

TABLE 11.10a FACTORS FOR OBTAINING VARIANCES IN CHAIN BLOCK DESIGNS

Treatments	$f_{22}$	$f_{11}$	$f_{12}$
In same group	0	0	$(b-1)/3$
1 group apart	$(b-2)$	$(b-1)$	$(b-1)/3$
2 groups apart	$(3b-8)$	$(2b-4)$	$(5b-9)/3$
3 groups apart	$(5b-18)$	$(3b-9)$	$(9b-25)/3$

In finding the shortest distance apart, number the groups as follows.

Block	1	2	3	...	b
	$G_b$	$G_1$	$G_2$		$G_{b-1}$
	$G_1$	$G_2$	$G_3$		$G_b$
	$g_1$	$g_2$	$g_3$		$g_b$

where  $g_i$  stands for the groups of treatments that are replicated once. In table 11.7a, for instance, A and I are one group apart, since A is in  $G_5$  and I in  $G_4$ . Similarly A (in  $G_5$ ) and q (in  $g_2$ ) are 2 groups apart while C (in  $G_1$ ) and k (in  $g_1$ ) are considered in the same group.

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TABLE 11.3 INDEX TO PLANS

t	k	r	b	$\lambda$ †	E	Plan	Type
4	2	3	6	1	.67	11.1	V
	3	3	4	2	.89	*	V
5	2	4	10	1	.62	11.2	V
	3	6	10	3	.83	11.1a	V
6	4	4	5	3	.94	*	V
	2	5	15	1	.60	11.3	I
7	3	5	10	2	.80	11.4	III
	3	10	20	4	.80	11.5	I
8	4	10	15	6	.90	11.6	II
	5	5	6	4	.96	*	V
9	2	6	21	1	.58	11.2a	II
	3	3	7	1	.78	11.7	V
11.1	4	4	7	2	.88	11.8	V
	6	6	7	5	.97	*	V
11.2	2	7	28	1	.57	11.9	I
	4	7	14	3	.86	11.10	I
11.3	7	7	8	6	.98	*	V
	2	8	36	1	.56	11.3a	II
11.4	4	8	18	3	.84	11.11	II

TABLE 11.3 INDEX TO PLANS (Continued)

<i>t</i>	<i>k</i>	<i>r</i>	<i>b</i>	$\lambda$ †	<i>E</i>	Plan	Type
9	5	10	18	5	.90	11.12	II
	6	8	12	5	.94	11.13	II
	8	8	9	7	.98	*	IV
10	2	9	45	1	.56	11.14	I
	3	9	30	2	.74	11.15	II
	4	6	15	2	.83	11.16	III
	5	9	18	4	.89	11.17	III
	6	9	15	5	.93	11.18	III
	9	9	10	8	.99	*	IV
11	2	10	55	1	.55	11.4a	II
	5	5	11	2	.88	11.19	IV
	6	6	11	3	.92	11.20	IV
	10	10	11	9	.99	*	IV
13	3	6	26	1	.72	11.21	II
	4	4	13	1	.81	11.22	IV
	9	9	13	6	.96	11.23	IV
15	3	7	35	1	.71	11.24	I
	7	7	15	3	.92	11.25	IV
	8	8	15	4	.94	11.26	IV
16	6	6	16	2	.89	11.27	IV
	6	9	24	3	.89	11.28	II
	10	10	16	6	.96	11.29	IV
19	3	9	57	1	.70	11.30	II
	9	9	19	4	.94	11.31	IV
	10	10	19	5	.95	11.32	IV
21	3	10	70	1	.70	11.33	I
	5	5	21	1	.84	11.34	IV
	7	10	30	3	.90	11.35	III
25	4	8	50	1	.78	11.36	II
	9	9	25	3	.93	11.37	IV
28	4	9	63	1	.78	11.38	I
	7	9	36	2	.89	11.39	III
31	6	6	31	1	.86	11.40	IV
	10	10	31	3	.93	11.41	IV
37	9	9	37	2	.91	11.42	IV
41	5	10	82	1	.82	11.43	II
57	8	8	57	1	.89	11.44	IV
73	9	9	73	1	.90	11.45	IV
91	10	10	91	1	.91	11.46	IV

† Number of times that two treatments appear together in the same block.

\* These plans are constructed by forming all possible combinations of the *t* numbers in groups of size *k*. The number of blocks *b* serves as a check that no group has been missed.

