Rate of Fire Against Men:

A Quantitative Assessment of Fire Team Lethality

MAJ TONY FORMICA
LTC ELI MYERS

Live-fire ranges must deliberately measure marksmanship if they are to achieve their purpose of training Soldiers and junior leaders in the skills needed to win close combat engagements. Training Circular 7-9, *Infantry Live-Fire Training*, describes marksmanship as "one of the most important" areas that live-fire exercises (LFXs) train; we argue that it is the most important, full stop.[1] Nothing else in an LFX matters — no other training objectives have any validity if the rounds Soldiers fire do not eliminate their intended targets.

A Soldier in the 5th Battalion, 20th Infantry Regiment aims his weapons during a training exercise. (Photo courtesy of the 1-2 Stryker Brigade Combat Team Facebook page)

Fire in All of Its Forms

Our view might be stated bluntly, but it should not be controversial. Seasoned company-grade leaders in the U.S. Army tend to embrace, either consciously or unconsciously, the concept best articulated by S.L.A. Marshall that "…fire in good volume, accurately delivered and steadily maintained" wins wars; the purpose of every other military line of effort in conflict is to allow a Soldier to place a well-aimed shot at his enemy.[2] One of the marks of effective infantry leaders is their ability to read a tactical scenario and direct rates of fire appropriately, deliberately prioritizing precision or volume as the situation dictates but always confident that bullets are landing where Soldiers are aiming.

And yet, how often do LFX after action reviews (AARs) focus on marksmanship in a manner that reflects its centrality to warfighting? How often does our assessment of leader performance during LFXs focus on their ability to truly, effectively control rates of fire? Our combined 35 years of infantry experience suggest the answer to these questions is "rarely." Picture the generic LFX AAR taking place on a berm at the end of a lane. Vague terms reflecting important training objectives that are hard to quantify, such as "violence of action" and "suppression," probably take top billing as discussion items but do not provide the executing unit with concrete, measurable feedback. If marksmanship is covered in this AAR, it is usually only in reference to how quickly movable targets went down after popping up; scant consideration is given to whether those targets received a shot to their vital organs or to their shoulders before going down.

Relocate this AAR so that it takes place not at the end of the lane but the beginning. The senior trainer starts the AAR by holding up the first target silhouette that the Soldiers engaged when they started the lane and asks a simple question: "Did you kill this target?" This question is easy to answer: the plurality of bullet holes either are or are not in the target's critical zone. Similarly, because marksmanship has now been made the first and most prominent focus item in the AAR, any follow-on conversation about violence of action, suppression, or other prioritized training objectives will revolve around the central, inescapable, quantifiable question of whether the executing unit won the first firefight.

We designed a controlled experiment in which we received standardized LFX feedback from our entire formation. The results were both harrowing and illuminating: One in eight rounds fired at a target hit that target's critical zone. The immediate conclusion we drew from our data was that we needed to double down on emphasizing marksmanship at every opportunity. However, the second, more subtle inference we were able to make and subsequently underscore is the distinction between volume of fire and precision of fire — and how, to return to our opening sentence, failing to

A paratrooper from 2nd Battalion, 503rd Infantry Regiment (Airborne) engages a target during a team live-fire exercise at the Rukla Training Area in Lithuania. (Photos courtesy of authors)

measure marksmanship in LFXs risks training the former at the expense of the latter, to the detriment of units' combat effectiveness.

Background and Assessment Methodology: Taking a Reasonably Accurate Measurement

Our unit ran a team leader academy as we entered a period in our operational tempo where we were absorbing new Soldiers and junior leaders. We made marksmanship — the ability to not just hit a target but to hit it in its critical zone, thereby eliminating the presented threat — the unifying theme of our academy. Our unit's definition of marksmanship was explicit and well-publicized: direct fires hitting the vital organs of a target (i.e., the critical zone). We intended to measure both our Soldiers' marksmanship and our team leaders' proficiency in employing their fire teams over the course of two iterations of team LFXs. Both iterations would occur on the same piece of terrain against the same enemy problem set.

