Animate your Data!

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Presented by:

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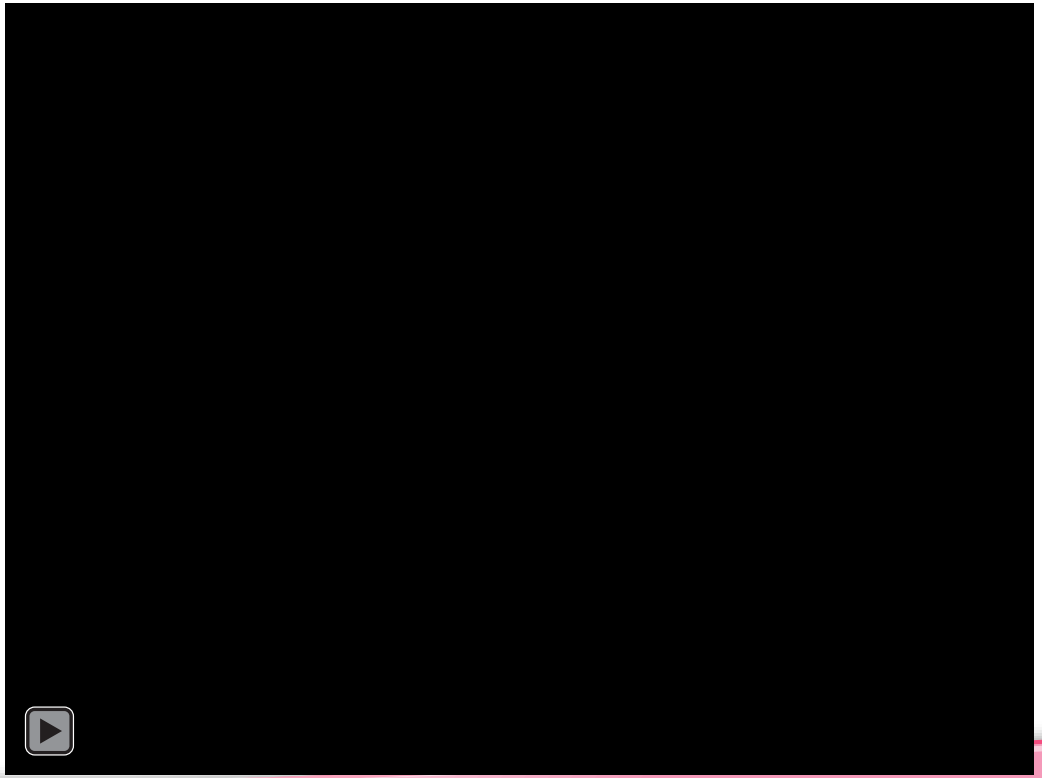
Agenda

Show you how to produce animations



Agenda

Show you how to produce smooth animations

Why use Animation?

- You can understand and interpret your data.
  - You can quickly get an idea of the number of subjects that had abnormal laboratory results at each visit.
  - You are also able to easily determine the adverse events each subject had and the duration of the adverse event.
  - You can monitor blood pressure over time by treatment.
  - You can easily discern a dip or a spike in someone's heart rate.

How to Animate

```
ods printer file="C:\animation.gif";
options printerpath=gif animation=start
  animduration=0.5 animloop=yes
  noanimoverlay;
  proc sgrender data=<data-set-name>
    template=<template-name>;
    <other optional statements>;
  run;
options printerpath=gif animation=stop;
ods printer close;
```

How to Animate

```
/* define template here */
ods printer file = "C:\animation.gif";
options printerpath = gif animation = start
     animduration = 0.5 animloop = yes noanimoverlay;
/* or could define the template here */
  proc sgrender data = <data-set-name>
    template = <template-name>;
    <other optional statements>;
  run;
options printerpath = gif animation = stop;
ods printer close;
```

How to Animate

```
proc template;
  define statgraph <template-name>;
    begingraph / <options>;
      <GTL statements>;
    endgraph;
  end;
run;
```