PLANS

Plan 11.1  $t = 4, k = 2, r = 3, b = 6, \lambda = 1, E = .67$ , Type V

Block	Rep. I	Rep. II	Rep. III
(1)	<u>1 2</u>	(3) <u>1 3</u>	(5) <u>1 4</u>
(2)	<u>3 4</u>	(4) <u>2 4</u>	(6) <u>2 3</u>

Plan 11.2  $t = 5, k = 2, r = 4, b = 10, \lambda = 1, E = .62$ , Type V

Block	Reps. I and II	Reps. III and IV
(1)	<u>1 2</u>	(6) <u>1 4</u>
(2)	<u>3 4</u>	(7) <u>2 3</u>
(3)	<u>2 5</u>	(8) <u>3 5</u>
(4)	<u>1 3</u>	(9) <u>1 5</u>
(5)	<u>4 5</u>	(10) <u>2 4</u>

Plan 11.1a  $t = 5, k = 3, r = 6, b = 10, \lambda = 3, E = .83$ , Type V

Block	Reps. I, II, and III	Reps. IV, V, and VI
(1)	<u>1 2 3</u>	(6) <u>1 2 4</u>
(2)	<u>1 2 5</u>	(7) <u>1 3 4</u>
(3)	<u>1 4 5</u>	(8) <u>1 3 5</u>
(4)	<u>2 3 4</u>	(9) <u>2 3 5</u>
(5)	<u>3 4 5</u>	(10) <u>2 4 5</u>

Plan 11.3  $t = 6, k = 2, r = 5, b = 15, \lambda = 1, E = .60$ , Type I

Block	Rep. I	Rep. II	Rep. III	Rep. IV	Rep. V
(1)	<u>1 2</u>	(4) <u>1 3</u>	(7) <u>1 4</u>	(10) <u>1 5</u>	(13) <u>1 6</u>
(2)	<u>3 4</u>	(5) <u>2 5</u>	(8) <u>2 6</u>	(11) <u>2 4</u>	(14) <u>2 3</u>
(3)	<u>5 6</u>	(6) <u>4 6</u>	(9) <u>3 5</u>	(12) <u>3 6</u>	(15) <u>4 5</u>

Plan 11.4  $t = 6, k = 3, r = 5, b = 10, \lambda = 2, E = .80$ , Type III

Block		
(1)	<u>1 2 5</u>	(6) <u>2 3 4</u>
(2)	<u>1 2 6</u>	(7) <u>2 3 5</u>
(3)	<u>1 3 4</u>	(8) <u>2 4 6</u>
(4)	<u>1 3 6</u>	(9) <u>3 5 6</u>
(5)	<u>1 4 5</u>	(10) <u>4 5 6</u>

Plan 11.5  $t = 6, k = 3, r = 10, b = 20, \lambda = 4, E = .80$ , Type I

Block	Rep. I	Rep. II	Rep. III	Rep. IV
(1)	<u>1 2 3</u>	(3) <u>1 2 4</u>	(5) <u>1 2 5</u>	(7) <u>1 2 6</u>
(2)	<u>4 5 6</u>	(4) <u>3 5 6</u>	(6) <u>3 4 6</u>	(8) <u>3 4 5</u>
	Rep. V	Rep. VI	Rep. VII	Rep. VIII
(9)	<u>1 3 4</u>	(11) <u>1 3 5</u>	(13) <u>1 3 6</u>	(15) <u>1 4 5</u>
(10)	<u>2 5 6</u>	(12) <u>2 4 6</u>	(14) <u>2 4 5</u>	(16) <u>2 3 6</u>
	Rep. IX	Rep. X		
(17)	<u>1 4 6</u>	(19) <u>1 5 6</u>		
(18)	<u>2 3 5</u>	(20) <u>2 3 4</u>		

Plan 11.6  $t = 6, k = 4, r = 10, b = 15, \lambda = 6, E = .90$ , Type II

Block	Reps. I and II	Reps. III and IV	Reps. V and VI
(1)	<u>1 2 3 4</u>	(4) <u>1 2 3 5</u>	(7) <u>1 2 3 6</u>
(2)	<u>1 4 5 6</u>	(5) <u>1 2 4 6</u>	(8) <u>1 3 4 5</u>
(3)	<u>2 3 5 6</u>	(6) <u>3 4 5 6</u>	(9) <u>2 4 5 6</u>
	Reps. VII and VIII	Reps. IX and X	
(10)	<u>1 2 4 5</u>	(13) <u>1 2 5 6</u>	
(11)	<u>1 3 5 6</u>	(14) <u>1 3 4 6</u>	
(12)	<u>2 3 4 6</u>	(15) <u>2 3 4 5</u>	