This degree of control and centralization over something as routine as team LFXs might strike some readers as overkill. We agree in principle but not in practice: We wanted a clear-eyed assessment of our Soldiers' marksmanship under something approximating combat conditions well before we entered our next intensive training cycle. The team leader academy was our first and best opportunity outside of the staid, laboratory-like conditions of the flat range to accurately gauge this. Measuring marksmanship under combat-like conditions required that all fire teams were evaluated against the same standards on the same range. Moreover, we wanted to teach our most junior leaders early on that the first and last measure of their effectiveness was how well their Soldiers' aim placed rounds on a target's critical zone.

In both team live-fire iterations (hereafter referred to as TM LFX I and TM LFX II), a fire team faced five E-type silhouettes guarding a constructed bunker; each of the silhouettes had a paper plate stapled over the target's center of mass. Range rehabilitation teams recovered the plates at the end of every LFX iteration and submitted them to the range officer in charge (OIC). The OIC added up all the hits that were on all the plates, representing the total number of hits to the critical zone that the fire team achieved during its execution of the lane. The OIC then counted all the rounds the team turned in at the end of their iteration and subtracted this number from the total number of rounds the team had been issued. The resulting figure was the total number of rounds the team had fired. Dividing the total number of plate hits (i.e., lethal hits) by the total number of rounds fired produced a marksmanship percentage. This math is demonstrated below for a notional iteration:

- Rounds on plate: 16
- Rounds issued: 190
- Rounds turned in: 42
- Rounds issued - rounds turned in = rounds fired
    - 190 - 42 = 148 rounds fired in this iteration
- Rounds on plate/rounds fired = marksmanship percentage
    - 16/148 = 10.81 percent of rounds fired hit the critical zone

TM LFX I had fire teams moving from an assault position directly onto and executing the range described above during both day and night conditions. Teams were given a week to retrain on tasks identified and prioritized by their leadership before executing TM LFX II. TM LFX II occurred on the exact same range and under the exact same conditions as TM LFX I, with an important caveat: Fire teams first

executed an estimated 6-kilometer movement under load through the training area, during which they were assessed on land navigation techniques, their ability to react to indirect fire, and their ability to treat and evacuate a casualty en route to the LFX range. TM LFX II did not feature a night iteration due to limited land availability and competing unit priorities.

Results: Massing Fire Whenever Ordered

We compiled the results of 45 fire teams during the day iteration of TM LFX I. The average daytime marksmanship percentage across the formation was 10.15 percent.[3] The night iteration of TM LFX I halved these marksmanship percentages: The unit average at night was 5.52 percent.[4] Marksmanship percentages increased after TM LFX II, though not in a statistically significant fashion. Here, with a total of 39 logged fire teams, the battalion average for day iterations was 16.69 percent, with a maximum marksmanship percentage of 41 percent and a minimum of 2.31 percent.[5]

The net unit marksmanship percentage was 13.32 percent once we combined the daytime results from TM LFXs I and II. We are confident that these results were mathematically representative of our formation's marksmanship at the time as measured by total hits in the critical zone out of all rounds fired.[6] A scatter plot showing the relationship between team marksmanship percentages and the total number of rounds those teams expended, meanwhile, revealed an interesting pattern: the more rounds a fire team expended during their iteration, the lower their marksmanship percentage tended to be. This scatter plot is depicted in Figure 1.

A binomial regression indicated a statistically significant inverse relationship between rounds fired and resultant marksmanship percentages.[7] The firing of a single round reduced a team's marksmanship percentage by .02 percent on average, which becomes important once teams begin expending hundreds of rounds. Figure 1 shows this relationship graphically: The fire teams that achieved the highest marksmanship percentages expended 150 rounds on average. By comparison, fire teams which expended more than 300 rounds rarely achieved a marksmanship percentage higher than 15 percent.

