

DIFFERENTIATING
REAL FROM **APHYSIOLOGIC**
BALANCE CONTROL
USING
COMPUTERIZED DYNAMIC POSTUROGRAPHY

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**WORKER'S
COMPENSATION**

RETURN-TO-WORK DECISIONS

CASE MANAGEMENT

**MEDICAL-LEGAL
DETERMINATION**

DISABILITY DETERMINATION

PATIENT ADVOCACY

Art Mallinson and Dr. Neil Longridge have been working together and actively engaged in clinical research for 27 years in the Neuro-otology Unit at Vancouver General Hospital, Vancouver, in the province of British Columbia. Included in their patient population are medical legal referrals. These patients may be referred by attorneys, the Worker's Compensation Board, long term disability carriers or the Insurance Corporation of British Columbia, and as many of them have atypical or nontraditional complaints of dizziness or imbalance, it is important to validate and legitimize their complaints.

As a result, Mallinson and Longridge saw the need to develop a methodology for detecting and documenting aphysiologic performance, or 'malingering', in this diverse clinical population. Drawing upon the existing literature, they developed their approach using Computerized Dynamic Posturography (CDP) as a measure of the effective use of vestibular, visual, and somatosensory cues in postural control.

By comparing the objective CDP findings to the clinical picture based on the presence/absence of pathology and the patient's functional status and symptomatic complaints, they constructed a confidence scale to determine whether a patient's posturography performance is genuine, or if there are some aspects of the patient's performance that are aphysiologic, or suggestive of an element of embellishment.

INTRODUCTION

Since Hamid, et al.¹ (1991) first described the “aphysiologic sway” pattern in Computerized Dynamic Posturography (CDP), multiple studies²⁻⁹ have focused on defining a set of criteria to best identify an “aphysiologic” CDP data set. The most recent set developed by Mallinson and Longridge³ is based on an extensive review of their patient population, including medical legal and Workers Compensation Board (WCB) cases with complaints of dizziness and/or imbalance after head injuries and/or whiplash type injuries. They combined the existing criteria for aphysiologic data with their own clinical experience to formulate a list of nine criteria (see Table 1) for identifying aphysiologic results and/or symptom embellishment during CDP assessment.

In their original paper, the sensitivity and specificity of these nine criteria were demonstrated by comparing a large group of work injured patients (109) against a group of 61 tertiary referral patients. In the group of 61 patients, all had been referred with complaints of non-traumatic dizziness thought to be of balance system origin. None of the 61 were involved with work related claims, medical legal proceedings or long term disability issues. All patients underwent a full workup, including a dizziness questionnaire,

<h2>APHYSIOLOGIC CRITERIA</h2>
Sensory Organization Test (SOT) Comprehensive Report
<ul style="list-style-type: none">1. High inter-trial variability seen throughout SOT assessment.2. Conditions 1 and 2 markedly below normal.3. Better performance on Conditions 1 and 2 when patient is unaware that performance is being recorded.4. Conditions 5 and 6 relatively better than Conditions 1 and 2.
SOT COG X-Y PLOT
<ul style="list-style-type: none">5. Circular sway (i.e. lateral and antero-posterior (A/P) together) without any falls.
SOT Sway, Shear, and Alignment Data
<ul style="list-style-type: none">6. Repeated, suspiciously consistent sway patterns throughout SOT trials.
Motor Coordination Tests (MCT & ADT)
<ul style="list-style-type: none">7. Exaggerated motor responses to even small forward and backward translations, which do not appropriately increase with larger translation amplitudes.8. Inconsistent, non-reproducible motor response to all support surface translations (MCT) and to toes-up/toes-down rotations (ADT).
Clinical Impression
<ul style="list-style-type: none">9. Clinical judgment (“gut feeling”).

Table 1: Mallinson and Longridge nine point criteria.

in-depth neurotologic history and examination, full videonystagmography (VNG), and CDP assessment. All medical examinations were carried out by one investigator and all diagnostic assessments and interpretations were carried out by the other. Both investigators took neuro-otological histories and assessed the patients subjectively, but were blinded to each other's opinions for the duration of the assessment.

The data from both groups were then evaluated according to three different protocols:

- the formula advanced by Cevette⁸ for evaluating inconsistencies in the Sensory Organization Test (SOT) protocol
- the criteria delineated by Gianoli⁶
- the nine point scale³ proposed by Mallinson and Longridge

In the work injured group, six of the 109 patients showed both objective and subjective signs that raised the suspicion of symptom embellishment or magnification (three were definite and three were borderline). The Gianoli criteria were generally not helpful in detecting these patients. Although the quantitative Cevette formula (looking at the SOT criteria in isolation) detected these individuals, the results suggested that another 30 patients (who showed no clinical suspicions of aphysiologic behaviour) were also malingering. The Cevette formula also categorized 16% of the non-trauma group as aphysiologic. Mallinson and Longridge concluded that identification of aphysiologic behaviour was most accurate when employing their nine point scale, which includes assessment of the patient's performance on CDP, evaluation of all SOT and MCT raw data, and the subjective impression of the clinician. The nine point assessment was undertaken independently by both clinicians, without prior consultation.

In developing their techniques for assessing these complex patients, they strived to adhere to the tenets of natural justice,⁴¹ the two primary rules of which are:

1. a person should be given a hearing
2. decision makers should be unbiased

Natural justice also dictates that:

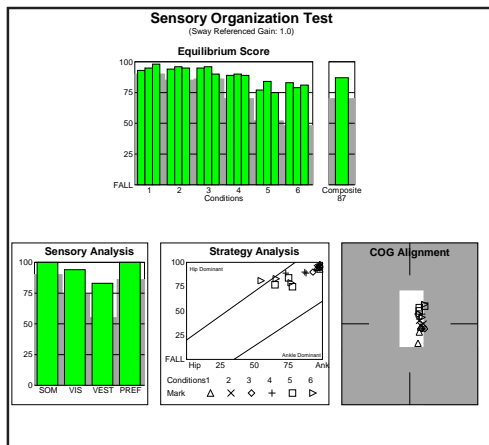
1. a person with any preconceived opinions about a matter should not attempt to settle that matter
2. a decision on the matter must be arrived at based solely on the merits of the case

In an assessment that often spans four hours, patients are evaluated both when they are aware they are being assessed, and when unaware that an assessment is taking place. In a situation where two unbiased and blinded clinicians find no behavioural inconsistencies, it is deemed that no clinical evidence exists to suggest that the patient's complaints are less than genuine. If this is the case, natural justice dictates that the patient's symptomatic complaints should be accepted as such. The assumption of innocence should be made unless and until strong evidence for guilt is demonstrated.

