Balancing Encounters

Metrics of A Combat Turn

For a Given Round of combat we need to be concerned with 4 variables for each side of the conflict

1. Attack Skill
2. Active Defenses
3. Damge Dealt
4. DR and Armor

And heres a spreadsheet.

Definitions:

Attack Skill - This is whatever your skill is with the weapon your using to attack. Examples include Broadsword, Brawling, Pistol, and innate attack.
Active Defesnes - Block Parry or Dodge.
Damage dealt - THe Dmage range for your primary attack.
DR - The damage reduction for any armor you might be wearing.

Know Thy Party:

The first thing you should do when balancing an encounter should be to look at the party and take the average values for the metrics designed above. This will help you find median values that will be suitable for the whole group. Be careful though, Large Value spreads can lead to odd results. Speaking of spreads, recording the highs and lows for each of these values will also be helpful.

Attack Skill - Many players will ahve more than one attack skill. Use the highest one.
Active Defesne - Figure these separately as Block, Parry and Dodge for good results. Dont forget to accoutn for things that affect defenses like weapon modifiers to parry and Acrobatics to dodge.
Damage Dealt - Figure this as the average of the Expectation values (3.5 per die plus bonuses) So 2d +3 has an Expecaion of 2(3.5) +3 = 10. As we are concerned with how damage gets through, not what happens afterwards, we dont really need to mess with wounding modifiers right now :).
DR - Again, just take the average over each person and then average those averages.

So Well use a hypothetical Party

Hypothetical Party:

Char	Attack	DMG	B/P/D	DR
Barbarian	15	11.5 Cut	14/13/12	3
Cleric	14	8 Cr	12/12/9	4
Knight	20	9 Cut	13/15/9	7
Wizard	14	10.5 Brn	--/12/9	2
AVGs	16	9.75 ~ 10	13/13/10	4

For the record, no I didnt work out all the values, generate Character Sheets OR anything of the sort. I did assume that the Wizard has Flamejet (Thus his high DMG output).

Difficulty and Challege: Setting the Knobs

Now, we need to discuss what we mean by 'challenging'.

To deal damage to a creature, the attack must succeed, the defense must fail and the dmage must exceed the DR.

So for an encouter to be challenging, we need to make it to where the odds of doing damage are low. To make a combat encounter less challenging, we increase the odds of damage. So lets say that

20% = Hard
40% = Medium
60% = Easy

Note that these are ARBITRARY. For your party, theses numbers might be very different. For highly skilled and combat savy PCs who want a serious challenge the hit chance may be as low as 10 or even 5%. For Players new to the game you might be better setting the easy level to 70 or even 80%!

The important thing is that we have numeric goals to set to.

lets say that we want a medium Difficulty encounter (40%).

That means that we want the odds of getting through the Defenses AND the Odds fo getting through the DR to multiply to 40%. Better Expressed as

(Odds of beating Active Defenses)x(Odds of Beating DR) = 40%

Now we can get 40% alot of different ways...

Hit x Penetrate
100% x 40%
90% x 45%
80% x 50%
70% x 60%
60% x 70%
50% x 80%
45% x 90%
40% x 100%

It is worth knowing that, generally speaking, the more likely you are to penetrate with Damage, the higher the average damage is going to be. More on that later.

Lets think about what this means in GURPS terms. Something that is Difficult to hit (Has a low hit percentage) Is some thing that has a HIgh active Defense (Dodge/Parry/Block). Some thing that has a low Penetration Percentage is some thing that has a high DR. Understanding that, we can select the set of stats that suits our monster. If we had a turtle for example, low defneses and high DR would be suitable, for an Unarmored swashbuckler, high defense and low armor would be suitable.

So, now we select one of these pairs to represent. Lets say we take something in the Middle . lets say 70% to hit and 60% penetrate

So how do we Build that?

Using the Metrics To Build the Monster:

Party On Offense:

Attacking and Hitting:

Attacking is when you roll your attack dice. HITTING is when your attack SUCCEEDS and the Defender FAILS

We said that we want the party to Beat the Defenses of the Monster 70% of the time. This does NOT mean that everyone in the party has a flat 70% chance, it means that the party average has 70% chance. This means that players with lower combat skills will be less successful and players with higher levels will excel. So how do we calculate this mathematically?

Well simply, the odds of getting past the Opponents Defense is

(Odds of A Crit)+(Odds of a Hit thats not a Crit)x(Odds Defender Fails) = 70%

Or Shoter

P(Crit) + P(Attack!Crit) x P(Defense-) = 70%

For example, a 15 Attack versus an 8 Defense.

