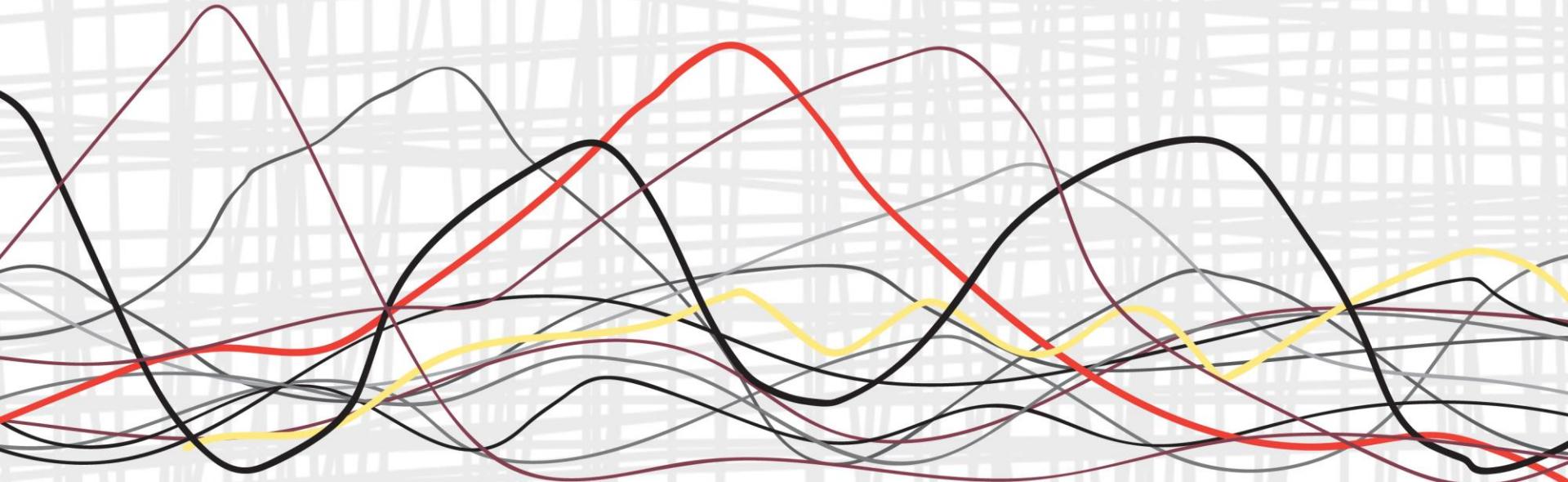


# statgraphics 19<sup>®</sup>

## Fitting Mixtures of Gaussian Distributions



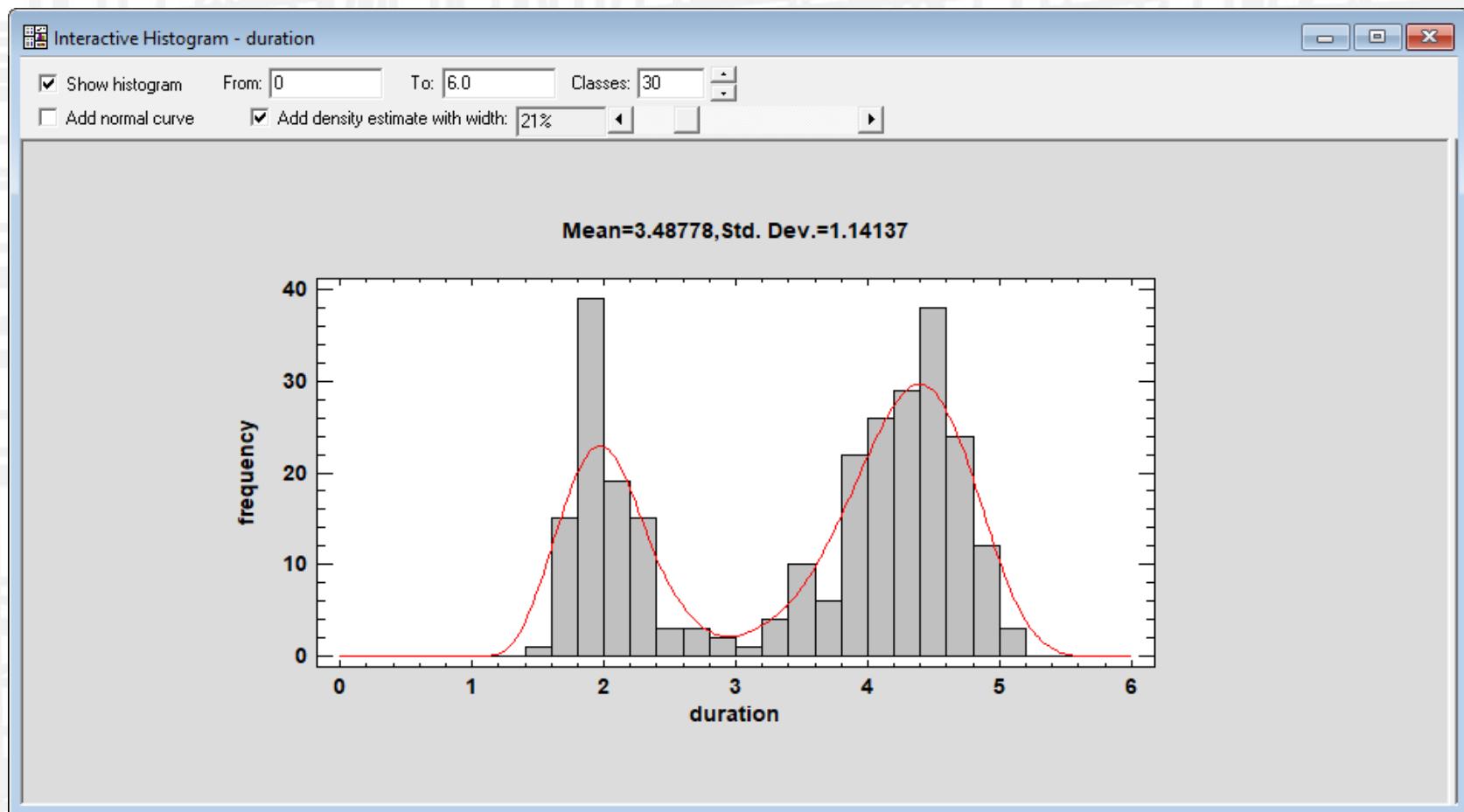
# Univariate Gaussian Mixture Distributions

$$f(y) = \sum_{i=1}^K p_i \frac{1}{\sqrt{2\pi}\sigma_i} e^{-\frac{(y-\mu_i)^2}{2\sigma_i^2}}$$

