Chapter 15
Pivoting Trays and Tables for Improved Analysis of Multidimensional Data (450 Patients)

General Purpose

Pivot tables can visualize multiple variables data with the help of interactive displays of multiple dimensions. They have been in SPSS statistical software for a long time (from version 7.0), and, gradually, they take over in most modules. They are helpful for improving the analysis by visualizing interaction patterns you so far did not notice.

Primary Scientific Question

Are pivot tables able to visualize interaction pattern in your clinical data that so far were unnoticed?

Example

We will use as example the data also used in the Chaps. 10–14. A parallel group study of 450 patients assessed the effect of different complementary treatment modalities on qol score levels. The first 11 patients of the data file is underneath. The entire data file is entitled "qol.sav", and is in extras.springer.com.

treatment	counseling	qol	satdoctor
3	1	4	4
4	0	2	1
2	1	5	4
3	0	4	4
2	1	2	1
2	0	1	4
4	0	4	1
3	0	4	1
4	1	4	4
2	1	3	4
4	1	5	5

treatment = treatment modality (1 = cardiac fitness, 2 = physiotherapy, 3 = wellness, 4 = hydrotherapy)
counseling = counseling given (0 = no, 1 = yes)
qol = quality of life scores (1 = very low, 5 = very high)
satdoctor = satisfaction with treating doctor (1 = very low, 5 = very high)

We will start by opening the data file in SPSS.

Command:

Analyze....Descriptive Statistics....Crosstabs....Row(s): enter treatment....Column(s): enter qol....click Cells....mark Observed....mark Columns....click Continue....click OK.

The underneath table is shown in the output sheets.

Treatment * qol score * counseling crosstabulation				Qol score					
				Very low	Low	Medium	High	Very high	Total
Counseling									
No	Treatment	Cardiac fitness	Count	19	16	8	8	14	65
			% within qol score	29,2 %	34,8 %	26,7 %	20,0 %	28,6 %	28,3 %
		Physiotherapy	Count	8	8	7	7	15	45
			% within qol score	12,3 %	17,4 %	23,3 %	17,5 %	30,6 %	19,6 %
		Wellness	Count	23	8	6	15	9	61
			% within qol score	35,4 %	17,4 %	20,0 %	37,5 %	18,4 %	26,5 %
		Hydrotherapy	Count	15	14	9	10	11	59
			% within qol score	23,1 %	30,4 %	30,0 %	25,0 %	22,4 %	25,7 %
	Total		Count	65	46	30	40	49	230
			% within qol score	100,0 %	100,0 %	100,0 %	100,0 %	100,0 %	100,0 %

(continued)

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Treatment * qol score * counseling crosstabulation

Counseling				Qol score					Total
				Very low	Low	Medium	High	Very high	
Yes	Treatment	Cardiac fitness	Count	2	5	8	16	22	53
			% within qol score	9,5 %	18,5 %	19,5 %	23,2 %	35,5 %	24,1 %
		Physiotherapy	Count	14	12	11	13	5	55
			% within qol score	66,7 %	44,4 %	26,8 %	18,8 %	8,1 %	25,0 %
		Wellness	Count	0	6	6	15	16	43
			% within qol score	,0 %	22,2 %	14,6 %	21,7 %	25,8 %	19,5 %
		Hydrotherapy	Count	5	4	16	25	19	69
			% within qol score	23,8 %	14,8 %	39,0 %	36,2 %	30,6 %	31,4 %
	Total		Count	21	27	41	69	62	220
			% within qol score	100,0 %	100,0 %	100,0 %	100,0 %	100,0 %	100,0 %
Total	treatment	Cardiac fitness	Count	21	21	16	24	36	118
			% within qol score	24,4 %	28,8 %	22,5 %	22,0 %	32,4 %	26,2 %
		Physiotherapy	Count	22	20	18	20	20	100
			% within qol score	25,6 %	27,4 %	25,4 %	18,3 %	18,0 %	22,2 %
		Wellness	Count	23	14	12	30	25	104
			% within qol score	26,7 %	19,2 %	16,9 %	27,5 %	22,5 %	23,1 %
		Hydrotherapy	Count	20	18	25	35	30	128
			% within qol score	23,3 %	24,7 %	35,2 %	32,1 %	27,0 %	28,4 %
	Total		Count	86	73	71	109	111	450
			% within qol score	100,0 %	100,0 %	100,0 %	100,0 %	100,0 %	100,0 %

* Symbol of multiplication

We will apply this table for pivoting the data, using the "user interface for pivot tables", otherwise called the pivoting tray.