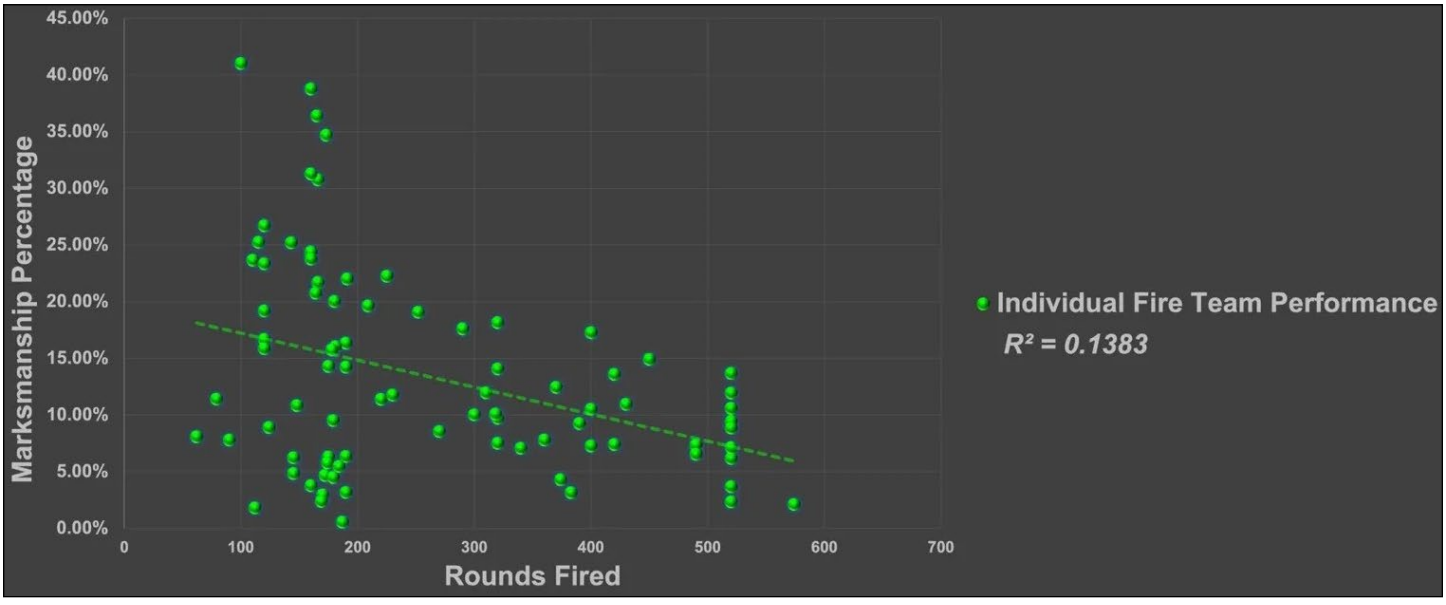
Finally, our model suggested we could predict 13.83 percent of a team's marksmanship percentage simply by knowing how many rounds they fired.[8] Simply put, a fire team which controlled its rates of fire such that they could accurately engage targets with each round returned a much higher marksmanship score in nearly every case. Fire teams with a common level of training and experience prior to the LFX returned strikingly similar marksmanship percentages, leading us to posit that the determining factor in their performance was their fire control as expressed by rounds expended.

Interpretation and Discussion: Fire in Good Volume, Accurately Delivered

It is important to remember that the percentages above reflect our fire teams' marksmanship as we defined it: a shot to the vital organs, not the shoulder. We wanted our team leaders to wonder if they truly would have made it to the bunker if the only thing their Soldiers reliably shot were non-vital points on enemy targets. It is also important to remember that our results represent the performance of a fire team, not an individual. Fire teams contain the M249 Squad Automatic Weapon (SAW), which is explicitly designed to increase the team's volume of fire.

Our results were still surprising. A unit marksmanship percentage of 13.32 percent means that one out of every eight rounds fired would kill its intended target. The immediate conclusion to draw was that we needed an increased focus on marksmanship — and indeed, the subsequent improvement in marksmanship percentages in TM LFX II, while not statistically significant, strongly suggests that having leaders

Figure 1 — Rounds Fired and Fire Team Marksmanship



ensure their Soldiers take the extra half-second to acquire a good sight picture has a marked effect on marksmanship performance on a LFX range. This is especially noteworthy because fire teams executed TM LFX II fundamentally more tired than they had been in TM LFX I, coming to the range after hours of dismounted movement at night through the wooded terrain of the training area.

