cases the letter **d** is accompanied by two small dashes.

Your task will be to find the letters **d** equal to those three (with two small dashes) and mark them with a line (/). Take a good look, because there are letters **d** with more than two or less than two small dashes and letters **p** that you should NOT mark in any case, regardless of the number of small dashes they have. If you make a mistake and want to change an answer, you must cross the line with another, forming a cross (X), so that it is noticed that you want to correct your mistake.

You only have to mark the letters **d** with two small dashes. Practice on the training line at the bottom of this page.

Línea de entrenamiento



Notice that each letter has a number on it. Then check that you have marked the letters with the numbers 1, 3, 5, 6, 9, 12, 13, 17, 19 and 22.

At the turn of the page (WAIT, DO NOT RETURN IT YET) you will find 14 lines similar to the practice line, which you just did. Again, your task will be to mark the letters **d** with two small dashes. You will start on line # 1 and when the examiner says CHANGE!, you will go to work on line # 2 and when the examiner says CHANGE! you will begin the next line of the test, and so on. Check that no lines are skipped.

Work as quickly as you can without making mistakes. Keep working until the examiner says STOP!; at that time you should stop immediately and turn this page over.

WAIT. DO NOT TURN THE PAGE UNTIL INSTRUCTED BY THE EXAMINER

Correction

- In every row:

1. In column TR, write down the number of the last letter marked
2. Add the number of marks inside a white box and enter the total in column TA
3. Add the number of unmarked white rectangles before the last letter indicated and enter them in the O column
4. Add the number of the marks outside the white rectangles and enter them in column C
5. Add each column and enter the total in the hatched boxes at the bottom of each column
6. With the data obtained, apply the formulas to obtain the TOT, CON and VAR scores

(En cada fila):

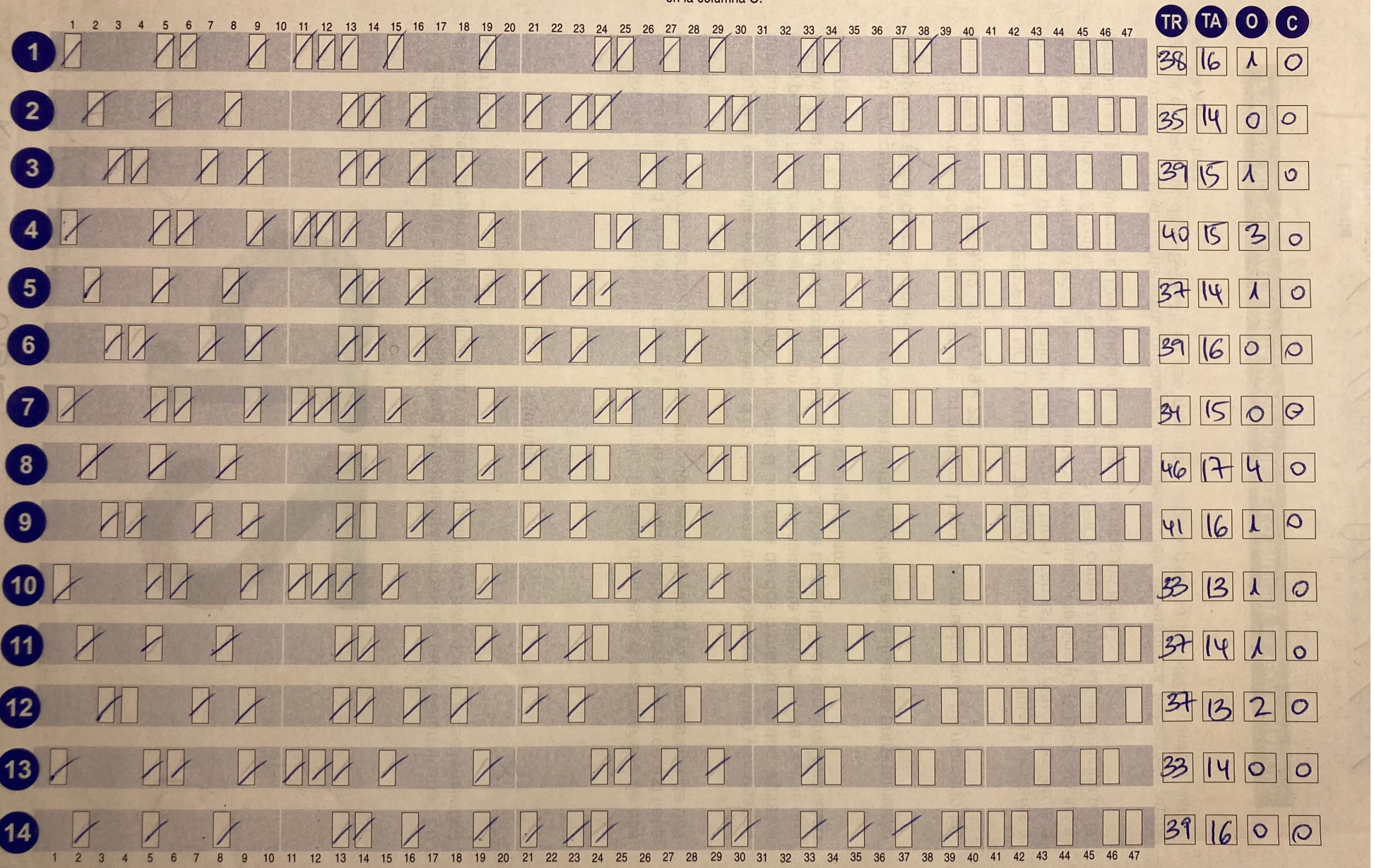
de la última letra marcada.

