

# DIFFERENTIATING MALINGERERS AND PATIENTS WITH CONVERSION DISORDER USING A COMPUTERIZED NEUROCOGNITIVE ASSESSMENT BATTERY

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## ABSTRACT

**Background:** There are many effective clinical strategies and neuropsychological tests to distinguish between patients with genuine medical disorders and patients whose problems are somatoform or malingering. Differentiating between people who are malingering a neurological or psychiatric condition and patients with conversion disorders (CD) is another matter entirely. Methods for distinguishing between the two conditions are not well-developed, and the distinction represents a formidable challenge.

There are clinical presentations that necessarily raise doubts; signs and symptoms that are "non-physiological" in nature, and psychological tests that perform like service. These will successfully identify patients with conversion disorder or malingering, but do not clearly distinguish the two. "Forced-choice" tests, however, like the TOMM and the CARB can identify patients who are willfully exaggerating their responses, because their performance falls below chance levels. Not all malingers, however, fail for that play.

In a sense, trying to diagnose malingering is no less than a category error: Conversion disorder is a medical diagnosis, arrived at through the process of differential diagnosis and meeting the test of "the preponderance of the evidence." But malingering is fraud, and by definition, a criminal act. The appropriate test that must be met for malingering, therefore, is "beyond a reasonable doubt." One doesn't "diagnose" malingering, any more than one can "diagnose" mail fraud or check-kiting. The best that a clinician can do, in the event, is to say: the patient's presentation is not consistent with any known medical (or psychiatric) disorder, or even with conversion, but is most consistent with the presentation of people who are known to be malingering." Our data suggest that a comprehensive computerized neuropsychological test battery can assist in supporting such a contention.

**Method:** The clinical database at the NC Neuropsychiatry Clinics includes more than 10,000 patients with various neurological and psychiatric conditions. As part of their routine evaluation, every patient is administered the CNS Vital Signs computerized battery. This self-administered battery includes tests of verbal and visual memory, shifting attention, finger tapping, symbol digit coding, continuous performance and the Stroop test.

**Subjects:** From the clinical database, 83 patients were identified either as malingers (MAL, N=37) or as patients with conversion disorders (CD, N=46). Together, we refer to them as group C\_M. Their performance on the CNS Vital Signs battery was compared and contrasted to the performance of age-matched normal controls (NML), patients with depression (DEP) and patients who had moderate-to-severe traumatic brain injuries (TBI). Every attempt was made to match the four groups for race, gender, education and level of computer familiarity, but the match was not entirely successful. Therefore, the variables were controlled in the statistical analyses.

The diagnoses were affirmed by two clinicians at the time of evaluation, and reviewed by a third, independent clinician. The assessment of likely malingering was carefully reviewed, and was usually affirmed by external data (e.g., video surveillance, long-term follow-up).

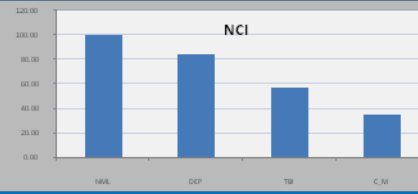
	NML	DEP	TBI	C_M	CONV	MAL
N	83	83	83	83	46	37
AGE	44.25	43.90	43.94	44.78	44.74	44.64
EDUCATION	15.29	14.29	13.57	13.83	13.84	13.81
COMPUTER FAMILIARITY	2.67	2.45	2.31	1.97	2.03	1.88
MALES	53	57	58	58	25	33
FEMALES	29	26	25	25	21	4
ASIANS	0	0	0	2	1	1
AFRICAN AMERICANS	13	13	17	3	3	14
HISPANICS	6	3	2	2	2	0
NON-WHITES	19	15	15	22	7	15
WHITES	64	68	68	61	39	22

	NML	DEP	TBI	C_M	F	Sig.
PSYCHOMOTOR SPEED	101.39	88.83	61.51	35.35	17.52	2.19328E-15
NCI	100.32	83.76	56.80	34.95	13.27	2.80661E-12
MEMORY	97.28	90.85	73.56	44.83	9.36	4.78392E-09
COGNITIVE FLEXIBILITY	101.82	80.34	55.59	43.27	8.39	3.52112E-08
REACTION TIME	100.02	95.87	70.27	63.87	6.29	3.30817E-06
REACTION TIME VARIABILITY	101.28	94.43	80.71	58.20	6.41	2.53247E-06
COMPLEX ATTENTION	100.52	66.57	23.32	-12.42	6.69	1.37645E-06

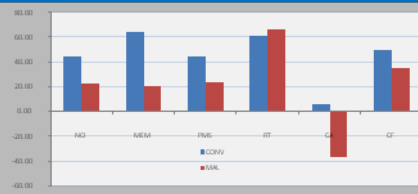
Reaction time variability (RTV) is a new measure that summarized the variability in reaction time scores on the finger tapping test, the Stroop test, shifting attention and continuous performance. RTV is generated as a summary score, and is also generated for individual tests. RTV proves to be an interesting variable when normals are compared to the C\_M group in the ROC analysis.

**Results:** 1. Group C\_M compared to the other three groups: The only demographic statistics that differentiated the groups were found in Group C\_M, where there were proportionately more males ( $\chi^2$  11.8) and more non-whites ( $\chi^2$  7.89).

