An Examination Of Fire Grouping

Description

I was at Winter Offensive at the end of last week, enjoying some ASL and spending time with friends, new and old alike. Inevitably discussions about ASL and tactics abound. I engaged in a discussion on when to split firepower from one large group into smaller groups. Everyone had an opinion. Some had even done the math but were uncertain on the details. Most everyone had an opinion and rules-of-thumb they followed, including me.

I like rules-of-thumb. They help me make quick decisions when I am under pressure. It is important that you ground your rules-of-thumb in sound decision making. Everyone knows by now that I am a huge fan of Robert Medrow's articles on ASL. The first three articles I reference in my resources page are Medrow's. I like to think my decisions are based on his works but are they? Has my thinking drifted over time? In this article, we will find out together how sound my own rules-of-thumb are and provide guidance to anyone else reading.

The Model

I wrote a python program that can model IFT shots at different DRM against different target morale. The model accurately handles the IFT out to the 36 column. The model does not deal with Pins other than to note them. I am only examining KIA and breaking. The model notes the instances of K/# happening and accurately reflects whether the unit remaining breaks. These K/# results are in the tables below. Note, the KIA/Break/NE total to 100%. There may be some small drift because of rounding errors but I have seen none in the runs I have made so far.

The model accounts for cowering but only as applicable to the shot. Since the presumption is a multi-Location Fire Group a leader cannot take part. Thus every shot taken is subject to Cowering. If Cowering occurs, the model accurately shifts one column to the left and resolves the attack. The model does not account for a Conscript double Cowering. The model allows for Leadership to affect the Fire Group but it isn't practical most times and thus I ignore it here unless otherwise noted.

My Rules-Of-Thumb

For Fire Grouping, I have the following rules-of-thumb:

1. Break "down"/minus shots into separate groups
2. Combine +2 or greater shots
3. Zero and +1 shots are less clear so I have no clear rule

Notice I am not taking anything else into consideration. I am not concerned about which Fire Phase it is, what turn it is, etc. These can and should play into your decision making. That is where the true art is.

This article also assumes Mandatory Fire Grouping rules are not violated when shooting. If your shot is bound by Mandatory Fire Grouping, you cannot break one shot into many. The most likely chance for breaking into separate shots are Multi-Location Fire Groups.

Breaking Minus Shots into Separate Groups

Let's first examine some -1 DRM shots and see what the results are. In the following chart, there are three groupings of results. The first shows a 6 -1 shot broken into three 2 -1 shots, a 12 -1 shot broken into three 4 -1 shots, and a 20 -1 broken into three 6 -1 shots. All targets have 7 morale.

Shot	Unit Morale	KIA	Broken	NE	K/#	Sum
6 -1	7	8.53	35.93	55.54	5.48	
3 X 2 -1	7	0	51.49	48.51	20.4	
12 - 1	7	8.24	55.53	36.23	8.37	
2 X 6 -1	7	13.19	56.41	30.4	8.92	
3 X 4 -1	7	5.74	65.33	28.93	11.48	
20 - 1	7	16.73	61.63	21.64	11.16	
3 X 6 -1	7	15.54	67.77	16.69	10.03	
30 -1	7	42.6	57.29	0.11	21.7	
2 X 16 -1	7	17.48	74.37	8.15	18.11	

From this table, we can see it is better to take as many minus shots as possible. This breaks down somewhat at the larger columns and is most easily seen in the Sum column. This is likely because of the awkward table breaks. It isn't possible to break a 30 column attack into equal attacks that hit IFT columns.

The more interesting thing to me is breaking 12 -1 into two 6 -1 shots produces more KIA results over all. Even when cowering, an Original DR 2 still results in a KIA for each attack. Thus, taking two chances to roll a 1,1 is significantly better than one chance to roll a 1,1. It is also worth noting the 2 -1 shots produce no KIA's since an Original 2 DR cowers to the one column where there are no possible KIA results.

Confirmation Plus

This confirms my first rule-of-thumb: take as many minus shots as you can. Mathematically, this should produce better overall results. Tactically, this leaves more units able to shoot at later targets if you roll low with an early shot. I also see a second rule-of-thumb: the data suggests a 6 -1 appears to be the sweet spot for producing KIA results. I suspect a 4 -2 would be another. One quick moment to confirm:

12 -2	7	17.15	54.27	28.58	10.89	
3 X 4 -2	7	15.5	66.99	17.51	15.12	

This isn't as sweet as the 6 -1 so let's examine the IFT to see if we can see why. Looking at the 12 column, we can see an Original DR 2,3, and 4 are a KIA EVEN if the shot cowers. This is because an Original 2,2 becomes a Final 2 on the 8 column which is a KIA. Looking at the 4 column, an Original 2 and 3 are a KIA on each column. There is no KIA on the 2 row of the 4 column accounting for the difference. While the 4 -2 isn't as favorable as the 6 -1 column in terms of KIA, it is still significantly favorable to the single 12 -2 overall. It

seems 4 -2 and 6 -1 are sweet spots on the IFT curve. That's a good corollary to the first rule-of-thumb.

