The Design of Combat Patrol™
One Man's Wargame Development Journey
Part 3

In part two of this series, I described the rationale for the ground scale in G.A.M.E.R.™, as well as how I designed the game for both "realistic" and "cinematic" gamers and the development of the activation mechanism for the system. In this article, I will focus on the development of the firing mechanism.

Rate and Distribution of Fire…

Controlling rate and distribution of fire is an important role for the squad and team leader. Rate of fire involves a steady pace of fire that suppresses and kills the enemy but does not consume all the team's ammunition in the first few minutes of the firefight. Despite what you see in movies, suppressive fire is not blazing away randomly in the general direction of the enemy. Instead it is controlled, aimed fire at known or suspected enemy positions. Rounds coming close suppress a soldier, not rounds that are nowhere near him. Of course rounds through his soft body parts have a huge suppressive effect. Distribution of fire involves ensuring that a leader's team or squad is firing at targets across the entire sector of fire. In the offense as well as the defense, platoons, squads, and teams are assigned sectors of fire. These assigned sectors of fire ensure there are no gaps through which the enemy might slip. It is important to engage all targets within the sector, not just the obvious targets, easy targets, or targets that somehow catch your attention. Well-trained infantrymen scan their entire sector looking for the enemy. Controlling rate and distribution of fire is difficult on a range and even more difficult in combat.

Some history…

I wanted a firing mechanism that reflected this difficulty. I did not want it to be easy for the players to get their figures to fire at exactly the enemy figures they chose. I faced this issue in the design of *Beer and Pretzels Skirmish* over 15 years ago. The mechanism chosen was quite unique and did (in my opinion) a terrific job of distributing hits across an area without exquisite player control over which enemy figures were targeted or hit. First, fire was conducted as a *team* into an *area*, such as a building, open area, or patch of woods. Fire resolution began by summing all the team's firepower. This was based on which figures were firing, what weapons they carried, and the range. This total firepower factor was reduced by the enemy's defense value. Defensive values were based on not only cover, but activity. A soldier sprinting in the open had lower defense than a soldier employing three-second bounds (or rushes) from cover to cover. The total net firepower was then applied to all figures within the target area. A rather imposing looking (but actually easy to use) table was used to do this, where the vertical axis was the difference between total fire power and the target area's defensive value and the horizontal axis was the number of figures in the target area. I am glossing over some of the finer points in this brief

description. Then for each figure in the target area, ***not for each firing figure***, a die was rolled to determine whether the figure was stunned, wounded, or killed. Admittedly, rolling for each target figure rather than each firing figure was counter intuitive. Once the players wrapped their heads around it, however, this method worked well. There were means by which better leaders could influence this fire, and players could try to concentrate their fire into a smaller area or spread their fire across a larger frontage.

Always trying to move forward, for G.A.M.E.R.™ I did not want to merely re-use what I had done for *Beer and Pretzels Skirmish*. (I normally abbreviate this to *BAPS*, but I understand that term has a colloquial meaning for some readers – which may explain why the rules never got any notice in the UK.) I liked distributing a squad's firepower over a smaller or wider area and not being able to target individual figures. While it remains innovative and in some ways elegant, the *Beer and Pretzels Skirmish* method fell short of my goals in a couple of ways. First, there was really no good way to represent individual soldier characteristics. As mentioned in part 2, I was trying to enable both "cinematic" and "realistic" games in the design of G.A.M.E.R.™, so it was important that I could have some soldiers with better marksmanship than others – particularly at the higher resolution described in part 2. Second, this method did not easily represent the abilities of more elite units beyond better leader control, which is beyond the scope of this article. There was also some dirtiness when different figures within a target area were behind different cover, such as when some were behind a wall and others were in front of it. In those cases you had to re-compute the horizontal axis on the combat result table while using the total number of figures in the target area (regardless of cover) for the horizontal axis. It worked fine, but was slightly complicated for modern gaming tastes. Finally, the leader's influence on the fire was not as great as I wanted.

So, I began to explore other options…

Drawing a bead on the enemy…

In a desire to give the team leaders more to do with respect to rate and distribution of fire, I came up with a method that involved using beads to represent a unit's firepower. I got this idea from the pulp spaceship game, *War Rocket*. In that game, during the firing phase all firing ships place beads or markers on ships they are targeting. The player controlling the targeted ship rolls just once to determine its fate, taking into account the total number of shots (or beads) placed on it.