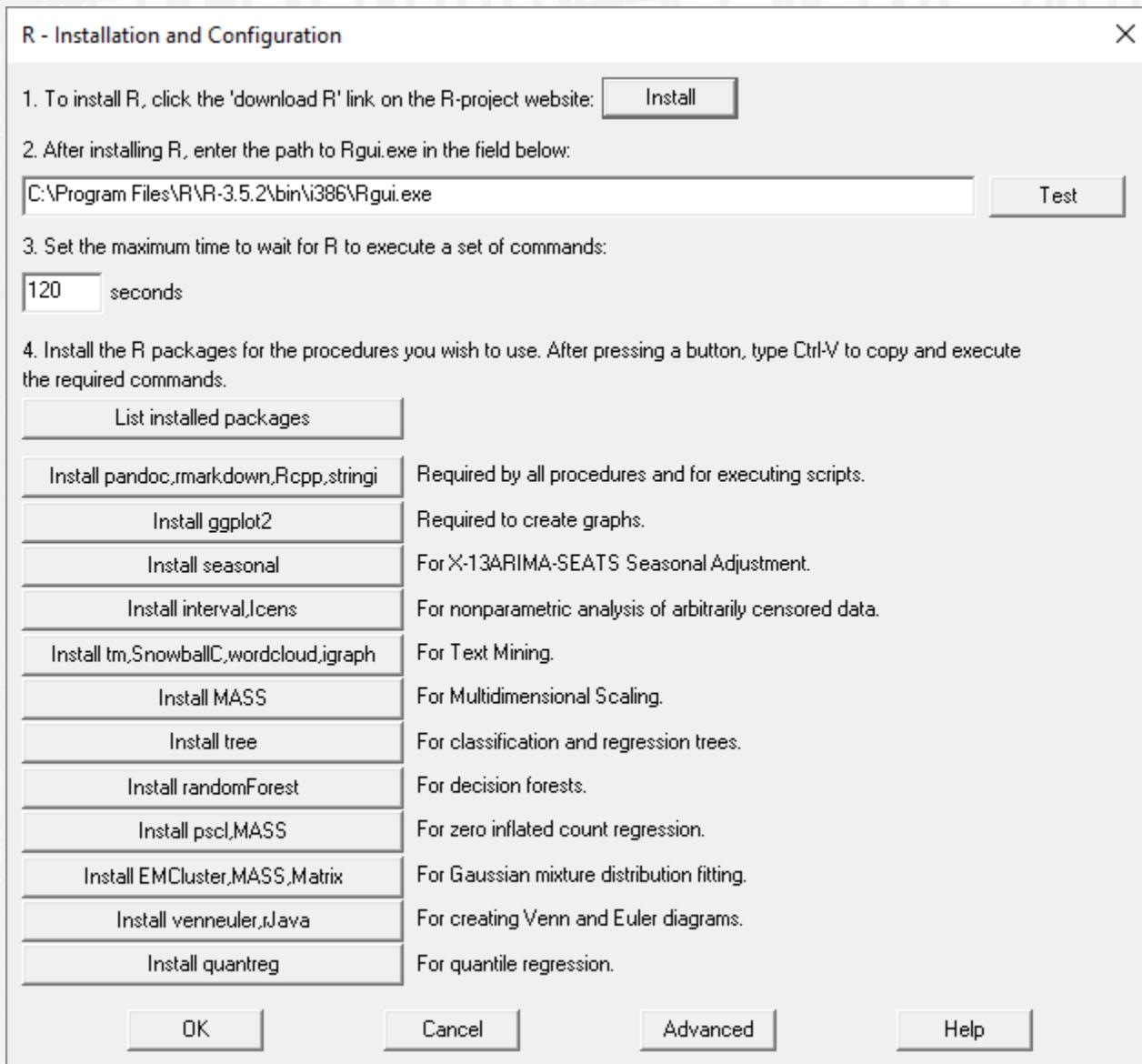
where

$$\sum_{i=1}^K p_i = 1$$

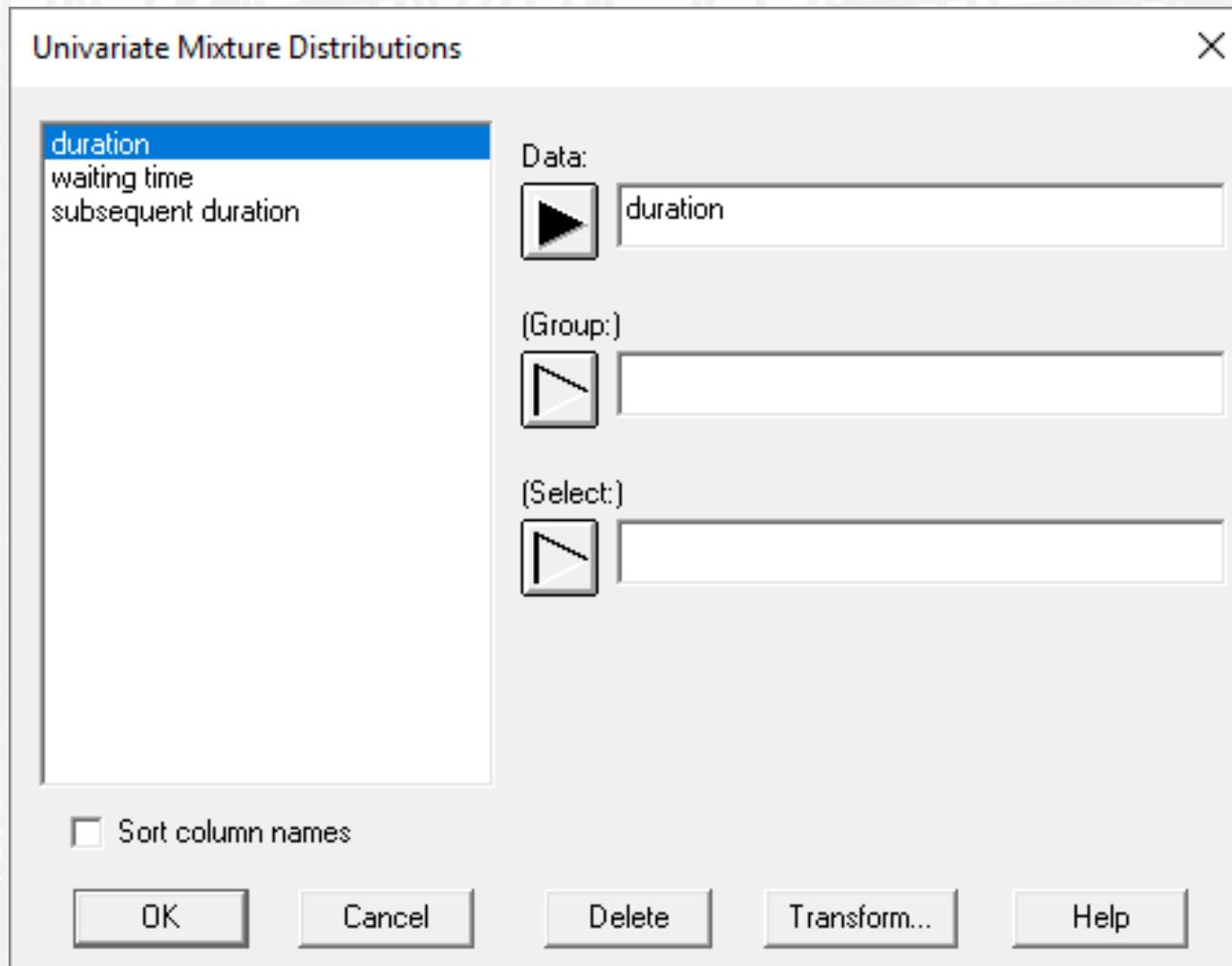
