Glossary of Terms

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Acquisition – The first part of learning. This involves getting information into the **short-term memory** system.

Associative Judgment – Applying contextual and environmental cues to make decisions.

Associative Skill Performance – When a skill is performed in response to context—the presence of other stimuli or based on the performance of other skills. An example might be firing a weapon immediately after reloading it, because those skills are always performed together.

Blocked Training – Occurs in training and/or practice environments where the actions performed are known ahead of time by the student and things like **context** and decision-making are not components of skill performance. Produces good outcomes with respect to fundamental technical skill performance ability in similarly stimulus-free settings. Produces much better technical skill performance than **interleaved training** (when used alone) does.

Connectionist Learning Theory – The most widely held theory of learning at a neuroscience level. The theory is based on **Hebb's Law** which states that "The neurons that fire together, wire together."

Consolidation – The process of transferring information into long-term memory. Involves physically changing the location of the information within the brain according to most modern interpretations of scientific research.

Contextual Skill Performance – When a skill is performed based on the totality of the environment, not based necessarily on a single stimuli. For example, a police officer receives a call to check out an abandoned building after dark because a citizen heard a scream coming from inside the building. The officer may enter the door with a firearm drawn, not because of the scream, or the darkness, or the abandoned building, but because the combination of factors indicate the weapon should be drawn.

Critical Incident – Any event which is significantly outside the realm of normal human experience. Often results in rapid physiological changes to the brain and body that affect performance.

Brain Data Filter – The human brain receives a tremendous amount of information, more than it can process. To reduce the brain's processing challenges when it is bombarded with stimuli, the brain naturally "filters" out information it does not recognize as important. These brain filters for each individual result from, among other things, that individual's own set of life experiences.

Declarative Memory – **Long-term memory** storage system that stores information that is consciously accessed. If something is thought about first, then performed, it is probably being accessed in the declarative memory system.

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Emotions – Emotions result (at least partially) from chemical (**hormone**) changes in brain tissue. Since learning is fundamentally the result of chemical reactions inside the brain, altering the chemical composition of the brain tissue has a significant impact on a student's learning.

Emotional Arousal – Emotional arousal is achieved in a training environment by adding emotional content, or emotion causing stimuli, to training. At a neurochemical this means that the chemical composition of the brain tissue changes. Generally, non-fear emotional arousal tends to improve long-term learning ability; although, it may impair the brain's ability to add more information to short-term memory.

Enhancement – Later stages of learning. Once information has been placed into **long-term memory**, it can continue to be improved. For example, just because a student has learned to draw a pistol effectively does not mean that the drawstroke cannot continue to be improved over time.

Environmental Skill Performance – Performing a skill based on environment. For example, on a shooting range a buzzer may indicate to draw and fire. At a hockey game, drawing and firing a weapon based on a buzzer would be tragically inappropriate.

Fear – Fear is an **emotion** that is both relatively easy to study scientifically (because it is easy to define/recognize) and that significantly impacts learning. Fear generally decreases learning potential; however, in certain specific circumstances (such as associating a stimulus with an event or outcome), fear can result in nearly instantaneous, "permanent" learning.

Hebb's Law – The basis for connectionist learning theory. States that neurons which fire together eventually wire together, creating literal pathways that improve the flow of signals between these neurons.

Hormones – Chemicals created naturally by the body. Can change the chemical composition of body and brain tissues, which can alter function and performance of both the body and the brain.

Integrated Skill Development – Application of the BUILDING SHOOTERS learning methodology to conduct entry level training or new skillset training. It is called "integrated" because the system of training design facilitates structured and informed use of **interleaved training** methods that integrate other skills, contexts, stimuli, and decision-making into the learning process. This can be applied in three general environments: 1) an academy/schoolhouse setting, 2) an in-service program intended to develop an entirely new skillset, 3) a mentoring setting (for more information please see our book *Mentoring Shooters*).

Integrated Skill Enhancement – Application of the BUILDING SHOOTERS learning methodology to sustain and (preferably) enhance existing skillsets. It is called "integrated" because the system of training design facilitates structured and informed use of **interleaved training** methods that integrate other skills, contexts, stimuli, and decision-making into the sustainment/enhancement process.

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Interference – A phenomenon where information in the brain is corrupted by other information that is competing for the same neural capacity or space.

Interleaved Training – Sometimes referred to as chaotic training. The actions and skills are not known by the student ahead of time and things like **context** and decision-making are required for skill performance. Interleaved training generally produces better long-term operational outcomes than **blocked training** does.

Learning Transfer – Modifying learned skills and knowledge to solve new problems in new environments and contexts. This is an advanced level of training where the focus becomes on thinking and problem solving. Before skills and knowledge can be modified and applied in novel ways, they must first exist in long-term memory.

Long-Term Memory – Storage location in the brain where information can be stored for long periods of time, unlike **short-term memory**. Long-term memory has two distinctly and functionally separate components, **declarative memory** and **procedural memory**. These two long-term memory storage locations have different uses; however, the same information can exist in both places at the same time.

Mirror Neurons – Brain cells which are components of neural networks for performing skills or activities that have the capability of firing when an activity is observed only. In other words, a neural network can be strengthened when a student watches a skill be performed, not just when the student is actually performing the skill. *Note that after a skill is well-learned by a student, this type of observation may have the opposite effect and reduce the student's skill performance.*

Modeling Tool – A method developed by Building Shooters to neurologically model the impacts and long-term results of training design and methodology. In theory this tool allows training developers to model a neural map for operational performance and then build this neural map in every student using specific and informed training methods.

