RI-12

Using Design Principles to Make ODS Template Decisions

Helen Smith, RTI International, Research Triangle Park, NC
Susan Myers, RTI International, Research Triangle Park, NC

ABSTRACT

With the Output Delivery System (ODS), SAS® continues to provide programmers with many style templates for developing reports. These default templates and style definitions present the data in a clear and attractive manner often with no further thought needed. However, when producing complicated reports with multiple requirements, using basic design principles to determine which template or which custom style definition to use can make for a more readable and comprehensive final report.

This paper presents the code and the design considerations for two ODS reports; one, a redesign of a 10-plus year old SAS® program originally designed with PUT statements, and two, a highly customized SAS® program for delivering output in Excel.

The reports are generated using Proc Report and developed with version 9.2 and 9.3 of SAS® executing on a Windows XP platform. The reports use features that are not platform specific.

INTRODUCTION

Perceptually, we notice the differences and similarities of what we see in order to navigate and make sense of the world. How we do this was first examined in detail in the 1920's and 30's by a group of researchers known as Gestalt psychologists, 'gestalt' being the German word for 'shape' or 'form'.

We differentiate between what is figure/object (important) and what is not background/ground (not so important) and group what we see into a hierarchy of visual and conceptual importance. Those elements that we see as figure (important) tend to be dominant, darker, larger, more colorful, and so on. Everything else appears less dominant and less important.

Those elements (numbers, shapes, lines, color, or the data that makes up a SAS® report) that appear to be similar, we unify visually and think of as a group (principle of similarity). An element that looks different from a larger group of similar shapes will seem separate from that larger group. Elements that are close to each other we will associate even if the elements are quite different (the principle of proximity). The farther apart these elements are, the more tenuous the visual association.

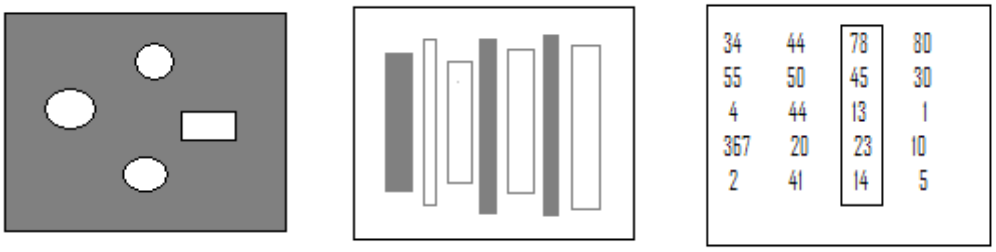


Figure 1. Similarity, Proximity, Continuity, Closure.

The first figure on the left shows three white circles and a white rectangle in a dark, grey rectangle. We group the three circles together because they are similar and close together. We see the rectangle apart from the group. The white rectangle is different yet at the same time we notice the overarching form of a circle created by the white circles and rectangle (principles of continuity and closure).

In the second figure, we see seven vertical stripes of varying thicknesses. Three are dark and form a visually dominant group. The other white verticals form another less visually dominant group. They are unified by the similar vertical orientation, proportion, shape, and relative closeness or proximity of the verticals.

Finally, on the far right, we see four columns of numbers. The numbers are close to one another, similar and form a recognizable form (a column) bracketed by 'white space' on either side. One column looks 'different' from the other

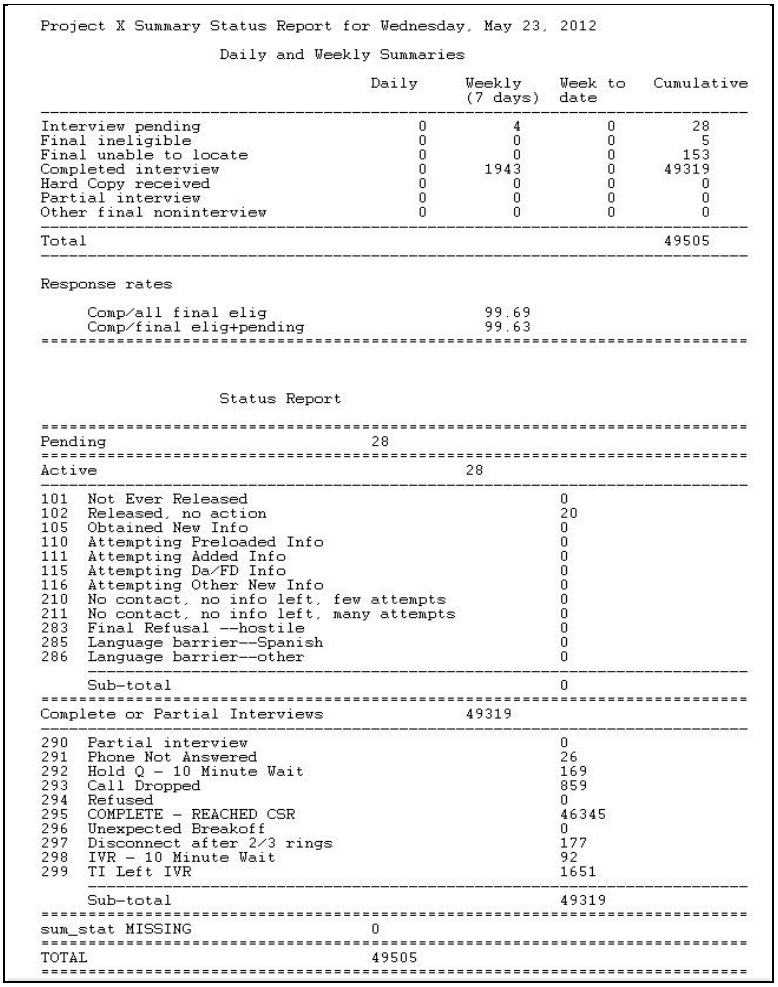
columns. We notice it before we see the other columns of numbers because it is outlined. By outlining it – making it different, we have designed that column to be seen as important and visually dominant.