# Duration of Old Faithful Eruptions



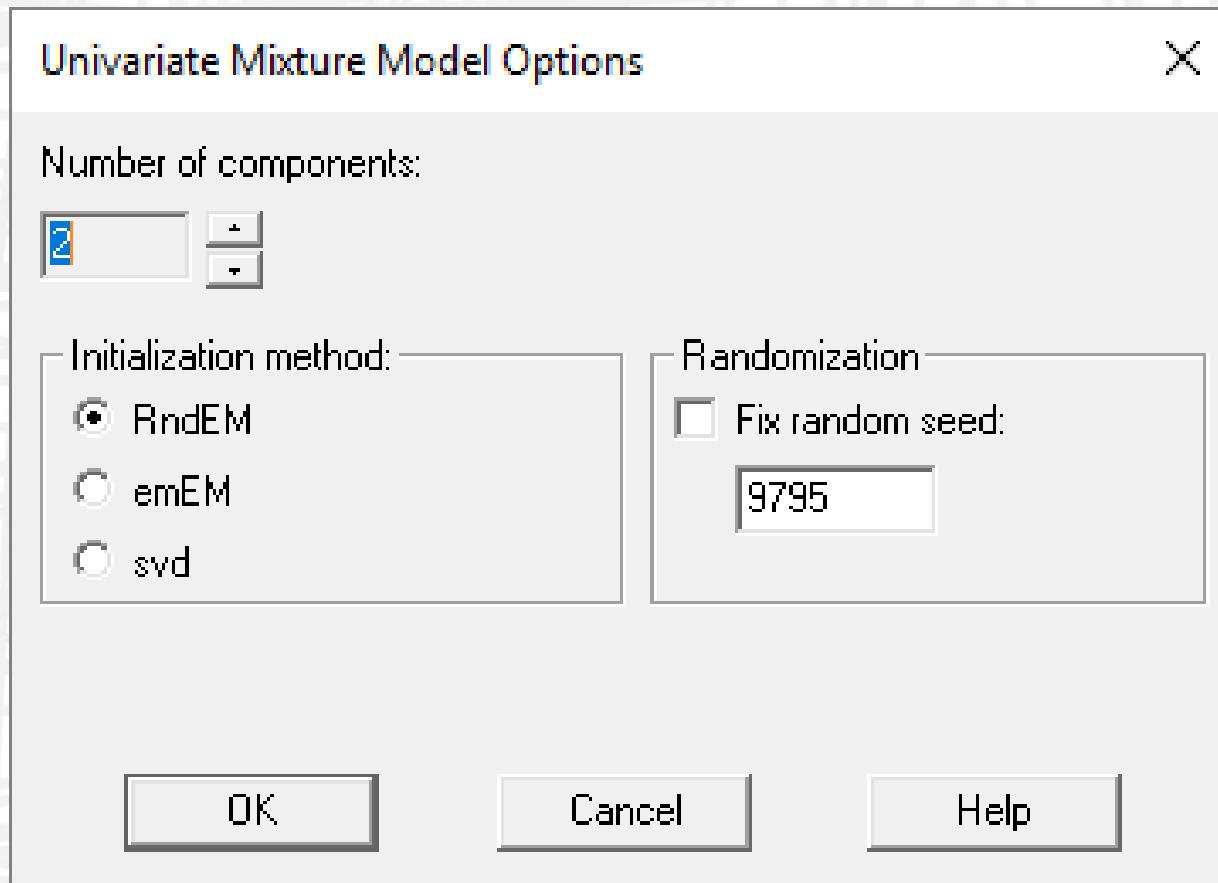
# Requires Installation of R and Supporting Libraries