Figure 1: War Rocket uses an interesting chit or bead method of accumulating potential damage on ships.

Before describing the "bead method" first tried out for G.A.M.E.R.™, let me wander off the reservation again. I firmly believe that a submachine gun is a submachine gun is a submachine gun. They all fire pistol ammunition at a high rate of fire and short range. There is no reason to represent a Sten differently than a Thompson or any other submachine gun. Similarly all bolt-action rifles of this period are similar enough in capabilities that the differences between the British,

Russian, Italian, and German versions are irrelevant in a skirmish game. Perhaps they matter in a role playing game like the old SPI game, *Commando*, but I'm not convinced. So in G.A.M.E.R.™, there are a limited number of small arms by broad category, such as bolt-action rifle, semi-automatic rifle, light machinegun, pistol, etc.

As a second aside, it is important to distinguish a machinegun's role from its caliber. In this period, light and medium machineguns both fired roughly the same .30(ish) caliber rifle ammunition. The difference between the two is that in a light machinegun *role*, the weapons are either fired unsupported or from a bipod. In the medium machinegun role, the weapons are fired from a tripod. So in G.A.M.E.R.™, an MG-34 can be either a light or medium machinegun depending on whether it is using its tripod, while a BAR is always considered a light machinegun.

I don't remember putting a lot of thought into whether to have three ranges bands (short, medium, long) or five (point blank, short, medium, long, and extreme), but I decided on three. Three bands resulted in fewer modifiers to the card system (described below). I did spend a fair amount of time thinking about whether to use standard range bands for all small arms or different ones. For instance, should short range be different between a rifle and pistol, with the pistol being less effective at that range, or should the short range for a pistol be different than for a rifle. While common range bands are easy for players to remember at the skirmish level it seems counter intuitive. I made it work in *Beer and Pretzels Skirmish* because I used five range bands, but with three it just wasn't going to work. Instead, I settled on a method that said if short range is x, medium range is 2x, and long range is 4x. So a player really only needs to know the short range of his weapon and can easily compute the others.

Drawing on the *Beer and Pretzels Skirmish* method, the various weapons had different firepower values (represented as beads) at different ranges. The number of beads could be modified by the firing figure's marksmanship attribute. These beads were then distributed as evenly as possible across all the figures in the target area. Team leaders had a leader rating, perhaps as high as four or five. This leader rating allowed the team leader to then move that many "bead-men." A leader with a rating of three could move three beads one target figure left or right, one bead three target figures left or right, or some combination. This gave the leader an explicit role in shaping how his fire was distributed across the target area. Better leaders would be more effective and could concentrate their team's fire on a key weapon. After this redistribution, the player rolled to determine the level of damage of each figure with beads on it. This method capitalized on the strengths of the *Beer and Pretzels Skirmish* method while addressing two weaknesses: it gave the leader some ability to influence his team's fire and it eliminated the difficulty of different target figures having different cover. I began to play around with the idea or rolling for hit location so that hits in protected areas would be converted to misses.

I subjected my gaming buddies Chris and Duncan to a couple of play tests of this method. It worked okay, and if I was going to continue down this path, some of the rough edges needed to be filed off. I felt, however, that it had serious drawbacks. First, it allowed players to snipe a little bit at enemy leaders and crew-served weapons. More importantly, the manipulation of all the beads was a bit fiddly and time consuming ("Hey, are there four beads on that guy or five? Is that bead on this figure or that figure?"). During play, stacks of beads littered the table and spoiled the game's aesthetics, just like the stacks of order chips in *Johnny Reb* and *Beer and Pretzels Skirmish*.

Back to the drawing board…

In the back of my mind, I was still pondering the use of cards, rather than charts, tables, and dice, to resolve combat. In combat resolution for a skirmish game, I felt that I really have to manage four sets of probabilities.

- The chance of a hit on some soldier in the target area.
- Determining which figure was hit.
- Perhaps determining where the figure was hit.
- Determining the amount of damage inflicted.

From the standpoint of probabilities, this can all be accomplished with four separate (or more) die rolls or with some careful analysis can be reduced to a single die roll.