In the following paragraphs, we discuss how these concepts were applied to the re-design of two SAS® programs. The first re-design is 'additive', slowly adding features to complete the report. The second re-design is 'subtractive', taking away original features to re-design the report.

REDESIGN OF A LEGACY SUMMARY STATUS REPORT

Our first report is a legacy program written in SAS® using arrays and PUT statements. It produces a listing of all the production status codes for a telephone survey including the call counts for the current and previous weeks. Its purpose is to provide project management a daily and weekly snapshot of production call activity.

Figure 2 shows output from the report and the PUT statements used to generate the output for the first two tables.



Project X Summary Status Report for Wednesday, May 23, 2012

Daily and Weekly Summaries

	Daily	Weekly (7 days)	Week to date	Cumulative
Interview pending	0	4	0	28
Final ineligible	0	0	0	5
Final unable to locate	0	0	0	153
Completed interview	0	1943	0	49319
Hard Copy received	0	0	0	0
Partial interview	0	0	0	0
Other final noninterview	0	0	0	0
Total				49505

Response rates

Comp/all final elig	99.69
Comp/final elig+pending	99.63

Status Report

Pending	28		
Active		28	
101	Not Ever Released		0
102	Released, no action		20
105	Obtained New Info		0
110	Attempting Preloaded Info		0
111	Attempting Added Info		0
115	Attempting Da/FD Info		0
116	Attempting Other New Info		0
210	No contact, no info left, few attempts		0
211	No contact, no info left, many attempts		0
283	Final Refusal --hostile		0
285	Language barrier--Spanish		0
286	Language barrier--other		0
	Sub-total		0
Complete or Partial Interviews		49319	
290	Partial interview		0
291	Phone Not Answered		26
292	Hold Q - 10 Minute Wait		169
293	Call Dropped		859
294	Refused		0
295	COMPLETE - REACHED CSR		46345
296	Unexpected Breakoff		0
297	Disconnect after 2/3 rings		177
298	IVR - 10 Minute Wait		92
299	TI Left IVR		1651
	Sub-total		49319
sum_stat MISSING	0		
TOTAL	49505		

Figure 2. Legacy Summary Status Report

A recent project required that this report display data for the entire sample plus seven sub-samples. Tweaking the PUT statement and creating seven more vertical columns might have been sufficient but using the features of ODS instead produced a better report.

The report has six sections: a table of the overall call counts based on the activity for the current and previous weeks, a table displaying two response rates for the survey, a table of counts of pending status codes with subtotals, a table of counts of final status codes with subtotals and totals, and an error table.

The initial task was to split the datasets into six separate tables for each of the report's main sections. The ODS style chosen for the report was 'normal'.

```
ODS listing close;
ODS HTML BODY=stat_rpt Style=normal;
```

This default style is simple and the output easily fits on one to two 8 ½" by 11" sheets of paper if needed. Yes, reports are still printed.

DESIGNING THE 'DAILY AND WEEKLIES' TABLE

Figure 3 shows first report table before adding additional bolding or shading/color. Although the header data is bold and in color, the report cells with values and the rows of descriptions disappear in the 'forest' of columns.

	Daily	1	2	3	4	5	6	7		Weekly	1	2	3	4	5	6	7		Week to Date	1	2	3	4	5	6	7		Cumulative	1	2	3	4	5	6	7
Interview Pending	75	3	1	0	71	0	0	0	Interview Pending	276	5	10	0	261	0	0	0	Interview Pending	75	3	1	0	71	0	0	0	Interview Pending	614	90	102	154	268	0	0	0
Final Ineligible	0	0	0	0	0	0	0	0	Final Ineligible	0	0	0	0	0	0	0	0	Final Ineligible	0	0	0	0	0	0	0	0	Final Ineligible	0	0	0	0	0	0	0	0
Final Unable To Locate	0	0	0	0	0	0	0	0	Final Unable To Locate	0	0	0	0	0	0	0	0	Final Unable To Locate	0	0	0	0	0	0	0	0	Final Unable To Locate	0	0	0	0	0	0	0	0
Completed Interview	18	0	2	0	16	0	0	0	Completed Interview	46	1	16	0	29	0	0	0	Completed Interview	18	0	2	0	16	0	0	0	Completed Interview	265	154	82	0	29	0	0	0
Partial Interview	0	0	0	0	0	0	0	0	Partial Interview	0	0	0	0	0	0	0	0	Partial Interview	0	0	0	0	0	0	0	0	Partial Interview	0	0	0	0	0	0	0	0
Other Final Interview	0	0	0	0	0	0	0	0	Other Final Interview	1	0	0	0	1	0	0	0	Other Final Interview	0	0	0	0	0	0	0	0	Other Final Interview	3	2	0	0	1	0	0	0
TOTAL	93	3	3	0	87	0	0	0	TOTAL	323	6	26	0	291	0	0	0	TOTAL	93	3	3	0	87	0	0	0	TOTAL	882	246	184	154	298	0	0	0

Figure 3. No bolding except for the header text.

In Figure 4 shows the report after the rows of descriptions are bolded. When bolded, the descriptions take precedence over the columns of data that are lighter and become not only more dominant but also a stronger organizational element in the report.