Combining Plus Two Or Greater

Next we can examine some +2 shots against 7 morale troops:

Shot	Unit Morale	KIA	Broken	NE	K/#	Sun
16 +2	7	0	42.94	57.06	0	
2 X 8 +2	7	0	39.12	60.88	0	
24 +2	7	0	62.88	37.12	8.43	
2 X 12 +2	7	0	53.71	46.29	0	
3X 8 +2	7	0	52	48	0	

Again, my original rule-of-thumb holds here. It is better to take one large shot against a +2 DRM. Large shots also bring KIA and K/# results into play which are missing from the lower end of the table when positive IFT DRM are in play.

Examining +2 shots against troops with lower and higher morale yields no hidden advantage.

Shot	Unit Morale	KIA	Broken	NE	K/#	Sun
24 +2	6	0	73.69	26.31	8.45	
24 +2	7	0	62.88	37.12	8.43	
24 +2	8	0	51.5	48.5	8.13	
2 x 12 +2	6	0	64.87	35.13	0	
2 X 12 +2	7	0	53.71	46.29	0	
2 X 12 +2	8	0	42.9	57.1	0	

In each case it is better to shoot the larger shot than it is to break them apart. From these last two tables, my original rules-of-thumb continue to hold. Combining larger shots at DRM greater than or equal to 2 makes the most mathematical sense.

Zero And Plus One Shots

Now we get to where my original rules-of-thumb are sketchy. They seem to be more art than match. Let us see if we can change that.

Shot	Unit Morale	KIA	Broken	NE	K/#	Sum
12 +1	7	0	43.55	56.45	2.94	
2 X 6 +1	7	0	38.72	61.28	0	
3 X 4 +1	7	0	35.26	64.74	0	
24 +1	7	8.39	63.95	27.66	5.39	
2 x 12 +1	7	0	67.77	32.32	4.15	
3 x 8 +1	7	0	69.17	30.83	6.23	
4 x 6 +1	7	0	64.11	35.89	0	
30 +1	7	14.14	65.04	20.82	13.62	
2x 16 +1	7	12.14	79.01	20.99	12.14	

Looking closely at this chart, a pattern emerges. For +1 shots, breaking into smaller columns less than or equal to 6 seems to be counterproductive mathematically. Breaking into separate shots on the 8 or greater columns is close to a wash for broken results. KIA results disappear below the 16 column so we must consider that. As a rule-of-thumb, it makes mathematical sense to take the one combined shot, especially when shooting a stack and the effects of a KIA result. Tactically, it probably makes more sense to break these shots up, especially if the smaller shots are on the 8 or better column. You stand a fair chance to get a result with the reduced firepower while leaving yourself tactical flexibility with the remaining firepower.

Shot	Unit Morale	KIA	Broken	NE	K/#	Sum
12 +0	7	2.48	50.76	46.77	5.23	
2 x 6 +0	7	0	54.65	45.35	13.35	
3 x 4 +0	7	0	51.89	48.11	6.58	
24 +0	7	13.69	65.24	21.07	14.55	
2x 12 +0	7	4.2	74.07	31.73	7.8	
3 x 8+0	7	5.03	76.59	18.38	10.68	

This second chart covers +0 DRM shots. Here, it seems pretty clear the shots are a wash as far as "break or better" is concerned. The frequency of KIA results are significantly diminished on the smaller columns. So if shooting at a stack of units the larger shot is preferable.

From these last two charts, I can likely clarify my original rules-of-thumb. If shooting +1 shots, don't break into separate attacks unless the broken attack has 8 firepower or better. If shooting at a stack of units, favor the combined shot since a KIA would break the entire stack. When shooting a +0 shot, breaking these into separate attacks makes the most sense unless targeting a stack of units. When shooting a stack, again favor the

combined attack because of the greater chance of a KIA result.

Summation

After running the model, I now have the four rules-of-thumb when comes to Fire Grouping:

1. Take as many minus shots as you can
   1. Breaking into 6 column shots is a sweet spot
2. Combine +2 or greater shots
3. Only break +1 shots into 8 column (or greater shots)
   1. Favor combined shot if shooting at a stack
4. Break even shots into smaller shots
   1. Favor a combined shot if shooting at a stack

After all these years, it is good to see I was mostly right on the first two. I wonder how often the last two have bitten me but I doubt it is often. I rarely achieve such large combined fire power. At least I know now.

Conclusion

I hope you enjoyed this article. For the code nerds out there, I pulled this together in python using a Jupyter notebook. If you want the code, let me know and I will share a copy with you. Like me, it isn't pretty but it works.

I am also very interested to hear from you what your rules-of-thumb are for breaking up shots. Based on the discussion I had a WO, there are a lot of them out there. Feel free to comment below. If there is something interesting mentioned, I will see if I can model it. Until next time.