Hit or miss…

As mentioned, I think it is important to determine the *minimum* set of modifiers needed for a particular roll. It seems to me that the most important determinates of whether a figure is hit by small arms fire are:

- Range to the target,
- Whether the firer is in a supported firing position,
- Whether either the shooter or target are moving (with the shooter moving having a greater impact),
- Whether the target is behind cover, and
- Whether the shooter is wounded.

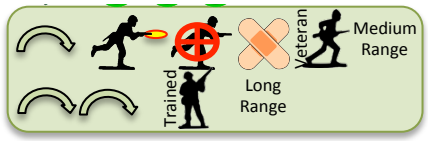


Figure 2: The initial set of modifiers for the game. These have remained stable during development. Note that cover is missing as a modifier.

You can imagine – and many designers have included – other factors, but these are the ones that seem the most important to me. So these are the only modifiers I wanted to include. As discussed in part 1 of this series, I wanted to represent cover as protection, not a modifier to hitting, and that will be discussed again below. Note, too, that all modifiers are bad. The starting point for computation is the best possible case: elite, stationary, unwounded soldiers firing at a stationary target in the open. In play testing I found that making all modifiers bad was really easy for players to remember when they were flipping cards quickly to resolve several actions in quick succession.

The top row of modifiers in Figure 2 are applied as one "column shift" if the shooter is moving, the target is moving, the shooter is wounded, the shooter is veteran, or the target is at medium range. These modifiers are cumulative, so a wounded and moving shooter would shift two "columns." The second row of modifiers indicates two-column shifts for trained shooters or fire at long range, which are again cumulative.

Given all this thinking I built a traditional-looking table with "hit" and "miss" icons. If this table were going to be on a chart card, the player would cross reference the marksmanship of the firing soldier with the range to the target. Then modifiers would be applied and a d10 rolled for randomization. The final cell in the table after modifications would indicate whether the shot was a hit or a miss.

Having decided to experiment with using cards for combat resolution, I needed to deconstruct this master chart and put portions of it on different cards. Since a normal deck consists of 54 cards, it was easiest to think of each card representing approximately a 2% probability. Drawing a card is analogous to rolling a die. So I broke the "master" chart into several charts, where each small chart corresponded to a portion of the big chart based on a die roll. The smaller charts initially looked something like these:

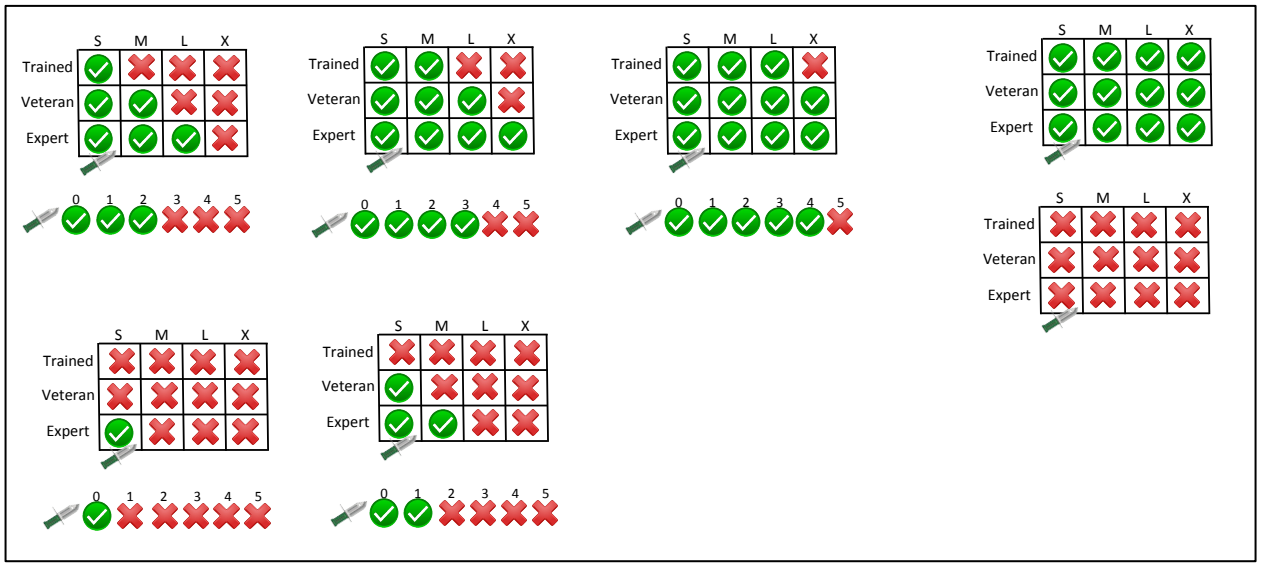


Figure 3: First and second attempts at decomposing the master chart and then a refinement on the first attempt.

