Web-Based Supplementary Materials for Inference for Bivariate Grouped Survival Data with an Application to Arm-In-Cage Experiments by B.A. Griffin and S.W. Lagakos

Table 1: Simulation Study Results. Estimated power of test statistics for $H_0 : F_0(t) = F_1(t)$ and $H_0 : G_1(z,t) = G_0(z,t)$ and a simple test of $H_0 : W_0(x) = W_1(x)$ which excludes information from the landings. The simulations assume hourly cage visits, no right-censoring, a Type-I error rate of 0.05, and that $T_0 \sim TN(4.5, 0.5^2, [3,6])$ and $T_1 \sim TN(4, 0.5^2, [2.5, 5.5])$ where $TN(\mu, \sigma^2, [a,b])$ represents a truncated normal distribution with mean μ, variance σ^2, and support $[a,b]$. Power is computed with $n_0 = n_1 = 30$ and using 300 simulations. Weibull$(\lambda, \alpha_1, \alpha_2)$ denotes a Weibull distribution with shape parameter λ and scale parameter $\exp\{\alpha_1 + \alpha_2 t\}$

	Null Hypothesis Tested		
	$F_0(t) = F_1(t)$	$G_1(z,t) = G_0(z,t)$	$W_0(x) = W_1(x)$
$(Z_0 \mid T_0 = t) \equiv (Z_1 \mid T_1 = t)$			
Weibull$(2, 3, -0.5)$	0.94	0.73	0.07
Weibull$(1, 3, -0.5)$	0.90	.71	0.05
Weibull$(0.5, 3, -0.5)$	0.91	0.74	0.16
Weibull$(2, 3, 0)$	0.90	0.73	0.08
Weibull$(1, 3, 0)$	0.90	0.71	0.05
Weibull$(0.5, 3, 0)$	0.92	0.71	0.34
Weibull$(2, 3, 0.5)$	0.95	0.71	0.36
Weibull$(1, 3, 0.5)$	0.95	.72	0.13
Weibull$(0.5, -5, 0.5)$	0.92	0.66	0.87
$(Z_0 \mid T_0 = t) \neq (Z_1 \mid T_1 = t)$			
$Z_0 \mid T_0 = t \sim$ Weibull$(2, 3, -0.5)$			
$Z_1 \mid T_1 = t \sim$ Weibull$(1.75, 3, -0.5)$	0.91	0.75	0.06
$Z_1 \mid T_1 = t \sim$ Weibull$(1, 3, -0.5)$	0.92	0.94	0.05
$Z_1 \mid T_1 = t \sim$ Weibull$(0.5, 3, -0.5)$	0.90	0.96	0.07
$Z_1 \mid T_1 = t \sim$ Weibull$(2, 2.5, -0.5)$	0.91	0.94	1.00
$Z_1 \mid T_1 = t \sim$ Weibull$(2, 2.5, -0.5)$	0.90	0.97	0.97
$Z_1 \mid T_1 = t \sim$ Weibull$(2, 2.8, -0.5)$	0.90	0.78	0.34
$Z_1 \mid T_1 = t \sim$ Weibull$(2, 3, -0.4)$	0.95	0.96	0.81
$Z_1 \mid T_1 = t \sim$ Weibull$(2, 3, -0.45)$	0.90	0.82	0.32

Table 2: Power and asymptotic relative efficiency for arm-in-cage designs with $k = 6$ when $T_0 \sim TN(4.5, 0.5^2, [3, 6])$ and $T_1 \sim TN(3.5, 0.5^2, [2, 5])$. Power computed with $n = 5.39$ for each group.