de un rectángulo blanco y anote el total en la columna TA.

blancos no marcados antes de la última letra señalada y anótelos en la columna O.

están fuera de los rectángulos blancos y anótelos en la columna C.

5. Sume cada columna y anote el total en los recuadros tramados en la base de cada columna.



TOT = TR − (O + C) 528 = 528 − (15 + 0) CON = TA − C 208 = 208 − 0 VAR = (TR+) − (TR−) 13 = 46 − 33

Pc 80 Pc 75 Pc 45 80 95 Pc

6. Con los datos obtenidos, aplique las fórmulas para obtener las puntuaciones TOT, CON y VAR.

528 208 (15 + 0) = 1

Pc 80 75 40 70 Pc

Spanish norms

APÉNDICE A

En este Apéndice se incluyen las siguientes tablas de baremos y estadísticos:

A.1. Baremos en varones y mujeres de 8 a 10 años (N=127)

A.2. Baremos en varones y mujeres de 11 a 12 años (N=115)

A.3. Baremos en varones y mujeres de 13 a 14 años (N=214)

A.4. Baremos en varones y mujeres de 15 a 16 años (N=157)

A.5. Baremos en varones y mujeres de 17 a 18 años (N=105)

A.6. Baremos en varones y mujeres de 19 a 23 años (N=343)

A.7. Baremos en varones y mujeres de 24 a 29 años (N=142)

A.8. Baremos en varones y mujeres de 30 a 39 años (N=136)

A.9. Baremos en varones y mujeres de 40 a 88 años (N=112)

A.10. Baremos en niños y adolescentes, varones y mujeres, de 8 a 18 años (N=718)

A.11. Baremos en adultos, varones y mujeres, de 19 a 88 años (N=733)

A.12. Baremos en adultos, varones y mujeres, aplicación colectiva (N=1.248)

A.13. Estadísticos básicos de cada sexo en las variables del d2

A.11. Baremos en adultos, varones y mujeres, de 19 a 88 años (N=733)