I thought that flipping a card and then having to cross reference a table and then apply modifiers would not be fast. It had the virtue of eliminating two modifiers (range and marksmanship), but I wanted players to be flipping cards and knowing the answer in less then a second in order to keep the game moving. During a morning run, I realized that I could collapse these charts and then make marksmanship skill a modifier. Each two-dimensional chart was reduced to a one-dimensional chart, as shown in Figure 3.

I want to pause here to make what I think is an important point. The development evolutions described thus far took over six months of thinking, testing, thinking, prototyping, etc. I do not believe most gamers appreciate the time, effort, and thinking that goes into developing something smooth and elegant. They often just look to see if the modifiers match their preconceived notions, scan the eye candy, and write a review without playing the game. As a result of this work, however, a player can flip a card, move right (and only right) the appropriate "column shifts" and quickly read the result (hit or miss). This *literally* takes less than a second. I also think many designers do not put much time and effort into thinking and rethinking mechanics. It is just too easy to make another chart or add anothre modifier.

Things that go BOOM!...

It was obvious early on that for high explosive (HE) weapons, something slightly different was needed. First of all, HE typically involves a scatter step if the round didn't land where indicated. I really dislike laying a bunch of burst radius templates on the table and the ambigutity associated with determining the burst radius each figure occupies. In

Look, Sarge, No Charts: World War II, I got rid of burst radii by saying that indirect fire had to be directed at a platoon base, and indirect fire either hit or missed with no scattering. At the level of those rules, this worked with little loss of fidelity. I racked my brains for several weeks, but I couldn't come up with a method for a skirmish game that elminated the need for a burst template.

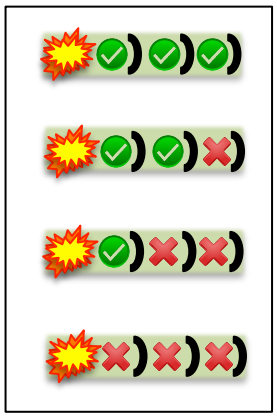


Figure 4: Early indicators of hits due to high explosive rounds.

In the end, I decided that HE weapons will come in three sizes, small, medium, and large, each size having a different burst template. Rather than circles, I made these octagons. In Figures 3 and 6, you can see a bayonet symbol. If an HE weapon misses its intended point of aim, the player draws the next card and looks for the bayonet symbol to determine the direction of scatter. Scatter distance is determined with those tiny numbers above the hit and miss symbols at the very top of the sample cards shown in Figure 5. There are eight scatter directions, and the octogonal shape of the burst templates makes it easier to meaure the scatter direction than a circle.

Initially, I was going to use something like the symbols shown in Figure 4 to determine whether a soldier within the burst radius was wounded, where the symbols were read from left to right as a small, medium, or large HE weapon. After play testing this a few times, I decided to instead use burst symbols with "S," "M," or "L" in them to indicate whether a figure is hit. These were easier for players to comprehend quickly. So, if the soldier is inside the burst radius of a small HE weapon, the player flips a card. If the "S" burst indicator is shown, the figure is hit, and the player flips the next card to determine if he is wounded or incapacitated as described below.

During testing, we felt that there should be some type of stunning effect caused by HE weapons. I felt that a blanket rules that said that all soldiers within the burst radius were stunned would lead to gamey tactics. Players might just start tossing grenades all over the place just to stun the enemy in a haphazard manner that wouldn't reflect actual tactics. Having no stunning effect didn't seem to work right either. After several tries, one of the guys in our club, Kurt, suggested that if any explosion icon appeared on the card other than the one the player wanted (e.g., the player was looking for a medium icon, but a large one appreard), the figure in question would be stunned. This worked well. After a number of playtests, however I decided to add a double exclamation point icon to half of the cards. When this symbol is drawn, the figure is stunned.

