Each factor is then partitioned so that the first partition contains the linear component of the orthogonal polynomial contrast:

```
PARTITION(A)/
PARTITION(B)/
```

Lastly, the design specifies a main effects model along with the linear × linear component of the interaction:

```
DESIGN=A, B, A(1) BY B(1)/
```

The resulting ANOVA table appears in Figure 1.29b.

Figure 1.29b

TESTS OF SIGNIFICANCE FOR Y USING SEQUENTIAL SUMS OF SQUARES

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIG. OF F
RESIDUAL	34.33855	5	6.86771		
CONSTANT	1452.00000	1	1452.00000	211.42418	.000
A	56.00000	2	28.00000	4.07705	.089
B	438.00000	3	146.00000	21.25890	.003
A(1) BY B(1)	17.66145	1	17.66145	2.57166	.170

The *F* test for the A(1) BY B(1) interaction is Tukey's test for nonadditivity.
Note that Tukey's test for nonadditivity can be extended to higher-order factorial experiments.

1.30 Simple Effects

The presence of a significant interaction in a two-way design precludes the testing of the main effects. Instead, the effect of one factor differs at each level of the other factor. Frequently one may wish to test the significance of these differential effects. Such tests are generally called tests of simple effects.

Simple effects can be tested in SPSS-MANOVA by using the nesting facility of the DESIGN subcommand. As an example, consider the data presented in Figure 1.2 for which the ANOVA table appears in Figure 1.3a. Here the interaction is significant at the 0.006 level. Simple effects tests are desired to examine the category differences for each of the drugs. The following DESIGN subcommand accomplishes this:

```
DESIGN=DRUG, CAT WITHIN DRUG(1), CAT WITHIN DRUG(2),
             CAT WITHIN DRUG(3)/
```

Here CAT WITHIN DRUG(1) tests the difference in means between category 1 and category 2 for the first level of drug. Similarly, the two successive effects test for category differences for the second and third drugs, respectively. Note that DRUG appears first in the design. This eliminates any confounding effects of CAT. Figure 1.30a presents the output of this design.

Figure 1.30a

TESTS OF SIGNIFICANCE FOR Y USING SEQUENTIAL SUMS OF SQUARES

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIG. OF F
WITHIN CELLS	106.00000	12	8.83333		
CONSTANT	882.00000	1	882.00000	99.84906	0.0
DRUG	48.00000	2	24.00000	2.71698	.106
CAT WITHIN DRUG(1)	54.00000	1	54.00000	6.11321	.029
CAT WITHIN DRUG(2)	54.00000	1	54.00000	6.11321	.029
CAT WITHIN DRUG(3)	54.00000	1	54.00000	6.11321	.029

The simple effects of the three drugs within each category of patients can be tested in the same manner.

In higher-order designs one may want tests of simple effects for both interactions and main effects. For example, consider a three-way factorial design with factors A, B, and C, each with two levels. Should the three-way interaction appear significant then an examination of the second-order interaction terms at various levels of the third factor would be in order. To accomplish this, the following DESIGN subcommands would be used:

```
DESIGN=A, B, C, A BY B, A BY C, B BY C,
       B BY C WITHIN A(1), B BY C WITHIN A(2)/

DESIGN=A, B, C, A BY B, A BY C, B BY C,
       A BY B WITHIN C(1), A BY B WITHIN C(2)/

DESIGN=A, B, C, A BY B, A BY C, B BY C,
       A BY C WITHIN B(1), A BY C WITHIN B(2)/
```