Command:

Double-click the above table....the term Pivot is added to the menu bar....click Pivot in the menu bar....the underneath Pivoting Tray consisting of all of the variables appears....qol score is a column variables....counseling, treatment, and statistics are row variables....left click the counseling icon and drag it to the column variables.... similarly have statistics dragged to the layer dimension....close the Pivoting Tray.
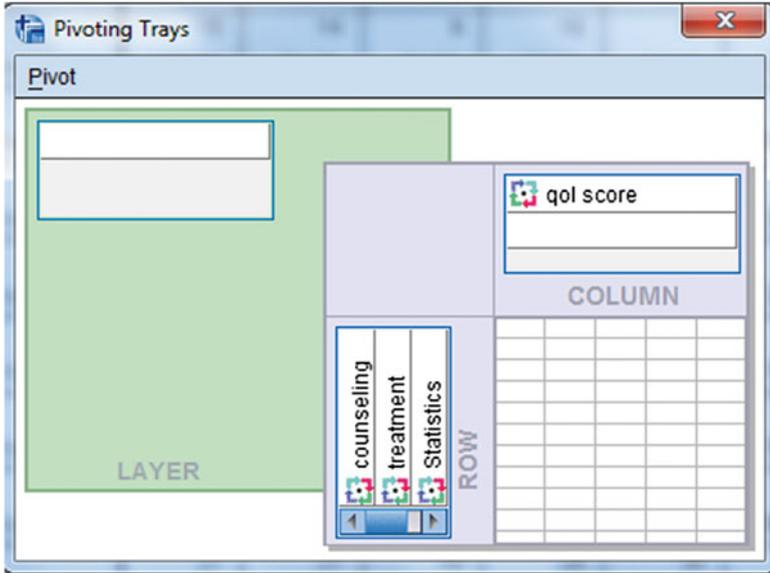
A new table is shown in the output.

Treatment * qol score * counseling crosstabulation
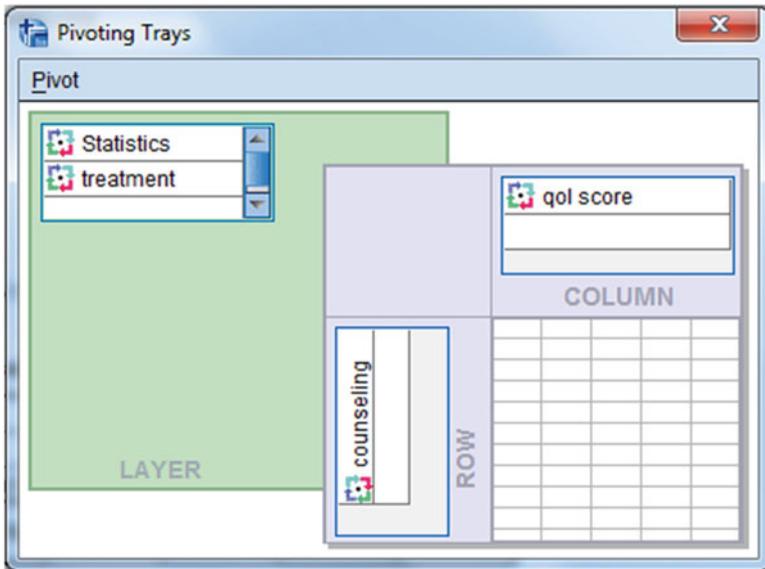
Statistics: % within qol score

		Qol score														
		Very low			Low			Medium			High			Very high		
		Counseling			Counseling			Counseling			Counseling			Counseling		
		No	Yes	Total	No	Yes	Total	No	Yes	Total	No	Yes	Total	No	Yes	Total
Treatment	Cardiac fitness	292 %	9,5 %	24,4 %	348 %	16,5 %	268 %	26,7 %	19,5 %	223 %	20,0 %	23,2 %	228 %	28,6 %	35,5 %	32,4 %
	Physiotherapy	123 %	66,7 %	25,6 %	17,4 %	44,4 %	27,4 %	233 %	26,6 %	25,4 %	17,5 %	18,6 %	183 %	30,6 %	8,1 %	18,0 %
	Wellness	35,4 %	,0 %	26,7 %	17,4 %	222 %	192 %	20,0 %	14,6 %	163 %	378 %	21,7 %	273 %	18,4 %	25,8 %	223 %
	Hydrotherapy	23,1 %	23,8 %	23,3 %	30,4 %	14,6 %	24,7 %	30,0 %	39,0 %	352 %	25,0 %	36,2 %	32,1 %	22,4 %	30,6 %	27,0 %
Total		100,0 %	100,0 %	100,0 %	100,0 %	100,0 %	1008 %	100,0 %	100,0 %	1002 %	100,0 %	100,0 %	1002 %	100,0 %	100,0 %	100,0 %