This method loses some of the resolution of multiple burst radii for different sized weapons (a lethal and burst radius for each size weapon, for instance), but in play testing, this seems to have come at the loss of little fidelity.

Who got hit? How badly?...

To speed the game and also replicate the challenge of rate and distribution of fire discussed earlier, I wanted all fire to be into an area, not against individual soldiers. I needed a method to determine which figure was hit. There were several challenges to overcome. Since units could come in a variety of sizes, I could not build a randomization mechanic that relied on units being a fixed size. I wanted there to a chance to hit the same

soldier more than once. In *G.A.S.L.I.G.H.T.®*, you roll a random number between 1 and the number of figures in the unit. Then you count off through the unit. If the number of figures remaining in the unit is an even multiple of the die roll, you hit the same figure many times. While this doesn't seem too likely, it seems to happen at least once a game. You can explain it away in a light-hearted game like *G.A.S.L.I.G.H.T.*®, but that was not going to work for G.A.M.E.R.™.

Eventually, I decided that after each hit a different random number was needed to determine the *next* figure hit and that 1-5 was enough randomness for this. For the first hit during the current activation, the hit randomizer number determines which figure was hit, say number three. This first hit is ALWAYS counted from the shooter's left. For the second hit on the same during the same activation, the hit randomizer number determines the next figure hit, say two. Counting from the last figure hit, number three, this indicates figure number five. The counting wraps back around, so if the target unit only had four figures, the counting wraps back around to figure number 1.

After several different ideas, I decided that each card could have a randomizer; after the players determine that a figure hit someone, the shooting player could consult a different area of the card to determine which soldier was hit. This was great! I could use one card draw to determine if there was a hit, who was hit, where he was hit, and how much damage resulted. The problem was that this required a LOT of cards in the deck: 10 x 10 x 10 x 5 x 9 = 4,500!

- 10 (at least 10 for the hidden die roll to determine whether the shot was a hit) x
- 10 (head, left arm, right arm, upper torso, upper torso, lower torso, lower torso, left leg, right leg, both legs)
- 5 (randomization for which figure in the target area was hit)
- 9 (except for a head, each hit location could be either a Wound or Incapacitation)

I then decided that I could make a simplifying assumption (which would only be *almost* true unless the each card was replaced and the deck shuffled seven times before the next card was drawn) that each of these results was independent. I also realized that some of these results, such as hit location and wound effect, could be collapsed into 20 cards instead of 90 cards. Given these realizations and assumptions, I determined that players could draw one card for whether the shot hit and, if the shot hit, they could draw a second card for which figure was hit, where it was hit, and how badly he was wounded. With a little work, I got this down to 50 cards, within the limit of a normal 54-card poker deck. I then used the remaining 4 cards to repeate results from the other 50 cards that I wanted to appear slightly more frequently that 2% of the time. On two cards I replaced the hit randomizer with "leader hit" and "soldier with crew-served weapon hit," because one can imagine those being high value targets. (Later when I was working with the publisher, DriveThruCards, I learned that I

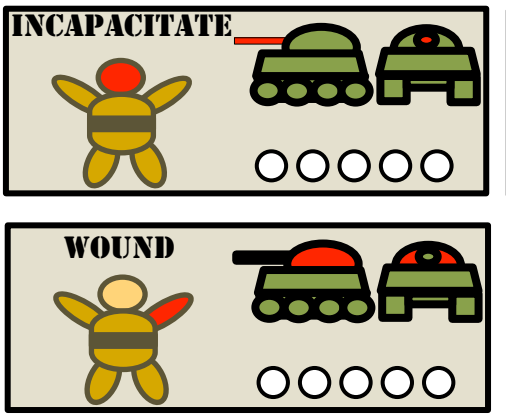


Figure 5: Some sample hit location indicators along with a blank hit randomizer (the white circles).

could make decks of sizes other than 54 cards, so I cut out the extra for, down to a 50-card deck, which make the math better.)

Uh-oh! He's wandering off again…

Wounds and incapacitation: When a soldier is hit in combat, even if the wound is not life threatening, he must take time to treat himself. More severe wounds might not kill him, but the soldier will be out of the fight. I decided early that all wounds should also stun the soldier for one activation. More severe wounds cause incapacitation, which may or may not result in death.

