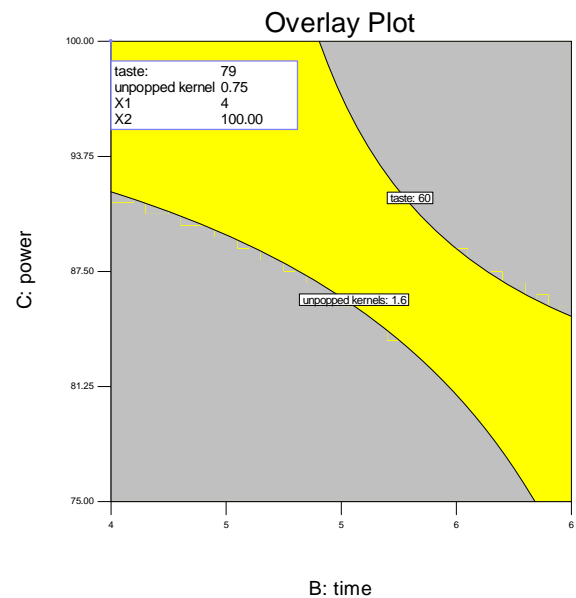
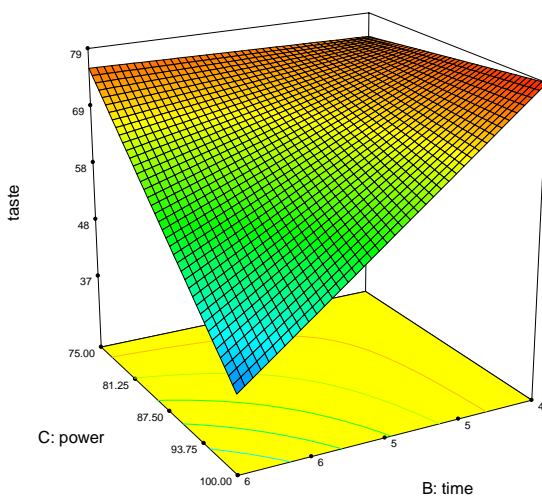
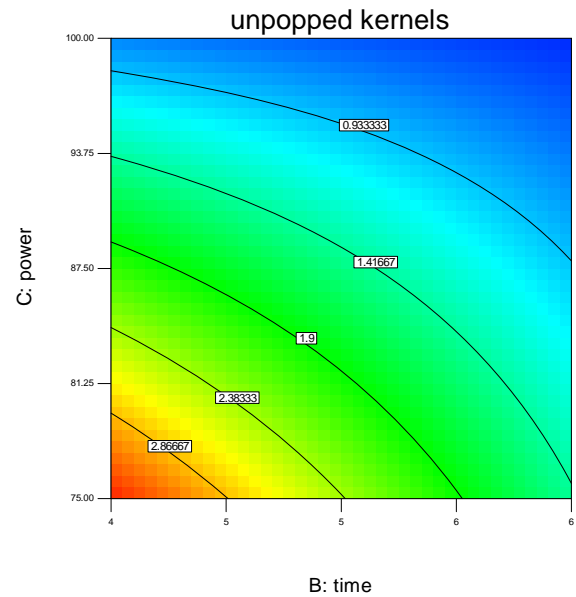
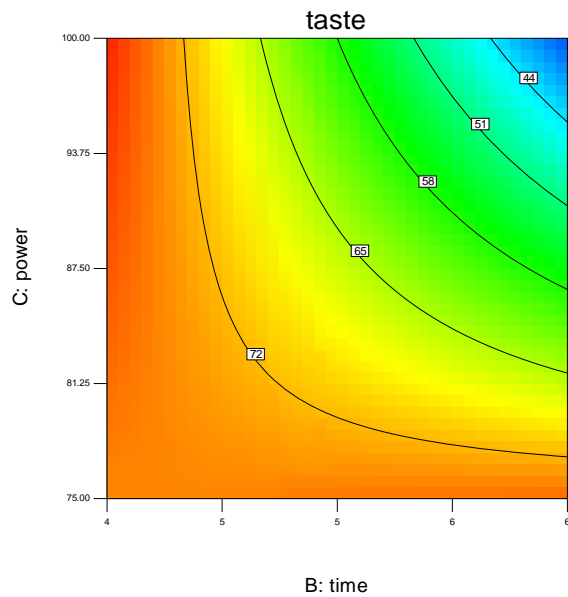


# Models for Popcorn Taste and Unpopped Kernels with analysis using Design-Expert®



**C.F. Kavanaugh & Associates**  
Carol F. Kavanaugh, M.Sc., C.Q.E

Carol@Kavanaugh.ca  
kavanaugh.ca



# Two-Level Fractional Factorial Designs

$2^{k-p}$  designs for k factors in  $2^k$  runs

showing p defining relations for introducing new factors

$2^{k-p}$ runs	k factors								
	3	4	5	6	7	8	9	10	
4	$2^{3-1}$ III  C=AB								
8	$2^{3-}$	$2^{4-1}$ IV  D=ABC	$2^{5-2}$ III  D=AB E=AC	$2^{6-3}$ III  D=AB E=AC F=BC	$2^{7-4}$ III  D=AB E=AC F=BC G=ABC				
16	$2 * 2^{3-}$	$2^{4-}$	$2^{5-1}$ V  E=ABCD	$2^{6-2}$ IV  E=ABC F=BCD	$2^{7-3}$ IV  E=ABC F=BCD G=ACD	$2^{8-4}$ IV  E=BCD F=ACD G=ABC H=ABD	$2^{9-5}$ III  E=ABC F=BCD G=ACD H=ABD I=ABCD	$2^{10-6}$ III  E=ABC F=BCD G=ACD H=ABD I=ABCD J=AB	1/64 rep
32	$4 * 2^{3-}$	$2 * 2^{4-}$	$2^{5-}$	$2^{6-1}$ VI  F=ABCDE	$2^{7-2}$ IV  F=ABCD G=ABDE	$2^{8-3}$ IV  F=ABC G=ABD H=BCDE	$2^{9-4}$ IV  F=BCDE G=ACDE H=ABDE I=ABCE	$2^{10-5}$ IV  F=ABCD G=ABCE H=ABDE I=ACDE J=BCDE	1/32 rep
64	$8 * 2^{3-}$	$4 * 2^{4-}$	$2 * 2^{5-}$	$2^{6-}$	$2^{7-1}$ VII  G=ABCDEF	$2^{8-2}$ V  G=ABCD H=ABEF	$2^{9-3}$ IV  G=ABCD H=ACEF I=CDEF	$2^{10-4}$ IV  G=BCDF H=ACDF I=ABDE J=ABCE	1/16 rep
	fraction (along diagonal) x8	x 4	x 2	full	1/2 rep	1/4 rep	1/8 rep	1/16 rep	

- k = number of factors
- p = number of factors confounded with high order effects
- designs of Resolution III or lower (not recommended for model building)
- designs of Resolution IV (proceed cautiously, must resolve 2-way interactions!)
- designs of Resolution V or better (great! Main and 2-way effects can be estimated clearly!)

Adapted from Table 12.15, Box, Hunter and Hunter, *Statistics for Experimenters*, 1978, page 410; 2nd Ed, 2005, page 272

by C.F. Kavanaugh & Associates - <http://www.kavanaugh.ca>