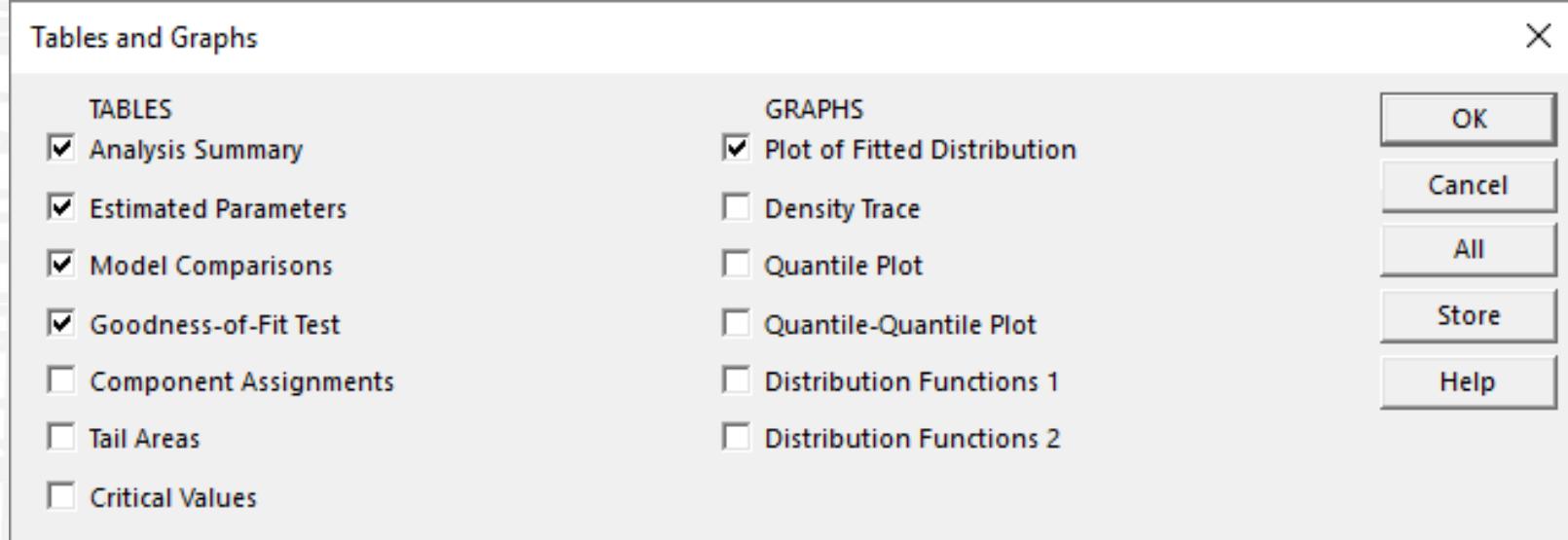
# Data Input Dialog Box



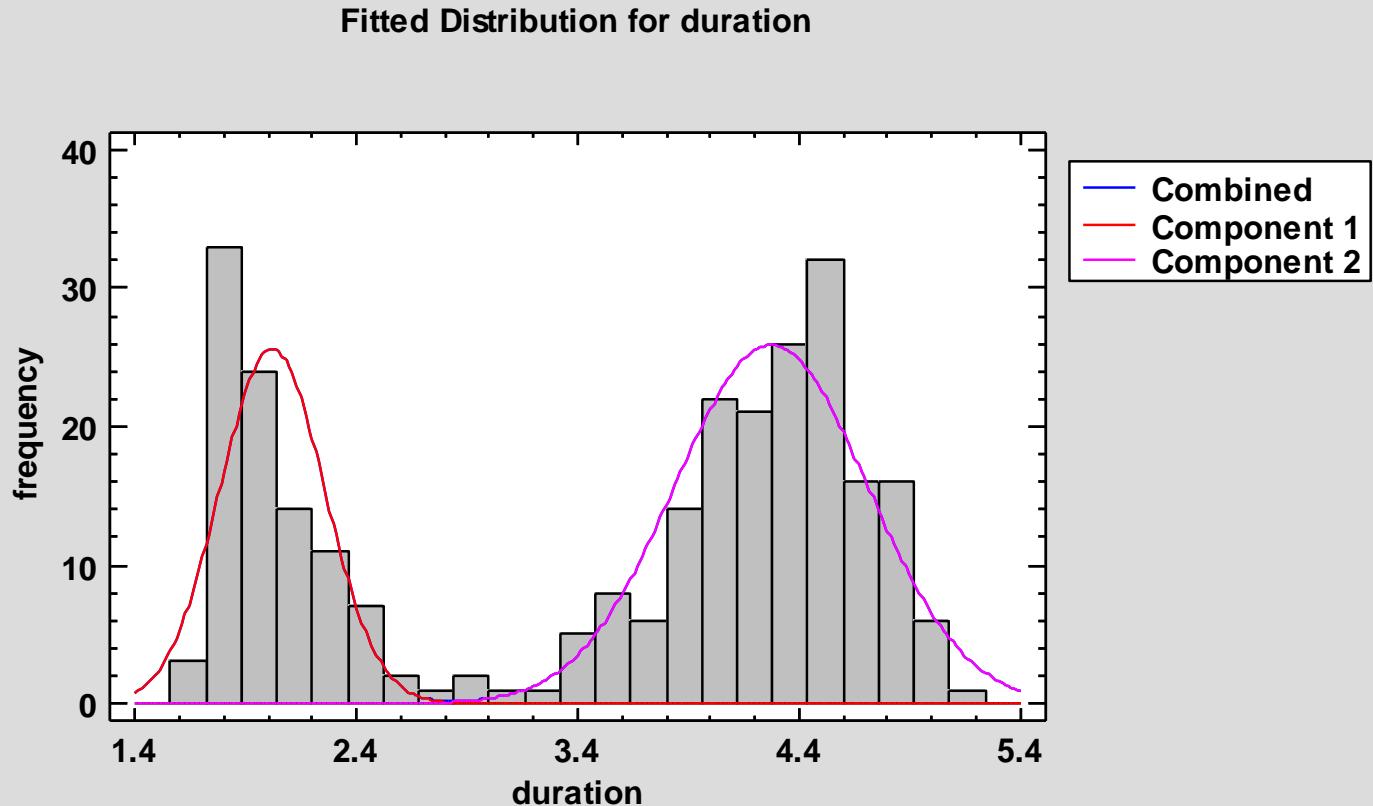
# Analysis Options Dialog Box



# Tables and Graphs



# Fitted Distribution



# Estimated Parameters

## Estimated Parameters

Sample size: 272

<i>Component</i>	<i>Proportion</i>	<i>Mean</i>	<i>Sigma</i>
1	0.348462	2.01874	0.235837
2	0.651538	4.27347	0.436871
Combined		3.48778	1.13927