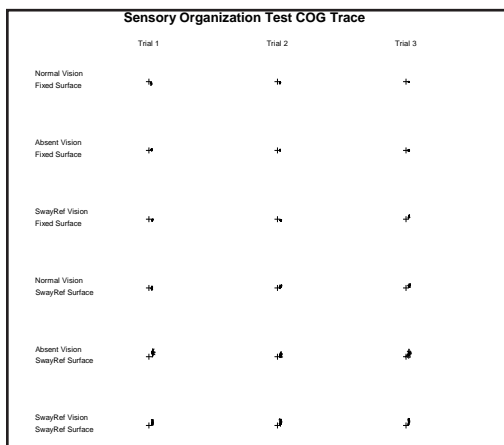
Keeping in mind the tenets of natural justice, the nine point system does allow for "scoring" a patient and it is likely that a positive score on one of the criteria might be more "powerful" than a positive score on another one. However, Mallinson and Longridge made the decision not to try and "weight" the criteria, other than to assign a total score out of nine. They then use this score as an indicator of the presence or absence of observed aphysiologic behaviour, rather than to assign a precise absolute score to all patients. They also caution that while the presence of many different indicators may be strongly suggestive of embellishing behaviour, the presence of one or two signs might just be the results of an idiosyncratic quirk, or perhaps a maladaptive compensation mechanism.

This handbook provides examples of the applications of these criteria to different patients seen in their clinics. An assumption is made that the reader is familiar with Computerized Dynamic Posturography (CDP), the Sensory Organization Test (SOT), Motor Control Test (MCT), and Adaptation Test (ADT). In the absence of this understanding, the reader is referred to the Appendix and to www.resourcesonbalance.com for more information.

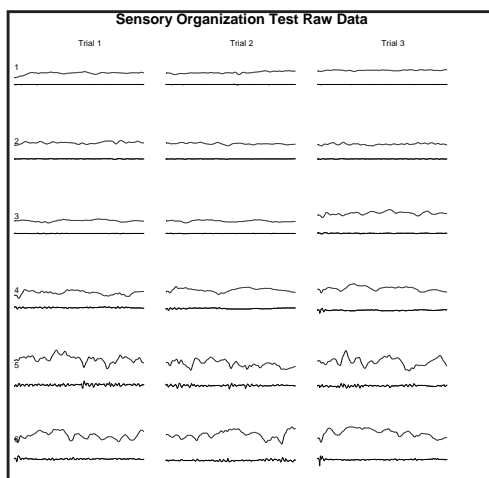
Figure 1: A typical CDP data set from a normal, asymptomatic individual.



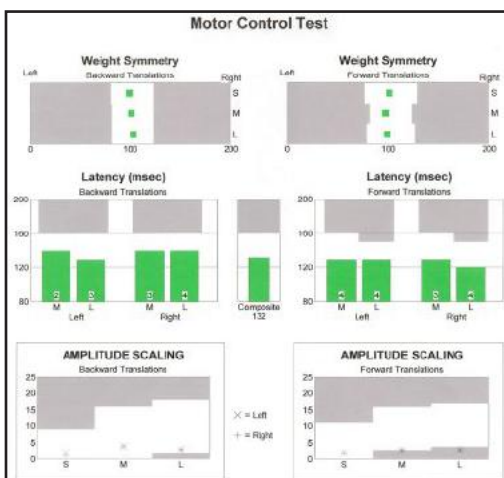
Sensory Organization Test (SOT) Comprehensive



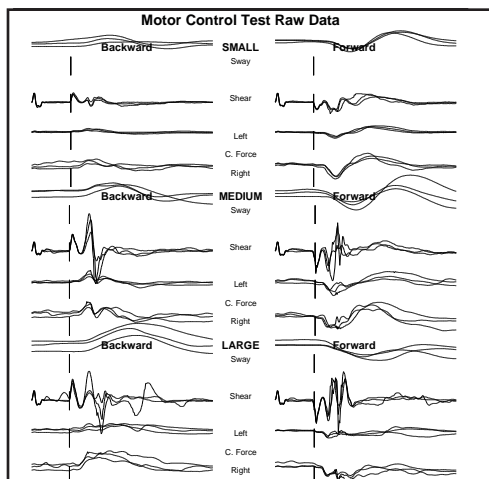
Sensory Organization Test (SOT) COG



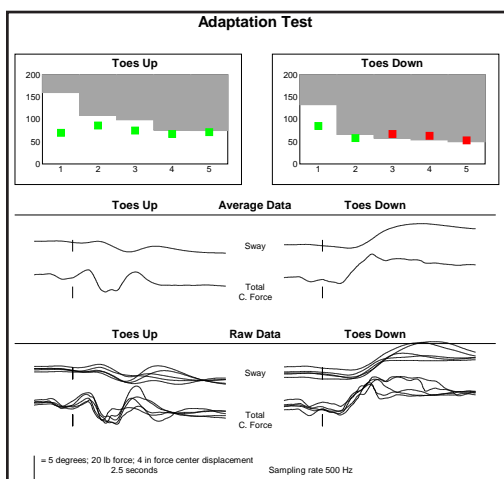
Sensory Organization Test (SOT) Raw Data



Motor Control Test (MCT) Comprehensive



Motor Control Test (MCT) Raw Data



Adaptation Test (ADT)

CLINICAL APPROACH

The assessment is undertaken by two examiners, each one blinded to the findings and impressions of the other until both examiners have completed their assessments. The protocol begins the moment that the patient is greeted by the first assessor (examiner one) in the waiting room. The patient is assessed to see how fluid and natural their movements are as they ambulate through the unit. The examiner escorts the patient on a route from the waiting room to the CDP testing room. This route includes making at least three sharp turns, and navigating up and down an incline. On this route there are also many environmental transitions and challenges, including floor-length windows, patterned carpets, and multiple intersecting hallways. A typical patient who is navigating in an unfamiliar environment will visually scan the surroundings, look up and down the halls, and often acknowledge passing staff or other patients. However, this environment presents a difficult challenge for the patient with a balance deficit, and such patients will usually stare at the floor to maintain balance. Examiner one also purposely chats with the patient while walking with them. While a patient is being engaged in conversation, it is socially appropriate for them to maintain eye contact, again a challenge for the patient with a balance system deficit.

There are handrails along the halls and it is noted whether or not the patient makes use of them while walking, or stops when talking. The examiner purposefully walks slightly faster than the patient, forcing the patient to attempt to keep up, which is another challenge to the balance compromised patient.

Examiner one takes an in depth neuro-otological history, without reviewing any medical information, impressions formed by other clinicians, or results of any previous vestibular assessments done elsewhere.

POSTUROGRAPHY ASSESSMENT

Examiner one performs the CDP assessment after the extensive history is taken but before any other aspects of the assessment (VNG, caloric testing, Romberg testing, etc.) are completed. In preparation for CDP testing, the patient is told that “there is no need for you to show us what is wrong because the machine can detect the problems you are having.” It is emphasized that their job is to do nothing except to stand as still as they can on the platform. It is also emphasized that they can take a break at any time or for any reason.

The CDP assessment begins with SOT Condition 1 and the patient is told during trial one that the “platform is being zeroed,” i.e. they are unaware they are being recorded. On trials two and three, the patient is told that “recording will begin now,” i.e. they are aware that recording is taking place. The same techniques are used for Condition 2. This is an important part of the assessment because performing three trials of Condition 1 followed by three trials of Condition 2 allows for evaluation of criteria two and three as outlined in Table 1.

When Conditions 1 and 2 have been completed, the patient is then told that:

- what they are looking at might sway with them
- what they are standing on might sway with them
- both conditions could occur

They are told that this is not a ride and that if they stand still, nothing will happen. They are asked if they understand the details. They are again reminded that they can take a break any time they want to. The remaining SOT conditions are then presented in random order.

