**Intro**

The way we think about +/- is fundamentally flawed. Any coach can tell you that a goal, an assist, and a block aren’t equal. An elite club coach would take someone who gets 3 blocks per game over someone who gets 3 goals per game. A middle school coach would do the opposite.

I think +/- is common because it’s easy to calculate. And it sort of makes sense. It’s a way to compare all players. Can be calculated on the fly really easily

**My biggest issues with +/-**

* It’s not zero sum. Ultimate is a zero-sum game!
* It equates blocks with goals, etc. Why should these be equal? Maybe an argument can be made for assists and goals,

**An ideal stat**

This begs the question, what are we trying to calculate?Really, what we want to measure someone’s impact on the game. Given the assumption of goals, assists, blocks, turns being the only things measured, how can we get a more accurate assessment of goals v blocks? There are two ways of thinking that I think can really help us divise a better stat.

First, a simplifying assumption: assists and goals are equal. I think this is imperfect because it ignores hockey assists, all passes are valuable, etc, but with what we have I contend it’s a reasonable assumption to make. I’ve tried and I don’t think you can make a convincing case that given only assists and goals as your offensive positive stats, you can weight one significantly higher than the other.

Also, naturally, blocks and turnovers should be equal. This is under simplifying assumption that the person who gets the block is wholly responsible for that block, even if their teammates shut down their marks forcing the offense to throw into a contested space. Note that is an assumption that standard +/- already makes that we are simply keeping. If I get a block but then turn over the disc, essentially nothing has changed [find an example of this (maybe that gif of condors vs revolvers of guy throwing turn then getting layout D].

#1 – ultimate is a zero-sum game. One team loses, one team wins. If something that you do bad is equally good for me and vice-versa, how can both teams end up positive or both negative on the stat sheet? **The sum of all modified plus-minuses should sum to 1**

Now, with four stats: G, A, T, B

i = 1, 2 – the teams

G\_i - number of goals scored by team i

A\_i – number of assists scored by team i

T\_i – number of turnovers by team i

B\_i – number of blocks by team i

Assumptions

* Value of goal = value of an assist
* Value of block = -value of one turnover

Knowns

* G\_i = A\_i (every goal has an assist. Assume callahans are goal and assist)
* zero sum, so G1 + A1 + T1 + B1 + G2 + A2 + T2 + B2 = 0.
* Also, we know the outcome of the game; team 1 scored G1 = A1, as did team 2.
* Team 1 outcome is G1 – G2. Say they won 15 to 12, this number would be 3.
* Then v(B) + v(T) = 3, so, substituting for B, we know

#2 – In the highest facets of the game, in a windless game, a block is incredibly gamechanging. [find example from finals of nationals universe point block or something]. However, sometimes turnovers aren’t that bad; in a windy game the ability to create goal scoring opportunities are more important than turning it over. Example of game from that windy tournament. Jimmy Mickle had 30 turnovers, normally he’s by far the worst player on the field, but we all know that isn’t true.

histogram of women’s conversion factor in nationals games

histogram of men’s conversion factor in nationals games

Note the mean and standard deviation

Unsurprisingly, these form a normal distribution

Upsides and downsides

* calculatability
* Downside: have to wait until the game to calculate accurately. Easy to ignore
* Introduce rule of 2/3 or whatever, by level
* Downside: not totally accurate, eventually will be supplanted by stats that take into account each pass (i.e. why is an assist 1 while a hockey assist is 0?). Then adding in clearing space… get closer and closer to approximating true value of player.
* Zero-sum vs not zero sum.
* Biased towards winning games??
* Note that you only need

Table of (at nationals) division, average conversion factor, std dev

And then, what does an actual stat sheet look like for this?

Show modified stat sheet from some game with +/- and modified +/-. One from very windy game, one from very clean game.