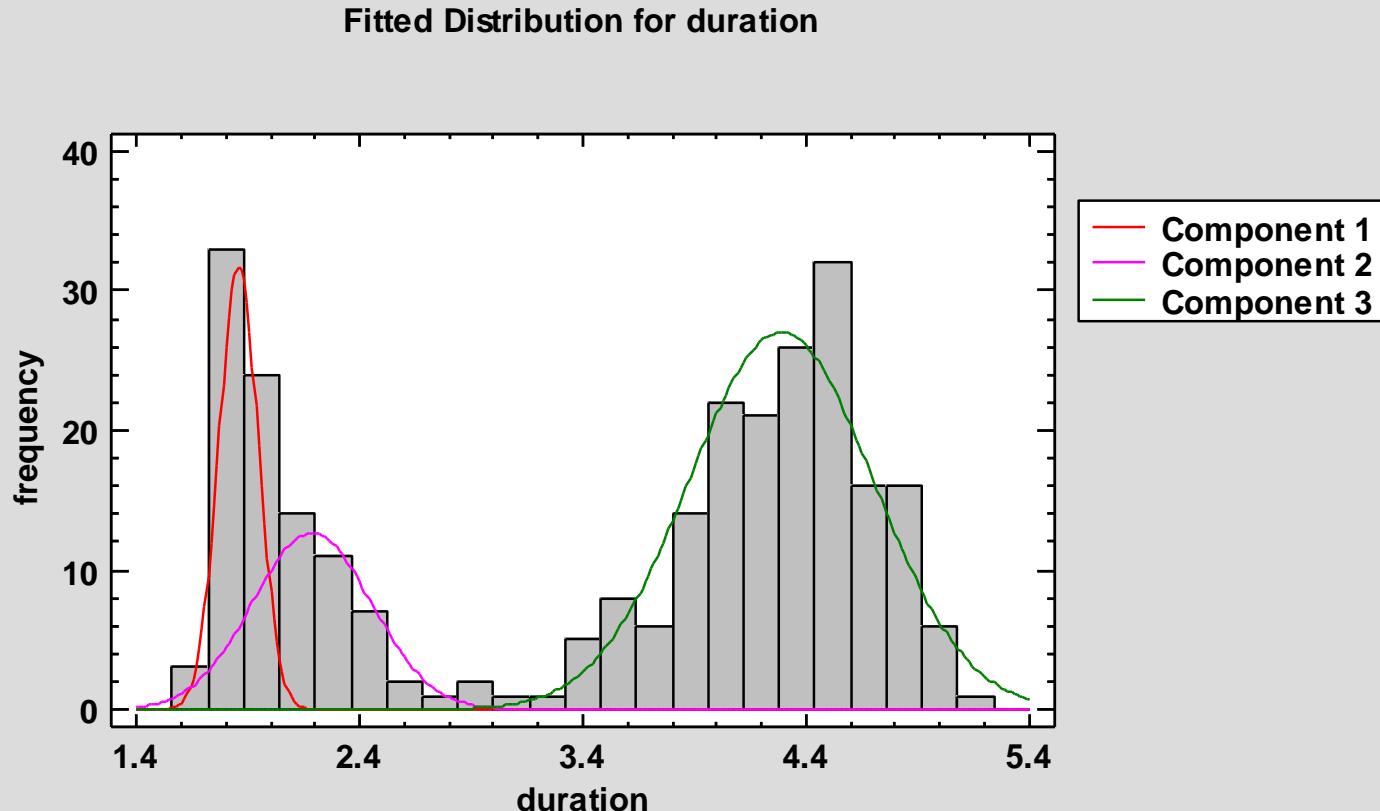
# Goodness of Fit Test

## Goodness-of-Fit Test

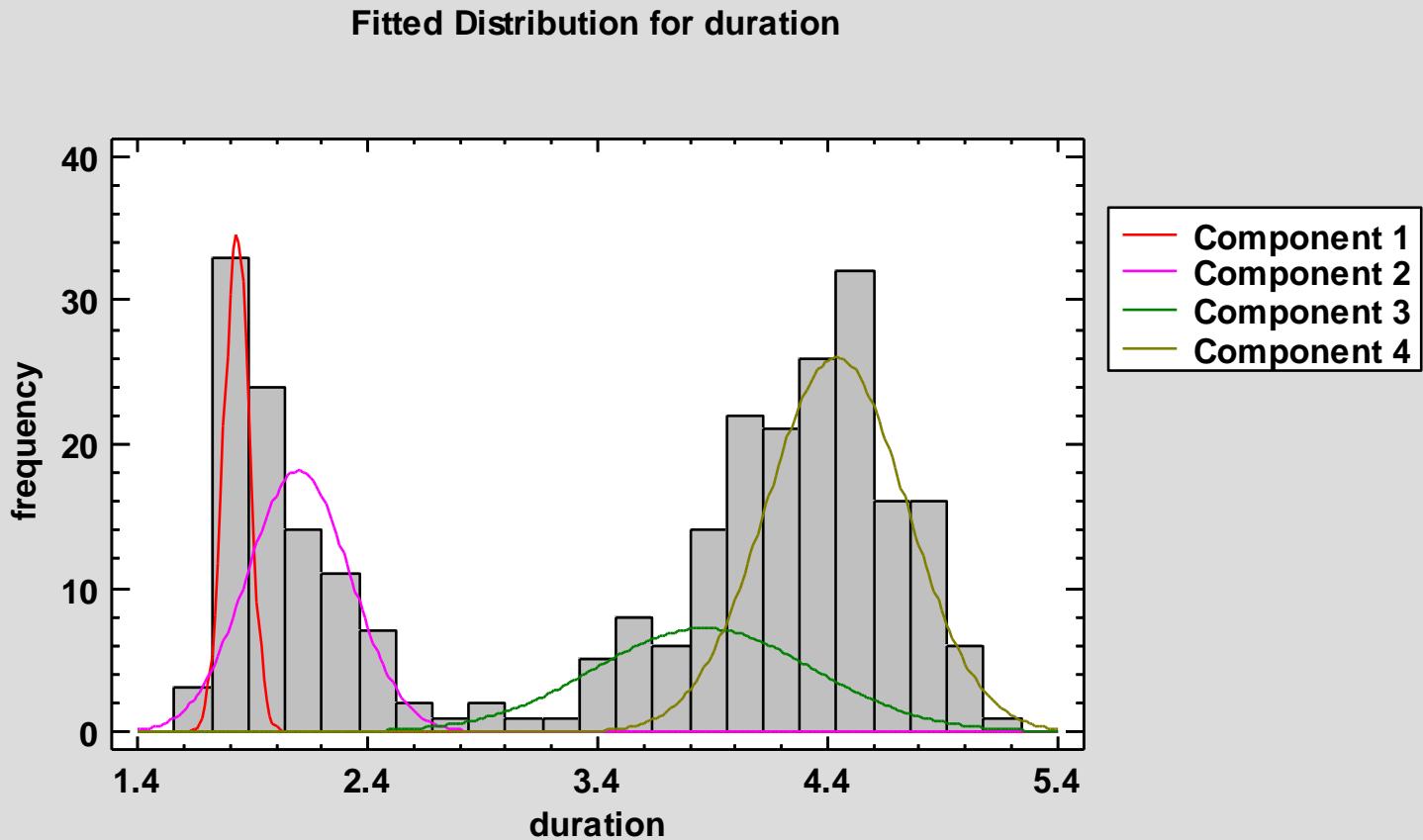
<i>Class</i>	<i>Lower limit</i>	<i>Upper limit</i>	<i>Observed</i>	<i>Expected</i>	<i>Chi-square</i>
1	at or below	1.8	16	16.7601	0.0344716
2	1.8	2.0	39	27.6286	4.6802
3	2.0	2.2	19	29.4395	3.70197
4	2.2	2.4	15	15.9335	0.054692
5	2.4	2.8	6	5.04214	0.181967
6	2.8	3.6	17	10.8923	3.42483
7	3.6	3.8	6	13.7598	4.37611
8	3.8	4.0	22	22.4062	0.00736236
9	4.0	4.2	26	29.6941	0.459554
10	4.2	4.4	29	32.0288	0.286409
11	4.4	4.6	38	28.1152	3.47528
12	4.6	4.8	24	20.0867	0.762371
13	4.8	5.0	12	11.6794	0.00879912
14	above 5.0		3	8.53361	3.58826