Pc	Puntuaciones directas									
	TR	TA	O	C	TOT	CON	TR+	TR-	VAR	S
99	624-658	270-299	0		609-658	269-299		34-47	37-47	97
98	606-623	260-269	-		594-608	260-268		-	33-36	91
97	601-605	255-259	1		585-593	255-259		-	29-32	87
96	596-600	250-254	-		578-584	250-254		-	27-28	85
95	578-595	238-249	2		561-577	238-249		33	24-26	83
90	560-577	224-237	3		536-560	223-237	47	30-32	21-23	76
85	538-559	216-223	-		520-535	216-222	-	-	19-20	71
80	525-537	210-215	4		507-519	209-215	46	29	18	67
75	515-524	203-209	5-6		499-506	202-208	44-45	28	17	63
70	504-514	197-202	7	0	486-498	196-201	43	27	16	60
65	490-503	190-196	8	-	471-485	189-195	42	-	15	58
60	473-489	184-189	9	-	456-470	184-188	41	25-26	-	55
55	463-472	180-183	10	-	448-455	179-183	-	-	14	52
50	454-462	174-179	11-12	-	437-447	173-178	40	24	-	50
45	444-453	168-173	13	-	420-436	167-172	39	23	13	48
40	429-443	163-167	14-15	-	411-419	162-166	38	21-22	-	45
35	416-428	157-162	16	1	396-410	156-161	37	19-20	12	42
30	398-415	152-156	17-18	-	385-395	151-155	35-36	-	11	40
25	385-397	146-151	19-20	-	368-384	144-150	34	15-18	10	37
20	370-384	138-145	21-26	2	346-367	135-143	33	13-14	-	33
15	340-369	128-137	27-33	3	322-345	121-134	31-32	8-12	9	29
10	294-339	107-127	34-43	4	283-321	100-120	29-30	0-7	-	24
5	261-293	91-106	44-54	5-8	241-282	78-99	25-28		8	17
4	239-260	83-90	55-60	9-13	211-240	74-77	24		-	15
3	208-238	70-82	61-64	14-17	196-210	61-73	23		7	12
2	174-207	47-69	65-78	18-27	145-195	39-60	20-22		6	9
1	0-173	0-46	>78	>27	0-144	0-38	0-19		0-5	3
Media	449,62	174,85	16,70	2,20	430,71	172,64	38,68	24,10	14,57	Media
Dt	98,53	46,08	18,57	7,95	99,75	48,30	6,96	8,10	6,13	Dt

Interpretation (Brickenkamp and Zillmer, 1998)

- TR: Reliable measure with a normal distribution of attention (selective and sustained), of processing speed, of the amount of work done and of motivation.
- TA: Measure of processing precision.
- O: Attentional control measure, compliance with a rule, the precision of the visual search and the quality of the performance.
- C: Related to inhibitory control, rule compliance, visual search precision, thoroughness and cognitive flexibility.

- TOT: Total amount of work. Measures processing precision and inhibitory control. Most used variable.
- CON: Concentration. It provides a balanced index between speed and precision in performance.
- VAR: Variability of fluctuations in attention. It is not normally distributed and is one of the least reliable measurements of the test. Evaluates the stability and consistency over time of the subject's performance.

Other measures (not typified)

- % ERR (ERR/TR)= Represents the ratio between the errors made and the number of items processed. The lower the ratio, the greater the precision of the subjects, the quality of the work and its thoroughness. Untypified variable.
- Error distribution (ED): Mean of errors in the last 4 trials (rows 10-14) - Mean of errors in the first 4 trials (rows 1-4). Indicates the improvement or deterioration throughout the task.
- Omission syndrome (SO): It is characterized by an extremely high score in TR, together with a high percentage of errors made (% ERR), especially in errors of omission. This score has not been typified and does not appear in the scales.

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The d2 Test of Attention: Construct validity and extensions in scoring techniques

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Table 1. Abbreviations, descriptions, and calculation of d2 Test measures

In text abbreviations	Standard abbreviations[1]	Description of measures	Computation
TOT #	TN	Total number of characters processed[2]	Sum of number of characters processed before the final cancellation on each trial
O ERR	O	Errors of omission[2]	Sum of number of target symbols not cancelled
C ERR	C	Errors of commission[2]	Sum of number of nontarget symbols cancelled
TOT ERR	E	Total errors[2]	Sum of all errors of omission and commission
% ERR	E %	Percent of errors[2]	Total number of errors divided by the total number of characters processed
TOT CORR	TN-E	Total correctly processed[2,3]	Total characters processed minus total errors made
CONC	CP	Concentration performance[2,3]	Total number of correctly cancelled minus total number incorrectly cancelled
FLUCT	FR	Fluctuation rate (in speed of processing)[2]	Maximum total items processed in a trial minus minimum total items processed in a trial
ERR DIST	ED	Error distribution[2]	Average errors for last 4 trials minus average errors for first 4 trials
ACCEL		Acceleration[4] (increases in speed)	Intraindividual correlation between trial number and speed (Z transformed)
DETER		Deterioration[4] (increases in errors)	Intraindividual correlation between trial number and errors (Z transformed)
STRAT		Strategy index[4]	The total number of characters processed and the percent of omission errors (O ERR/TOT #) were standardized (z scores) and summed. High score = fast with many errors; Low score = slow with few errors