Motor Skill – Physical skill that involves motion of the body. Normally involves response to or use of **sensory input** from the body's senses.

Neural Network – A combination of **neurons** that are repetitively linked together electrically, resulting in permanent physical changes in the cells that reduce electrical resistivity between the cells and make the activation of those neurons together, in sequence, much more energy efficient.

Neural Map – A "blueprint" of the desired operational performance requirements of the student – from the perspective of what brain functions, information, and skills are required to be in what parts of the brain.

Neurons – Brain cells whose primary function is sending and receiving signals.

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Observation – Watching a skill, sequence, or interaction take place is a very effective form of learning. In some cases, the watcher's brain can actually fire the same **neural networks** that the performer's brain is firing. This is called the **mirror neuron** system.

Offline Time (Waking) – In order for some components of **long-term** learning to occur, the brain must be in an "awake" state and not consciously using the information being learned. Acts as a companion to **sleep**.

Physical Motor Skill – A physically performed skill involving bodily motion.

Priming – A teaching technique where information is presented to the student without any expectation that they will learn or retain it in any way. The purpose of priming is to allow the student's brain to recognize the information as important when it is presented a second time (during teaching). This increases the chances that the information will pass the brain's **data filter** and be placed into **short-term memory**.

Procedural Memory – **Long-term memory** storage system that stores information that is unconsciously accessed. If an action or response occurs directly in result to a stimulus, without the need for conscious thought, it is probably being accessed in the procedural memory system. Note that during high-stress events, chemical changes in the brain limit access to all memory systems *except* procedural memory.

Progressive Interference – Occurs when a complex, progressive skill is performed before the student possesses the capacity to perform the necessary **sub-skills** from long-term memory. This can result in repetitively performing these subskills with incorrect technique and therefore create long-term learning of technical skills being performed incorrectly.

Progressive Reinforcement – Occurs when a complex, progressive skill is performed after the student possesses the capacity to perform the necessary **sub-skills** from long-term memory. This results in repetitively performing the sub-skills with technical perfection, which improves the student's long-term learning and operational performance potential—reinforcing rather than interfering with the student's skillset.

Progressive Skills – Skills that build upon other, component, **sub-skills**. For example, drawing and firing a handgun is a complex skill that requires the performance of various sub-skills such as "snatch", pairing, grip, extension, trigger manipulation, flash sight picture (**visuomotor skill**), recoil-management, etc. Without the ability any of these other skills, the drawstroke itself will be significantly degraded, if it can be performed at all. Therefore, drawing a handgun is a progressive skill.

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Repetition – Firing a **neural network** multiple times tells the brain that the network is important and should be placed into long-term memory. It also, over time, improves the connectivity between the brain cells involved in the brain communications necessary for the performance of that skill. This is the single most effective form of producing long-term learning.

Short-Term Memory – The memory system directly to the right of the **brain filter**. In terms of function, this is analogous to a computer's RAM or Random Access Memory. Once information gets past the filter and into the brain, it usually goes first into short-term memory, where it must remain for at least 24 hours before it can be transferred to a **long-term memory** storage system. Short-term memory is distinctive because it has a finite size and cannot permanently retain information. Once the system is "full," new information must either replace or over-write existing information. When information is overwritten, often both sets of information become corrupted.

Sleep – In order for some components of **long-term** learning to occur, the brain must be in various REM (sleep) states. Acts as a companion to **off-line time**.

Stabilization – The first part of retaining information in the brain. Once a piece of information gets into **short-term memory**, it is easily corrupted or lost. After a short time (about 10 minutes), information stabilizes and is less likely to be lost or corrupted.

Stimulus Initiated Skill Performance – When a skill or series of skill are performed in response to receiving a stimulus externally through one or more of the body's senses. For example, drawing a firearm in response to a sound.

Stimulus Response – Reaction to an input signal that is received through one of the body's senses.

Stress (High Level) – Impairs most types of learning. Can result in nearly instantaneous, "permanent" associative learning. Acts in a manner similar to **fear** with respect to its impact on learning.

Stress (Low Level) – Can improve learning in male students and reduce learning in female students in some phases of a training environment.

Stress Response – The body's reaction to highly stressful events, or **critical incidents**. Rapid releases of chemicals into body and brain tissues change the way that the body operates, enhancing performance in some areas such as strength and speed, while limiting performance in other areas such as cognitive processing and fine motor skills. Engagement of the **sympathetic nervous system** is a part of the stress response.

Sub-skill – A component skill of a more complex, **progressive skill**. For example, gripping a handgun is a sub-skill of drawing a handgun.

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Sympathetic Nervous System – The body control system that is engaged during periods of high stress, such as during many **critical incidents**. Results in physiological changes that alter performance capability. In general, when controlled by the sympathetic nervous system the body has greater speed, strength, and endurance with less fine motor control, decision-making, and critical thinking ability.

Tactical Environment – Any operating environment that requires decision-making and action in response to dynamic stimuli.

Training Scars – Nonsensical actions that result from, or were learned in training that are carried out in an operational setting. Examples include bending over to pick up empty shell casings during gunfights and handing a firearm to an attacker after successfully wrestling it away from them.

Visuomotor Skills – Physical skills that involve continuous visual sensory input and feedback.