Plan 11.2a  $t = 7, k = 2, r = 6, b = 21, \lambda = 1, E = .58$ , Type II

Block	Reps. I and II	Reps. III and IV	Reps. V and VI
(1)	<u>1 2</u>	(8) <u>1 3</u>	(15) <u>1 4</u>
(2)	<u>2 6</u>	(9) <u>2 4</u>	(16) <u>2 3</u>
(3)	<u>3 4</u>	(10) <u>3 5</u>	(17) <u>3 6</u>
(4)	<u>4 7</u>	(11) <u>4 6</u>	(18) <u>4 5</u>
(5)	<u>1 5</u>	(12) <u>5 7</u>	(19) <u>2 5</u>
(6)	<u>5 6</u>	(13) <u>1 6</u>	(20) <u>6 7</u>
(7)	<u>3 7</u>	(14) <u>2 7</u>	(21) <u>1 7</u>

Plan 11.7  $t = 7, k = 3, r = 3, b = 7, \lambda = 1, E = .78$ , Type V

Block			
(1)	<u>1 2 4</u>	(3) <u>3 4 6</u>	(5) <u>5 6 1</u>
(2)	<u>2 3 5</u>	(4) <u>4 5 7</u>	(6) <u>6 7 2</u>
			(7) <u>7 1 3</u>

Plan 11.8  $t = 7, k = 4, r = 4, b = 7, \lambda = 2, E = .88$ , Type V

Block		
(1)	<u>3 5 6 7</u>	(4) <u>1 2 3 6</u>
(2)	<u>1 4 6 7</u>	(5) <u>2 3 4 7</u>
(3)	<u>1 2 5 7</u>	(6) <u>1 3 4 5</u>
		(7) <u>2 4 5 6</u>

Plan 11.9  $t = 8, k = 2, r = 7, b = 28, \lambda = 1, E = .57$ , Type I

Block	Rep. I	Rep. II	Rep. III	Rep. IV
(1)	<u>1 2</u>	(5) <u>1 3</u>	(9) <u>1 4</u>	(13) <u>1 5</u>
(2)	<u>3 4</u>	(6) <u>2 8</u>	(10) <u>2 7</u>	(14) <u>2 3</u>
(3)	<u>5 6</u>	(7) <u>4 5</u>	(11) <u>3 6</u>	(15) <u>4 7</u>
(4)	<u>7 8</u>	(8) <u>6 7</u>	(12) <u>5 8</u>	(16) <u>6 8</u>
	Rep. V	Rep. VI	Rep. VII	
(17)	<u>1 6</u>	(21) <u>1 7</u>	(25) <u>1 8</u>	
(18)	<u>2 4</u>	(22) <u>2 6</u>	(26) <u>2 5</u>	
(19)	<u>3 8</u>	(23) <u>3 5</u>	(27) <u>3 7</u>	
(20)	<u>5 7</u>	(24) <u>4 8</u>	(28) <u>4 6</u>	

Plan 11.10  $t = 8, k = 4, r = 7, b = 14, \lambda = 3, E = .86$ , Type I

Block	Rep. I	Rep. II	Rep. III	Rep. IV
(1)	<u>1 2 3 4</u>	(3) <u>1 2 7 8</u>	(5) <u>1 3 6 8</u>	(7) <u>1 4 6 7</u>
(2)	<u>5 6 7 8</u>	(4) <u>3 4 5 6</u>	(6) <u>2 4 5 7</u>	(8) <u>2 3 5 8</u>
	Rep. V	Rep. VI	Rep. VII	
(9)	<u>1 2 5 6</u>	(11) <u>1 3 5 7</u>	(13) <u>1 4 5 8</u>	
(10)	<u>3 4 7 8</u>	(12) <u>2 4 6 8</u>	(14) <u>2 3 6 7</u>	

Plan 11.3a  $t = 9, k = 2, r = 8, b = 36, \lambda = 1, E = .56$ , Type II

Block	Reps. I and II	Reps. III and IV	Reps. V and VI	Reps. VII and VIII
(1)	<u>1 2</u>	(10) <u>1 3</u>	(19) <u>1 4</u>	(28) <u>1 5</u>
(2)	<u>2 8</u>	(11) <u>2 5</u>	(20) <u>2 6</u>	(29) <u>2 4</u>
(3)	<u>3 4</u>	(12) <u>3 6</u>	(21) <u>2 3</u>	(30) <u>3 8</u>
(4)	<u>4 7</u>	(13) <u>4 9</u>	(22) <u>4 5</u>	(31) <u>4 6</u>
(5)	<u>5 6</u>	(14) <u>5 8</u>	(23) <u>5 7</u>	(32) <u>3 5</u>
(6)	<u>1 6</u>	(15) <u>6 7</u>	(24) <u>6 8</u>	(33) <u>6 9</u>
(7)	<u>3 7</u>	(16) <u>1 7</u>	(25) <u>7 9</u>	(34) <u>2 7</u>
(8)	<u>8 9</u>	(17) <u>4 8</u>	(26) <u>1 8</u>	(35) <u>7 8</u>
(9)	<u>5 9</u>	(18) <u>2 9</u>	(27) <u>3 9</u>	(36) <u>1 9</u>