After the SOT is completed, the MCT and ADT assessments are undertaken. Instructions for the MCT are simply that “the platform will jiggle” and that the purpose of the test is to measure how their balance system responds to the platform movements. The MCT and ADT tests are then completed.

Examiner one then reviews and scores the patient’s CDP performance using the criteria in Table 1 to establish the final score on the aphysiologic scale.

Examiner two also takes a detailed neuro-otological and medical history, and examines the patient medically. This usually takes place two to four hours after the patient is seen by examiner one. Examiner two is blinded to:

- all prior medical information
- impressions formed by other clinicians
- results of previous vestibular assessments
- the history, vestibular assessment, CDP assessment, and aphysiological scores established by examiner one

Following the medical examination, examiner two also scores the posturography assessment using the nine point scale. If there is a difference greater than one between examiners, they discuss their impressions and rescore the patient together.

DETERMINATION

0 of 9	No suspicion of aphysiologic behaviour
1 of 9	No suspicion of aphysiologic behaviour
2 of 9	No suspicion of aphysiologic behaviour
3 of 9	Suspicious for aphysiologic behaviour
4 of 9	Suspicious for aphysiologic behaviour
5 of 9 to 9 of 9	Definite aphysiologic performance

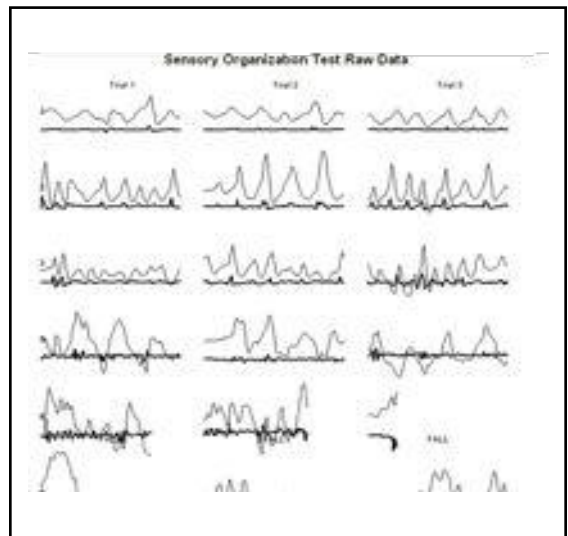
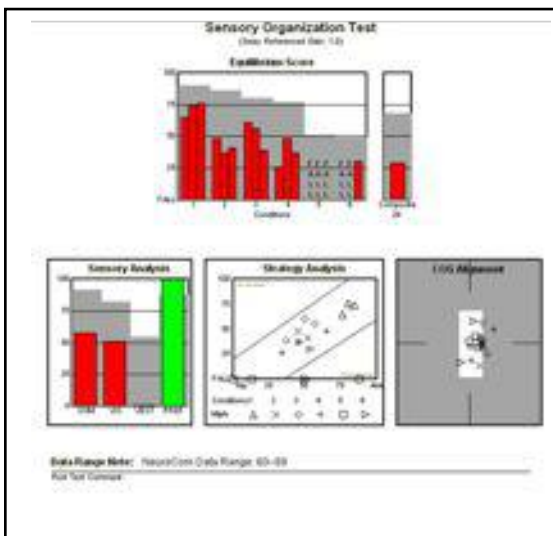
Table 2: Aphysiologic scale.

ASSESSMENT OF INDIVIDUAL CRITERIA

1. High intertrial variability on all SOT trials.

As the SOT assesses innate ability to maintain balance control, the results should be reproducible across trials within a given condition. As mentioned previously, our SOT assessment is:

- Three trials of Condition 1 followed by three trials of Condition 2. This allows us to assess criterion 2 and 3.
- Randomizing of all remaining 12 trials. Because the patient doesn't know what condition they are going to get next, it is difficult for them to feign an abnormality on a particular condition. This allows us to see if there is any embellishment on particular trials. Any within-condition variability greater than 15% (> 2 s.d.) on any of the SOT Conditions 3 - 6 is regarded as suspicious.



Performance is markedly below normal. This patient had a history of dizzy spells prior to a motor vehicle accident, but since the accident has had constant dizziness. The variability between trials of the SOT conditions is significant and suspicion of exaggeration is strong. For example, look at the rhythmic oscillations on the raw data, especially on Condition 2. This is aphysiologic.

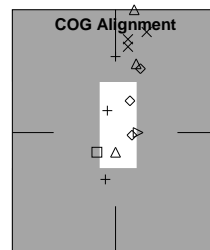
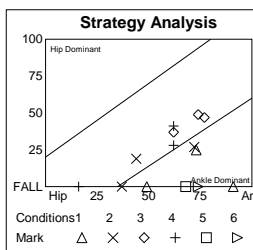
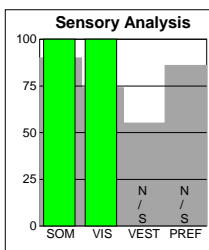
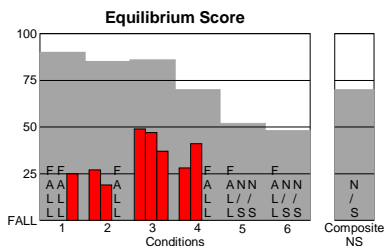
2. Conditions 1 and 2 markedly below normal.

SOT Conditions 1 and 2 can be performed reasonably well by almost anybody, even a patient with no vestibular function. It is important, however, to note that patients with known neurologic disorders or clinical signs may present with legitimate difficulty on SOT Condition 2.

Patients who are able to ambulate naturally down the hallway and around the corners to the testing area, who are able to take their shoes off and step onto the EquiTest® platform and who are able to adjust their foot position without assistance should be able to perform Conditions 1 and 2 with near normal scores. Normal scores represent two standard deviations from the norm, and we regard any score on Conditions 1 and 2 more than 15% below normal (i.e. greater than two standard deviations below normal) as suspicious.

Sensory Organization Test

(Sway Referenced Gain: 1.0)



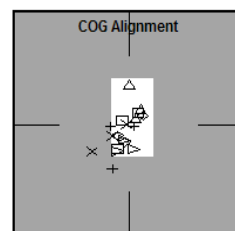
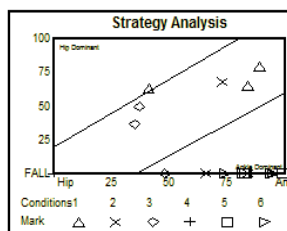
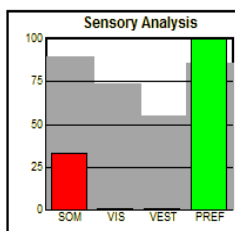
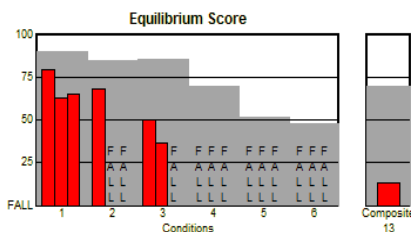
Performance is markedly below normal on SOT 1 and 2 (failed criterion 2). This patient walked in to the clinic on her own with complaints of extreme imbalance following an MVA (failed criterion 9).