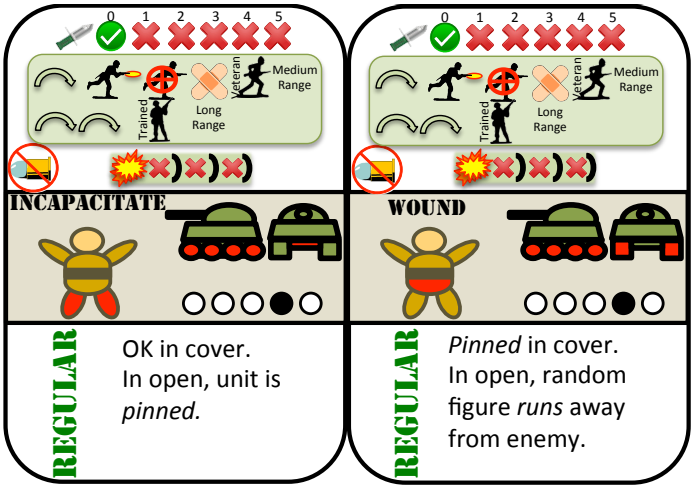


Figure 6: Early prototype cards. These two samples have the out of ammunition icon.

Morale / training levels: While often treated as the same in most game designs, I think that morale and training are separate, orthogonal – though perhaps not completely independent – variables. You can imagine motivated but poorly-trained troops as well as well-trained, but not particularly motivated, soldiers. Though I have occasionally lumped them together in previous designs myself, for this project I was determined to keep them separate. That is why there are separate attributes for marksmanship (Accuracy), hand-to-hand (Melee), and morale (Guts) in G.A.M.E.R.™.

It is not important that a morale rating of a unit or soldier be universally consistent across all troop types in every theater in every month of the war. It is more important that the ratings of troops within a scenario be *relatively* accurate. To accomplish this, in most cases three morale levels are sufficient for most games. In G.A.M.E.R.™ I began by using the terms trained, veteran, and elite. The term "trained" seemed to give players a problem when applied to morale, so the three levels of Guts evolved into green, regular, elite.

Running out of ammunition: In the 80's when I first began thinking about WWII skirmish games, tracking individual bullets was in vogue. Recall my discussion about maintaining a consistent level of abstraction. Squad leaders do not track individual bullets during a firefight, but I still wanted to reflect those times when the soldier – in the heat of battle – stopped counting rounds as he was shooting and was surprised when he needed to reload or when the weapon jammed. I picked a probability – honestly it was just a number I made up – that seemed to have weapons jamming or running out of ammunition about as frequently as I wanted from a *game*

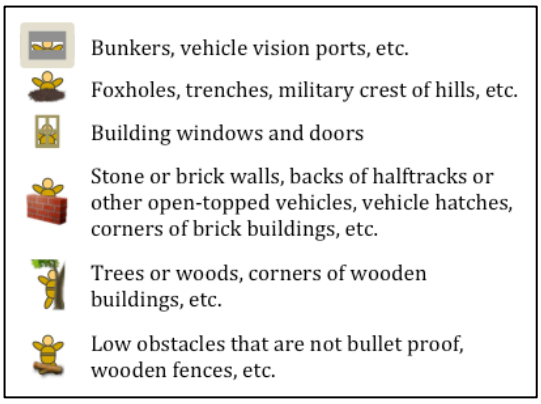
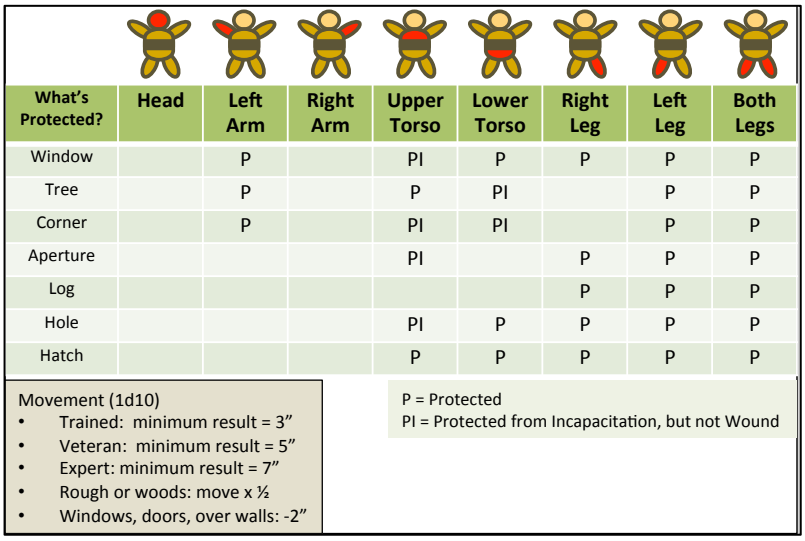


