In this example, for every time a mob attacks you there is:
10 % chance you Parry it
9 % chance you Riposte it
8.1 % chance you Dodge it
7.29 % chance you Block it
and a 65.61% chance the mob hits you.

So really, there is a 65.61% chance it goes into the hit or miss check. And correct me if i'm wrong, but i'd say there has to be at least 3x as many misses as parry/ripo/dodge/block combined, so it seems pretty important to figure out the most effective way to increase the misses. Combat avoidance AA's are one obvious one that adds to this, correct?

Prelim Avoidance Check (Parry-Block/Riposte/Dodge/ShieldBlock) --> Hit/Miss check (Natural avoidance skills/combat agility AA/Avoidance mod2) --> Damage (RNG of DI)

DISCLAIMER: At the behest of leadership, I have generated a guide to systematically explain various tanking concepts. I am only human, and as such I do make mistakes. If your views have been proven to contradict opinions laid out in this guide, please feel free to post the discrepancy and I will gladly adjust the guide accordingly.

Purpose: To educate <Silent Resurgence> in the core concepts of tanking, as well as provide clarification on the nomenclature that is commonly used.

Glossary of Commonly Used Terms:

DB - Damage Base: DB is the common term used to describe the base damage associated with melee combat. DB can be thought of as guarenteed damage when succesfully hit.

DI - Damage Interval: In combat terms, DI represents a unit/interval of damage.

DI1 - Damage Interval 1: DI1 is the scientific term for minimum hit.

DI20 - Damage Interval 20: DI20 is the scientific term for maximum hit.

Displayed AC - The AC that is displayed ingame under character information.

rAC - Real AC: rAC is the term used to describe the actual amount of AC a person has, it is functionally different than Displayed AC

Raw AC - The AC displayed on an item or augmentation.

The Warrior Advantage:

Warrior's have an innate 5% mitigation of the DI potion of damage.

EDIT: Warriors do get 20 distinct damage intervals vice 19 as previously mentioned. There is an innate 5% mitigation to the DI rolled, and not just an elimination of DI20. This has been proven on 05/28 by parse Dairen vs. Krond, see that thread for the analysis.

Chapter 1: Displayed Damage Formula

In EverQuest, there are only 20 possible displayed damages available per NPC. Note: These 20 different displayed damages are related only to hit/bite/maul/punch/et cetera, and are unrelated to the damage formulas for secondary attacks such as bash/kick/slam.

Melee damage isn't just a "hit." It consists of two separate portions: the Damage Base or 'DB', and the Damage Interval or 'DI'. The Damage Interval is a specific integer, for which there are 20 multiples. A "hit" consists of the DB plus the DI multiplied by a number ranging from 1 to 20. Which number between 1 and 20 is determined by an interplay of the Random Number Generator, your AC, the attackers ATK rating, discipline in use, etc.

The mod2 "shielding" impacts the DB portion of a melee hit - and it is the only real way to decrease damage taken form the DB portion.

These 20 damages are labelled DI1 thru DI20 and they represent the full spectrum of melee output for NPCs. Displayed Damage is calculated using the following formula:

Displayed Damage = DB + DI*(Random[1 thru 20])

I will further explain Random[1 thru 20] in Chapter 2 of this guide

Example:
Overlord Mata Muram
DB = 500
DI = 100

Calculating Minimum Hit: DI1
Displayed Damage = 500 + 100 = 600 damage minimum hit

Calculating Maximum Hit: DI20
Displayed Damage = 500 + 100*20 = 2500 damage maximum hit

Overlord Mata Muram, in addition to having DI1(min) and DI20(max), can hit for 18 other possible displayed damage outputs.

For instance, DI12 = 500 + 100*12 = 1700 damage

Contrary to popular belief that a NPC can hit for any amount in the range between min and max hits; in reality, there are only 20 possible displayed damages that he can hit for.