3. Better performance on Condition 1 and 2 when unaware.

When a patient is placed in a position where they have a golden opportunity to “fake,” there is reasonable chance that a dishonest patient will take this opportunity. An individual with a legitimate problem has no reason at all to do so, and the fact that a patient does not take such an opportunity suggests that they are genuine.

Sensory Organization Test

(Sway Referenced Gain: 1.0)

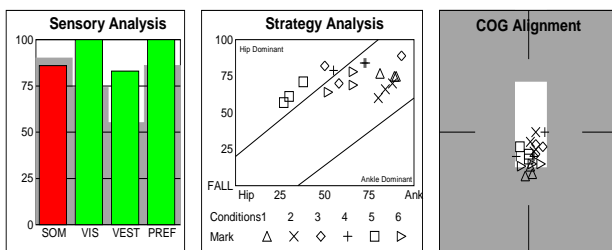
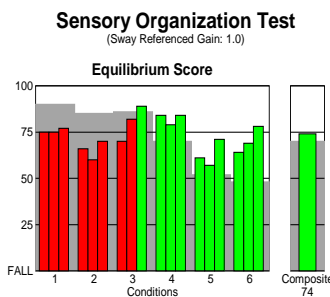


This 33 year-old man suffered an electrocution injury on the job. Note the markedly worse performance on Conditions 1 and 2 on the trials when he was told he was being tested (trials 2 and 3).

On the first trial of Conditions 1 and 2, the patient is told that the “platform is being zeroed” (or calibrated) and that they should stand still so it can “feel their feet.” In contrast, on the second and third trials the patient is told that “recording will begin” and they are informed exactly when the 20 second epoch starts and ends. This allows the examiner to see if the patient takes the opportunity to exaggerate on the trials when they know they are being measured (trials two and three of each condition) as compared to the trials when they didn’t think they were being assessed. We believe that any difference greater than 15% may constitute a physiologic behaviour.

4. Condition 5 and 6 relatively better than Condition 1 and 2

Performance on Conditions 5 and 6 forces the brain to use vestibular information only to maintain balance control because both somatosensory and visual information are orientationally inaccurate. Basic physiology dictates that it is not possible for a patient to perform better (relative to the normative performance values) on Conditions 5 and 6 than on Conditions 1 and 2. Common sense suggests that equilibrium scores on Conditions 5 and 6 should be lower than on Conditions 1 and 2.



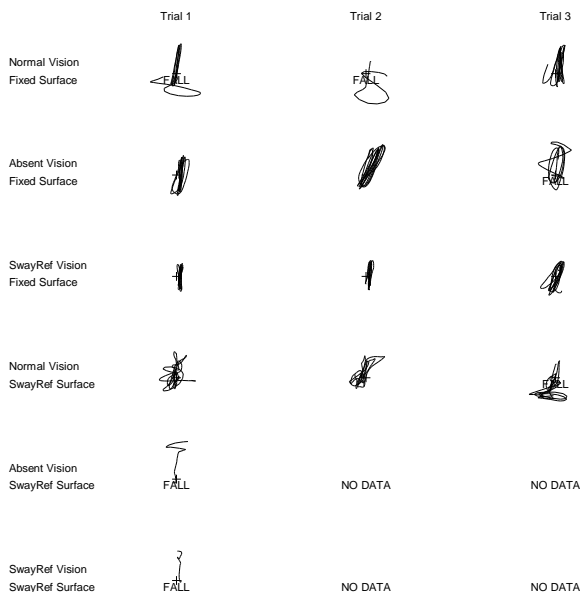
Performance is markedly below normal on SOT 1 and 2 (criterion 2) and SOT 5 and 6 show relatively better performance or balance control than SOT 1 and 2 (criterion 4). This patient walked in to the clinic on her own with complaints of extreme imbalance following an MVA (criterion 9).

5. Circular sway (i.e. lateral and AP together) without any falls.

Patients with known neurologic disorders or clinical signs may exhibit circular, ataxic sway patterns. For normal people, circular sway, or rather A/P and lateral sway together, is difficult to perform during an anterior/posterior testing task and actually requires good balance control. We believe that the patient with circular sway has learned where his limits of stability are and is operating at very close to those limits. Most normal individuals and legitimate patients try to

stay centered to the best of their ability within their limits of stability. This pattern can also be seen in the raw (sway, shear, and alignment) data in which the patient sways to and from their limit without falling or loss of balance. There are probably some unusual sway strategies that are genuinely maladaptive compensation devices, but we regard circular sway as manufactured, as it is unnatural, and can only be successfully performed by a patient with reasonably intact balance function.

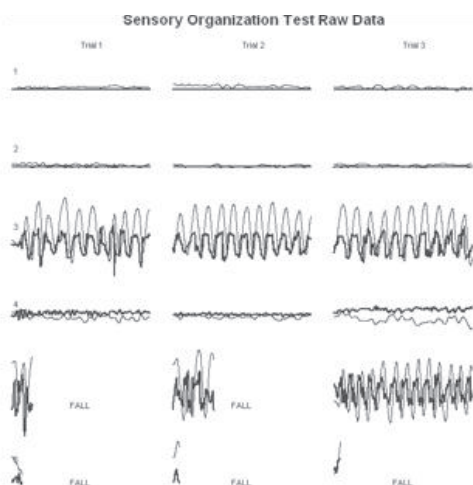
Sensory Organization Test COG Trace



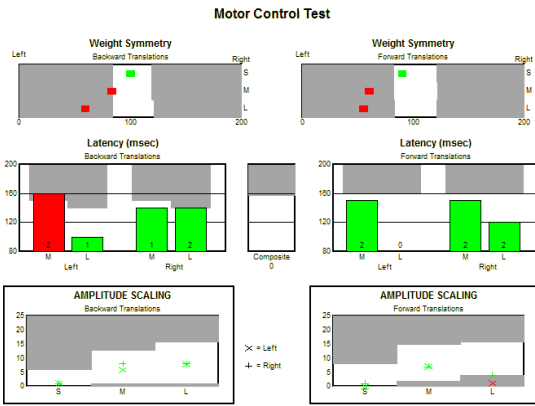
Significant amounts of lateral sway mixed with excessive anterior/posterior sway in this male involved in a MVA. His performance and overall aphysiologic score (6/9) did not change on testing after re-instruction.

6. Repeated suspiciously consistent sway patterns throughout SOT trials.

If a patient wishes to “demonstrate” just how bad his balance is, they sometimes adopt an anterior/posterior “swaying” tactic to illustrate the fact that they are unable to stand still. This is unphysiologic and the rhythmic swaying pattern is easily seen in the raw data. The swaying tracing often looks sinusoidal and is noticeably different from the genuinely unsteady patient who may sway, but not in a controlled rhythmic manner.



This example is not a true patient, but was generated by one of the authors. His faking on Conditions 3, 5, and 6 caused a legitimate looking deficit, but when the raw data was examined on these trials, the totally rhythmic sway was evident. Case Example #1 on page 17 provides another clinical variant frequently seen.



