Simpson's paradox occurs when groups of data show one particular trend, but this trend is **reversed** when the groups **are combined together**. Understanding and identifying this paradox is important for correctly interpreting data.

For example, you and a friend each do problems on Brilliant, and your friend answers a higher proportion correctly than you on each of two days. Does that mean your friend has answered a higher proportion correctly than you **when the two days are combined?** Not necessarily!

Day	You	Your friend
Saturday	$\frac{7}{8} = 87.5\%$	$\frac{2}{2} = \mathbf{100\%}$
Sunday	$\frac{1}{2} = 50\%$	$\frac{5}{8} = \mathbf{62.5\%}$
Total	$\frac{8}{10} = \mathbf{80\%}$	$\frac{7}{10} = 70\%$

This seemingly unintuitive possibility is referred to as **Simpson's paradox.**

Explaination:

- On Saturday, you solved 7 out of 8 attempted problems, but your friend solved 2 out of 2. You had solved more problems, but your friend pointed out that he was more accurate, since 7/8 < 2/2 . Fair enough.
- On Sunday, you only attempted 2 problems and got 1 correct. Your friend got 5 out of 8 problems correct. Your friend gloated once again, since ½ <5 /8

However, the competition is about the one who solved more accurately over the weekend, not on individual days. Overall, you have solved 8 out of 10 problems whereas your friend has solved 7 out of 10 problems. Thus, despite your friend

solving a higher proportion of problems on each day, you actually won the challenge by solving the higher proportion for the entire weekend! While your friend got furious, you calmly pointed him to this page: you had just **shown an instance of Simpson's paradox.**

Another example of the **Simpson Paradox** can be seen in the following hypothetical scenario: A hospital has two wards, A and B. Ward A has a **higher mortality rate** than Ward B, with **10%** of patients dying in **Ward A** compared to **5%** of patients dying in Ward B. However, when broken down further into **male and female patients**, it turns out that **more women** die in Ward B than in Ward A (7% vs 5%), while more men die in Ward A than in Ward B (13% vs 8%). ***This reversal of trends*** occurs because there are **more men than women admitted to Ward A than to Ward B.**

Resources:

https://brilliant.org/wiki/simpsons-paradox/