The C\_M group performed much worse than normals and patients with depression or brain injury in all of the tests and sub-tests. This is captured by the Neurocognition Index (NCI), a summary score derived from the domain scores for memory, psychomotor speed, reaction time, complex attention and cognitive flexibility. The NCI is reported as a standard score, with a mean of 100 and a standard deviation of 15.



The NCI is calculated from 5 domains: memory, psychomotor speed, reaction time, complex attention and cognitive flexibility.



Areas under the ROC curve, indicating the specificity and sensitivity of different variables, comparing Ss in the normal group to those in group C\_M: measures of psychomotor speed, cognitive flexibility, memory and reaction manifest the greatest differences between the C\_M group and the other three groups, and are the most sensitive and specific in differentiating the C\_M group from normals.

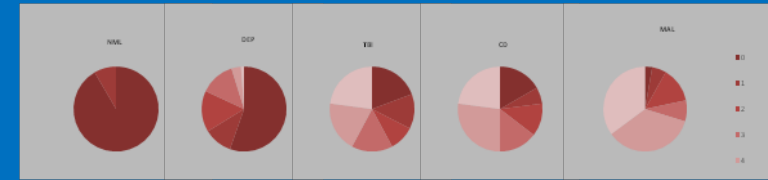
Area Under the Curve	Area
PSYCHOMOTOR SPEED	0.993
NCI	0.957
FTT LEFT RT	0.944
COGNITIVE FLEXIBILITY	0.918
FTT RIGHT RT	0.913
MEMORY	0.889
STROOP CHOICE RT	0.874
COMPLEX ATTENTION	0.862
REACTION TIME	0.858
FTT LEFT RTV	0.846
STROOP SIMPLE RT	0.843
STROOP CHOICE RTV	0.837
STROOP RT	0.819
VISUAL MEMORY RT	0.819
STROOP RTV	0.816
CPT RTV	0.811
VERBAL MEMORY RT	0.771
FTT RIGHT RTV	0.768
SAT RT	0.762

Area Under the Curve	Area
NCI	0.989
MEMORY	0.988
PSYCHOMOTOR SPEED	0.988
STROOP SIMPLE RT	0.988
STROOP SIMPLE RTV	0.986
FTT RIGHT RTV	0.985
STROOP CHOICE RTV	0.977
STROOP CHOICE RT	0.971
COGNITIVE FLEXIBILITY	0.970
COMPLEX ATTENTION	0.957
STROOP RT	0.840
GPT RTV	0.621
STROOP RT	0.778
REACTION TIME	0.761
CPT RT	0.759

Area Under the Curve	Area
FTT RIGHT RTV	0.894
FTT LEFT RTV	0.880
STROOP SIMPLE RT	0.861
STROOP SIMPLE RTV	0.856
MEMORY	0.839
STROOP CHOICE RTV	0.773
STROOP CHOICE RT	0.760

RTV is an interesting parameter. Discriminant function analysis indicates that 91.7% of the CD patients and malingers are correctly classified on the basis of RTV

A way to visualize the differences among the groups is to present the number of domain scores (out of 5 domains) that are less than 70, that is, two standard deviations below the age-controlled population mean. A domain score less than 70 is clear indication of cognitive impairment. There were 37 malingers in this sample. Only one fellow scored above 70 in all 5 domains. 34/37 scores below seventy in two or more domains, and 26/37 (70%) were <70 in four or five domains. 11/46 (24%) were <70 in all 5 domains. Among the 46 conversion disorder patients, 8 scored above 70 in all the domains, 35/46 were below seventy in two or more domains, and 24/46 (52%) were <70 in four or five domains. 13/37 (35%) were <70 in all five domains.



	CONV	MAL	F	Sig.
MEMORY	79.89	57.23	2.98	0.0866
COMPLEX ATTENTION	6.11	-36.77	1.56	0.2680
COGNITIVE FLEXIBILITY	49.83	34.68	0.80	0.3734
REACTION TIME VARIABILITY	68.19	42.81	0.78	0.6835
REACTION TIME	61.59	66.78	0.50	0.7724
NCI	44.95	22.63	0.40	0.8379
PSYCHOMOTOR SPEED	44.80	23.53	0.18	0.9644

When malingers are compared to CD patients, they are lower in every domain except reaction time, but there is a great deal of variance in the performance of both groups, and the F scores are not significant.

## A FORCED CHOICE PARADIGM LIKE THE TOMM

On the verbal and memory tests, total correct score less than 60 indicates performance lower than chance levels. None of the normals, none of the patients with depression, brain injury or CD scored less than 60 on the memory composite score. Sixteen of 37 malingers (43%) scored less than 60, and were clearly exaggerating their performance in a willful way.

**CONCLUSION:** When conventional neuropsychological tests are coupled with reaction time measures, including RTV, one may be able to differentiate between patients who are only pretending to be disabled from patients with somatoform disorders. Computerized testing will indicate that CD patients perform worse than patients who have had brain injuries, and that malingers will perform even worse. Measures of memory, psychomotor speed and RTV are especially important variables to consider. However, no one can suggest that cognitive testing can "diagnose" malingering. At some future point, we may develop a formula to increase one's confidence that a subject is malingering, but even 91.7% falls short of "beyond a reasonable doubt."

However, computerized tests can generate forced choice paradigms similar to conventional neuropsychological tests, and yielding similar results; such tests are, beyond a reasonable doubt, indicative of willful exaggeration.

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