Establishing Reliability:

Standard Acts, Practices & Conditions

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Establishing Reliability:
Standard Acts, Practices & Conditions

This article is more than a purely academic exercise. Using the framework presented, you will be able to identify and establish whether or not a reading presented is reliable, whatever that reading may be. Conversely, you will be able to raise doubts concerning the reliability of a reading when one has been appropriately identified…

What is Reliability?

In Volume 1, Issue 1 of Counterpoint, we introduced the notions of *Accuracy, Precision and Reliability* in the article of the same name. In this issue, we discussed issues with Specificity in the article *Window on a Molecule*. These are all scientific concepts that are not only useful, but critical to understand. Now, I want to deal with the concept of reliability using a different framework. This approach may be more accessible to many of you.

When we say something is *reliable*, what do we mean? The other articles referenced above talk about reliability as hitting the right target, on the bull's eye, time and again with consistent and repeated results. The concept of reliability refers to a *system that produces consistent results under similar conditions*. Reliability is a *systems* concept. In other words, it is the *system itself* that is reliable, not necessarily the *individual measurements produced*.

Think of reliability as the degree to which an assessment tool produces stable and consistent results, repeatedly.

Establishing Reliability

I said earlier that I wanted to deal with the concept of *reliability* using a different framework. Remember that reliability refers to a *system of measurement*. If you need to establish that a reading is reliable, you need to examine the system that produced the reading. In other words, you need to examine the way the reading was produced, and under what conditions the reading was produced. Enter the concept of *Acts, Practices* and *Conditions*.

A system is used to produce a reading – any reading, no matter what it is. The system consists of two broad components: The infrastructure and policies surrounding the system (or, the way the measurement was produced by the system – the individual *acts* and established *practices*), and; The *conditions* under which the reading was obtained.

I'm a breath alcohol specialist, so I will use that system as an example. A Breath Alcohol Concentration (BrAC) reading is produced. We need to examine that BrAC reading to determine whether or not it is reliable.

We do that by looking at by looking in three main areas: ***Acts, Practices*** and ***Conditions***

Reliability refers to the consistency & stability of a measurement system across situations, or over time, without any significant drift in accuracy or precision.

Standard Acts, Practices and Conditions

Infrastructure, Policies, Acts and Practices

The system, in this a case a *Breath Alcohol System*, is used to produce a BrAC reading. It is helpful to look at the system as a whole to establish reliability. This brings us to our first issue – Infrastructure.

Infrastructure in breath alcohol testing refers to the standards and policy surrounding the use of the device. How are they to be maintained? What training is required to use the device? How often are they to be calibrated? What are the minimum testing requirements? What are the Standard Operating Procedures to be conducted during each test? In short, what are the agency's policies and procedures required in the use of the devices?

It is helpful to think of these theoretical police requirements as individual ACTS. Instead of looking at the concept of "calibration," take a look at the individual actions that must be accomplished during a device's annual calibration. Were the acts performed? Was a standard for performance attached to the act? Similarly, what actions must be performed during calibration? During operation?

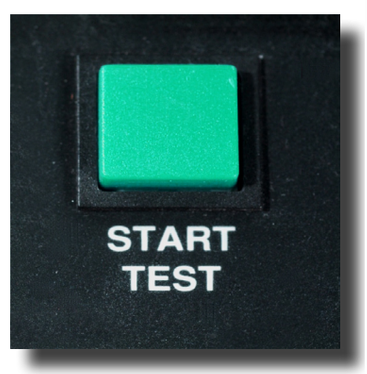
These actions can be broken down into two categories: *Practices* that are standardized and required, and individual *acts* – those actions that become the *de facto* way of operating a device. Sometimes there are compelling reasons why local acts or actions should take precedence over suggested practices. These must be judged on their individual merits and circumstances.