Chi-square statistic = 25.0423 with 8 degrees of freedom P-Value = 0.0015

# 3 Components



# 4 Components

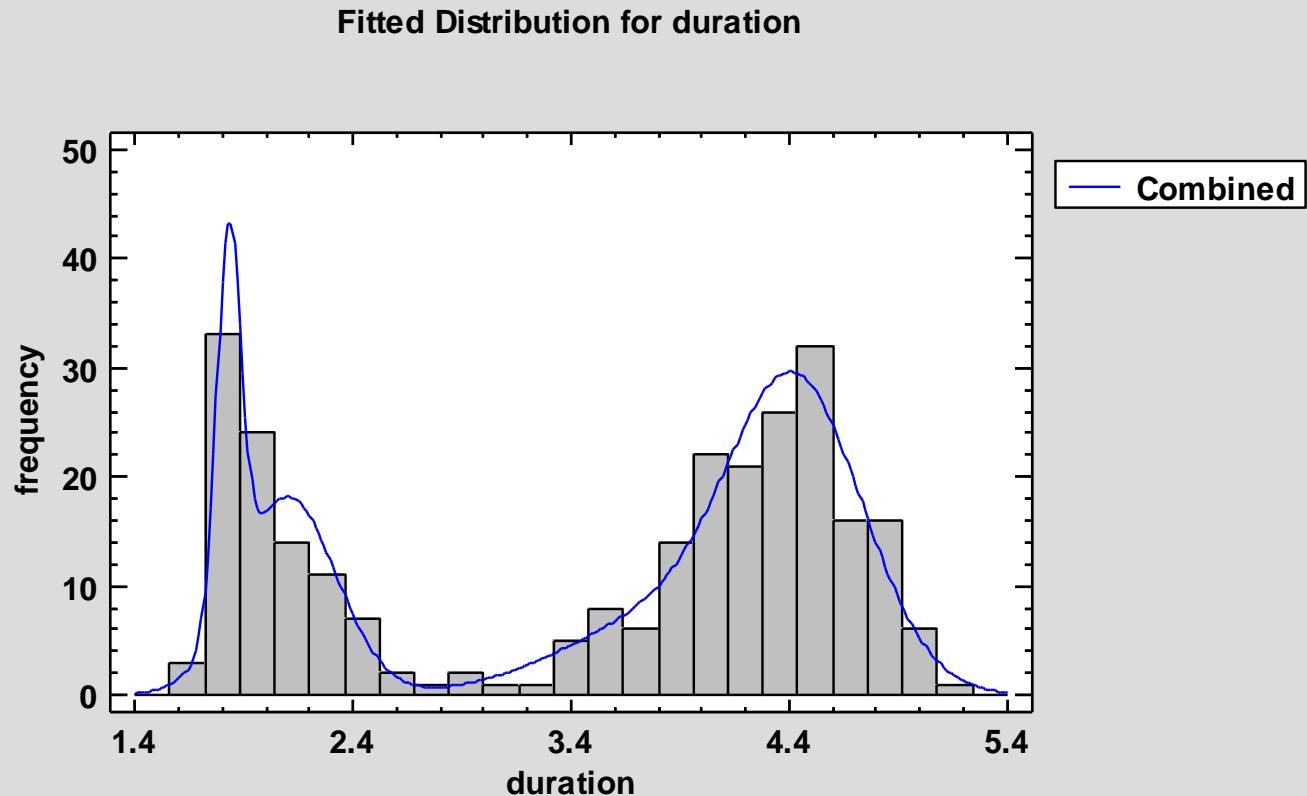


# Model Comparisons

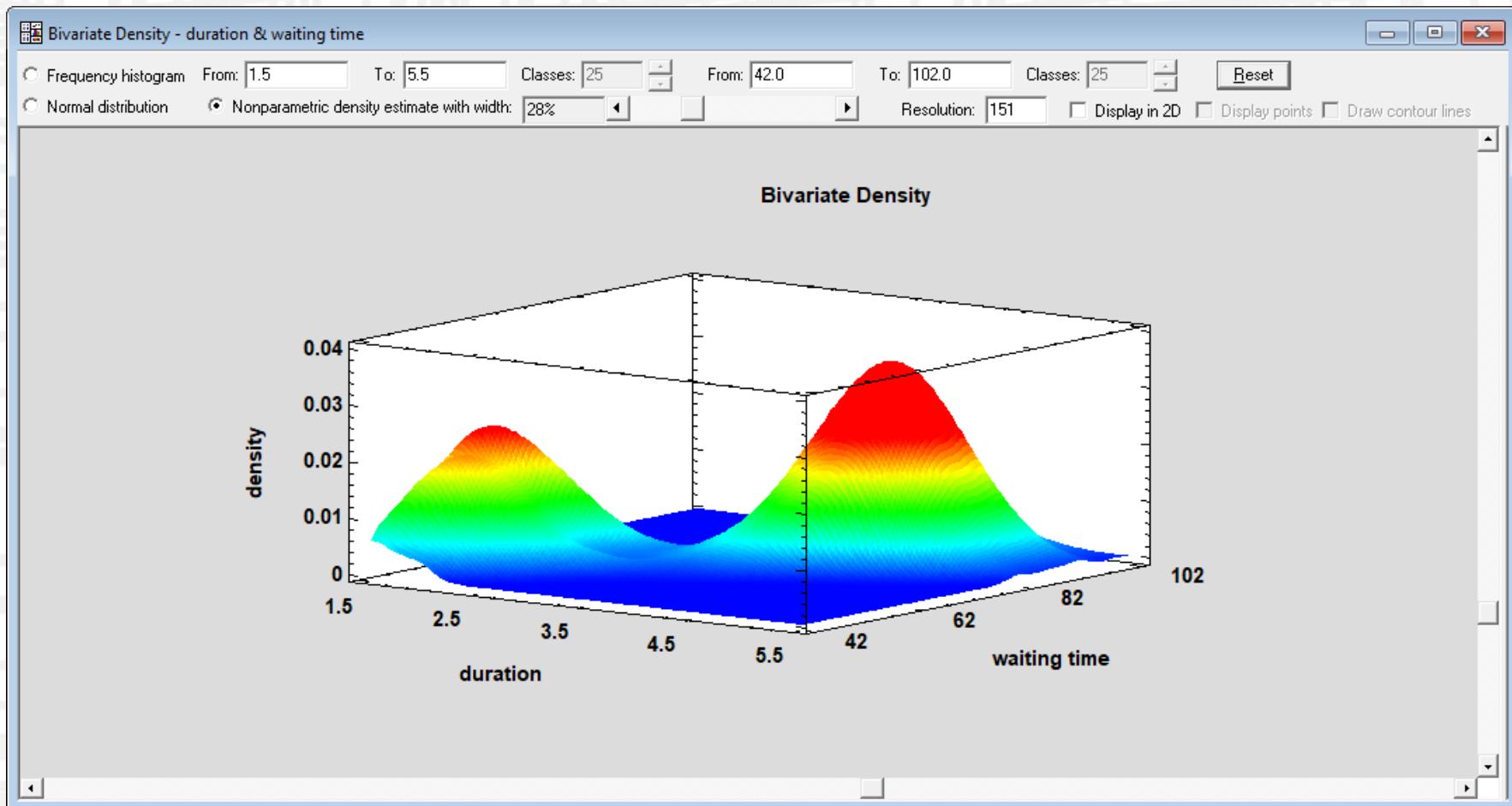
## Model Comparisons

<b>Number of components</b>	<b>Parameters</b>	<b>Log likelihood</b>	<b>AIC</b>	<b>BIC</b>	<b>CLC</b>
1	2	-421.417	846.834	854.046	842.834
2	5	-276.36	562.72	580.749	556.224
3	8	-263.919	543.838	572.684	597.074
4	11	-257.466	536.933	576.596	712.057
5	14	-255.825	539.65	590.131	773.007