Note: While there are only 20 possible damage intervals, displayed damages often do not reflect their associated DI# because the displayed number has been mitigated by vies/runes/songs.

Example:

Zyric begins casting a spell. <Rune V>
(Rune V provides 700 damage mitigation)

Overlord Mata Muram hits Zyric for 1400 points of damage!

Normally 1400 damage is equivalent to a DI9 (500 + 100*9 = 1400); however, since 700 damage was mitigated by the rune I really took a DI16 (500 + 100*16 = 2100, 2100 - 700 = 1400 displayed).

Chapter 2: The Relationship Between DI spread and AC

Many people ask me what AC really does, how it relates to HP, and if theres a certain ratio of AC/HP that should be used. In reality, there is a specific ratio where AC reaches a point of diminishing returns; however, in current content this point has yet to be reached. Let me refresh your memory of the Displayed Damage Formula:

Displayed Damage = DB + DI*(Random[1 thru 20])

DB - Damage Base
DI - Damage Interval

Random[1 thru 20] - This component of the damage formula varies between tanks. While I use the nomenclature "Random" this variable in essence is not random in the classical sense. It is a weighed scale that is based on NPC Atk vs. Player AC.

While this is a very confusing concept, lets use the following example to explain the "Random[1 thru 20] component".

Example:

Lets say every time a NPC succesfully hits you, he draws a ball from a bucket with a number (1 thru 20) written on it. This ball determines the amount of damage you take. Now this bucket is full of many different balls based on how much Atk the NPC has and how much AC the tank has. Conceptually, our two heroes Hemlocc and Zyric are tanking the same NPC.

Shadowknights vs. Mayong Mistmoore, the Night:
=====================================

Mayong Mistmoore, the Night:
DB = 2000
DI = 300

DI1 = min hit = 2000 + 1*(300) = 2300 dmg
DI20 = max hit = 2000 + 20*(300) = 8000 dmg

Hemlocc has an unbuffed AC of 3800

His bucket contains:

DI1: 5 balls
DI2: 5 balls
DI3: 5 balls
DI4: 5 balls
DI5: 5 balls
DI6: 5 balls
DI7: 5 balls
DI8: 5 balls
DI9: 5 balls
DI10: 5 balls
DI11: 5 balls
DI12: 5 balls
DI13: 5 balls
DI14: 5 balls
DI15: 5 balls
DI16: 5 balls
DI17: 5 balls
DI18: 5 balls
DI19: 5 balls
DI20: 10 balls

Average DI = 10.95

Average Damage Per Hit:

AvgDmg = DB + ADI*DI = 2000 + 10.95*(300) = 5285 damage

Zyric has an unbuffed AC of 5000

His bucket contains:

DI1: 45 balls
DI2: 15 balls
DI3: 10 balls
DI4: 5 balls
DI5: 3 balls
DI6: 2 balls
DI7: 2 balls
DI8: 2 balls
DI9: 1 ball
DI10: 1 ball
DI11: 1 ball
DI12: 1 ball
DI13: 2 balls
DI14: 2 balls
DI15: 2 balls
DI16: 2 balls
DI17: 2 balls
DI18: 2 balls
DI19: 2 balls
DI20: 3 balls

Average DI = 4.84

Average Damage Per Hit:

AvgDmg = DB + ADI*DI = 2000 + 4.84*(300) = 3452 damage

Now with this example, you can see that while the NPC still has the same min hit (DI1) and max hit (DI20), it has a higher probably of drawing a lower number ball from the later bucket because Zyric's has more lower number balls than Hemlocc's.

The affect that AC has in layman's terms is: The more AC you have the more low number balls you have in your bucket. While there is still a chance you get hit for max, or close to max...the probability shifts toward a lower damage.

Another Highly Popularized Example:

Mob Damage is based on a formula:

DB + DI x Random(1 thru 20)

Where DB is base damage.

and DI is damage interval.