[1]Abbreviations designated in the d2 Manual (Brickenkamp & Zillmer, 1998).
[2]Existing measures examined in convergent and discriminant validity analyses.
[3]Compared for accuracy in determining overall level of performance.
[4]New measures examined in convergent and discriminant validity analyses.

Calculation

- Acceleration (intraindividual):
  - (TR row 14 - Individual mean TR in the 14 rows) / Standard deviation TR in the 14 rows
- Deterioration (intraindividual):
  - (E row 14 - Individual mean E in the 14 rows) / Standard deviation E in the 14 rows
- Strategy:
  - Z TR + Z O

Interpretation (Bates & Lemay, 2004)

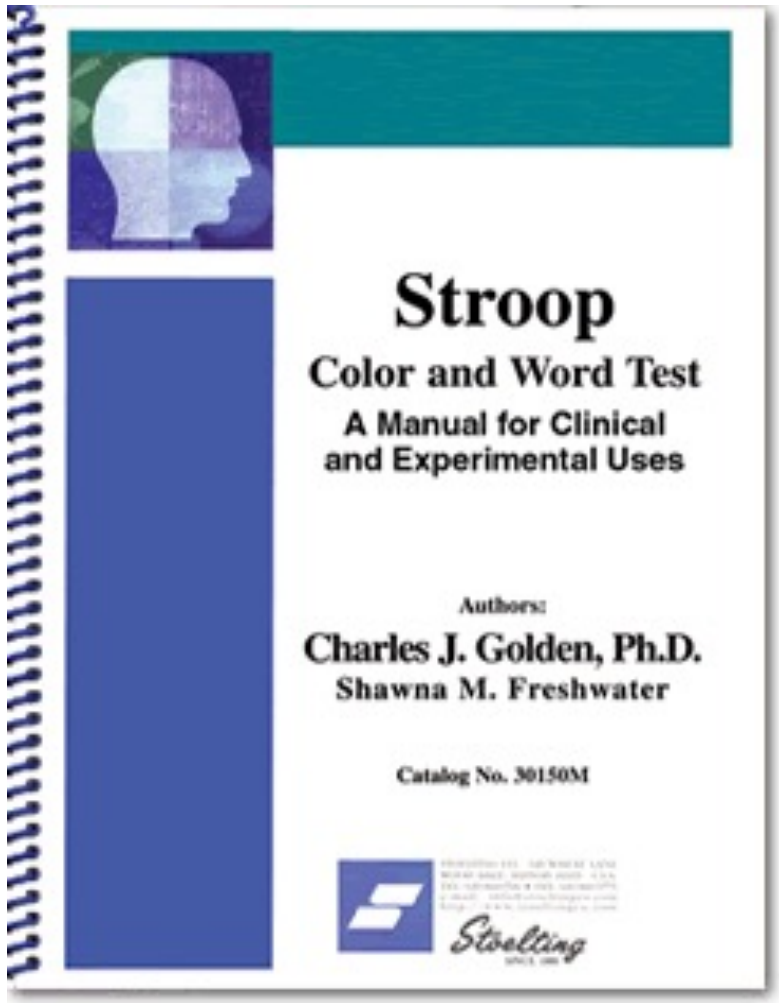
- **Strategy index (STRAT)**: High values = Jump strategy (Works fast with many errors). Low values = Cautious strategy (Work slowly with few errors)
- **Deterioration (D)**: measure changes in precision over time. 0 = No change. Negative = Decrease in errors. Positive = Increase in errors
- **Acceleration (AC)**: measure changes in speed over time. 0 = No change. Negative = Slowdown. Positive = Acceleration
  - **Error reduction (negative deterioration) + Speed increase (positive acceleration)** = Suggest learning
  - **Increase in errors (positive deterioration) + Decrease in speed (negative acceleration)**= Indicates increasing fatigue or inability to maintain attention