Figure 7: Types of cover in G.A.M.E.R.™, arranged in descending order with the most protection at the top and the least protection at the bottom.

perspective. On the right number of cards, as shown in Figure 6, I placed an out-of-ammunition icon. Soldiers run out of ammo or their weapons jam, but players are relieved of the bookkeeping. Because automatic weapons draw more cards when they shoot, they more frequently encounter the out of ammunition icon, which has intuitive appeal. During subsequent play tests I adjusted the number of out-of-ammunition cards in the deck until it felt "about right."

But I'm behind a tree!...

Recall from the earlier discussion that I wanted to explicitly represent the fact that cover stops bullets and protects soldiers. I began by listing the types of cover that I needed to represent. Those can be seen in Figure 7. As a first pass I used the hit locations (example in Figure 5). For instance, a hit to the legs would be protected by a wall, window, foxhole, or bunker and *might* be protected by a low obstacle or a tree. All of the cards with leg hits would have the bunker, foxhole, window, and wall icons on them. Half the leg hits would have tree and low obstacle icons. After this first pass, I looked at all the cards laid out on a table to look for logical errors. This resulted in a few adjustments where more or fewer cover icons were placed on cards in order to enforce the ordering of cover protection shown in Figure 7.



What's Protected?	Head	Left Arm	Right Arm	Upper Torso	Lower Torso	Right Leg	Left Leg	Both Legs
Window		P		PI	P	P	P	P
Tree		P		P	PI		P	P
Corner		P		PI	PI		P	P
Aperture				PI		P	P	P
Log						P	P	P
Hole				PI	P	P	P	P
Hatch				P	P	P	P	P

Movement (1d10)
- Trained: minimum result = 3"
- Veteran: minimum result = 5"
- Expert: minimum result = 7"
- Rough or woods: move x ½
- Windows, doors, over walls: -2"

P = Protected
PI = Protected from Incapacitation, but not Wound

Figure 8: Early concept for protection provided by cover.

When a figure that has been hit is in some kind of cover and when that cover icon is on the card drawn to determine which figure was hit and where, the hit is stopped by the cover. Even in John Wayne movies, however, when a bullet hits the corner of a building near someone, he ducks back instinctively behind that cover. All hits that are blocked by cover are converted into a "duck back" or "stun" result.

In play testing this has worked quite well and achieves a good feel. Cover is represented explicitly. What I have found is that the results on the cards actually tend to encourage players to have their figures seek cover, because they can clearly see its value. That value is less apparent (though perhaps just as effective) when cover is represented as a modifier to the to-hit die roll.

In early stages of development, I built the table shown in Figure 8. The idea behind "partially protected" is that sometimes that cover would protect you, and sometimes it wouldn't. I was considering having a result that some cover would slow down or deflect the bullet that would protect the figure from incapacitation, but not from being wounded. Incapacitation results would be converted into wounds. I even toyed with a notion that a

figure would ignore a wound in a part of the body in which he had already been wounded. In the end, both of these concepts turned out to be more trouble than they are worth.

More trouble than it's worth…

How does a developer determine that something is more trouble (higher resolution) than it's worth (fidelity)? For me, when I see players in play tests ignoring, skipping, or forgetting a procedure or effect, I have to sit back and think about whether to retain it. Sometimes, the effect is needed, but the mechanism is bad. As an example, players missed the out of ammunition icon shown in Figure 6. After some reflection, I still felt that this was important to represent, but that the out of ammunition icon was being overlooked, because it was not where the players were looking on the card. I modified the card to superimpose the words "Out of Ammunition" over the hit indicators (i.e., the green circles or red X's), because that is where the player was looking when he flipped a card to determine if the shot was a hit or miss. In other cases, I determined that while I thought the concept was interesting, it added little to the game and should be dropped.

