

Folk R L & Ward W C. Brazos River bar: a study in the significance of grain size parameters. *J. Sediment. Petrol.* 27:3-26, 1957.
[University of Texas, Austin, TX]

This bar contained both sand and gravel. Particle size analysis showed that the river simply mixed these two populations in different proportions without modifying their inherent nature. Four refined graphic statistical parameters were developed and found to be interrelated in a pulsating helix. [The SC[®] indicates that this paper has been cited over 295 times since 1961.]

R. L. Folk
Department of Geology Science
University of Texas
Austin, TX 78712

Februarys 1978

"This paper was written with Bill Ward, a student who did the slave labor of sieving. Bill has since gone on to become a respected worker on carbonate geology and professor at the Louisiana State University, New Orleans.

"I had been taught statistics by J. C. Griffiths at the Pennsylvania State University, who introduced me to the mean size vs. sorting scatter diagram as a tool in interpreting the origin of sediments. He also mentioned in passing two other statistical measures, skewness and kurtosis, which fascinated me because at that time (in the late 1940s) these two properties were of no known geologic significance and had not been put to any practical use; they produced only abstract useless numbers. So I wanted to study some sediments and see if I could figure out what these esoteric statistical parameters meant in geologic terms. In order to do this I refined existing graphical statistical parameters with a new set of formulas, based on more

points on the cumulative curve than were then customarily used. Thus they were especially useful for non-normal distributions. In those pre-computer slide rule days it was much easier to use graphic statistics than to calculate a long stack of data by the moment method.

"While I was employed by Gulf Oil Company, I had been sent out on a project to study sediments of modern river bars in Mississippi and Alabama. This generated an interest in river bar sedimentation, and when I began teaching sedimentation at the University of Texas I decided to continue this work. A student, Tim Thames, suggested a bar on the Brazos River near his home and helped me survey the bar and collect samples in 1953. By chance, this bar turned out to display in a very simple and obvious way the relationships between the four statistical parameters. Once these relations had been deciphered in an ideal case, it was then much easier to interpret that statistical relationship in more obscure or complex examples. I have utilized these principles ever since in my analyses of grain size distributions and in other data that use population statistics.

"To me, the major importance of this paper lies in the fact that it was the first to show the geologic meaning of skewness and kurtosis (resulting from mixtures of two populations). Furthermore, it showed that mean, standard deviation, and skewness were interrelated in a helical trend, with the fourth property (kurtosis) forming rhythmic pulsations along this trend.

"Ironically, the paper is usually cited, not for these important geometric discoveries about the mathematical properties of sediments, but only for the development of the refined statistical parameters."