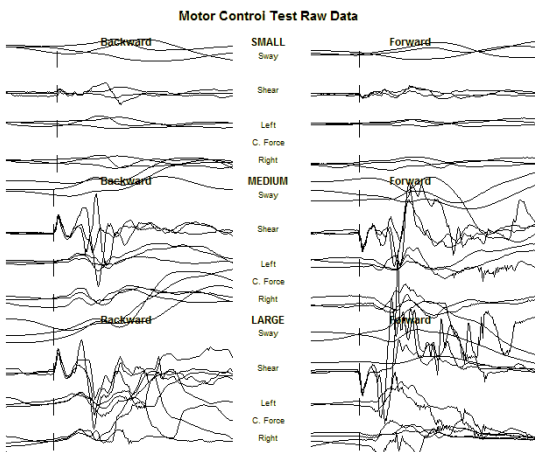
MCT Composite Data: Although the reliability of this recording is not judged as high, the changing weight bearing asymmetry is unusual. Latencies are normal and amplitudes are within normal parameters, which helps to rule out long loop reflex pathology.

7. Exaggerated MCT responses.

The small platform translations of the MCT are standardized to provide a sub-threshold stimulus and as such should not generate a robust response during or after the stimulus. Dramatic responses during the small translations or responses that do not increase in amplitude with the larger force plate translations should be viewed suspiciously.

8. Inconsistent MCT responses.

In reviewing the MCT raw data tracings, the force responses which occur within 80-150 milliseconds, are produced reflexively and should be of appropriate amplitude to maintain balance control. Because they are reflexive responses and not cortical motor programs, they should also be reproducible. The response amplitude should be appropriately larger for larger MCT translations. The data should be in keeping with the results of the SOT assessment. A patient with a “4, 5, 6 down” abnormality pattern (i.e. dependent on a stable surface) might have legitimate imbalance during the MCT and thus have larger responses than typically seen. If a patient is totally unable to stand on Conditions 4, 5, or 6, then the MCT trials should show very high amplitudes because such a patient



MCT Raw Data: Scores show low but slightly variable sway forces on small translations. Only slightly larger translations elicit dramatically larger sway forces, and this dramatic increase is even more pronounced on shear force. Center of force recordings are also dramatically larger for even slight increases in platform translation amplitude.

would have to work very hard to maintain balance when the support surface is disrupted. A patient attempting to embellish the underlying reflexive response may take the opportunity to “show” how unstable he is when the floor is shifted only slightly and respond in ways that are not physiologically appropriate. These dramatic “demonstrations of imbalance” are not consistently reproducible, especially when we randomize the order of presentation of the MCT trials.

Above is a case of a truck driver who fell off his truck, striking both the front and then rear of his head with subsequent visual-vestibular mismatch type symptoms (symptoms of dizziness and instability in moving visual environments). Note the inconsistencies on the composite report; note the inconsistent sway following the reflex response or after the first 150 milliseconds of the test. This can be clearly seen on the MCT Composite report. See this case in more detail on page 20.

9. “Gut feeling” (i.e. clinical judgement).

A subjective or qualitative assessment of a patient is a very important aspect of the evaluation. Observations such as:

- distracted gait differing from observed gait
- ability to bend over and pick up a purse without any support
- a patient who repeatedly emphasizes that all of their problems are related to an accident
- a story that is too “perfect” (e.g. perhaps obtained from the internet)

may raise some suspicions or a “gut feeling” to the assessor that things aren’t adding up. Perhaps suspicions may be raised in a patient who complains of constant pain or terrible balance, but still plays recreational hockey regularly, or complains of constant nausea, but still eats out with friends all the time, and has not lost weight.

In contrast, a patient with no ulterior motives may repeatedly downplay their symptoms, or may state that they are just afraid nobody will believe them because they have previously had their complaints dismissed. These patients sometimes generate a “gut feeling” in the assessor that their complaints are legitimate. The “gut feeling” that is developed while a patient is in our clinic (often as long as three to four hours) is valuable.

In our clinical examination, this “gut feeling” is:

- developed based on functional observations
- correlated with diagnostic findings
- formed independently by two assessors

The physiologic scores of the two assessors are compared after:

- histories have been taken by both of us
- the patient has been fully assessed by one of us
- the patient has been undergone full clinical neuro-otological examination by the other

When a patient’s performance raises suspicions, our assessment protocol includes (if necessary) what we call “**Reassessment After Reinstruction.**” The patient (in the presence of a relative or friend where possible) is told that the machine has detected that they are not trying their hardest. The test is readministered anywhere from a few hours to a few days later, to see what changes have taken place. This is quite often helpful as it is sometimes apparent that a patient with true underlying pathology will embellish their symptoms to some degree. This is not the same as malingering, a point we addressed in our article; sometimes a patient may be fed up with not being believed by other clinicians, some of whom may not have adhered strictly to the guidelines of natural justice when they assessed the patient.

When all assessments are completed, then the CDP assessment is scored using the nine point criterion based protocol. Most of the criteria are scored quantitatively, but the gut feeling is more qualitative as previously described. Recall that this includes how the patient performed walking to the assessment room, as well as other aspects observed during history-taking and assessment. For example, a patient who performed very poorly should not be able to stand on one foot to slip on their shoes, lean over a sink unsupported to wash their face after assessments, or bend over to pick up their purse without hesitation. A patient's history may not be consistent, they may back-track on their history, or alternatively they may have "too perfect" a story. The patient's aphysiologic score is calculated and the score sheet placed in the chart.

Prior to reviewing the findings from examiner one, the medical examiner first completes his full history and examination of the patient. He then examines the CDP reports, analyzes them, and independently scores the patient using the nine point criteria (see Table 2). Examiner two compares his score to the one generated by examiner one, and if there is a marked difference in score (>1) between the two determinations, the case and findings are discussed by the two examiners. The decision to re-assess after re-instruction is then made.

When a patient has responses which appear aphysiologic there are two possibilities. One is that the patient is exaggerating or malingering. However, it is also possible that the patient has a disorder which we do not yet understand that is producing these abnormal findings. This second possibility should be kept in mind, but obviously it is more likely that there is a nonorganic component to their behaviour.

As a means of addressing this behaviour, we recommend discussion with the patient at a later date. The patient must have a close relative or friend present. It is indicated to them that the tests show that the patient is able to do better on the test than they have done, and that if the test is repeated, results are likely to be better because they will be making a more concerted effort. We suggest that perhaps they were having a bad day when assessed. It is explained that these things can sometimes happen; that it is unusual but does occur, and that it is important for the patient to make the best effort, because if they don't, it will not be possible to make effective use of the test for diagnostic purposes.

This is done in the presence of a friend or relative because they are more objective than the patient, and are not likely to be defensive. The friend hears the message that we have detected that the patient can perform better (in other words, is exaggerating or malingering), and can explain this to him. This avoids the patient denying the detected nonorganic finding and repeating their performance.

The patient is then purposely scheduled for reassessment at least two hours later, during which they can go for lunch or for a walk. This provides an opportunity for

them to talk to their friend and decide to do their best. Specifically at no stage is it mentioned that the patient is exaggerating or malingering, but they are given an out of “having a bad day;” that “these things sometimes happen;” and that the most important thing is they do their best when the test is repeated.