Except, the Random(1 thru 20) part isn't exactly random. Its a weighed scale that is based on Mob Atk, Player AC, etc.

In layman's terms:

Lets say everytime a mob tries to hit you the following example happens (after dodge/parry/riposte/block checks):

The Mob spawns 19 midget pirates. These midget pirates gain power based on the mob's attack.

Now in the mean time: You the tank, summon 1 big ogre thing. Your ogre gains strength, health, and manliness based on your AC.

The 19 midget pirates fight your ogre to the death. At the end of the fight the number "Random(1 thru 20)" is based on how many midget pirates survive +1 (All shorties dead = DI 1). And this number gets plugged into the formula and the result is how much damage you take from the mob.

So as you can see, the stronger your ogre is in terms of the midget pirate swarm, the less damage you'll take, since he'll probably kill them all before they kill him. But in the event that the midget pirates get lucky during their fight and kill the ogre, you'll take a spike round of damage.

Chapter 3: Preliminary Avoidance (Parry/Dodge/Riposte/Shield Block)

Preliminary Avoidance are checks that occur prior to a NPC actually landing a blow on you.

This is an explanation of how the defensive abilities fire in a nut shell.

The order is: Parry/Block --> Riposte --> Dodge --> Shield Block.

**Note: Nomenclature: Parry/Block will be refered to as "Parry" and Shield Block will be refered to as "Block". While no class gets both Parry and regular Block, tanks in particular use both Parry AND Shield Block thus, the guide will be written with that as the predominant theme.

Each defensive ability has a % chance of firing, thus causing you to avoid the attack. For the sake of easy math, lets assume each has a 10% chance to fire.

Mob attacks you:

First defensive tier: (Parry)
======================
Check 1: Parry (10%) So theres a 10% chance you successfully parry

Second defensive tier: (Riposte)
=======================

Parried?
(10% chance) Yes: Check 2: Still fires, Riposte (10%) but does nothing. Since you already "parried." Show "parried"

(90% chance) No: Check 2: Riposte (10%), attempt 2 at avoiding attack.

Not Parried, but Riposted: (9%...10% of the remaining 90%) Show "riposted"
-This shows that the chance to visibly see "riposted" is now 9%, regardless if parry fired or not

Third defensive tier: (Dodge)
=======================

Parried? (10% chance) Show "parried"

Not Parried: (90% chance)

Not Parried, but Riposted: (9%) Show "riposted"

Not Parried, AND not Riposted: (81% chance)

Check Dodge (10%)

Not Parried, AND not Riposted, but Dodged: (8.1% chance..10% chance of the remaining 81%)

-This shows that the chance to visibly see "dodged" is only 8.1%

Fourth defensive tier: (Shield Block)
=======================

Not Parried, AND, not Riposted, AND not Dodged: (72.9% chance)

Check Block (10%)

Not Parried, AND not Riposted, AND not Dodged, but Blocked: (7.29% chance):

-This shows that the chance to visibly see "blocked" is only 7.29%

In summation:
A single attack can be: dodged, parried, riposted and blocked, or any combination there of, but it will only "show" which ever checked first.

If you dodge and block a single attack, it will still show as "dodged" because you dodged it before you got to the shield block check point.

Since shield block is the last check, its ability decreases with every check before it. For you to see "You blocked suchandsuchs attack" It would mean you failed to dodge, parry, or riposte the attack first.

Mathematical summary:
=========================

Even though you started with:
10% chance to Parry
10% chance to Riposte
10% chance to Dodge
10% chance to Block

Does NOT mean only 60% of hits will get through!!!

In reality:

In this example, for every time a mob attacks you there is:
10 % chance you Parry it

9 % chance you Riposte it
8.1 % chance you Dodge it
7.29 % chance you Block it

and a 65.61% chance the mob hits you

So Block has a 10% chance to work, but an effective use of 7.29% because of earlier defensive checks. If you had Improved Dodge and Parry V, the *effective use* of block would drop even further

Chapter 4: Mod2s/AAs and How They Affect You

Avoidance - Avoidance caps at 100, it provides a secondary check to preliminary avoidance.