	Daily	1	2	3	4	5	6	7		Weekly	1	2	3	4	5	6	7		Week to Date	1	2	3	4	5	6	7		Cumulative	1	2	3	4	5	6	7
Interview Pending	0	0	0	0	0	0	0	0	**Interview Pending**	210	2	11	0	197	0	0	0	**Interview Pending**	210	2	11	0	197	0	0	0	**Interview Pending**	632	90	104	154	284	0	0	0
Final Ineligible	0	0	0	0	0	0	0	0	**Final Ineligible**	0	0	0	0	0	0	0	0	**Final Ineligible**	0	0	0	0	0	0	0	0	**Final Ineligible**	0	0	0	0	0	0	0	0
Final Unable To Locate	0	0	0	0	0	0	0	0	**Final Unable To Locate**	0	0	0	0	0	0	0	0	**Final Unable To Locate**	0	0	0	0	0	0	0	0	**Final Unable To Locate**	0	0	0	0	0	0	0	0
Completed Interview	0	0	0	0	0	0	0	0	**Completed Interview**	30	1	16	0	13	0	0	0	**Completed Interview**	30	1	16	0	13	0	0	0	**Completed Interview**	247	154	80	0	13	0	0	0
Partial Interview	0	0	0	0	0	0	0	0	**Partial Interview**	0	0	0	0	0	0	0	0	**Partial Interview**	0	0	0	0	0	0	0	0	**Partial Interview**	0	0	0	0	0	0	0	0
Other Final Interview	0	0	0	0	0	0	0	0	**Other Final Interview**	1	0	0	0	1	0	0	0	**Other Final Interview**	1	0	0	0	1	0	0	0	**Other Final Interview**	3	2	0	0	1	0	0	0
TOTAL	0	0	0	0	0	0	0	0	**TOTAL**	241	3	27	0	211	0	0	0	**TOTAL**	241	3	27	0	211	0	0	0	**TOTAL**	882	246	184	154	298	0	0	0

Figure 4. Add bolding for row descriptors.

Next the report cells with values greater than zero are bolded for emphasis (Figure 5). As more cells have values greater than zero, this bolding of the cells becomes less useful as the rows of descriptions become visually more similar and tend to group together. Additional tweaking is needed.

	Daily	1	2	3	4	5	6	7		Weekly	1	2	3	4	5	6	7		Week to Date	1	2	3	4	5	6	7		Cumulative	1	2	3	4	5	6	7
Interview Pending	0	0	0	0	0	0	0	0	**Interview Pending**	**210**	**2**	**11**	0	**197**	0	0	0	**Interview Pending**	**210**	**2**	**11**	0	**197**	0	0	0	**Interview Pending**	**632**	**90**	**104**	**154**	**284**	0	0	0
Final Ineligible	0	0	0	0	0	0	0	0	**Final Ineligible**	0	0	0	0	0	0	0	0	**Final Ineligible**	0	0	0	0	0	0	0	0	**Final Ineligible**	0	0	0	0	0	0	0	0
Final Unable To Locate	0	0	0	0	0	0	0	0	**Final Unable To Locate**	0	0	0	0	0	0	0	0	**Final Unable To Locate**	0	0	0	0	0	0	0	0	**Final Unable To Locate**	0	0	0	0	0	0	0	0
Completed Interview	0	0	0	0	0	0	0	0	**Completed Interview**	**30**	**1**	**16**	0	**13**	0	0	0	**Completed Interview**	**30**	**1**	**16**	0	**13**	0	0	0	**Completed Interview**	**247**	**154**	**80**	0	**13**	0	0	0
Partial Interview	0	0	0	0	0	0	0	0	**Partial Interview**	0	0	0	0	0	0	0	0	**Partial Interview**	0	0	0	0	0	0	0	0	**Partial Interview**	0	0	0	0	0	0	0	0
Other Final Interview	0	0	0	0	0	0	0	0	**Other Final Interview**	**1**	0	0	0	**1**	0	0	0	**Other Final Interview**	**1**	0	0	0	**1**	0	0	0	**Other Final Interview**	**3**	**2**	0	0	**1**	0	0	0
TOTAL	0	0	0	0	0	0	0	0	**TOTAL**	**241**	**3**	**27**	0	**211**	0	0	0	**TOTAL**	**241**	**3**	**27**	0	**211**	0	0	0	**TOTAL**	**882**	**246**	**184**	**154**	**298**	0	0	0

Figure 5. Make cells with values greater than 0 bold.

Applying a different shade/color for the columns (1,2,3,4,5,6,7) can make the columns less similar yet provide a reasonable visual difference (Figure 6). The resulting pattern of alternating grey and white stripes however undermines the more fundamental conceptual and visual grouping set up previously, the columns of descriptions and the columns containing the data.

	Daily	1	2	3	4	5	6	7		Weekly	1	2	3	4	5	6	7		Week to Date	1	2	3	4	5	6	7		Cumulative	1	2	3	4	5	6	7
Interview Pending	75	3	1	0	71	0	0	0	Interview Pending	276	5	10	0	261	0	0	0	Interview Pending	75	3	1	0	71	0	0	0	Interview Pending	614	90	102	154	268	0	0	0
Final Ineligible	0	0	0	0	0	0	0	0	Final Ineligible	0	0	0	0	0	0	0	0	Final Ineligible	0	0	0	0	0	0	0	0	Final Ineligible	0	0	0	0	0	0	0	0
Final Unable To Locate	0	0	0	0	0	0	0	0	Final Unable To Locate	0	0	0	0	0	0	0	0	Final Unable To Locate	0	0	0	0	0	0	0	0	Final Unable To Locate	0	0	0	0	0	0	0	0
Completed Interview	18	0	2	0	16	0	0	0	Completed Interview	46	1	16	0	29	0	0	0	Completed Interview	18	0	2	0	16	0	0	0	Completed Interview	265	154	82	0	29	0	0	0
Partial Interview	0	0	0	0	0	0	0	0	Partial Interview	0	0	0	0	0	0	0	0	Partial Interview	0	0	0	0	0	0	0	0	Partial Interview	0	0	0	0	0	0	0	0
Other Final Interview	0	0	0	0	0	0	0	0	Other Final Interview	1	0	0	0	1	0	0	0	Other Final Interview	0	0	0	0	0	0	0	0	Other Final Interview	3	2	0	0	1	0	0	0
TOTAL	93	3	3	0	87	0	0	0	TOTAL	323	6	26	0	291	0	0	0	TOTAL	93	3	3	0	87	0	0	0	TOTAL	882	246	184	154	298	0	0	0

Figure 6. Add alternating grey stripes?