On occasion, when this is done the patient will return with a significant change in results, sometimes indicating physical organic findings and sometimes indicating normal results. In other words, they have realized that their sham performance has been detected and it is more important that they do their best so that their diagnosis can be assisted by testing, rather than leave the impression that they appear to be attempting to manipulate the test results.

The improved results can then be used in concert with the patient’s physical examination and history. Obviously the initial record is retained, and for legal purposes is significant and has to be dealt with in any report. Sometimes on the repeat test a characteristic measured abnormality of a standard organic type is found. If the results on repeat testing are nonorganic, this may be a genuine disorder which we do not understand, but in practical terms the patient, at our present level of knowledge, is stated to have nonorganic disease.

CASE EXAMPLE: MOTOR VEHICLE ACCIDENT AND WHIPLASH

This patient was injured in a motor vehicle accident and suffered a whiplash injury. Although she was belted and did not strike her head, she was told by her physician she had suffered “brain damage.” Subsequent examination by a neurologist found no abnormalities at all and she was referred for an “aphysiologic evaluation.”

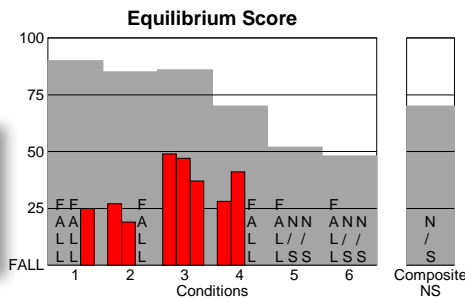
On her visit to the Neuro-otology Unit, she was able to walk down the hall while moving her neck naturally, when she was unaware of being observed (just before the assessment began).

At the start of the assessment, she was initially asked by examiner one what her complaints were and she stood up and said, “watch me.” She immediately began to sway rhythmically. She displayed a “tightrope walking” style of gait when she demonstrated her impairments in the hall.

This particular case was not referred for medical legal assessment, but just for a screening assessment by her neurologist, hence SOT only was done. However, one can see that the SOT data was sufficient to raise extreme suspicions of aphysiologic performance. The composite score could not be computed, as she refused to attempt more than one trial of Condition 5 or Condition 6.

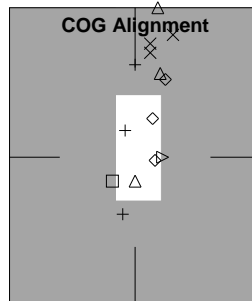
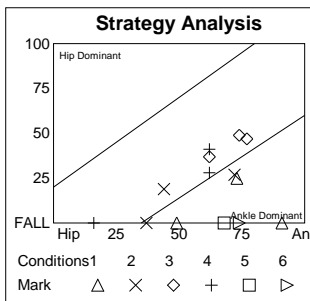
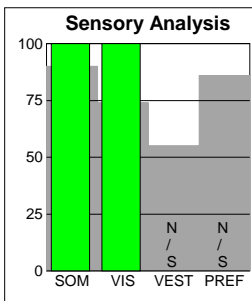
Sensory Organization Test

(Sway Referenced Gain: 1.0)

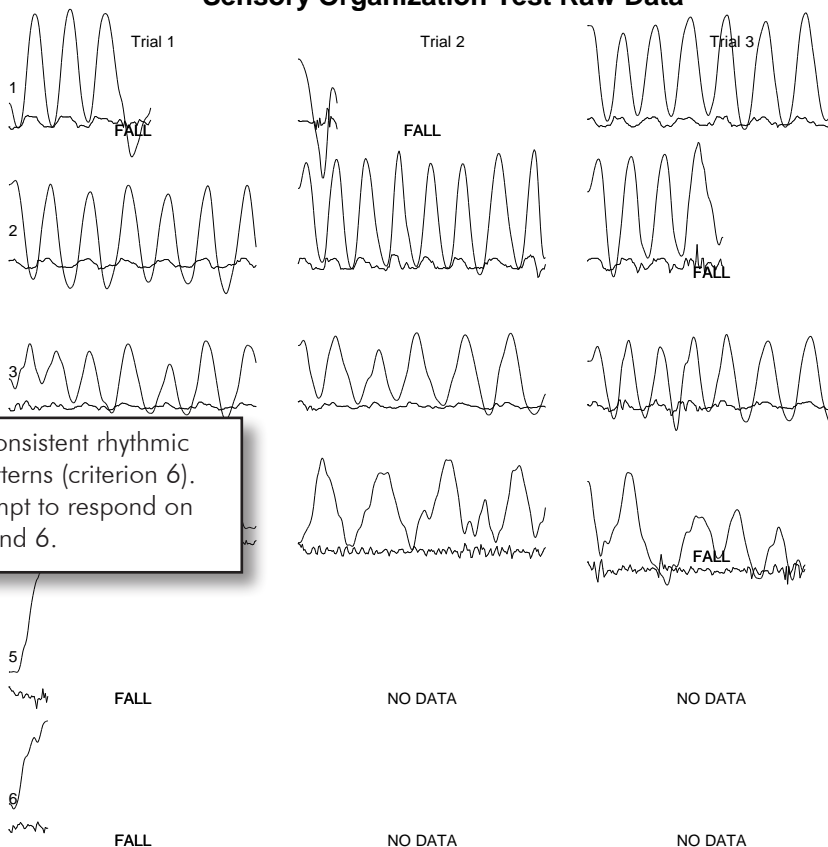


Conditions 1 and 2 are markedly below normal (criterion 2) and the patient walked in (criterion 9).

Center of Gravity (COG) is scattered, inconsistent, and near limits of stability.

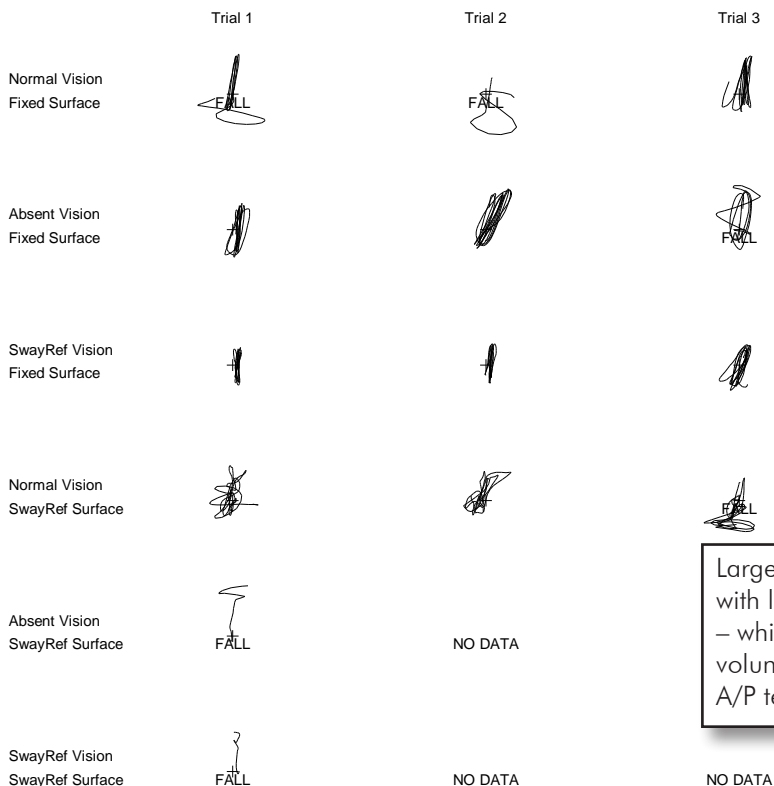


Sensory Organization Test Raw Data



Huge, consistent rhythmic sway patterns (criterion 6).
No attempt to respond on SOT 5 and 6.

