DAV 5400 Week 10 Assignment Review: Analysis & "Simpson's Paradox"

		LA	Phoenix	San Diego	San Fran	Seattle	Overall	
ALASKA	on time	497	221	212	503	1,841	**3,274**	
	delayed	62	12	20	102	305	**501**	
	Total	559	233	232	605	2,146	**3,775**	
		89%	**95%**	**91%**	**83%**	**86%**	**87%**	% On Time
AM WEST	on time	694	4,840	383	320	201	**6,438**	
	delayed	117	415	65	129	61	**787**	
	Total	811	5,255	448	449	262	**7,225**	
		86%	**92%**	**85%**	**71%**	**77%**	**89%**	% On Time
		3%	**3%**	**6%**	**12%**	**9%**	**-2%**	Alaska % on time - AM West % on time

1) Alaska Airlines had a better on time arrival record than AMWest Airlines at each of the indicated destination cities. However, the data we've been provided offer no insight into why that might be the case. For example, does Alaska Airlines build in a larger amount of airtime or ground time into its published flight times than does AMWest? If so, that might allow Alaska Airlines to more easily record an on time arrival for any given flight. Or does AMWest fly out of departure cities that typically experience a larger amount of ground holds prior to takeoff than does Alaska Airlines? In other words, there may be any number of **confounding variables** that account for AMWest's relatively weaker on time arrival performance for the indicated cities. Therefore, **we shouldn't try to draw any definitive conclusions from these metrics.**

2) The overall on time arrival rate for AMWest is **better than** that of **Alaska Airlines**, <u>despite the fact that Alaska Airlines had better on time arrival statistics at each of the individual destination cities.</u> This is due to the fact that AMWest flew nearly double the total number of flights to the indicated destination cities than did Alaska Airlines while having its best on time arrival performance (92%) for the destination at which it flew nearly 73% of its total overall flights: as we can see, Phoenix comprised 5255 of AMWest's 7225 total flights. The relatively large number of ontime arrivals AMWest had for that one destination (4840) serves to skew its overall performance metric higher than it would be otherwise.

Therefore, this data serves as a great reminder of how **we often need to look beyond simple statistical averages when trying to compare different populations**: if the populations are of vastly different size, our initial **comparison conclusions based solely on statistical averages might prove to be misleading**.

This is an example of "<u>Simpson's Paradox</u>": Simpson's paradox (aka "Simpson's reversal", "Yule–Simpson effect", "amalgamation paradox", or "reversal paradox") is a phenomenon in probability and statistics, in which a trend appears in several different groups of data but disappears or reverses when these groups are combined.