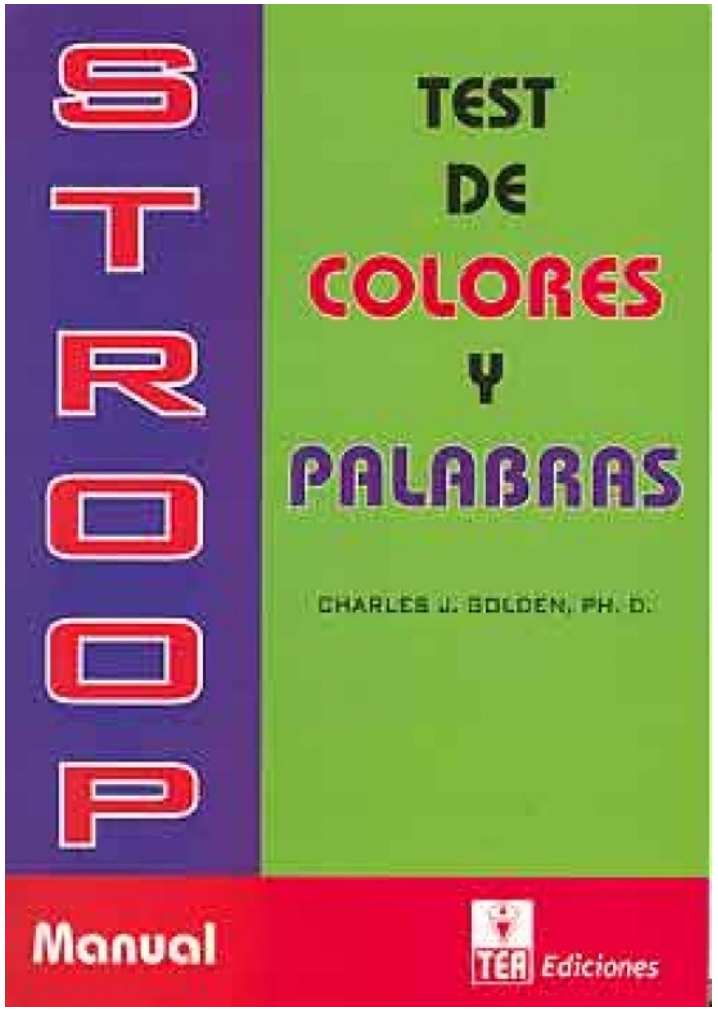
- Selective attention: total errors (E), omissions (O) and percentage of error (% ERR)
- Sustained attention: distribution of errors (ED), acceleration (AC) and deterioration (D)

d2 and ADHD

- The **inattentive subtype ADHD** will show problems with selective attention -errors in attention to the selection of the correct stimulus- (high scores in omission errors, low TA, low CON), as well as slower processing speed (low TR and TOT).
- In the case of **ADHD with the impulsive-hyperactive subtype**, there is a deficit in sustained attention (inability to maintain attention for long periods of time). In this case, the subjects would commit high scores in comission errors, as well as increase in errors (positive deterioration) and decrease in speed (negative acceleration) over time.
- In the case of the **combined subtype**, the results would show high error scores of both omission (absence of response) and commission errors, affecting both selective and sustained attention.
- High VAR (variability or fluctuation of attention) in all subtypes.