Plan 11.11  $t = 9, k = 4, r = 8, b = 18, \lambda = 3, E = .84$ , Type II

Reps. I, II, Block III, and IV	Reps. V, VI, VII, and VIII
(1) <u>1 4 6 7</u>	(10) <u>1 2 5 7</u>
(2) <u>2 6 8 9</u>	(11) <u>2 3 5 6</u>
(3) <u>1 3 8 9</u>	(12) <u>3 4 7 9</u>
(4) <u>1 2 3 4</u>	(13) <u>1 2 4 9</u>
(5) <u>1 5 7 8</u>	(14) <u>1 5 6 9</u>
(6) <u>4 5 6 9</u>	(15) <u>1 3 6 8</u>
(7) <u>2 3 6 7</u>	(16) <u>4 6 7 8</u>
(8) <u>2 4 5 8</u>	(17) <u>3 4 5 8</u>
(9) <u>3 5 7 9</u>	(18) <u>2 7 8 9</u>

Plan 11.12  $t = 9, k = 5, r = 10, b = 18, \lambda = 5, E = .90$ , Type II

Reps. I, II, Block III, IV, and V	Reps. VI, VII, VIII, IX, and X
(1) <u>1 2 3 7 8</u>	(10) <u>1 2 3 5 9</u>
(2) <u>1 2 4 6 8</u>	(11) <u>1 2 5 6 8</u>
(3) <u>2 3 5 8 9</u>	(12) <u>1 3 4 5 6</u>
(4) <u>2 3 4 6 9</u>	(13) <u>2 3 4 7 8</u>
(5) <u>1 3 4 5 7</u>	(14) <u>2 4 5 7 9</u>
(6) <u>2 4 5 6 7</u>	(15) <u>3 5 6 7 8</u>
(7) <u>1 3 6 7 9</u>	(16) <u>1 4 7 8 9</u>
(8) <u>1 4 5 8 9</u>	(17) <u>3 4 6 8 9</u>
(9) <u>5 6 7 8 9</u>	(18) <u>1 2 6 7 9</u>

Plan 11.13  $t = 9, k = 6, r = 8, b = 12, \lambda = 5, E = .94$ , Type II

Block	Reps. I and II	Reps. III and IV	Reps. V and VI	Reps. VII and VIII
(1)	<u>1 2 4 5 7 8</u>	(4) <u>1 2 5 6 7 9</u>	(7) <u>1 3 5 6 7 8</u>	(10) <u>4 5 6 7 8 9</u>
(2)	<u>2 3 5 6 8 9</u>	(5) <u>1 3 4 5 8 9</u>	(8) <u>1 2 4 6 8 9</u>	(11) <u>1 2 3 4 5 6</u>
(3)	<u>1 3 4 6 7 9</u>	(6) <u>2 3 4 6 7 8</u>	(9) <u>2 3 4 5 7 9</u>	(12) <u>1 2 3 7 8 9</u>

Plan 11.14  $t = 10, k = 2, r = 9, b = 45, \lambda = 1, E = .56$ , Type I

Block	Rep. I	Rep. II	Rep. III	Rep. IV	Rep. V
(1)	<u>1 2</u>	(6) <u>1 3</u>	(11) <u>1 4</u>	(16) <u>1 5</u>	(21) <u>1 6</u>
(2)	<u>3 4</u>	(7) <u>2 7</u>	(12) <u>2 10</u>	(17) <u>2 8</u>	(22) <u>2 9</u>
(3)	<u>5 6</u>	(8) <u>4 8</u>	(13) <u>3 7</u>	(18) <u>3 10</u>	(23) <u>3 8</u>
(4)	<u>7 8</u>	(9) <u>5 9</u>	(14) <u>5 8</u>	(19) <u>4 9</u>	(24) <u>4 10</u>
(5)	<u>9 10</u>	(10) <u>6 10</u>	(15) <u>6 9</u>	(20) <u>6 7</u>	(25) <u>5 7</u>

  

Rep. VI	Rep. VII	Rep. VIII	Rep. IX
(26) <u>1 7</u>	(31) <u>1 8</u>	(36) <u>1 9</u>	(41) <u>1 10</u>
(27) <u>2 6</u>	(32) <u>2 3</u>	(37) <u>2 4</u>	(42) <u>2 5</u>
(28) <u>3 9</u>	(33) <u>4 6</u>	(38) <u>3 5</u>	(43) <u>3 6</u>
(29) <u>4 5</u>	(34) <u>5 10</u>	(39) <u>6 8</u>	(44) <u>4 7</u>
(30) <u>8 10</u>	(35) <u>7 9</u>	(40) <u>7 10</u>	(45) <u>8 9</u>