Type of Design	**Visit Times**	**Power**	**ARE**
Class I	$[3.25, 4.5]$, $\Delta = .25$	.950	-
	$[3.5, 4.75]$, $\Delta = .25$	.950	1.00
	$[3, 4.25]$, $\Delta = .25$	.945	.973
	$[3, 5]$, $\Delta = .25$	.943	.966
Class II	$[2.5, 5]$, $\Delta = .5$	.936	.933
	$(2.25, 3, 3.25, 3.75, 4.25, 4.75)$	.936	.930
	$[2, 4.5]$, $\Delta = .5$	.936	.930
Class III	$[3, 5.5]$, $\Delta = .5$	.936	.933
	$[3.5, 6]$, $\Delta = .5$	.935	.930
	$(3.25, 4, 4.25, 4.75, 5.25, 5.75)$	.931	.913
Class IV	$[1, 6]$, $\Delta = 1$	.893	.788
	$[0.5, 5.5]$, $\Delta = 1$	.828	.650
Class V	$[4.75, 6]$, $\Delta = .25$	.326	.175
	$[2, 3.25]$, $\Delta = .25$	.326	.175
	$[5.2, 6]$, $\Delta = .2$	.105	.036
	$(0.5, 1.5, 2, 2.5, 5.5, 6)$	.077	.018
	$[0.25, 1.50]$, $\Delta = .25$	.050	.000

*When visit times are evenly spaced, they are described by the notation $[a, b]$, Δ where a and b denote the first and last cage visit and Δ denotes the length of time between cage visits.

Table 3: Power and asymptotic relative efficiency for arm-in-cage designs with $k = 6$ when $T_0 \sim TN(4.5, 0.5^2, [3, 6])$ and $T_1 \sim TN(2.5, 0.5^2, [1, 4])$. Power computed with $n = 0.456$ for each group.

Type of Design	Visit Times	Power	ARE
Class I	$[3, 4]$, $\Delta = .2$	.950	-
	$[3.1, 3.6]$, $\Delta = .1$	.944	.969
	$[3, 3.5]$, $\Delta = .1$	.922	.878
	$[3.5, 4]$, $\Delta = .1$	.922	.878
Class II	$[1.5, 4]$, $\Delta = .5$	.921	.876
	$[1, 3.5]$, $\Delta = .5$	.903	.817
	$(1.25, 2, 2.25, 2.75, 3.25, 3.75)$	.899	.807
	$[2, 3.25]$, $\Delta = .25$	.687	.460
Class III	$[3, 4.25]$, $\Delta = .25$	.946	.981
	$[3, 5.5]$, $\Delta = .5$	.921	.876
	$[3.5, 6]$, $\Delta = .5$	.903	.817
	$(3.25, 4, 4.25, 4.75, 5.25, 5.75)$	.811	.621
Class IV	$[0.5, 5.5]$, $\Delta = 1$	.891	.784
	$[1, 6]$, $\Delta = 1$	.597	.375
Class V	$[1, 2.25]$, $\Delta = .25$	.074	.016
	$[4.75, 6]$, $\Delta = .25$	.074	.016
	$[0.25, 1.50]$, $\Delta = .25$	.051	.000

*When visit times are evenly spaced, they are described by the notation $[a, b]$, Δ where a and b denote the first and last cage visit and Δ denotes the length of time between cage visits.

Table 4: Power and asymptotic relative efficiency for arm-in-cage designs with $k = 6$ when $T_0 \sim TN(4.5, 0.5^2, [3, 6])$ and $T_1 \sim TN(1.5, 0.5^2, [0, 3])$. Power computed with $n = 0.064$ for each group.

Type of Design	**Visit Times**	**Power**	**ARE**
Class II	$(.25, 1, 1.25, 1.75, 2.25, 2.75)$	.950	–
	$[1.75, 3]$, $\Delta = .25$	.950	1.00
	$[0.5, 3]$, $\Delta = .5$	.399	.223
Class III	$[3, 4.25]$, $\Delta = .25$	.950	1.00
	$(3.25, 4, 4.25, 4.75, 5.25, 5.75)$	.950	1.00
	$[3, 5.5]$, $\Delta = .5$	.399	.223
	$[3.5, 6]$, $\Delta = .25$	.399	.223
Class IV	$[0.5, 5.5]$, $\Delta = 1$	.673	.447
	$[2, 4.5]$, $\Delta = .5$	.673	.447
	$[2.5, 5]$, $\Delta = .5$	.673	.447
	$[1.5, 4]$, $\Delta = .5$	.673	.447
	$[1, 6]$, $\Delta = 1$	.131	.052
Class V	$[0.25, 1.50]$, $\Delta = .25$	.057	.005
	$[4.75, 6]$, $\Delta = .25$	.053	.002

*When visit times are evenly spaced, they are described by the notation $[a, b]$, Δ where a and b denote the first and last cage visit and Δ denotes the length of time between cage visits.