Figures 7 and 8 are variations on this theme. However, each introduces 'visual noise' / 'data imprisonment' (Edward Tufte, *Envisioning Information*, p 64) rather than clarification. The darker or colorful columns distract because they disrupt the order set up earlier. The bars of columns corral the data and make no sense as the strongest visual elements in the table, more dominant than the data in the cells, the rows of description, and the header.

	Daily	1	2	3	4	5	6	7		Weekly	1	2	3	4	5	6	7		Week to Date	1	2	3	4	5	6	7		Cumulative	1	2	3	4	5	6	7
Interview Pending	75	3	1	0	71	0	0	0	Interview Pending	276	5	10	0	261	0	0	0	Interview Pending	75	3	1	0	71	0	0	0	Interview Pending	614	90	102	154	268	0	0	0
Final Ineligible	0	0	0	0	0	0	0	0	Final Ineligible	0	0	0	0	0	0	0	0	Final Ineligible	0	0	0	0	0	0	0	0	Final Ineligible	0	0	0	0	0	0	0	0
Final Unable To Locate	0	0	0	0	0	0	0	0	Final Unable To Locate	0	0	0	0	0	0	0	0	Final Unable To Locate	0	0	0	0	0	0	0	0	Final Unable To Locate	0	0	0	0	0	0	0	0
Completed Interview	18	0	2	0	16	0	0	0	Completed Interview	46	1	16	0	29	0	0	0	Completed Interview	18	0	2	0	16	0	0	0	Completed Interview	265	154	82	0	29	0	0	0
Partial Interview	0	0	0	0	0	0	0	0	Partial Interview	0	0	0	0	0	0	0	0	Partial Interview	0	0	0	0	0	0	0	0	Partial Interview	0	0	0	0	0	0	0	0
Other Final Interview	0	0	0	0	0	0	0	0	Other Final Interview	1	0	0	0	1	0	0	0	Other Final Interview	0	0	0	0	0	0	0	0	Other Final Interview	3	2	0	0	1	0	0	0
TOTAL	93	3	3	0	87	0	0	0	TOTAL	323	6	26	0	291	0	0	0	TOTAL	93	3	3	0	87	0	0	0	TOTAL	882	246	184	154	298	0	0	0

Figure 7. Add alternating darker grey stripes?

The colored columns fare no better.

	Daily	1	2	3	4	5	6	7		Weekly	1	2	3	4	5	6	7		Week to Date	1	2	3	4	5	6	7		Cumulative	1	2	3	4	5	6	7
Interview Pending	75	3	1	0	71	0	0	0	Interview Pending	276	5	10	0	261	0	0	0	Interview Pending	75	3	1	0	71	0	0	0	Interview Pending	614	90	102	154	268	0	0	0
Final Ineligible	0	0	0	0	0	0	0	0	Final Ineligible	0	0	0	0	0	0	0	0	Final Ineligible	0	0	0	0	0	0	0	0	Final Ineligible	0	0	0	0	0	0	0	0
Final Unable To Locate	0	0	0	0	0	0	0	0	Final Unable To Locate	0	0	0	0	0	0	0	0	Final Unable To Locate	0	0	0	0	0	0	0	0	Final Unable To Locate	0	0	0	0	0	0	0	0
Completed Interview	18	0	2	0	16	0	0	0	Completed Interview	46	1	16	0	29	0	0	0	Completed Interview	18	0	2	0	16	0	0	0	Completed Interview	265	154	82	0	29	0	0	0
Partial Interview	0	0	0	0	0	0	0	0	Partial Interview	0	0	0	0	0	0	0	0	Partial Interview	0	0	0	0	0	0	0	0	Partial Interview	0	0	0	0	0	0	0	0
Other Final Interview	0	0	0	0	0	0	0	0	Other Final Interview	1	0	0	0	1	0	0	0	Other Final Interview	0	0	0	0	0	0	0	0	Other Final Interview	3	2	0	0	1	0	0	0
TOTAL	93	3	3	0	87	0	0	0	TOTAL	323	6	26	0	291	0	0	0	TOTAL	93	3	3	0	87	0	0	0	TOTAL	882	246	184	154	298	0	0	0

Figure 8. Add alternating colored stripes?

In Figure 9, the report returns to the lighter grey and groups the columns of data into blocks. A better solution. There is a clear hierarchy established between the header, the rows of descriptions the blocks of data, and cells with values greater than zero.

	Daily	1	2	3	4	5	6	7		Weekly	1	2	3	4	5	6	7		Week to Date	1	2	3	4	5	6	7		Cumulative	1	2	3	4	5	6	7
Interview Pending	75	3	1	0	71	0	0	0	Interview Pending	276	5	10	0	261	0	0	0	Interview Pending	75	3	1	0	71	0	0	0	Interview Pending	614	90	102	154	268	0	0	0
Final Ineligible	0	0	0	0	0	0	0	0	Final Ineligible	0	0	0	0	0	0	0	0	Final Ineligible	0	0	0	0	0	0	0	0	Final Ineligible	0	0	0	0	0	0	0	0
Final Unable To Locate	0	0	0	0	0	0	0	0	Final Unable To Locate	0	0	0	0	0	0	0	0	Final Unable To Locate	0	0	0	0	0	0	0	0	Final Unable To Locate	0	0	0	0	0	0	0	0
Completed Interview	18	0	2	0	16	0	0	0	Completed Interview	46	1	16	0	29	0	0	0	Completed Interview	18	0	2	0	16	0	0	0	Completed Interview	265	154	82	0	29	0	0	0
Partial Interview	0	0	0	0	0	0	0	0	Partial Interview	0	0	0	0	0	0	0	0	Partial Interview	0	0	0	0	0	0	0	0	Partial Interview	0	0	0	0	0	0	0	0
Other Final Interview	0	0	0	0	0	0	0	0	Other Final Interview	1	0	0	0	1	0	0	0	Other Final Interview	0	0	0	0	0	0	0	0	Other Final Interview	3	2	0	0	1	0	0	0
TOTAL	93	3	3	0	87	0	0	0	TOTAL	323	6	26	0	291	0	0	0	TOTAL	93	3	3	0	87	0	0	0	TOTAL	882	246	184	154	298	0	0	0

Figure 9. Simplify. Reduce the number of elements for better results.