Plan 11.15  $t = 10, k = 3, r = 9, b = 30, \lambda = 2, E = .74$ , Type II

Block	Reps. I, II, and III	Reps. IV, V, and VI	Reps. VII, VIII, and IX
(1)	<u>1 2 3</u>	(11) <u>1 2 4</u>	(21) <u>1 3 5</u>
(2)	<u>2 5 8</u>	(12) <u>2 3 6</u>	(22) <u>2 6 7</u>
(3)	<u>3 4 7</u>	(13) <u>3 4 8</u>	(23) <u>3 8 9</u>
(4)	<u>1 4 6</u>	(14) <u>4 5 9</u>	(24) <u>2 4 10</u>
(5)	<u>5 7 8</u>	(15) <u>1 5 7</u>	(25) <u>3 5 6</u>
(6)	<u>4 6 9</u>	(16) <u>6 8 9</u>	(26) <u>1 6 8</u>
(7)	<u>1 7 9</u>	(17) <u>3 7 10</u>	(27) <u>2 7 9</u>
(8)	<u>2 8 10</u>	(18) <u>1 8 10</u>	(28) <u>4 7 8</u>
(9)	<u>3 9 10</u>	(19) <u>2 5 9</u>	(29) <u>1 9 10</u>
(10)	<u>5 6 10</u>	(20) <u>6 7 10</u>	(30) <u>4 5 10</u>

Plan 11.16  $t = 10, k = 4, r = 6, b = 15, \lambda = 2, E = .83$ , Type III

Block	Reps. I, II, III, and IV	Reps. V, VI, VII, and VIII
(1)	<u>1 2 3 4</u>	(6) <u>1 6 8 10</u>
(2)	<u>1 2 5 6</u>	(7) <u>2 3 6 9</u>
(3)	<u>1 3 7 8</u>	(8) <u>2 4 7 10</u>
(4)	<u>1 4 9 10</u>	(9) <u>2 5 8 10</u>
(5)	<u>1 5 7 9</u>	(10) <u>2 7 8 9</u>
(11)	<u>3 5 9 10</u>	(12) <u>3 6 7 10</u>
(12)	<u>3 4 5 8</u>	(13) <u>3 4 5 8</u>
(13)	<u>4 5 6 7</u>	(14) <u>4 5 6 7</u>
(14)	<u>4 6 8 9</u>	(15) <u>4 6 8 9</u>

Plan 11.17  $t = 10, k = 5, r = 9, b = 18, \lambda = 4, E = .89$ , Type III

Block	Reps. I, II, III, IV, and V	Reps. VI, VII, VIII, and IX
(1)	<u>1 2 3 4 5</u>	(7) <u>1 4 5 6 10</u>
(2)	<u>1 2 3 6 7</u>	(8) <u>1 4 8 9 10</u>
(3)	<u>1 2 4 6 9</u>	(9) <u>1 5 7 9 10</u>
(4)	<u>1 2 5 7 8</u>	(10) <u>2 3 4 8 10</u>
(5)	<u>1 3 6 8 9</u>	(11) <u>2 3 5 9 10</u>
(6)	<u>1 3 7 8 10</u>	(12) <u>2 4 7 8 9</u>
(13)	<u>2 5 6 8 10</u>	(14) <u>2 6 7 9 10</u>
(14)	<u>2 6 7 9 10</u>	(15) <u>3 4 6 7 10</u>
(15)	<u>3 4 6 7 10</u>	(16) <u>3 4 5 7 9</u>
(16)	<u>3 4 5 7 9</u>	(17) <u>3 5 6 8 9</u>
(17)	<u>3 5 6 8 9</u>	(18) <u>4 5 6 7 8</u>
(18)	<u>4 5 6 7 8</u>	

Plan 11.18  $t = 10, k = 6, r = 9, b = 15, \lambda = 5, E = .93$ , Type III

Block

(1) 1 2 4 5 8 9	(6) 2 3 4 6 8 10	(11) 1 4 5 7 8 10
(2) 5 6 7 8 9 10	(7) 1 2 6 7 9 10	(12) 1 2 3 5 7 10
(3) 2 4 5 6 9 10	(8) 1 3 5 6 8 9	(13) 2 3 5 6 7 8
(4) 1 2 4 6 7 8	(9) 1 2 3 8 9 10	(14) 1 3 4 5 6 10
(5) 3 4 7 8 9 10	(10) 2 3 4 5 7 9	(15) 1 3 4 6 7 9