P(Crit) = Odds of rolling a 3, 4, or 5 = 4.62%
P(Attack!Crit) = Odds of rolling 6-15 = Odds of roling less than 15 or less- Odds of rolling 5 or less = 95.37 - 4.62 = 90.8%
P(Defense-) = Odds of rolling 9 or greater = 1 - Rolling 8 or less = 100-25.92 = 74.08%

so pluggin in for the values

4.62+(74.08 x 90.8) = 71.8% which is about what were looking for. To speed up the math, I worked it all out in a spreadsheet here for easy reference. Its in the Skill v ADs tab.

Using the SpreadSheet:

Our Hypothetical Party has an average Attack of 16.
We look along the left side of the table in the red boxes in column A untill we find 16 (Row 17). Now we read across the coulmns untill we come to 70% (or the closest value). We come to two values, one at 75.1, the other at 64.8. Each one is about the dame distance from our taget value so we can use either. We need to remember this value for the sake of our next number. If we're a little low on this value, we can make up for it by being a little high on the Penetration value. So we'll go ahead and use the lower value of 64.8. Reading up to the top of the column we see that an active defense of 9 does the Trick.

So Attack 16 vs AD 9 = 64.8%

How we get this Active Defense of 9 is really up to the GM. This could be for a basic move 6 creature that is unencumbered (dodge of 9) or could be for a creature with a 10 Shield skill and a small shield. 10/2 + 3 + 1DB. Use whatever makes sense for your monster. It is not ABSOLUTELY mandatory that you explain how you get these values but it can help you explain/understand your creatures.

Damage and Penetrating:

You deal damage when you HIT, but that damage doesnt PENETRATE untill the DMG exceeds the DR of the Defender.

So that solves one side of the equation, now all we have to do is get the other side working. This is actually more staright forward than the Attack/Hit Calculations.

So we're looking for something thats a little over 60%/ Remember we were a little under the 70% on the other (We settled on 64.8). Now we do an average damage expectation of about 10. This can be 2d+3 or 3d - 1. Normally it will be the 2d+3 value, so we'll look at that. So for 2d+3 damage, we do from 5-15. A quick search gets us the 2d probabilities. Thanks to the darke fortress for this table.

Dice Score	Result exactly	Result or less	Result or more
2	2.77	2.77	100
3	5.55	8.33	97.22
4	8.33	16.66	91.66
5	11.11	27.77	83.33
6	13.88	41.66	72.22
7	16.66	58.33	58.33
8	13.88	72.22	41.66
9	11.11	83.33	27.77
10	8.33	91.66	16.66
11	5.55	97.22	8.33
12	2.77	100	2.77

Now we see that we get close to our 60% line at 58.33 or when the dice roll 7 or more. As a quick check we look at 58.3 x 64.8 and see that its 37.8. Very close to what we're looking for! Rememebr we were looking for 40%. As you do these, getting to within +- 10% of the final result should be your goal.

So since the Damge is 2d+3 and there is a 58.3 % chance the dice will show 7 or better, we need our Monster to have DR 10.

Party on Defense:

Monsters DMG:

Now lets look at the otherside of the equation. We do the same thing taht we did above, just using reverse logic. So first we decide on difficulty.

We'll Say we want the party to take damage about once a turn. so we want 1 in 4 or about 25%. Now we look at this from the other side,

with the added benefit of knowing what their DR is ahead time.

So again we look at

100% x 25%
80% x 30%
70% x 35%
60% x 40%
50% x50%

So lets say that we want their ability to penetrate armor much higher than oddsof hitting with a weapon. So lets look at that as 70% chance to penetrate DR 4 (Our parties Average DR) So we look at what it will take to beat DR 4 and try to work it out. So we start with 1d:

Result > 4
1d + 0 : 33%
1d + 1 : 50%
1d + 2 : 67%
1d + 3 : 83%

We'll use 1d+2 which will be either ST 12 or ST 18 depending on if we use that as a thrust value or a swing value.

Monster Attack and Deceptive Attack:

Then we look at the parties active defenses of about 13. Now, we said we wanted the Hit odds to be about 35%, but looking down the 13 column on the Spreadsheet.(Column N) we dont see anything close. If we look close by though we do see that 14 v 11 is 35.2%. So all we need to do is to set the monster's Attack level at a point where it can be 14 when the Parties defense is Deceptive Attacked down to 11. So since we want to drop the parties Defense by 2, the the Monsters Attack needs to be 4 levels higher than 14 or 18.

So we record

18 (DAed to 14 and -2)

So we dont forget the tactics.

So there you have it!

Attack: 18 (2xDA to 14)
DMG : 1d+2
Defense : 9
DR : 10

Lets review the process

Decide on a difficulty for the Players to Damage the Monster.
Decide on Probailities for Hitting and Penetrating that are suitable.
Find the Mechanics that support those levels.