THE COMPLETED RE-DESIGNED SUMMARY STATUS REPORT

For the other tables in the report, using alternating light grey columns, bolding for the active cells and sub-headings was the solution.

Project X BY SAMPLE Summary Status Report : July 31, 2012 12:14:29

Daily and Weekly Summaries

	Daily	1	2	3	4	5	6	7		Weekly	1	2	3	4	5	6	7		Week to Date	1	2	3	4	5	6	7		Cumulative	1	2	3	4	5	6	7
Interview Pending	75	3	1	0	71	0	0	0	Interview Pending	276	5	10	0	261	0	0	0	Interview Pending	75	3	1	0	71	0	0	0	Interview Pending	614	90	102	154	268	0	0	0
Final Ineligible	0	0	0	0	0	0	0	0	Final Ineligible	0	0	0	0	0	0	0	0	Final Ineligible	0	0	0	0	0	0	0	0	Final Ineligible	0	0	0	0	0	0	0	0
Final Unable To Locate	0	0	0	0	0	0	0	0	Final Unable To Locate	0	0	0	0	0	0	0	0	Final Unable To Locate	0	0	0	0	0	0	0	0	Final Unable To Locate	0	0	0	0	0	0	0	0
Completed Interview	18	0	2	0	16	0	0	0	Completed Interview	46	1	16	0	29	0	0	0	Completed Interview	18	0	2	0	16	0	0	0	Completed Interview	265	154	82	0	29	0	0	0
Partial Interview	0	0	0	0	0	0	0	0	Partial Interview	0	0	0	0	0	0	0	0	Partial Interview	0	0	0	0	0	0	0	0	Partial Interview	0	0	0	0	0	0	0	0
Other Final Interview	0	0	0	0	0	0	0	0	Other Final Interview	1	0	0	0	1	0	0	0	Other Final Interview	0	0	0	0	0	0	0	0	Other Final Interview	3	2	0	0	1	0	0	0
TOTAL	93	3	3	0	87	0	0	0	TOTAL	323	6	26	0	291	0	0	0	TOTAL	93	3	3	0	87	0	0	0	TOTAL	882	246	184	154	298	0	0	0

Comp/All Final Elig RR

Percent	Overall	1	2	3	4	5	6	7
Complete / All final eligible	98.88	98.72	100.00	0.00	96.67	0.00	0.00	0.00

Comp/All Final Elig + Pend RR

Percent	Overall	1	2	3	4	5	6	7
Complete / Final eligible + pending	30.05	62.60	44.57	0.00	9.73	0.00	0.00	0.00

Pending Cases table not displayed due to page limitations. Similar to Final Cases table shown below.

Final Cases

Finalized / Completed	ALL	1	2	3	4	5	6	7
Subject Ineligible								
251 Ineligible	0	0	0	0	0	0	0	0
255 Deceased	0	0	0	0	0	0	0	0
256 Not Ever Released	0	0	0	0	0	0	0	0
258 Invalid Case	0	0	0	0	0	0	0	0
SUBTOTAL	0	0	0	0	0	0	0	0
Subject Not Located								
260 Unable to locate	0	0	0	0	0	0	0	0
262 Time Exhausted	0	0	0	0	0	0	0	0
SUBTOTAL	0	0	0	0	0	0	0	0
Subject Located (Non-Interview)								
270 Unavailable for duration of study	**1**	0	0	0	**1**	0	0	0
271 Out of country	**1**	**1**	0	0	0	0	0	0
272 Incapable/incapacitated	0	0	0	0	0	0	0	0
273 Institutionalized/incarcerated	0	0	0	0	0	0	0	0
274 Has no Phone	0	0	0	0	0	0	0	0
275 Hearing Impaired	0	0	0	0	0	0	0	0
280 Refusal--unreviewed	**1**	**1**	0	0	0	0	0	0
281 Refusal--reviewed	0	0	0	0	0	0	0	0
282 Refusal by other--multiple	0	0	0	0	0	0	0	0
283 Final Refusal --hostile	0	0	0	0	0	0	0	0
285 Language barrier--Spanish	0	0	0	0	0	0	0	0
286 Language barrier--other	0	0	0	0	0	0	0	0
SUBTOTAL	**3**	**2**	0	0	**1**	0	0	0
Completes / Partials								
290 Partial interview	0	0	0	0	0	0	0	0
292 Complete, SPN	0	0	0	0	0	0	0	0
295 Complete	**265**	**154**	**82**	0	**29**	0	0	0
SUBTOTAL	**265**	**154**	**82**	0	**29**	0	0	0

Final Cases - Total	ALL	1	2	3	4	5	6	7
TOTAL	**268**	**156**	**82**	0	**30**	0	0	0

Error

Error Report	ALL	1	2	3	4	5	6	7
ERROR								
999 sum_stat MISSING	0	0	0	0	0	0	0	0

Figure 10. Add alternating grey and white columns, bolding for active cells and sub-headings for the rest of the report.