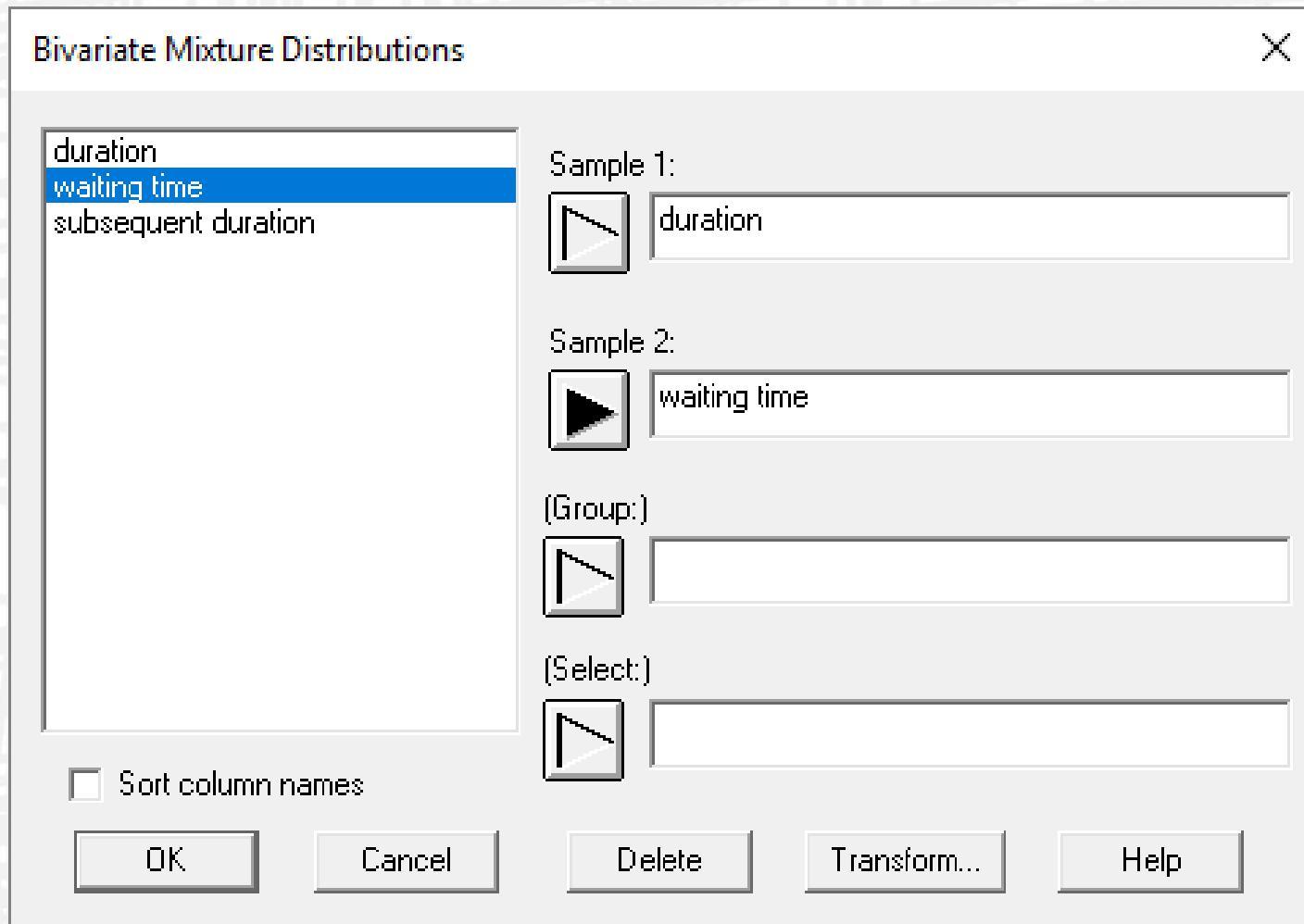
# Combined Distribution



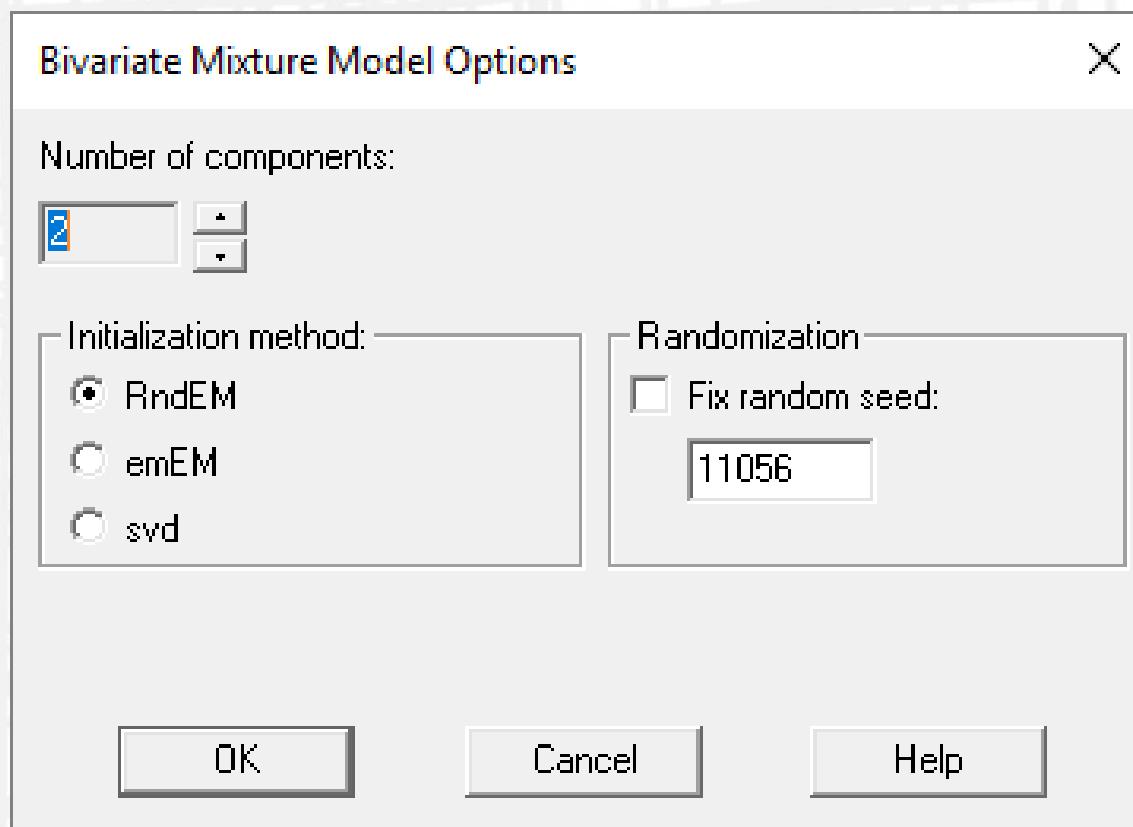
# Bivariate Gaussian Mixture Distributions