But the more subtle inference to make from our data is the distinction and relationship between precision of fire and volume of fire. If, as our data strongly suggests, marksmanship is inversely proportional to the number of rounds fired, then the effectiveness of direct fire has more to do with precision than volume. These two aspects of fire control are not mutually exclusive: Both have their place in a gunfight, and one of the key roles of a tactical leader is knowing when to emphasize one over the other. However, we argue that both volume and precision are functions of relative skill, and that proficiency in the latter enables the former. A Soldier who has greater weapons training and experience can achieve precision with each shot faster than a less-trained peer, thus increasing his volume of fire.

The suggestion that precision is more important than and enables volume of fire is another viewpoint that should not be controversial, until one considers just how many Army leaders implicitly believe that fire superiority and suppression mean increasing the volume of fire without regard for precision. Our data indicates that this mentality is counterproductive if leaders are not supremely confident that every shot their Soldiers fire is aimed with the intent to kill. Absent this certainty, high volumes of fire — lots of loud noises in an engagement, the auditory cues which many team leaders are trained to use to understand the rhythm and progress of a fight — might signal that a maneuver element is wasting valuable resources and exposing their position to create only the impression of suppression.

Presume, however, that our emphasis on precision is not controversial. We are still left with the question we asked at the beginning of this article: How often do our LFXs, in both their design and assessment, allow us to evaluate unit marksmanship and junior leader fire control?

Conclusion: Field Maneuvers Cannot Approximate Combat… But You Should Still Try

Professionals with more than a handful of years of experience have all lived this reality: Our unit begins an intensive training cycle with a series of flat qualification ranges before beginning collective training gateways. We rapidly progress from fire team, to squad, to platoon live fires, usually culminating in a company LFX at a combat training center. Each step up the Integrated Weapons Training Strategy (IWTS) ladder brings more and increasingly complicated training objectives, and we tell ourselves that our formations are becoming better at warfighting because they are negotiating those IWTS wickets in a linear fashion that is easy to confuse with progress.

Rarely, if ever, do we circle back to reexamine the foundations of that IWTS ladder and validate that it remains on solid ground: Rarely do we assess our formations' marksmanship with the same rigor we applied on the flat range, even as our LFXs' increasing complexity brings them closer to simulating combat. There are a host of sources of this oversight, and most of them are benign if not well-intentioned. At base, however, our experience tells us that units which do not meaningfully inspect marksmanship in their LFXs do so for one main reason: They do not think they need to.

This is almost always an unconscious omission, bore on the unexamined assumption that a passing score on a day and night qualification table implies that a Soldier will deliver accurate and lethal fires to any target they aim at. It is also a classic case of the illusion of understanding, the flawed belief that we accurately comprehend the past — which most of us do not — and so we can meaningfully anticipate and control the future, which most of us cannot.[9] It manifests in the faulty logic which posits that because our unit just did marksmanship density, we do not need to assess marksmanship during team LFXs because our fire teams are all qualified.

Paratroopers from 2-503rd IN engage opposing forces during Exercise Iron Sword 16 in Pabrade Training Area, Lithuania.

The results from our team LFXs should cause professionals to reexamine that logic chain if they notice they have ever succumbed to it themselves. The risk of executing an LFX that does not involve an inspectable, measurable assessment of marksmanship proficiency is training volume of fire without precision — and the risk of training volume without precision is that Soldiers will not win the first firefight. Senior trainers should be constantly aiming to achieve both outcomes while understanding that precision enables effective volume.

Many readers will likely remember a number if they recall anything from this article: "one in eight," "13.32 percent," and so forth. We would like to emphasize two points here. The first is that our results reflected a thin slice of our formation at a specific time in its life cycle. They are specific and only apply to that unit at that time and have no bearing on either that unit today or, more generally, like units across the Army. The second is that the numbers and statistics were only useful to us in helping us truly understand ourselves — and that understanding was only possible because we decided that marksmanship was something worth measuring in concrete, quantifiable, incontestable terms.

There are no barriers to entry that would prevent a conventional Army unit from doing what we did. The backside support requirements that allowed us to make marksmanship the centerpiece of our team LFX series were minimal: a modest outlay for paper plates, a data collection table, and junior leaders — OICs and range safety officers — who understood the value of the data they were entrusted with collecting. The math that allowed us to see ourselves, arguably the most intimidating component of our study, took less than 20 minutes to execute, including both data entry and running a few lines of code in a statistical software package. Planning and forethought allowed us to ensure that marksmanship formed the base of all Soldier and leader assessment in our LFX series.