Proc Report Source Code for the 'DAILIES AND WEEKLIES' Table

```
 ODS listing close ;
 ODS HTML BODY=stat_rpt Style=normal ;

 PROC REPORT data = overall nowd split='~' style(calldef)=[background=cxFFFFFF];  ods
escapechar='^';
 title1 "&study Summary Status Report : %sysfunc(date(),worddate.)
%sysfunc(time(),time.)";
 title2 " ";
 title3 "Daily and Weekly Summaries" ;
 title4 "  ";

 columns desc daily daily1 daily2 daily3 daily4 daily5 daily6
          daily7
```

```
          desc weekly weekly1 weekly2 weekly3 weekly4 weekly5 weekly6
          weekly7
          desc todate todate1 todate2 todate3 todate4 todate5 todate6
          todate7
          desc cum cum1 cum2 cum3 cum4 cum5 cum6 cum7 ;
 DEFINE desc / display width=50 format=$50.'        ' style(column) =
{font_weight=bold};
 DEFINE daily /  display width=5 format=5. 'Daily' style(column) =
[background=cxFFFFFF];
 DEFINE daily1 / display width=5 format=5. '1' style(column)=[background=cxCCCCCC];
 DEFINE daily2 / display width=5 format=5. '2' style(column)=[background=cxCCCCCC];
 DEFINE daily3 / display width=5 format=5. '3' style(column)=[background=cxCCCCCC];
 DEFINE daily4 / display width=5 format=5. '4' style(column)=[background=cxCCCCCC];
 DEFINE daily5 / display width=5 format=5. '5' style(column)=[background=cxCCCCCC];
 DEFINE daily6 / display width=5 format=5. '6' style(column)=[background=cxCCCCCC];
 DEFINE daily7 / display width=5 format=5. '7' style(column)=[background=cxCCCCCC];

 DEFINE weekly / display width=5 format=5. 'Weekly' style(column) =
[background=cxFFFFFF];
 DEFINE weekly1 / display width=5 format=5. '1' style(column)=[background=cxCCCCCC];
 DEFINE weekly2 / display width=5 format=5. '2' style(column)=[background=cxCCCCCC];
 DEFINE weekly3 / display width=5 format=5. '3' style(column)=[background=cxCCCCCC];
 DEFINE weekly4 / display width=5 format=5. '4' style(column)=[background=cxCCCCCC];
 DEFINE weekly5 / display width=5 format=5. '5' style(column)=[background=cxCCCCCC];
 DEFINE weekly6 / display width=5 format=5. '6' style(column)=[background=cxCCCCCC];
 DEFINE weekly7 / display width=5 format=5. '7' style(column)=[background=cxCCCCCC];

 DEFINE todate / display width=5 format=5. 'Week to Date' style(column) =
[background=cxFFFFFF];
 DEFINE todate1 / display width=5 format=5. '1' style(column)=[background=cxCCCCCC];
 DEFINE todate2 / display width=5 format=5. '2' style(column)=[background=cxCCCCCC];
 DEFINE todate3 / display width=5 format=5. '3' style(column)=[background=cxCCCCCC];
 DEFINE todate4 / display width=5 format=5. '4' style(column)=[background=cxCCCCCC];
 DEFINE todate5 / display width=5 format=5. '5' style(column)=[background=cxCCCCCC];
 DEFINE todate6 / display width=5 format=5. '6' style(column)=[background=cxCCCCCC];
 DEFINE todate7 / display width=5 format=5. '7' style(column)=[background=cxCCCCCC];

 DEFINE cum / display width=5 format=5. 'Cumulative' style(column) =
[background=cxFFFFFF];
 DEFINE cum1 / display width=5 format=5. '1' style(column)=[background=cxCCCCCC];
 DEFINE cum2 / display width=5 format=5. '2' style(column)=[background=cxCCCCCC];
 DEFINE cum3 / display width=5 format=5. '3' style(column)=[background=cxCCCCCC];
 DEFINE cum4 / display width=5 format=5. '4' style(column)=[background=cxCCCCCC];
 DEFINE cum5 / display width=5 format=5. '5' style(column)=[background=cxCCCCCC];
 DEFINE cum6 / display width=5 format=5. '6' style(column)=[background=cxCCCCCC];
 DEFINE cum7 / display width=5 format=5. '7' style(column)=[background=cxCCCCCC];

 (Code repeated for daily, weekly, todate, and cum. )
```

MS EXCEL WORKSHEET FOR SURVEY PARADATA REPORTING

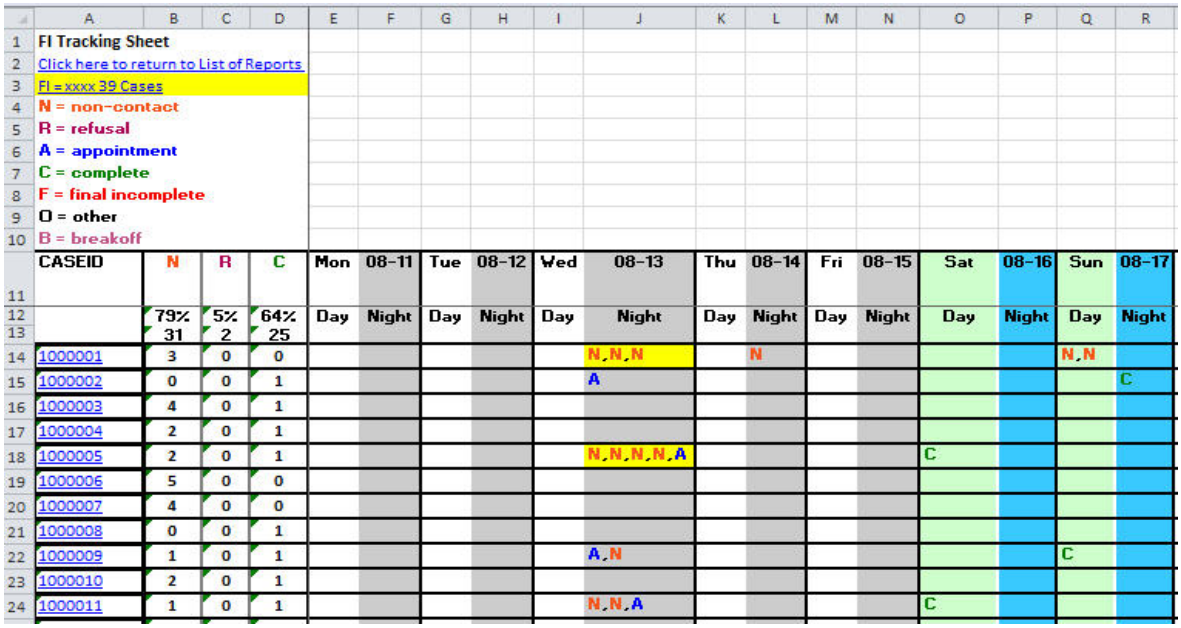
Our second report is a highly customized MS Excel worksheet that was designed to present a large amount of paradata in a more readable format.