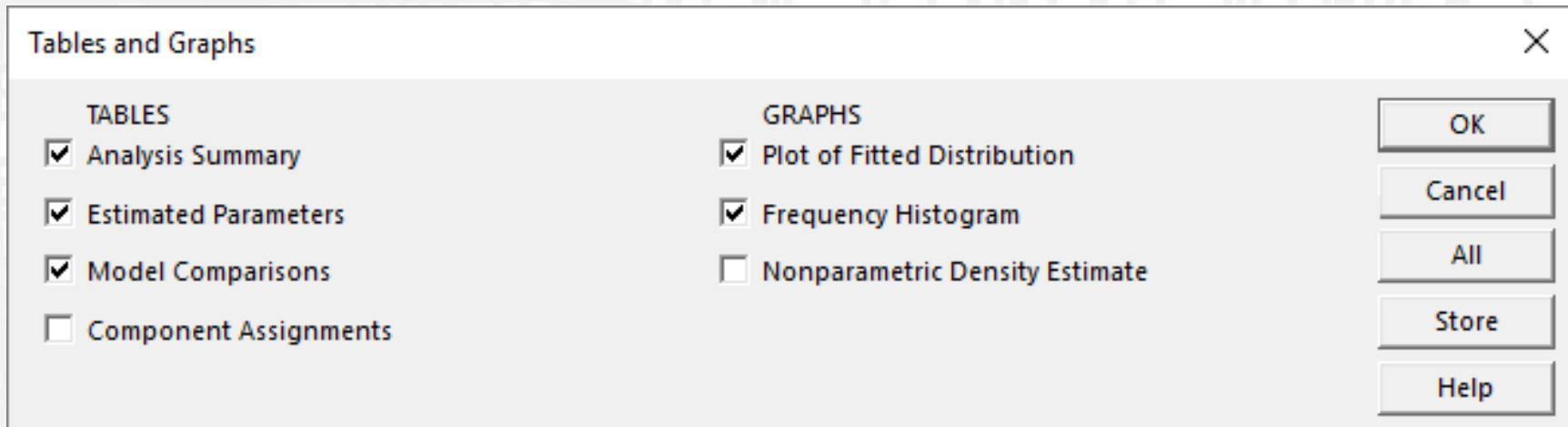
# Data Input Dialog Box



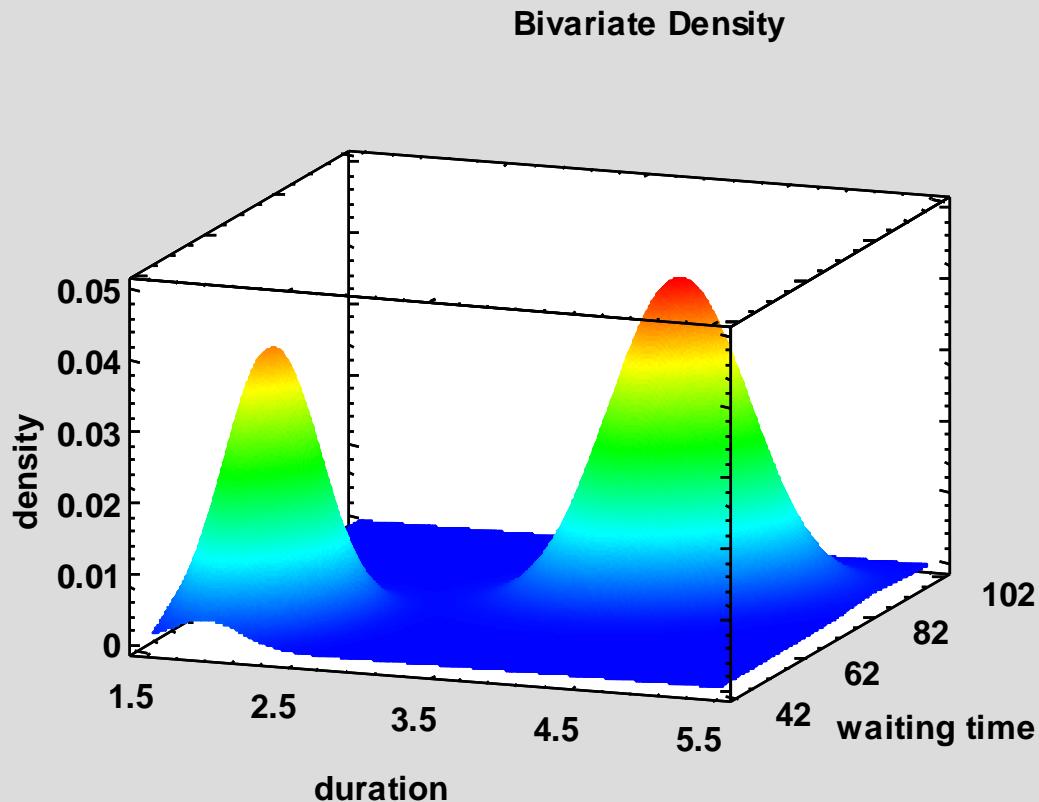
# Analysis Options



# Tables and Graphs



# Plot of Fitted Distribution



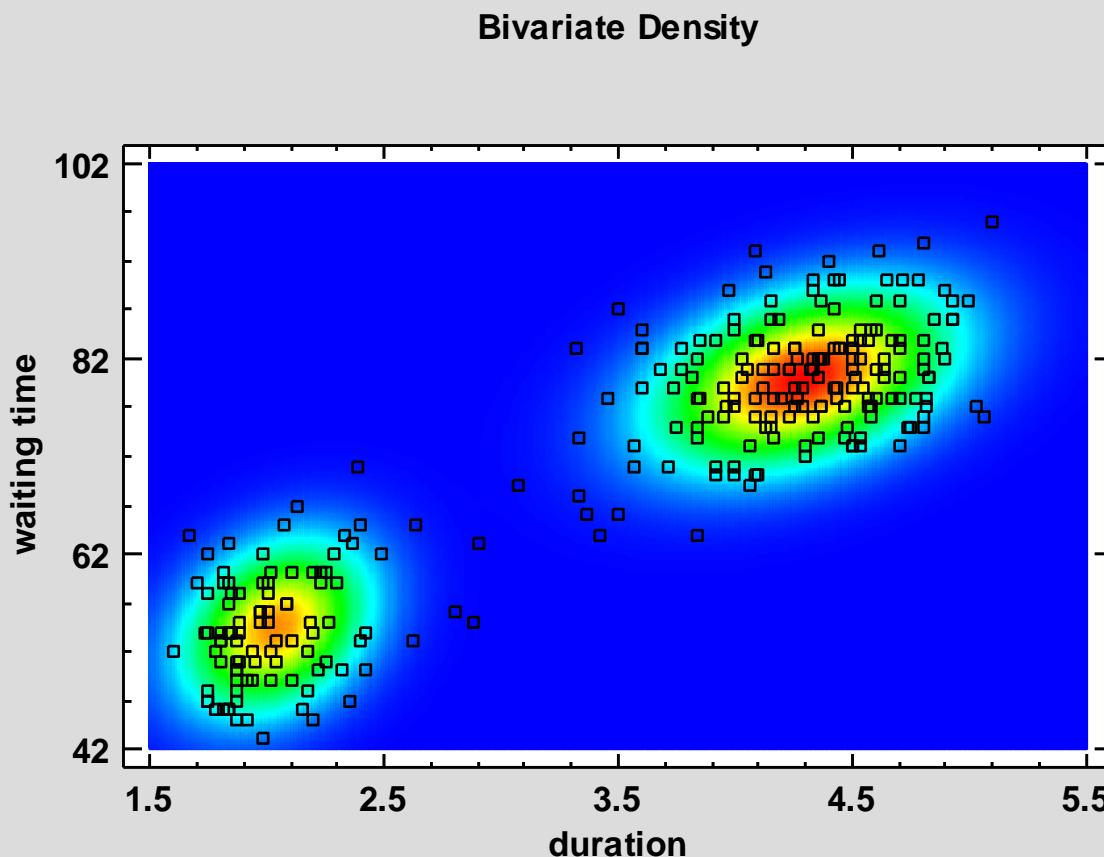
# Estimated Parameters

## Estimated Parameters

Sample size: 272

Component	Proportion	Mean 1	Mean 2	Sigma 1	Sigma 2	Correlation
1	0.644112	4.28969	79.9685	0.412222	6.00336	0.379875
2	0.355888	2.03643	54.4789	0.263053	5.80512	0.285173
Combined		3.48778	70.8971	1.13927	13.57	0.859504

# Contour Plot



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You'll find them at:

**[www.statgraphics.com/instructional\\_videos](http://www.statgraphics.com/instructional_videos)**

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