Plan 11.4a  $t = 11, k = 2, r = 10, b = 55, \lambda = 1, E = .55$ , Type II

Block	Reps. I and II	Reps. III and IV	Reps. V and VI	Reps. VII and VIII	Reps. IX and X
(1)	1 2	1 3	1 4	1 5	1 6
(2)	2 11	2 6	2 3	2 9	2 5
(3)	3 10	3 5	3 7	3 6	3 4
(4)	4 5	4 10	4 6	4 4	4 7
(5)	5 6	5 9	5 10	5 7	5 8
(6)	6 7	6 8	6 9	6 10	6 11
(7)	1 7	2 7	7 11	7 8	7 10
(8)	3 8	1 8	2 8	4 8	8 9
(9)	4 9	7 9	1 9	9 11	3 9
(10)	9 10	10 11	8 10	1 10	2 10
(11)	8 11	4 11	5 11	3 11	5 11

Plan 11.19  $t = 11, k = 5, r = 5, b = 11, \lambda = 2, E = .88$ , Type IV

Block

(1) 1 2 3 5 8	(7) 7 8 9 11 3
(2) 2 3 4 6 9	(8) 8 9 10 1 4
(3) 3 4 5 7 10	(9) 9 10 11 2 5
(4) 4 5 6 8 11	(10) 10 11 1 3 6
(5) 5 6 7 9 1	(11) 11 1 2 4 7
(6) 6 7 8 10 2	

Plan 11.20  $t = 11, k = 6, r = 6, b = 11, \lambda = 3, E = .92$ , Type IV

Block

(1) 4 6 7 9 10 11	(7) 1 2 4 5 6 10
(2) 1 5 7 8 10 11	(8) 2 3 5 6 7 11
(3) 1 2 6 8 9 11	(9) 1 3 4 6 7 8
(4) 1 2 3 7 9 10	(10) 2 4 5 7 8 9
(5) 2 3 4 8 10 11	(11) 3 5 6 8 9 10
(6) 1 3 4 5 9 11	

Plan 11.21  $t = 13, k = 3, r = 6, b = 26, \lambda = 1, E = .72$ , Type II

Block	Reps. I, II, and III	Reps. IV, V, and VI
(1)	1 3 9	2 5 6
(2)	2 4 10	3 6 7
(3)	3 5 11	4 7 8
(4)	4 6 12	5 8 9
(5)	5 7 13	6 9 10
(6)	1 6 8	7 10 11
(7)	2 7 9	8 11 12
(8)	3 8 10	9 12 13
(9)	4 9 11	1 10 13
(10)	5 10 12	1 2 11
(11)	6 11 13	2 3 12
(12)	1 7 12	3 4 13
(13)	2 8 13	1 4 5

Plan 11.22  $t = 13, k = 4, r = 4, b = 13, \lambda = 1, E = .81$ , Type IV

Block

(1) 1 2 4 10	(6) 6 7 9 2	(11) 11 12 1 7
(2) 2 3 5 11	(7) 7 8 10 3	(12) 12 13 2 8
(3) 3 4 6 12	(8) 8 9 11 4	(13) 13 1 3 9
(4) 4 5 7 13	(9) 9 10 12 5	
(5) 5 6 8 1	(10) 10 11 13 6	

Plan 11.23  $t = 13, k = 9, r = 9, b = 13, \lambda = 6, E = .96$ , Type IV

Block

(1) 3 5 6 7 8 9 11 12 13	(8) 1 2 3 5 6 7 10 12 13
(2) 1 4 6 7 8 9 10 12 13	(9) 1 2 3 4 6 7 8 11 13
(3) 1 2 5 7 8 9 10 11 13	(10) 1 2 3 4 5 7 8 9 12
(4) 1 2 3 6 8 9 10 11 12	(11) 2 3 4 5 6 8 9 10 13
(5) 2 3 4 7 9 10 11 12 13	(12) 1 3 4 5 6 7 9 10 11
(6) 1 3 4 5 8 10 11 12 13	(13) 2 4 5 6 7 8 10 11 12
(7) 1 2 4 5 6 9 11 12 13	

Plan 11.24  $t = 15, k = 3, r = 7, b = 35, \lambda = 1, E = .71$ , Type I

Block	Rep. I	Rep. II	Rep. III	Rep. IV
(1)	1 2 3	(6) 1 4 5	(11) 1 6 7	(16) 1 8 9
(2)	4 8 12	(7) 2 8 10	(12) 2 9 11	(17) 2 13 15
(3)	5 10 15	(8) 3 13 14	(13) 3 12 15	(18) 3 4 7
(4)	6 11 13	(9) 6 9 15	(14) 4 10 14	(19) 5 11 14
(5)	7 9 14	(10) 7 11 12	(15) 5 8 13	(20) 6 10 12

	Rep. V	Rep. VI	Rep. VII
(21)	1 10 11	(26) 1 12 13	(31) 1 14 15
(22)	2 12 14	(27) 2 5 7	(32) 2 4 6
(23)	3 5 6	(28) 3 9 10	(33) 3 8 11
(24)	4 9 13	(29) 4 11 15	(34) 5 9 12
(25)	7 8 15	(30) 6 8 14	(35) 7 10 13

Plan 11.25  $t = 15, k = 7, r = 7, b = 15, \lambda = 3, E = .92$ , Type IV

See incomplete latin squares Plan 13.7; randomize units in blocks ignoring replications.