Classical Stroop: Stroop Color-Word Test





Introduction

- The classical Stroop (Stroop, 1935; Golden, 1978; Trenerry et al., 1989) measures inhibition, that is a primary executive function consisting of the capacity to inhibit an automatic response in order to generate a different response.
- Specifically, the Stroop requires the inhibition of an overlearned automatic response (reading) in order to generate a conflicting response of naming the dissonant ink colors
- Conditions:
  - Reading of words that denote colors
  - Naming of color
  - Interference task

ROJO	AZUL	VERDE	ROJO	AZUL
VERDE	VERDE	ROJO	AZUL	VERDE
AZUL	ROJO	AZUL	VERDE	ROJO
VERDE	AZUL	ROJO	ROJO	AZUL
ROJO	ROJO	VERDE	AZUL	VERDE
AZUL	VERDE	AZUL	VERDE	ROJO
ROJO	AZUL	VERDE	AZUL	VERDE
AZUL	VERDE	ROJO	VERDE	ROJO
VERDE	ROJO	AZUL	ROJO	AZUL
AZUL	VERDE	VERDE	AZUL	VERDE
VERDE	ROJO	AZUL	ROJO	ROJO
ROJO	AZUL	ROJO	VERDE	AZUL
VERDE	ROJO	AZUL	ROJO	VERDE
AZUL	AZUL	ROJO	VERDE	ROJO
ROJO	VERDE	VERDE	AZUL	AZUL
AZUL	AZUL	ROJO	VERDE	ROJO
ROJO	VERDE	AZUL	ROJO	VERDE
VERDE	ROJO	VERDE	AZUL	AZUL
ROJO	AZUL	ROJO	VERDE	ROJO
VERDE	ROJO	VERDE	AZUL	VERDE

XXXX	XXXX	XXXX	XXXX	XXXX
XXXX	XXXX	XXXX	XXXX	XXXX
XXXX	XXXX	XXXX	XXXX	XXXX
XXXX	XXXX	XXXX	XXXX	XXXX
XXXX	XXXX	XXXX	XXXX	XXXX
XXXX	XXXX	XXXX	XXXX	XXXX
XXXX	XXXX	XXXX	XXXX	XXXX
XXXX	XXXX	XXXX	XXXX	XXXX
XXXX	XXXX	XXXX	XXXX	XXXX
XXXX	XXXX	XXXX	XXXX	XXXX
XXXX	XXXX	XXXX	XXXX	XXXX
XXXX	XXXX	XXXX	XXXX	XXXX
XXXX	XXXX	XXXX	XXXX	XXXX
XXXX	XXXX	XXXX	XXXX	XXXX
XXXX	XXXX	XXXX	XXXX	XXXX
XXXX	XXXX	XXXX	XXXX	XXXX
XXXX	XXXX	XXXX	XXXX	XXXX
XXXX	XXXX	XXXX	XXXX	XXXX
XXXX	XXXX	XXXX	XXXX	XXXX
XXXX	XXXX	XXXX	XXXX	XXXX

ROJO	AZUL	VERDE	ROJO	AZUL
VERDE	VERDE	ROJO	AZUL	VERDE
AZUL	ROJO	AZUL	VERDE	ROJO
VERDE	AZUL	ROJO	ROJO	AZUL
ROJO	ROJO	VERDE	AZUL	VERDE
AZUL	VERDE	AZUL	VERDE	ROJO
ROJO	AZUL	VERDE	AZUL	VERDE
AZUL	VERDE	ROJO	VERDE	ROJO
VERDE	ROJO	AZUL	ROJO	AZUL
AZUL	VERDE	VERDE	AZUL	VERDE
VERDE	ROJO	AZUL	ROJO	ROJO
ROJO	AZUL	ROJO	VERDE	AZUL
VERDE	ROJO	AZUL	ROJO	VERDE
AZUL	AZUL	ROJO	VERDE	ROJO
ROJO	VERDE	VERDE	AZUL	AZUL
AZUL	AZUL	ROJO	VERDE	ROJO
ROJO	VERDE	AZUL	ROJO	VERDE
VERDE	ROJO	VERDE	AZUL	AZUL
ROJO	AZUL	ROJO	VERDE	ROJO
VERDE	ROJO	VERDE	AZUL	VERDE

Delis-Kaplan Executive Function System (D-KEFS) Color-Word Test

General description

- Two baseline conditions that measure key component skills of the higher-level tasks:
  - Naming of color patches (Condition 1)
  - Reading of color-words printed in black ink (Condition 2)
- Two higher-level tasks:
  - Condition 3: Inhibit reading the words in order to name the dissonant ink color in which those words are printed.
  - Condition 4: Requires to switch back and forth between naming dissonant ink colors and reading the conflicting words (cognitive flexibility).
- Administration ages: 8-89