Survey organizations typically have available much more data on the survey process than can be analyzed in a reasonable amount of time. Some of these “paradata” are potentially very useful for identifying data collection concerns that should be addressed to maximize efficiency and data quality. At the call, sample member and field interviewer (FI) levels, paradata in the form of a record-of-calls are commonly collected but difficult for supervisors and data quality analysts to utilize in their raw format.

This report was designed to compile raw record-of-calls data into an interactive chart for graphic display. The resulting spreadsheet displays call history data including the date, time, case ID, interviewer ID, and disposition code, for every call made to a sample member. With the report, a reviewer can trace the pattern of calls made by an interviewer to a single household on a single day, and get an overall picture of the progress of the field. In addition to

presenting the paradata in a visually appealing manner, specific situations can be highlighted to draw attention to potentially problematic cases.

Figure 11 shows the extensive formatting, including column shading, text colors and highlighting specific conditions within cells. We have disposition codes with unique colors and show them in the header. Each column represents a portion of the day, daytime and evening, with shading of evening columns to distinguish from each other. We also have additional special shading for weekends to draw attention to work week versus weekend periods. The intent of the various column shading is to draw attention to particular times of the day and week that may be more suspicious for reported activity. For example, a large number of completed cases during the weekday morning may be improbable due to respondents being at work or school. In addition to the aforementioned formatting, we also define certain patterns to be particularly worthy of further investigation. Cells that contain predefined patterns are highlighted in yellow.



FI Tracking Sheet
Click here to return to List of Reports
FI = xxxx 39 Cases
N = non-contact
R = refusal
A = appointment
C = complete
F = final incomplete
O = other
B = breakoff

CASEID	N	R	C	Mon	08-11	Tue	08-12	Wed	08-13	Thu	08-14	Fri	08-15	Sat	08-16	Sun	08-17
	79% 31	5% 2	64% 25	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
1000001	3	0	0						N,N,N		N					N,N	
1000002	0	0	1						A								C
1000003	4	0	1														
1000004	2	0	1														
1000005	2	0	1						N,N,N,N,A					C			
1000006	5	0	0														
1000007	4	0	0														
1000008	0	0	1														
1000009	1	0	1						A,N							C	
1000010	2	0	1														
1000011	1	0	1						N,N,A					C			

Figure 11. Former Main Interface for SAS Management Console

Before we discuss simplifying the report, one of the particularly interesting challenges to programming the first sample was to color code individual disposition codes within a single cell. The code excerpt provided below demonstrates how to assign specific colors to a character variable. We concatenate the codes that occur within the timeframe represented in a cell, separating them with commas.

Note: Some preset colors provided by name may not be the desired shade. The following website is helpful for choosing and refining color choices (http://www.colorschemer.com/online.html). In our code below we use a combination of named colors and refined HEX values using this website.

Source Code To Set Colors

```
data new4;set new3;
length o1-&outmaxvar c1-&commamaxvar $35 callstring $500;
array codes(*) $ e1-&evtmaxvar.;
array outcomes(*) $ o1-&outmaxvar;
do i=1 to &evtmax;
select (codes(i));
  when (330)
    outcomes(i)=' ^S={foreground=blue} A';
  when (336)
    outcomes(i)=' ^S={foreground=#C6538C} B';
  when (491)
    outcomes(i)=' ^S={foreground=green} C';
…
```

```
  when (360,362)
    outcomes(i)=' ^S={foreground=#B8005C} R';
   otherwise ;
end;                /* end of select */
end;/* end of DO */
array outcomes2(*) $ o2-&outmaxvar;
array commas(*) $ c1-&commamaxvar;
do i=1 to &evtmax-1;
if outcomes2(i) ne '' then commas(i)=' ^S={foreground=black} ,';
end;
callstring=&callstr;
keep fidu callstring;
run;
```

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	FI Tracking Sheet																	
2	Click here to return to List of Reports																	
3	FI = xxxx 39 Cases																	
4	N = non-contact																	
5	R = refusal																	
6	A = appointment																	
7	C = complete																	
8	F = final incomplete																	
9	O = other																	
10	B = breakoff																	
11	CASEID	N	R	C	Mon	08-11	Tue	08-12	Wed	08-13	Thu	08-14	Fri	08-15	Sat	08-16	Sun	08-17
12		79%	5%	64%	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
13		31	2	25														
14	1000001	3	0	0						N,N,N		N					N,N	
15	1000002	0	0	1						A								C
16	1000003	4	0	1														
17	1000004	2	0	1														
18	1000005	2	0	1						N,N,N,N,A					C			
19	1000006	5	0	0														
20	1000007	4	0	0														
21	1000008	0	0	1														
22	1000009	1	0	1						A,N							C	
23	1000010	2	0	1														
24	1000011	1	0	1						N,N,A					C			