Table 5: Power and asymptotic relative efficiency for arm-in-cage designs with $k = 6$ when $T_0 \sim TN(4.5, .75^2, [3, 6])$ and $T_1 \sim TN(3.5, .75^2, [2, 5])$. Power computed with $n = 11.11$ for each group.

Type of Design	**Visit Times**	**Power**	**ARE**
Class I	$[3, 5]$, $\Delta = .4$	.950	–
	$[3.25, 4.5]$, $\Delta = .25$	.932	.932
	$[3.5, 4.75]$, $\Delta = .25$	.932	.932
	$[3, 4.25]$, $\Delta = .25$	.927	.899
Class II	$[2.5, 5]$, $\Delta = .5$	.948	.987
	$(2.25, 3, 3.25, 3.75, 4.25, 4.75)$	.943	.965
	$[2, 4.5]$, $\Delta = .5$	.937	.932
Class III	$[3, 5.5]$, $\Delta = .5$	.948	.987
	$(3.25, 4, 4.25, 4.75, 5.25, 5.75)$	.937	.936
	$[3.5, 6]$, $\Delta = .5$	.936	.932
Class IV	$[1, 6]$, $\Delta = 1$	.925	.890
	$[0.5, 5.5]$, $\Delta = .5$	.906	.827
Class V	$[4.75, 6]$, $\Delta = .25$	.617	.393
	$[2, 3.25]$, $\Delta = .25$	.617	.393
	$[5.2, 6]$, $\Delta = .2$	.307	.163
	$(0.5, 1.5, 2, 2.5, 5.5, 6)$	.258	.132
	$[0.25, 1.50]$, $\Delta = .25$	.050	.000

*When visit times are evenly spaced, they are described by the notation $[a, b]$, Δ where a and b denote the first and last cage visit and Δ denotes the length of time between cage visits.

Table 6: Power and asymptotic relative efficiency for arm-in-cage designs with $k = 6$ when $T_0 \sim U(3,6)$ and $T_1 \sim U(2,5)$. Power computed with $n = 12.99$ for each group.

Type of Design	**Visit Times**	**Power**	**ARE**
Class I	$[3,5]$, $\Delta = .4$	.950	-
	$[3,4.25]$, $\Delta = .25$	.803	.609
	$[3.25,4.5]$, $\Delta = .25$	.707	.483
	$[3.5,4.75]$, $\Delta = .25$	.707	.483
Class II	$[2.5,5]$, $\Delta = .5$	.950	1.00
	$(2.25,3,3.25,3.75,4.25,4.75)$	.885	.769
	$[2,4.5]$, $\Delta = .5$	.837	.667
Class III	$[3,5.5]$, $\Delta = .5$	.950	1.00
	$[3.5,6]$, $\Delta = .5$	.837	.667
	$(3.25,4,4.25,4.75,5.25,5.75)$	.837	.667
Class IV	$[1,6]$, $\Delta = 1$	.950	1.00
	$[0.5,5.5]$, $\Delta = 1$	.778	.571
Class V	$[4.75,6]$, $\Delta = .25$	.732	.512
	$[2,3.25]$, $\Delta = .25$	.732	.512
	$(0.5,1.5,2,2.5,5.5,6)$	.625	.400
	$[5.2,6]$, $\Delta = .2$	.585	.367
	$[0.25,1.50]$, $\Delta = .25$	.050	.000

*When visit times are evenly spaced, they are described by the notation $[a,b]$, Δ where a and b denote the first and last cage visit and Δ denotes the length of time between cage visits.