Sensory Organization Test COG Trace



Large antero-posterior sway with lateral sway components – which can only be voluntary because it is an A/P testing task (criterion 5).

DISCUSSION

This patient’s assessment raised suspicions for a number of reasons. Her unusual rhythmic ‘rocking’ that was seen when she was standing did not change at all, even when being steadied by the examiner’s hand. The amplitude and nature of the rocking was also unchanged when she was asked to sit on the examining bed. This was in contrast to what was observed when she was sitting in a chair during initial history taking. At that time, the rocking virtually disappeared.

When asked to demonstrate what her balance difficulties were, she adopted a “tightrope

walking” stance (i.e. narrowing her base of support) which is not a physiologic method of attempting to maintain balance.

There was a dramatic difference between her observed and unobserved performance. When she walked around our unit she moved in a natural fashion. She was not destabilized turning her head to read a sign on the wall when walking. When she left our unit, she was seen walking down a sloped lane and was able to negotiate speed bumps and walk over them.

	Criterion/Description	Pass	Fail	Comments
				Composite Equilibrium NS
1	Better performance on blinded trial 1 of SOT 1,2	✓	.	Questionable
2	Inter-trial variability on all SOT conditions		✓	
3	SOT 5, 6 better than SOT 1,2	✓		
4	SOT 1, 2 ‘markedly’ below normal (> 15 points)		✓	Scores are significantly below normative performance values and outside the sd.
5	Circular COG sway		✓	
6	Repeated, consistent sway patterns throughout SOT		✓	
7	Exaggerated motor response to small platform movements		ND	Not done
8	Inconsistent, non-repetitive motor responses, all translations and adaptations		ND	Not done
9	“Gut” Feeling		✓	Grossly poor performance with minimal functional difficulty observed.
Total Fails:			5/7	Definite aphysiologic performance

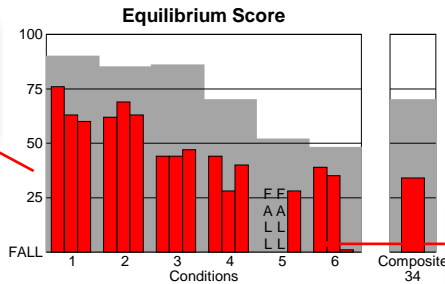
CASE EXAMPLE: RETURN TO WORK DETERMINATION

This patient was injured in a work related truck accident. His complaints consisted of imbalance, noticed by his wife when he repeatedly walked into her, and also dizzy spells described as “things going wobbly,” usually related to head movement. One of his concerns was that he had to climb up on his truck to secure the load and felt off balance doing so.

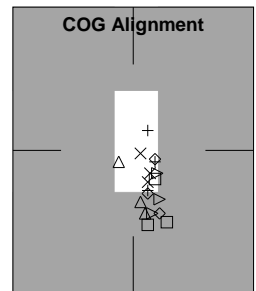
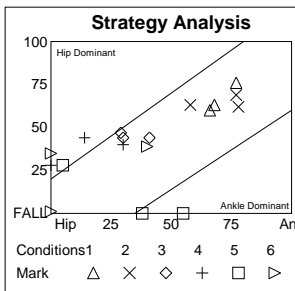
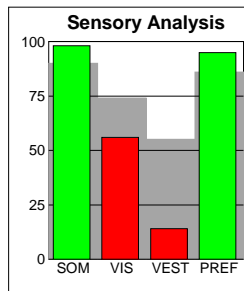
He was initially seen in our clinic and results were borderline abnormal in an “across the board” fashion.³ However when seen nine months later, his performance had deteriorated substantially, which was unexpected, as his complaints were essentially unchanged. His SOT was very poor and his malingering score was 5. On reassessment after reinstruction the next day, the results still showed an across the board pattern, but he had improved somewhat from the day before. At this time the results were thought to be more compatible with a disturbance of the balance system.

“Across the Board”
dysfunction pattern

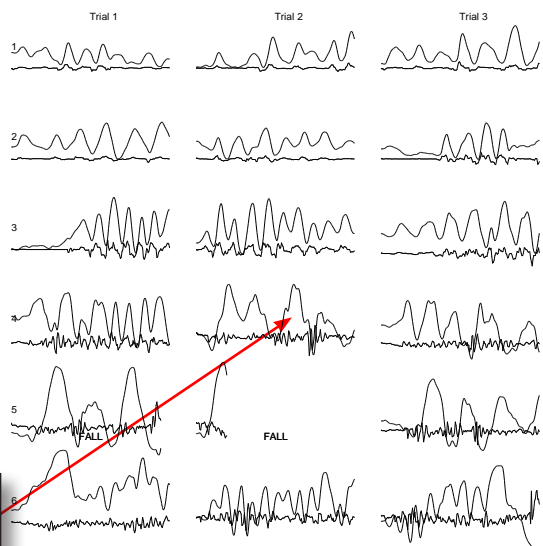
Sensory Organization Test (Sway Referenced Gain: 1.0)



Perhaps an underlying, legitimate SOT 5, 6 pattern?

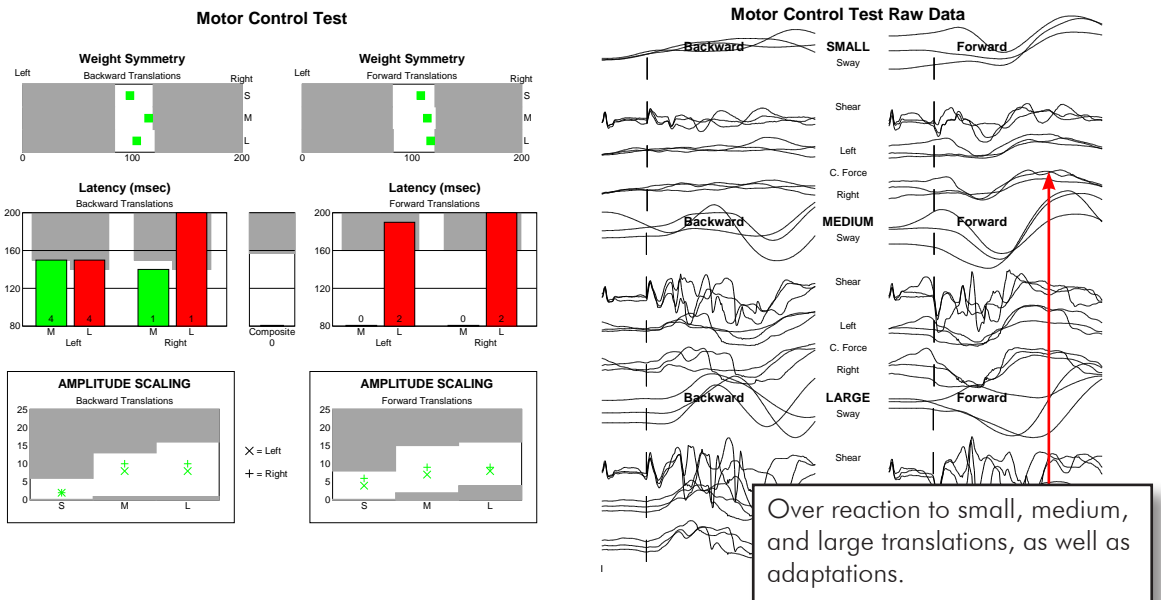


Sensory Organization Test Raw Data



Large amplitude, rhythmic, sinusoidal sway throughout SOT trial conditions.