Figure 12. SAS Management Console with contrasting colors for weekend times eliminated

When we rework the SAS Management Console report and focus on the formatting we may come to the conclusion that 'less is more' as the saying goes. Figure 12 contains the same paradata as the report in Figure 11 with less intensive formatting. The result is cleaner and allows the user to focus on the problem cells highlighted by the yellow cell. Formerly, the cyan blue columns for the weekend columns and the contrast between that and the lighter green columns for the weekend day compete for visual dominance with the highlighted yellow cells. As a report, the user needs to focus on the problems highlighted in yellow and then to notice the day of week. By simplifying – utilizing the principle of similarity to group like elements, we begin to arrive at a cleaner presentation that draws attention to those cells that require notice first.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	FI Tracking Sheet																	
2	Click here to return to List of Reports																	
3	FI = xxxx 39 Cases																	
4	N = non-contact																	
5	R = refusal																	
6	A = appointment																	
7	C = complete																	
8	F = final incomplete																	
9	O = other																	
10	B = breakoff																	
11	CASEID	N	R	C	Mon	08-11	Tue	08-12	Wed	08-13	Thu	08-14	Fri	08-15	Sat	08-16	Sun	08-17
12		79%	5%	64%	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
13		31	2	25														
14	1000001	3	0	0						N,N,N		N					N,N	
15	1000002	0	0	1						A								C
16	1000003	4	0	1														
17	1000004	2	0	1														
18	1000005	2	0	1						N,N,N,N,A					C			
19	1000006	5	0	0														
20	1000007	4	0	0														
21	1000008	0	0	1														
22	1000009	1	0	1						A,N							C	
23	1000010	2	0	1														
24	1000011	1	0	1						N,N,A					C			

Figure 13. SAS Management Console with Simplified Header

If we simplify even further and take away the colors for the text that describes the types of cases, non-contact, refusal, appointment, complete, final incomplete, other and break off, the highlighted cells become even more visually dominant, important. This is not inconsistent with the content of the report. The color for the text does add that much structurally to the sense of the report.

Now we can darken the weekend hours to make a visual group so that there is now a division between daily and weekend activities. We notice the distinction but it does not distract from the highlighted yellow cells.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	FI Tracking Sheet																	
2																		
3	FIID=xxxx 39 Cases																	
4																		
5	N = non-contact R = refusal A = appointment C = complete F= final incomplete O = other B = breakoff																	
6																		
7	CASEID	N	R	C	Mon	11-Aug	Tue	12-Aug	Wed	13-Aug	Thu	14-Aug	Fri	15-Aug	Sat	16-Aug	Sun	17-Aug
8		79%	5%	64%	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
9		31	2	25														
10	1000001	3	0	0						N,N,N		N					N,N	
11	1000002	0	0	1						A								C
12	1000003	4	0	1														
13	1000004	2	0	1														
14	1000005	2	0	1						N,N,N,N,A					C			
15	1000006	5	0	0														
16	1000007	4	0	0														
17	1000008	0	0	1														
18	1000009	1	0	1						A,N							C	
19	1000010	2	0	1														
20	1000011	1	0	1						N,N,A					C			

Figure 14. SAS Management Console with header simplified and weekend columns darkened

After each format iteration, it is important to take a step back and evaluate whether the change takes away from the visual effect or adds to it. In our example, we find the color coded results adds value to the visual effect and does not conflict with the message of the report. Once we reinstate the colored text we find it easier to detect what is represented in each block of time and aids in drawing conclusions. Although we highlight situations we know are suspicious, we do not claim to identify all circumstances that need closer inspection. By seeing the different colored

events within shaded blocks of time, the analyst can easily understand how the field interviewer is spending their time and we have achieved our goal.

FI Tracking Sheet

FIID=xxxx 39 Cases

N = non-contact R = refusal A = appointment C = complete F= final incomplete O = other B = breakoff

CASEID	N	R	C	Mon Day	11-Aug Night	Tue Day	12-Aug Night	Wed Day	13-Aug Night	Thu Day	14-Aug Night	Fri Day	15-Aug Night	Sat Day	16-Aug Night	Sun Day	17-Aug Night
	79%	5%	64%														
	31	2	25														
1000001	3	0	0						N,N,N		N					N,N	
1000002	0	0	1						A								C
1000003	4	0	1														
1000004	2	0	1														
1000005	2	0	1						N,N,N,N,A					C			
1000006	5	0	0														
1000007	4	0	0														
1000008	0	0	1														
1000009	1	0	1						A,N							C	
1000010	2	0	1														
1000011	1	0	1						N,N,A					C			

Figure 15. SAS Management Console with colored events reinstated

CONCLUSION

While SAS provides the tools to customize extensively, it may be more effective to keep the formatting to a well-chosen minimum. It is important to design reports so that any visual additions add to the understanding of the data rather than the contrary. When too many layers of shading and colors are applied we run the risk of over-stimulating the eye and losing focus on key elements, information we want the user to see.

Our walking through the redesign of these two programs provides examples of how one can approach simplifying the output, thereby enhancing and supporting the intent of the report.

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- Tufte, Edward R. 1990. *Envisioning Information*. Cheshire, Connecticut. Graphics Press, LLC.

RECOMMENDED READING

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CONTACT INFORMATION

Your comments and questions are valued and encouraged. Contact the author at:

Name: Helen Smith
Enterprise: RTI International

Address: 3040 Cornwallis Road, PO Box 12194
City, State ZIP: Research Triangle Park, NC 27709-2194
Work Phone: 919-541-6912
Fax: 919-541-6178
E-mail: hsmith@rti.org

Name: Susan Myers
Enterprise: RTI International
Address: 3040 Cornwallis Road, PO Box 12194
City, State ZIP: Research Triangle Park, NC 27709-2194
Work Phone: 919-541-7441
Fax: 919-541-6178
E-mail: smyers@rti.org