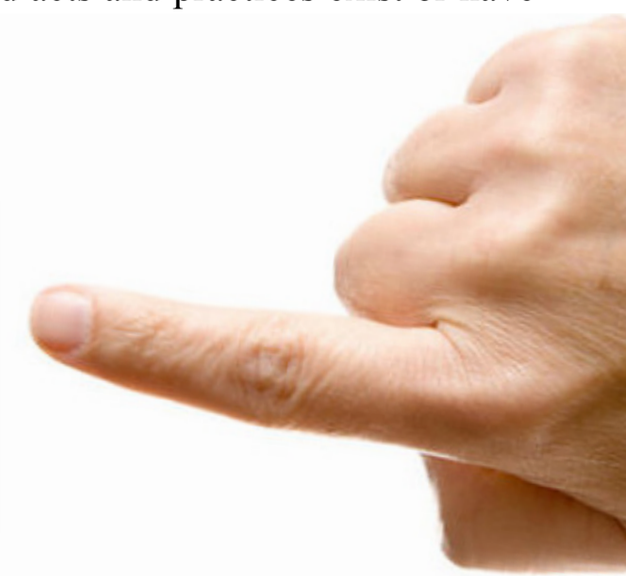
The automated nature of modern breath alcohol testing devices has taken over the control of many acts and practices in breath alcohol testing. Often, Qualified Technicians will testify in court along the lines of, *"I don't know about that. I'm trained to push the green button..."* regarding a specific operation of the device.

But, there are certain procedures (practices) that are established in your local breath alcohol testing protocols. As an example, disposable mouthpieces may be required to be changed for each test. The Qualified Technician might be required to inspect each mouthpiece prior to use. Certain jurisdictions may require mouthpieces to be seized in the case of a refusal to provide a breath sample, to prove that there were no obstructions in the mouthpiece that created an inability to provide a breath sample. If these practices were carried out properly, the reliability of a reading is enhanced. If these practices were NOT carried out, or carried out improperly, the reliability of the reading obtained is in doubt.

Similarly, in many jurisdictions, Calibration Checks must be performed. In some jurisdictions, these checks are performed with EACH breath test, or breath test sequence. In other jurisdictions, the checks are performed at some period of time – often quite far apart. Some jurisdictions do not perform Calibration Checks at all, and rely upon the annual maintenance of the breath testing device to discern any discrepancies in testing (by then, of course, it is too late.)

Again, if these practices are carried out properly, the reliability of a reading is enhanced. If these practices are NOT carried out, or carried out improperly, the reliability of the reading obtained is in doubt. A Qualified Technician, minimally trained only to "push the green button" may not identify and recognize that sub-standard acts and practices exist or have occurred.



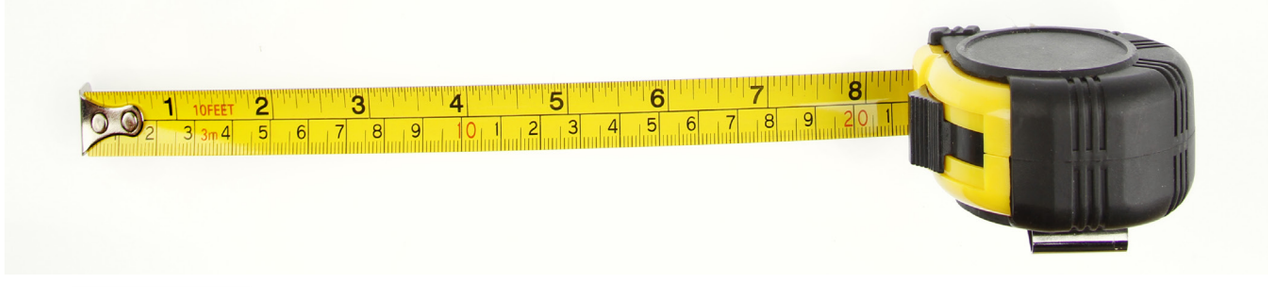


Testing Conditions

One thing to keep in mind with breath alcohol testing is that the breath test system assumes that certain conditions will be present for testing to occur. As an example, the ambient temperature of the testing room cannot be too hot or too cold. There cannot be fumes in the room emanating from a recent paint job, or from the use of harsh cleansers or fumigants. There cannot be radio frequency interference from police radios or cellular phones, including transmitter arrays for the communications system. Electrical outlets should be dedicated, grounded and isolated. The list goes on and on.