His MCT initially showed inconsistent motor responses, but on the next day they were much more consistent and regular with no evidence of exaggeration. Repeated sway patterns were still seen and his score on reassessment was 1.



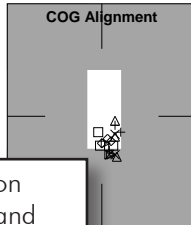
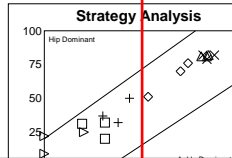
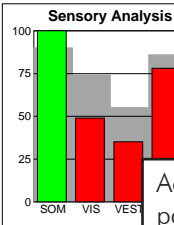
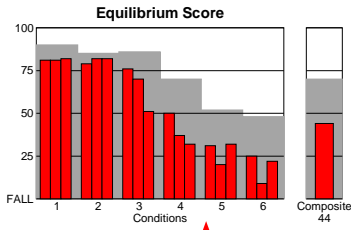
Example 10: WCB A

	Criterion/Description	Pass	Fail	Comments
				Composite Equilibrium NS
1	Better performance on blinded trial 1 of SOT 1,2	✓		
2	Inter-trial variability on all SOT conditions		✓	
3	SOT 5, 6 better than SOT 1,2		✓	SOT 1
4	SOT 1, 2 'markedly' below normal (> 15 points)	✓		
5	Circular COG sway	✓		
6	Repeated, consistent sway patterns throughout SOT		✓	
7	Exaggerated motor response to small platform movements		✓	Huge sway responses to even very small translations
8	Inconsistent, non-repetitive motor responses, all translations and adaptations	✓		Questionable
9	"Gut" Feeling		✓	
	Total Fails:		5/9	Slight suspicion of aphysiologic performance

REASSESSMENT AFTER REINSTRUCTION

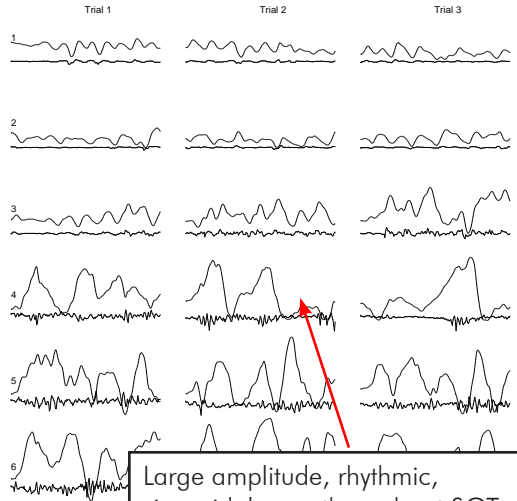
Sensory Organization Test

(Sway Referenced Gain: 1.0)



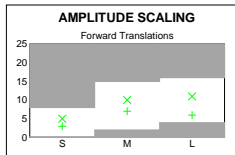
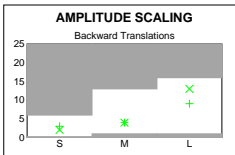
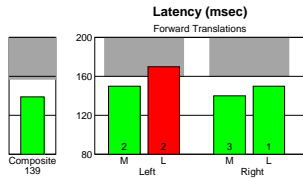
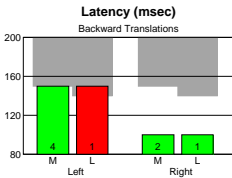
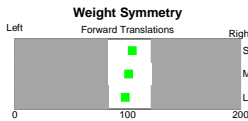
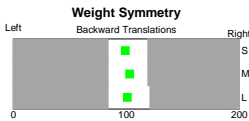
Across the Board dysfunction pattern; normal strategies and COG.

Sensory Organization Test Raw Data



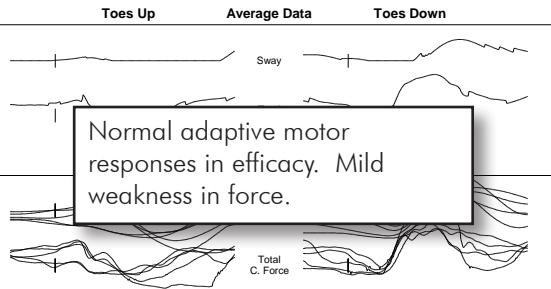
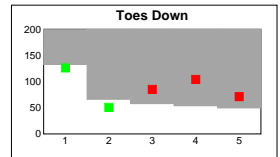
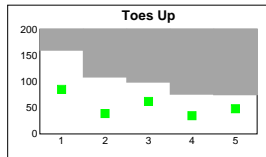
Large amplitude, rhythmic, sinusoidal sway throughout SOT trial conditions.

Motor Control Test



Normal automatic motor response timing; LLE slower to respond and weaker in response.

Adaptation Test



Normal adaptive motor responses in efficacy. Mild weakness in force.

Example 10: WCB B – Repeat after Reinstruction (24 hours later)

	Criterion/Description	Pass	Fail	Comments
				Composite Equilibrium 44 (norm 70)
1	Better performance on blinded trial 1 of SOT 1,2	✓		
2	Inter-trial variability on all SOT conditions	✓		
3	SOT 5, 6 better than SOT 1,2	✓		
4	SOT 1, 2 ‘markedly’ below normal (> 15 points)	✓		
5	Circular COG sway	✓		
6	Repeated, consistent sway patterns throughout SOT		✓	Repeated, consistent large sway patterns throughout SOT
7	Exaggerated motor response to small platform movements	✓		
8	Inconsistent, non-repetitive motor responses, all translations and adaptations	✓		
9	“Gut” Feeling	✓		
Total Fails:			1 /9	No suspicion of aphysiologic performance

DISCUSSION

This patient’s assessment raised suspicions that prevented a return to work determination. Using our assessment process and applying the criterion, this individual met five of our criteria, raising suspicions of aphysiologic performance. It was for this reason and a gut feeling of legitimate problems from both examiners that the test was repeated after reinstruction the following day. Upon re-examination, the legitimate problem was documented and readiness for return to work could be determined.

CLOSING DISCUSSION

Medical legal assessments should not differ from standard medical assessments. Both must be carried out without prejudice. Many of our medical legal patients express desires which are similar to our medical patients. They want to find out what is wrong with them and they want to be helped. They often intimate that they are not interested in litigation and would gladly “give up any money” in return for a cure/reduction of their symptoms. We owe it to our medical legal patients to treat them as patients first and as litigants second. We keep in mind that the process of litigation means that there must be a fair assessment and compensation process from the medical point of view. But these processes must adhere to the tenets of natural justice.

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