We would like to think that the benefits of our approach to our formation outlasted our tenure. Junior leaders have seen how easy it is to both set up and conduct an AAR of an LFX that measures marksmanship, and to leverage evidence in discussions about violence of action or the efficacy of suppression. Soldiers have seen that their marksmanship always matters and is always assessable, especially outside of the laboratory conditions of the flat range. More seasoned leaders have learned how to assess the unit's training glidepath and adjust it as necessary based on continual range feedback. A few staff officers were tortured to remember the basic statistics skills they acquired in their freshmen or sophomore years of undergraduate studies and apply those skills to their profession. Our experiment will have more than proved its worth if even one of these cohorts remembers these experiences as they progress through their careers.

Editor's Note: *This article first appeared on* The Company Leader *at https://companyleader.themilitaryleader.com/2024/08/25/rate-of-fire-against-men/.*

The risk of executing an LFX that does not involve an inspectable, measurable assessment of marksmanship proficiency is training volume of fire without precision — and the risk of training volume without precision is that Soldiers will not win the first firefight.

Notes

[1] Training Circular 7-9, *Infantry Live-Fire Training*, April 2014, 1-2.

[2] S.L.A. Marshall, *Men Against Fire* (Norman, OK: University of Oklahoma Press, 2000), 66-67. Authors' Note: The section subheadings used throughout this article are all pulled from *Men Against Fire* as an homage to Marshall: His statistics might have been fabricated, along with much of his biography, but we thoroughly agree with his central premise that accurate direct fires are at the heart of warfare.

[3] The maximum marksmanship percentage of TM LFX I day was 36.36 percent, and the minimum was 1.79 percent; the median marksmanship percentage was 10.87 percent, and the mode was 7.8 percent. A single standard deviation was 9 percent.

[4] TM LFX I Night maximum = 15.52 percent; TM LFX I Night minimum = 0 percent.

[5] TM LFX II Day maximum = 41 percent; TM LFX II Day minimum = 2.31 percent.

[6] Our sample size of 84 fire teams is large enough that we can be confident it closely represents the performance of any of our fire teams on this range. A sample size of 30 is generally considered sufficient for standard statistical analysis and interpretation in social sciences, although it might not be large enough for precise inferences. This accepted standard derives from the Central Limit Theorem, which states that a large enough random sampling — usually containing at least 30 observations — will produce an approximately normal (i.e., bell-shaped) distribution, and the Law of Large Numbers, which states that larger and larger random samples tend to produce results that are closer and closer to the true population's descriptive statistics — in this case, the true marksmanship percentage of the unit. See Alan Agresti, *Statistical Methods for the Social Sciences* (Fifth Edition) (Boston: Pearson Education, Inc., 2018), 88-100.

[7] These results were significant at the .001 level, meaning that there is at least a 1-in-1000 chance of our results being due to random chance, i.e., that there was no relationship between rounds fired and marksmanship percentage. This result is as rigorous as statistical significance gets in the social sciences.

[8] R2 = 13.83; R2 measures how much of the proportion of all variation between the dependent variable (lethality percentage) is explained by the independent variable(s) (rounds fired). A simpler way of understanding this concept is to say that R2 allows us to see how much of a fire team's marksmanship can be explained just by how many rounds they fired. See Agresti, 317.

[9] Daniel Kahneman, *Thinking Fast and Slow* (NY: Farrar, Straus, and Giroux, 2011), 201.

MAJ Tony Formica is a career Infantryman with experience in Stryker and airborne formations. He has deployed to the U.S. European Command and Central Command areas of responsibility. MAJ Formica earned a Bachelor of Science from the U.S. Military Academy and a Master of Arts from Yale University's Jackson School of Global Affairs, which he obtained through the Downing Scholars Program.

LTC Eli Myers is a career Infantryman who has served in light, airborne, and special operations forces formations. He has commanded company and battalion formations and has served at tactical, operational, and strategic levels.