Plan 11.26  $t = 15, k = 8, r = 8, b = 15, \lambda = 4, E = .94$ , Type IV

See incomplete latin squares Plan 13.8; randomize units in blocks ignoring replications.

Plan 11.27  $t = 16, k = 6, r = 6, b = 16, \lambda = 2, E = .89$ , Type IV

See incomplete latin squares Plan 13.9; randomize units in blocks ignoring replications.

Plan 11.28  $t = 16, k = 6, r = 9, b = 24, \lambda = 3, E = .89$ , Type II

Block	Reps. I, II, and III	Reps. IV, V, and VI	Reps. VII, VIII, and IX
(1)	1 2 5 6 11 12	(9) 1 3 6 8 13 15	(17) 1 4 5 8 10 11
(2)	3 4 7 8 9 10	(10) 2 4 5 7 14 16	(18) 2 3 6 7 9 12
(3)	5 6 9 10 13 14	(11) 5 7 9 11 13 15	(19) 5 8 9 12 13 16
(4)	7 8 11 12 15 16	(12) 6 8 10 12 14 16	(20) 1 4 6 7 13 16
(5)	1 2 9 10 15 16	(13) 2 4 6 8 9 11	(21) 1 4 9 12 14 15
(6)	3 4 11 12 13 14	(14) 1 3 5 7 10 12	(22) 6 7 10 11 14 15
(7)	1 2 7 8 13 14	(15) 2 4 10 12 13 15	(23) 2 3 10 11 13 16
(8)	3 4 5 6 15 16	(16) 1 3 9 11 14 16	(24) 2 3 5 8 14 15

Plan 11.29  $t = 16, k = 10, r = 10, b = 16, \lambda = 6, E = .96$ , Type IV

See incomplete latin squares Plan 13.10; randomize units in blocks ignoring replications.

Plan 11.30  $t = 19, k = 3, r = 9, b = 57, \lambda = 1, E = .70$ , Type II

See extended incomplete latin squares Plan 13.15a; randomize units in blocks ignoring replications.

Plan 11.31  $t = 19, k = 9, r = 9, b = 19, \lambda = 4, E = .94$ , Type IV

See incomplete latin squares Plan 13.11; randomize units in blocks ignoring replications.

Plan 11.32  $t = 19, k = 10, r = 10, b = 19, \lambda = 5, E = .95$ , Type IV

See incomplete latin squares Plan 13.12; randomize units in blocks ignoring replications.

Plan 11.33  $t = 21, k = 3, r = 10, b = 70, \lambda = 1, E = .70$ , Type I

Block	Rep. I	Rep. II	Rep. III	Rep. IV	Rep. V
(1)	1 2 3	(8) 1 4 15	(15) 1 5 17	(22) 1 6 9	(29) 1 7 21
(2)	4 5 6	(9) 2 5 11	(16) 2 4 14	(23) 2 7 16	(30) 2 13 17
(3)	7 8 9	(10) 3 9 16	(17) 3 7 11	(24) 3 8 21	(31) 3 10 18
(4)	10 11 12	(11) 6 17 20	(18) 6 10 19	(25) 4 17 19	(32) 4 8 11
(5)	13 14 15	(12) 7 12 19	(19) 8 16 20	(26) 5 10 13	(33) 5 16 19
(6)	16 17 18	(13) 8 13 18	(20) 9 15 18	(27) 11 15 20	(34) 6 12 15
(7)	19 20 21	(14) 10 14 21	(21) 12 13 21	(28) 12 14 18	(35) 9 14 20

	Rep. VI	Rep. VII	Rep. VIII	Rep. IX	Rep. X
(36)	1 8 10	(43) 1 11 18	(50) 1 12 20	(57) 1 13 19	(64) 1 14 16
(37)	2 18 19	(44) 2 10 20	(51) 2 6 8	(58) 2 9 12	(65) 2 15 21
(38)	3 15 17	(45) 3 5 12	(52) 3 14 19	(59) 3 4 20	(66) 3 6 13
(39)	4 12 16	(46) 4 9 13	(53) 4 18 21	(60) 5 8 14	(67) 4 7 10
(40)	5 9 21	(47) 6 16 21	(54) 5 7 15	(61) 6 7 18	(68) 5 18 20
(41)	6 11 14	(48) 7 14 17	(55) 9 10 17	(62) 10 15 16	(69) 8 12 17
(42)	7 13 20	(49) 8 15 19	(56) 11 13 16	(63) 11 17 21	(70) 9 11 19

Plan 11.34  $t = 21, k = 5, r = 5, b = 21, \lambda = 1, E = .84$ , Type IV

See incomplete latin squares Plan 13.13; randomize units in blocks ignoring replications.