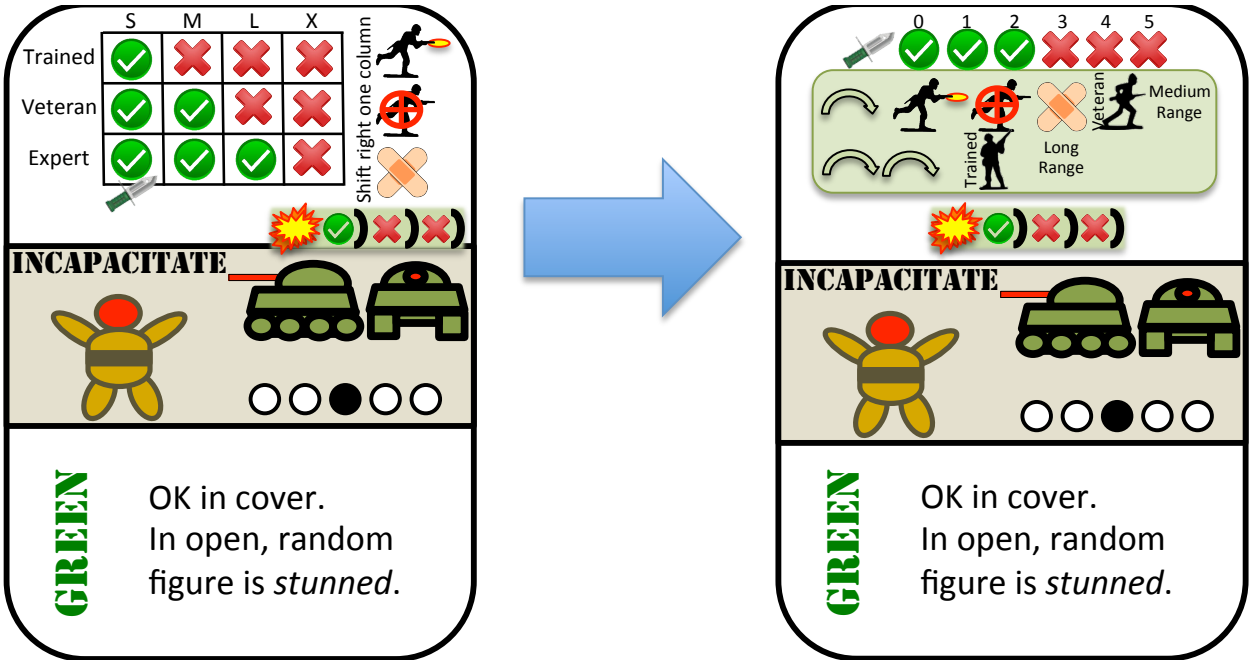
I bring this up, because I think some game developers do not step back for this introspective step. I play a lot of games written by other designers and think, "that step could be eliminated," "those two steps could be combined into a single die roll," or "that result has little impact on the game considering how long it took to resolve it."

But bullets sometimes pass through trees…

I wanted to be able represent the fact that sometimes bullets pass through trees and other cover. I developed a system in which all weapons, including small arms, have a penetration number. All cover has a protection value. When a soldier is behind cover, the shooting player compares the penetration of his weapon with the protection afforded the target figure. If the penetration is greater, the figure is wounded despite the cover. If the penetration is not greater than the protection, the cover has protected the soldier, and he is merely stunned as described earlier. This would enable heavy machine-guns, for instance, to be more effective against certain types of cover than other small arms. In play testing, it seemed that this was an unnecessary complication in most cases, so I retained it but made it an optional rule.

I bring this up, because I try to keep the core rules as small as possible and allow the players to complicate the game as they see fit by incorporating optional rules. The basic rules for G.A.M.E.R.™ are only six pages long, including a large number of figures, charts, and examples. I typically push everything other than activating, moving, and shooting into the optional rules so that players can get started quickly.

In the fourth and final part of this series, I will show the final cards and discuss how I addressed special situations, such as close assaulting vehicles.


S
M
L
X
Trained
Veteran
Expert
Shift right one column
INCAPACITATE
GREEN
OK in cover.
In open, random
figure is *stunned*.
0
1
2
3
4
5
Medium
Range
Veteran
Trained
Long
Range
INCAPACITATE
GREEN
OK in cover.
In open, random
figure is *stunned*.