* Symbol of multiplication

In it click Statistics and click "% within qol score" in the drop box of the table next to Statistics. In the now upcoming table the cell counts have disappeared. They are not relevant, anyway, only the percentages are so. From the Chaps. 2 and 6 we already know, that there is an overall difference between the cells of the yes-counseling matrix, and that the 67 % very low qol is significantly different from the 5 % very high qol in the physical therapy treatment groups. What more can the above pivoted table teach us? It underscores the finding from the Chaps. 2 and 6 by showing next to each other the no-counseling and yes-counseling percentages; very low qol with physiotherapy is observed in respectively 12.3 and 66.7 %, low qol in 17.4 and 44.4 %, and, in contrast, very high qol in respectively 30.6 and 8.1 %.

Restarting with the above unpivoted table once more, give the commands:

Double-click the table....the term Pivot is added to the menu bar....click Pivot in the menu bar....the Pivoting Tray consisting of all of the variables appears....qol score is a column variables....counseling, treatment, and statistics are row variables....drag treatment to the layer dimension....similarly have statistics dragged to the layer dimension....the Pivoting Tray now looks like shown underneath....close it.

A new pivot table is given in the output. In the left upper angle of it, it has a Statistics and a treatment drop box. Statistics: click Count and select "% within qol score", treatment: select, subsequently, all of the four treatments given. The four underneath tables are produced.

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Treatment * qol score * counseling crosstabulation

Statistics: % within qol score, treatment: treatment cardiac fitness

	Qol score					
Counseling	Very low	Low	Medium	High	Very high	Total
No	29,2 %	34,8 %	26,7 %	20,0 %	28,6 %	28,3 %
Yes	9,5 %	18,5 %	19,5 %	23,2 %	35,5 %	24,1 %
Total	24,4 %	28,8 %	22,5 %	22,0 %	32,4 %	26,2 %

* Symbol of multiplication

Treatment * qol score * counseling crosstabulation

Statistics: % within qol score, treatment: treatment physiotherapy

	Qol score					
Counseling	Very low	Low	Medium	High	Very high	Total
No	12,3 %	17,4 %	23,3 %	17,5 %	30,6 %	19,6 %
Yes	66,7 %	44,4 %	26,8 %	18,8 %	8,1 %	25,0 %
Total	25,6 %	27,4 %	25,4 %	18,3 %	18,0 %	22,2 %

* Symbol of multiplication

Treatment * qol score * counseling crosstabulation

Statistics: % within qol score, treatment: treatment wellness

	Qol score					
Counseling	Very low	Low	Medium	High	Very high	Total
No	35,4 %	17,4 %	20,0 %	37,5 %	18,4 %	26,5 %
Yes	,0 %	22,2 %	14,6 %	21,7 %	25,8 %	19,5 %
Total	26,7 %	19,2 %	16,9 %	27,5 %	22,5 %	23,1 %

* Symbol of multiplication

Treatment * qol score * counseling crosstabulation

Statistics: % within qol score, treatment: treatment hydrotherapy

	Qol score					
Counseling	Very low	Low	Medium	High	Very high	Total
No	23,1 %	30,4 %	30,0 %	25,0 %	22,4 %	25,7 %
Yes	23,8 %	14,8 %	39,0 %	36,2 %	30,6 %	31,4 %
Total	23,3 %	24,7 %	35,2 %	32,1 %	27,0 %	28,4 %

* Symbol of multiplication

They visualize a big downward trend of percentages from very low to very high qol for the treatments cardiac fitness, wellness and hydrotherapy, and an upward trend for the treatment physiotherapy. Although this is in agreement with the findings from the Chaps. 2 and 6, the patterns are relevant, because they give you an additional idea about how patients experience their treatments.

Conclusion

The interactive pivot tables are not only a way of showing the same in another perspective, but they are also more than that, because they help you better notice what is going on at difference levels of the analysis, and, so, they, actually, can improve the analysis by visualizing data patterns you did not notice before.

Note

Pivot tables are widely applied not only in SPSS and most of the larger statistical software programs, but also in spreadsheets programs like Excel. In SPSS they are being applied with Anova (analysis of variance), Correlations, Crosstabs, Descriptives, Examine, Frequencies, General Linear Models, Nonparametric Tests, Regression, T-tests. In the current book pivot tables were applied in many more Chaps., e.g., the Chaps. 6, 16, and 29.