Plan 11.35  $t = 21, k = 7, r = 10, b = 30, \lambda = 3, E = .90$ , Type III

Block

(1)	2 5 10 11 17 19 20	(16)	2 7 10 13 18 20 21
(2)	3 6 11 12 18 20 21	(17)	3 1 11 14 19 21 15
(3)	4 7 12 13 19 21 15	(18)	4 2 12 8 20 15 16
(4)	5 1 13 14 20 15 16	(19)	5 3 13 9 21 16 17
(5)	6 2 14 8 21 16 17	(20)	6 4 14 10 15 17 18
(6)	7 3 8 9 15 17 18	(21)	7 5 8 11 16 18 19
(7)	1 4 9 10 16 18 19	(22)	1 2 4 8 9 11 21
(8)	3 4 8 13 17 19 20	(23)	2 3 5 9 10 12 15
(9)	4 5 9 14 18 20 21	(24)	3 4 6 10 11 13 16
(10)	5 6 10 8 19 21 15	(25)	4 5 7 11 12 14 17
(11)	6 7 11 9 20 15 16	(26)	5 6 1 12 13 8 18
(12)	7 1 12 10 21 16 17	(27)	6 7 2 13 14 9 19
(13)	1 2 13 11 15 17 18	(28)	7 1 3 14 8 10 20
(14)	2 3 14 12 16 18 19	(29)	1 2 3 4 5 6 7
(15)	1 6 9 12 17 19 20	(30)	8 9 10 11 12 13 14

Plan 11.36  $t = 25, k = 4, r = 8, b = 50, \lambda = 1, E = .78$ , Type II

See extended incomplete latin squares Plan 13.16a; randomize units in blocks ignoring replications.

Plan 11.37  $t = 25, k = 9, r = 9, b = 25, \lambda = 3, E = .93$ , Type IV

See incomplete latin squares, Plan 13.1a; randomize units in blocks ignoring replications.

Plan 11.38  $t = 28, k = 4, r = 9, b = 63, \lambda = 1, E = .78$ , Type I

Block	Rep. I	Rep. II	Rep. III
(1)	28 1 10 19	(2) 28 2 11 20	(15) 28 3 12 21
(2)	2 9 13 16	(9) 3 1 14 17	(16) 4 2 15 18
(3)	3 8 11 18	(10) 4 9 12 10	(17) 5 1 13 11
(4)	4 7 23 24	(11) 5 8 24 25	(18) 6 9 25 26
(5)	5 6 20 27	(12) 6 7 21 19	(19) 7 8 22 20
(6)	12 17 22 25	(13) 13 18 23 26	(20) 14 10 24 27
(7)	14 15 21 26	(14) 15 16 22 27	(21) 16 17 23 19
Rep. IV		Rep. V	
(22)	28 4 13 22	(29) 28 5 14 23	(36) 28 6 15 24
(23)	5 3 16 10	(30) 6 4 17 11	(37) 7 5 18 12
(24)	6 2 14 12	(31) 7 3 15 13	(38) 8 4 16 14
(25)	7 1 26 27	(32) 8 2 27 19	(39) 9 3 19 20
(26)	8 9 23 21	(33) 9 1 24 22	(40) 1 2 25 23
(27)	15 11 25 19	(34) 16 12 26 20	(41) 17 13 27 21
(28)	17 18 24 20	(35) 18 10 25 21	(42) 10 11 26 22
Rep. VII		Rep. VIII	
(43)	28 7 16 25	(50) 28 8 17 26	(57) 28 9 18 27
(44)	8 6 10 13	(51) 9 7 11 14	(58) 1 8 12 15
(45)	9 5 17 15	(52) 1 6 18 16	(59) 2 7 10 17
(46)	1 4 20 21	(53) 2 5 21 22	(60) 3 6 22 23
(47)	2 3 26 24	(54) 3 4 27 25	(61) 4 5 19 26
(48)	18 14 19 22	(55) 10 15 20 23	(62) 11 16 21 24
(49)	11 12 27 23	(56) 12 13 19 24	(63) 13 14 20 25
Rep. IX			