A SIMPLE STATISTICAL METHOD TO "REPLACE" YATES ANALYSIS & A. N. O. V. A.

ABSTRACT

At the most "basic level", this is a very simple method, which is easy to understand.
The "basics" is just subtracting one value from another. The "basics", can be very revealing, in showing differences between "intermediate, virtual results".
For "clarification of understanding", most of these calculations are based on "idealised results", where the "calculated results" are matches to the "obviously expected results". (The "originally inputted results".)
Furthermore, more "clarification of understanding" is achieved by using "children's stacking blocks", with "binary numbers" written on them, as "equivalents", to the "experimental results". Also the "data set used is a simple experimental version" -
3 variables (C = clear = 100, B = black = 010, A = amber = 001; N = NO blocks with NO numbers)
at 2 levels (0 = Absent; 1 = Present.)
This gives 8 possible "combination", variations:-

NNN,	NNA,	NBN,	NBA,	CNN,	CNA,	CBN,	CBA	BLOCK COLOUR /VARIABLE
000,	001,	010,	011,	100,	101,	110,	111	BINARY NUMBERS
##0,	##1,	##2,	##3,	##4,	##5,	##6,	##7	DECIMAL NUMBERS
##0,	##1,	##2,	##3,	##4,	##5,	##6,	#11	"Test Data"

BINARY NUMBERS Needs a 1 at the beginning to "keep all 3 numbers in place", for computer calculations!
It is fairly easy to extrapolate this method to more variables and more levels. e.g. using trinary numbers.
This method is easier and better than Yates Analysis Effects or ANalysis Of VAriance (ANOVA).

BACKGROUND

At the most "basic level", this is a very simple method, which is easy to understand. I invented this mathematical procedure, because I found the mathematics, terminology & symbols, very confusing when I started to use the Yates analysis & ANOVA calculations. I also found the conclusions very confusing.
The "basics" is just subtracting one value from another. The "basics", can be very revealing, in showing differences between "intermediate, virtual results".

METHOD

THIS IS THE SIMPLE, MOST BASIC ANALYSIS OF THE RESULTS.
[TABLE 1]
For the first part:-
#1. The "row headers" & "column headers", are entered in "binary number order", which equates to the "Yates order". This order is used for the variations in the number of variables and number of levels.
#2. At the most "basic level" the "within table values" are simply the ["row header"] - ["column header"].
#3. The following cells are then blanked out:-
#4. ALL the cells along the diagonal from top left to bottom right, because [row header]-[column header]=0
#5. ALL the cells "above & to the right of this diagonal". (Opposite sign of the remaining cells.)
#6. EVERY remaining cell that has any digit value other than 0 or 1. (The binary numbers.) (A more advanced version calculates "binary values" for these cells – giving 4 calculated values for EVERY effect!) (7*4= 28 values from 8 inputted values!)
The remaining "binary test data set", shows identical values aligned along diagonals.
#7. Each "set of cells along a diagonal" should be given its own, unique, colour-coded background.

[See Table 3]
This table is extended sideways by adding the following columns:-
[sum] [minimum] [average] [maximum] [standard devation] [variance] [main variance ratio] [2-way var ratio]
[main variance ratio] = (var A)/(var A + var B + var C). Also for (var B) & (var C)
[2-way variance ratio] = (var AB)/(var AB + var AC + var BC). Also for (var AC) & (var BC)

[See Plot 1]

Note:- As both the [main variance ratios] & [2-way variance ratios] each have three values that add up to exactly 1, each can have the three values plotted as a single point on a “triangular plot graph”. As these 2 graphs are “inter-related”, the two “triangular plot graphs”, can be “overlaid”, with their centres aligned, but their “peaks”, “pointing in opposite directions”.
For these “idealised, binary results”, (& for the “idealised plot”), ALL 6 VALUES ARE SHOWN BY ONE PLOTTED POINT.
The Gaudie Analysis includes 1. the basic subtraction. 2. the two, three way variance ratios. 3. the “Dual triangular plot”(which should, of course, be adjusted to give the 2 centre points in the same position!)

CONCLUSIONS

At the most “basic level”, this is a very simple method, which is easy to understand.
The “basics” is just subtracting one value from another. The “basics”, can be very revealing, in showing differences between “intermediate, virtual results”.
It seems like “a very viable alternative statistical method”, to A. N. O. V. A. & Yates Analysis.

TABLES & PLOTS

Table 1 - BASIC TEMPLATE
(The non binary cells are “blanked” for the basic version & recalculated for the “advanced version”)

		1000	1001	1010	1011	1100	1101	1110	1111
baseline	1000								
A	1001	1							
B-	1010	10	9						
BA	1011	11	10	1					
C--	1100	100	99	90	89				
C-A	1101	101	100	91	90	1			
CB-	1110	110	109	100	99	10	9		
CBA	1111	111	110	101	100	11	10	1	

Table 2 – Showing the full “unused cell” values, with the “test data”

.		0	1	2	3	4	5	6	11
baseline									
A	1	1	0	-1	-2	-3	-4	-5	-10
B-	2	2	1	0	-1	-2	-3	-4	-9
BA	3	3	2	1	0	-1	-2	-3	-8
C--	4	4	3	2	1	0	-1	-2	-7
C-A	5	5	4	3	2	1	0	-1	-6
CB-	6	6	5	4	3	2	1	0	-5
CBA	11	11	10	9	8	7	6	5	0

Table 3

\\//										
Sum of "same coloured blocks"	Divisor	Minimum	Average	Maximum	Sum of Squares	Std dev	Variance (Std dev)^2	Ratio	.	Interact effects
32	8		4			3.46	12			
.	.		.	.		.	0.75		12.00	24.00
8	4	1	2	5	8	2.00	4	0.5	0.33	.

12	4	2	**3**	6	18	2.00	4	0.5	0.33	.
10	2	3	**5**	7	12.5	2.83	8	1	.	0.33
20	4	4	**5**	8	50	2.00	4	0.5	0.33	.
14	2	5	**7**	9	24.5	2.83	8	1	.	0.33
16	2	6	**8**	10	32	2.83	8	1	.	0.33

3-Variable, Relative Variance, Dual, Triangular Plot

Note :- The triangles are for the main effects OR the interactions only!
The base for the interaction effects = 0: the tip = 1.0

NOTE:- The CENTRE of the "overlaid triangle" of the triangular plot,
for the 2-WAY EFFECTS, is offset by "half a unit"!

[Plot 1]