Recording

- Completion time in seconds
- Uncorrected errors (writing the first letter of the incorrect color name below the correct response)
- Self-corrections (drawing a slash (/) through the fist letter of the word)
- Nonsense words (e.g. “grue” “bleen”), write the nonsense word below the target word

Interpretation

- The **COMPLETION-TIME SCORE** for each condition provides a global measure of performance on that task. The contrast measures allow to assess the degree to which deficient performance on the higher-level tasks (conditions 3 and 4) might be accounted for by impairments in one or more fundamental cognitive skills.
- **CONDITION 1**: Measures **speed of naming**.
  - Average to above-average scores indicate fluency in the ability to name high-frecuency words.
  - Low scores on this baseline cognitive task could reflect
    - a word-finding impairment,
    - a developmental verbal learning disability,
    - limited exposure to the English language,
    - or other factors that may affect speed of mental processing.
  - When a relatively low score on this condition, the examiner should analyze the contrast scores in order to determine whether or not the examinee's performances on Conditions 3 and 4 can be accounted for by his or her deficient performance on Condition 1.

- **<u>CONDITION 2</u>**: Measures **speed of reading**.
  - Low scores on this baseline cognitive task could reflect dyslexia, an acquired reading impariment, a generalized language problem, limited exposure to written English language, or other factors that might affect speed of mental processing.
  - People with low scores on Condition 2 might obtain low scores on Condition 4 because half the items require a reading response. Thus, condition 4 should be interpreted vis-à-vis performance on Condition 2.
  - Examinees who exhibit slow reading on Condition 2 due to impaired reading but an adequate score on Condition 1 due to intact naming will achieve average to above-average scores on Condition 3 (Inhibition), because the impaired reading skills lessen the interference effect of the conflicting printed words and thus allow the examinee to name the ink colors with less cognitive distraction.

- **<u>CONDITION 3</u>**: The time to complete this condition reflects the ability to inhibit the more salien, automatic task of reading words in order to name the dissonant ink colors quickly.
  - An adequate score on Condition 1 (reflecting normal naming speed) but a poor score on Condition 3 is often related to an executive-function **deficit in verbal inhibition**.
  - Equivalent levels of impairment on Conditions 1 and 3 suggest that the examinee does not have a deficit in verbal inhibition over and above his or her deficiency in naming speed.
  - If an individual's performance is impaired on Condition 1 and significantly more impaired on Condition 3, then he or she may have deficits in both naming speed and verbal inhibition.

- **<u>CONDITION 4</u>**: Requires adequate naming speed, reading speed, verbal inhibition, and cognitive flexibility.
  - If an individual performs adequately on Conditions 1, 2 and 3 (reflecting normal naming speed, reading speed, and verbal inhibition, respectively) but falters on Condition 4, then his or her executive function deficit may be in **cognitive flexibility**.
  - A mild deficit in performance on Condition 3 coupled with a more severe deficit in performance on Condition 4 suggest impairments in both verbal inhibition and cognitive flexibility.

- **ERROR ANALYSIS**
  - Helpful for determining the severity of an examinees's impaired performance on the test. High completion times with few to no errors indicates less impairment than both high completion times and high number of errors
  - Self-correct errors demonstrates the cognitive capacity to monitor and modify his or her behavior in order to produce correct responses
  - Markedly slow completion times and elevated number of uncorrected errors tend to have signiticant impairments in the cognitive domains tapped by that test
  - **Impulsivity**: Usually average to above-average time but an elevated error rate (they can work quickly but often at the expense of not being able to inhibit incorrect responses).
  - Similar types and number of errors on a higher-level condition (3 or 4) as on baseline condition (1 or 2) is likely related to the problem of the fundamental cognitive task (i.e., high uncorrected errors on Condition 1 and on Condition 3, both likely related to a naming impairment –not inhibition problem). In contrast, errors in conditions 3 or 4 but not on the baseline conditions, relate to a deficit in verbal inhibition and/or cognitive flexibility.

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NEURODEVELOPMENT CARE for Refugees

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