Then there are issues with the test subject's themselves. Certain assumptions are made about people, as a whole, that individuals must meet, in order for testing to be correct. The blood to breath ratio of the person must be 2100:1 for reliable readings. The person's exhaled breath temperature is expected to be a certain temperature (34.0°C) for reliable readings. The test subject cannot have endogenous[4] Volatile Organic Compounds (VOCs) on their breath for reliable readings. The test subject must have a minimal lung volume, and be free from any medical conditions that make them a poor candidate for breath alcohol testing.

As with acts and practices, when these conditions are met, the reliability of the reading is enhanced. If these conditions are *not met*, the reliability of a reading is in doubt. Sub-standard conditions can and do affect breath test results. Again, a Qualified Technician, trained only to "push the green button" may not identify and recognize that sub-standard conditions exist or have occurred.



4 Endogenous refers to naturally occurring compounds on a person's breath.

The Concept of Measurable Standards

When looking at overall reliability, it is helpful to look at the standards required for the testing process. What acts, practices and conditions are required, and under what standards are they measured or compared? We can't really look at results of a breath test and say for certain that they are reliable or unreliable without looking at the acts, practices and conditions under which the testing occurred.

*Why a **measurable** standard?* It is difficult, if not impossible, to examine a test and say it was done "correctly" or "incorrectly". How do we decide upon correct versus incorrect? We can, on the other hand, attach performance standards, or measurable objectives to individual components of the testing process, then assess whether or not these performance standards or measurable objectives were met.

From this notion we get measurable standards such as:

- A minimum exhaled breath volume of 1.5 litres
- A simulator temperature of 34.0°C
- Two sample within 0.02 grams/100mL (20 milligrams/100mL) of one another
- Two samples taken within 3 minutes
- Two samples taken no sooner than 15 minutes apart
- A Calibration Check within +/- 10 milligrams/100mL (+/-0.10 grams/100mL) of the Standard Solution value

If the individual acts, practices and conditions were performed correctly according to the measurable standards, the reliability of a reading can be established. Reliable readings can be considered scientifically valid.

If, on the other hand, the acts, practices and conditions under which a reading was obtained were performed incorrectly, or they did not meet the established measurable standards, then the results must be considered inherently unreliable. Unreliable readings cannot be considered scientifically valid, and should be disregarded.

Examples:

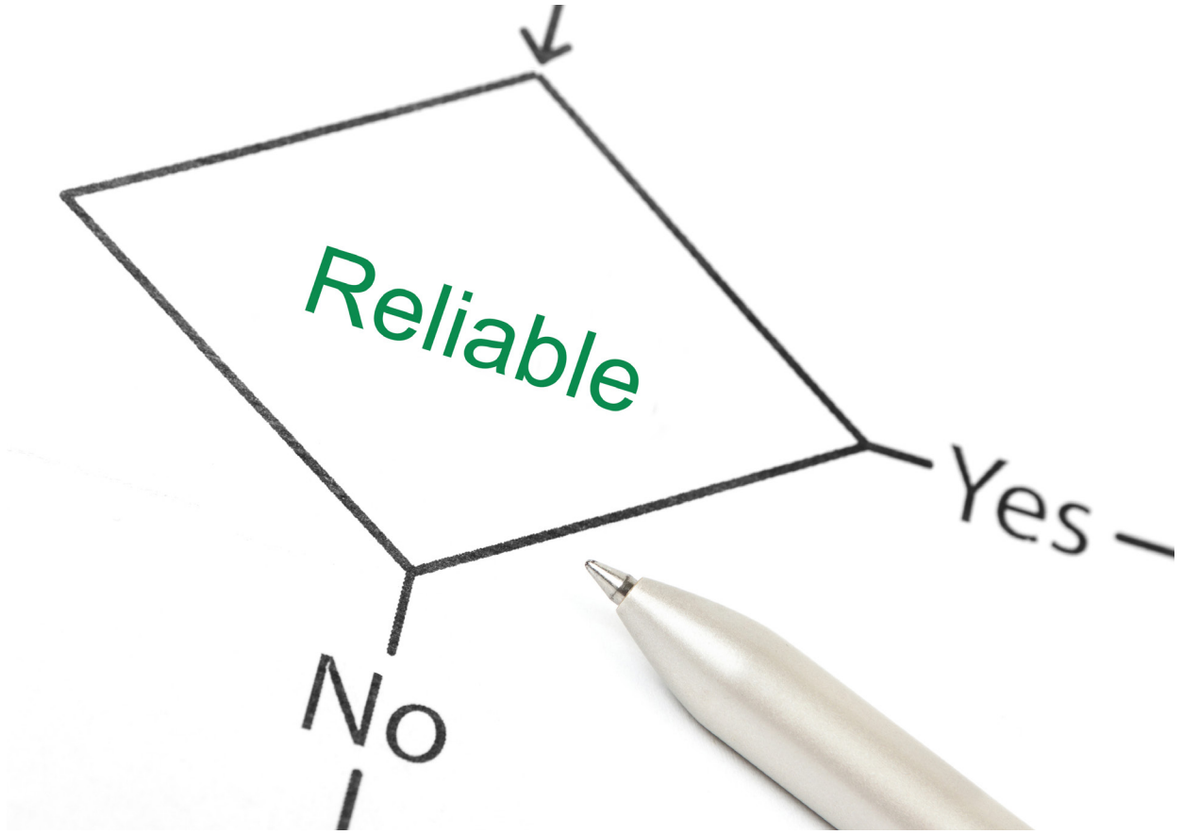
INHERENTLY RELIABLE	INHERENTLY UNRELIABLE
STANDARD PRACTICE	**SUB-STANDARD PRACTICE**
• Routine maintenance procedures performed annually according to the jurisdiction's or manufacturer's instructions or recommendations	• Maintenance not performed at required intervals, not performed altogether, or not performed according to the jurisdiction's or manufacturer's instructions or recommendations
• Simulator solution changed according to requirements, using traceable standard	• Simulator solution not changed in a timely manner, or not performed using traceable standard
STANDARD ACT	**SUB-STANDARD ACT**
• Instrument diagnostics performed and passed at routine intervals	• Instrument diagnostics not performed, or performed at sub-standard intervals, or instrument does not pass but left in service
• Calibration and maintenance records retained for external review	• Calibration and maintenance records not retained, or not available for external review
STANDARD CONDITION	**SUB-STANDARD CONDITION**
• Test subject free from medical conditions that make them unsuitable candidates for testing	• Test subject has medical conditions that make them unsuitable candidates for testing
• Testing environment free from contaminants or sub-standard conditions	• Testing environment that contains contaminants or sub-standard testing conditions

The Last Word

This has not been intended to be a philosophical discussion about nuance, but rather, an exercise intended to provide you with a valuable assessments tool. Remember, the *reliability* of a reading is based on the examination of the *system* that created the reading to begin with, holistically.

When looking at the reliability of a reading, whatever that reading may be, examine the individual acts, standards and conditions under which the reading came to be. If the examination indicates that the measured standards have been met, then the reliability of the reading is enhanced. Reliable readings are considered scientifically valid.

On the other hand, if sub-standard acts, practices and conditions are identified, then, by definition, the results are also sub-standard. Sub-standard results must be considered inherently unreliable, scientifically invalid, and should be discarded. ▲



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