Shielding - Shielding caps at 35%, it directly reduces the DB component of the Damage Formula:

Example:

Spindlecrank:
DB = 1000
DI = 200

Shielding = 0
Max hit = DB + DI20 = 1000 + 4000 = 5000 damage max

Shielding = 35
Max hit = DB*(1 - .35) + DI20 = 650 + 4000 = 4650 damage max

Combat Agility - Combat Agility increases your chance to completely avoid melee damage.

Combat Stability - While the ingame description of Combat Stability states, "The first three ranks of this ability increase melee damage mitigation by 2, 5, and 10 percent...et cetera" In reality, Combat Stability raises your characters AC softcap; and does not provide direct melee damage mitigation. (This has been verified by Nodyin)

Chapter 5: Real AC vs. Displayed AC

While it comes as a shock to many, a person's displayed AC actually means relatively nothing. Displayed AC is affected by many things and in no way has no bearing on a persons Real AC (rAC).

Real AC is calculated using the following formula:

$$rAC = SoftCap + Shield + [WornAC - (SoftCap + Shield)]*OvercapReturn$$

Overcap Returns (Subject to Change):

Warrior: 0.45
SK/Pal/Monk: 0.33
Rang: 0.17
Silk: 0.02

The rest of you shouldnt be tanking, reason (Silk Overcap Return = 0.02)

Example:

Zyric has a worn AC of 2500, (This can be found using Magelo under Worn AC + Aug AC)

Shadowknight SoftCap = 915   (This changes for each class, consult your CC or respective community to find yours)

Shield AC = 218

Shadowknight OvercapReturn = 0.33

Zyric's rAC = 915 + 218 + [2500 - (915 + 218)]*0.33 = 1584

While Zyric's ingame Displayed AC may be 5000, in reality his rAC is only 1584.

Displayed AC and its relationship to Raw AC:

Displayed AC = Raw AC * 1.575

If you get a 10 Raw AC upgrade, for instance upgrading from a 25AC aug to a 35AC aug, your displayed AC will actually increase by 15.75; not just by 10. **The 1.575 is a standard fudge factor for all classes excluding rogues and silkies**

Chapter 6: Defensive Check Order

Order goes:

1. Preliminary Defensive Check (Parry/Dodge/Riposte/SBlock) --> 2. Hit/Miss Check (Innate Skill/AvoidanceMod2) --> 3. Damage (RNG of DI)

In SoF T3+ content NPCs gain the ability "Strikethrough", this allows the mobs attack to bypass Check 1 (Prelim Def Check) and go straight to the second Hit/Miss Check.

AC Softcaps and Overcap Returns: (A work in progress):

Pre SoF:
Warriors had a softcap > 878 Real
Their return was 0.45 (confirmed)

Knights were 878 Real AC @ lvl 75 with a 1.47*softcap multiplier, with enough AGI (confirmed)
Their return then was 0.33 (confirmed)

Cleric/Bard's softcap @ 75: 623 Real (though to be confirmed)
Return for Clerics/Bards was 0.24

Now:
For warriors it's > 915 Real with CS23 and PE, enough agi @ lvl 80
Estimated return of 0.5 (to be confirmed)

For Knights it's estimated now that at Lvl 80 in SoF it is 915 Real AC with 1.52*softcap multiplier (CS 23 PE), with enough AGI (to be confirmed)
With a return estimate of 0.45 (to be confirmed)

Estimating for Clerics, 645 Real @ 80 with CS 23 (to be confirmed)
Bards I have no idea, but > 645 with CS 23 and PE
Return wise is apparently 0.33 for clerics and perhaps a bit more for bards (to be confirmed for both)