

# The Whole Isn't Always the Sum of Its Parts

## **BEWARE of season-long statistics? No. Just be AWARE of season-long statistics!**

There once were two college classmates & teammates attending State College. Owen H. Wonder & Oliver H. Tooley take Micro-Economics together and are pin hitters on the volleyball team. In the same calendar month, Owen & Oliver took Micro-Econ assessments on 5 consecutive Fridays and played their only volleyball matches on each Saturday to follow. The learning measured by grades and their volleyball performance indicated by hitting efficiency. In every record of these 10 opportunities, Owen exceeded Oliver by 10%. Note the month-long consolidation seen below:

Student	A1	A2	A3	A4	A5	Ave.
OH Won	80%	85%	90%	95%	100%	90%
OH Too	70%	75%	80%	85%	90%	80%
Points	16/20	17/20	18/20	19/20	20/20	90/100
Possible	14/20	15/20	16/20	17/20	18/20	80/100

After the last assessment, Professor Arrow informs OH Wonder & OH Tooley their mid-term averages are 90% and 80%, respectively.

Every Friday assessment is weighted the same 20 points, but that isn't the reason Owen's mid-term average is also 10% higher. These assessments could have been weighted out of 10, 15, 20, 25, & 30 points and his monthly average is still going to be 10% higher than Oliver's. The reason there is consistency with the parts and the whole is that each grade, even if weighted different than one another, is weighted the same for each student.

Owen is achieving at a 10% higher rate! The mid-term grade tells the story of 5 grades, each 10% higher.

Player	M1	M2	M3	M4	M5	Ave.
OH 1	.100	.200	.300	.400	.500	.250
OH 2	.000	.100	.200	.300	.400	.280
Kills - Errors	3/30	5/25	6/20	6/15	5/10	25/100
Attempts	0/5	1/10	4/20	9/30	14/35	28/100

After the final match in the month, Coach Simpson informs OH1 he is now hitting .030 less than OH2, overall, even though he hit .100 higher every match!

It seems each match played had a less worthy opponent. OH1 had a lion's share of attempts when the opponent was highly skilled and far fewer opportunities as the month went on. Half of the kills by OH2 came against the least capable opponent in week #5. The whole month K% (like season long...) might actually be a poor metric in measuring performance by a hitter in volleyball.

Owen is achieving at a .100 higher rate. The K% for the month doesn't tell the story as his overall efficiency is .030 lower than Oliver's, even though hitting .100 higher in every match.

### QUESTION: The first Econ assessment wasn't the first day of the month. What were the boys celebrating after their 3rd match?

The phenomena demonstrated above is called Simpson's Paradox. It occurs when combining rates of the parts to arrive at a whole, thinking it offers a simple truth. (Like season-long data?) Turns out, the truth isn't always so simple. Take a player who serves 50 Aces & 75 Errors in a season. Seems pretty special. What happens when breaking the whole into its parts to determine the same data is 5 Aces to 30 Errors playing against the best 25 teams in the country, and 45 Aces to 45 Errors competing against the rest? Do you think the same way about it now, especially knowing this player competes for a top 25 team, also?

The first week of the 2024 D3 Men's Volleyball season just finished yesterday. I looked at 24 team's match and season statistics, they having played more than one match and me wanting to know how often Simpsons appeared. In an hour I found 6 instances from 5 different teams. None is nearly as shocking as the story above, produced only to demonstrate a point. How could it be in only 2 or 3 matches so far? Below are two of those 6 from the first weekend:

#### Koby Sherman & Jack Hershman of Stevens

K. Sherman	.118	.400	.125	.158
J. Hershman	.000	.343	DNP	.333

*Sherman v. Hershman. Can't make this stuff up! Hershman, a St. Francis-Brooklyn transfer and Sherman a returning upperclassmen attempted 36 & 38 kills, respectively. Hershman played a whole lot against St. Joseph's-LI, taking 35 swings, and just a smidge against Sacred Heart. Sherman played far more at Sacred Heart (17 swings) and Kean (16 swings), and just a smidge against St. Joes. Sherman hit better in each match, but has a season long K% less than half Hershman's.*

#### Christian Herr & Tyler Martin of Lancaster Bible

C. Herr	.500	.000	.400
T. Martin	.500	.000	.250

*Herr Martin. Takes me back to my high-school German class. These players had no more than 5 attempts - One a setter and the other a libero. I suspect the attempts came while not playing libero. LOL The thing I found interesting here is how the identical efficiencies in two consecutive games resulted in a .150 difference for the season so far. Sure, the sample size is small and contributes to the paradoxical outcome. Not claiming this is significant, just taking note that it happened.*