Animating Boxplot of Laboratory Results

Example 1: Animated Boxplot of Lab Results

Creatinine was selected

	Actual Treatment	Actual Treatment (N)	Sex	Analysis Visit	Analysis Visit (N)	Parameter	Analysis Range 1 Lower Limit	Analysis Range 1 Upper Limit
1	Placebo	0	F	Week 2	2	Creatinine (umol/L)	62	124
2	Placebo	0	F	Week 4	4	Creatinine (umol/L)	62	124
3	Placebo	0	F	Week 6	6	Creatinine (umol/L)	62	124
4	Placebo	0	F	Week 8	8	Creatinine (umol/L)	62	124
5	Placebo	0	M	Week 2	2	Creatinine (umol/L)	71	141
6	Placebo	0	M	Week 4	4	Creatinine (umol/L)	71	141
7	Xanomeline High Dose	81	M	Week 2	2	Creatinine (umol/L)	71	141
8	Xanomeline High Dose	81	M	Week 4	4	Creatinine (umol/L)	71	141
9	Xanomeline High Dose	81	M	Week 6	6	Creatinine (umol/L)	71	141
10	Xanomeline High Dose	81	M	Week 8	8	Creatinine (umol/L)	71	141
11	Xanomeline Low Dose	54	M	Week 2	2	Creatinine (umol/L)	71	141
12	Xanomeline Low Dose	54	M	Week 4	4	Creatinine (umol/L)	71	141

The Data

Example 1: Animated Boxplot of Lab Results

Number of subjects calculated at each visit for each treatment

	Actual Treatment	Actual Treatment (N)	Sex	Analysis Visit	Analysis Visit (N)	Analysis Range 1 Upper Limit	Analysis Range 1 Lower Limit	N Subjects/Visit
1	Placebo	0	M	Week 2	2	141	71	33
2	Xanomeline Low Dose	54	M	Week 2	2	141	71	33
3	Xanomeline High Dose	81	M	Week 2	2	141	71	41
4	Placebo	0	M	Week 4	4	141	71	32
5	Xanomeline Low Dose	54	M	Week 4	4	141	71	29
6	Xanomeline High Dose	81	M	Week 4	4	141	71	37
7	Placebo	0	M	Week 6	6	141	71	31

```
proc sql;
  create table lab_data_with_n as
  select *, count(distinct usubjid) as nobs_subject_visit
  from lab_data
  group by trtan, avisitn, sex;
quit;
```

Data Manipulations

Example 1: Animated Boxplot of Lab Results

```
proc template;
   define statgraph boxplot_template_sex;
     dynamic _byval_ _byval2_ _byval4_ upperlim lowerlim;
     begingraph;
         entrytitle halign = center _byval_ ":" " Sex = " _byval2_ " and Visit = " _byval4_;
         layout overlay / yaxisopts = (linearopts = (viewmin = 60 viewmax = 180
               tickvaluesequence = (start = 60 end = 180 increment = 30)));
           boxplot x = trtan y = aval / group = trtan groupdisplay = cluster;
           referenceline y = lowerlim / lineattrs = (pattern = 2);
           referenceline y = upperlim / lineattrs = (pattern = 2);
           innermargin;
              axistable x = trtan value = nobs_subject_visit / stat = mean
                   label = "n" valueattrs = (size = 9);

           endinnermargin;
         endlayout ;
     endgraph;
   end;
 run;
```

First Create the Template with Graph Template Language (GTL)

Example 1: Animated Boxplot of Lab Results

```
options nobyline;
options papersize=('8 in', '4.8 in') printerpath = gif
    animation = start animduration = 0.5 animloop = yes
    noanimoverlay;
ods printer file = "&outpath\boxplotM1.gif";

ods graphics / width = 8in height = 4.8in imagefmt = gif;

proc sgrender data = adlbc_all_n_gen
              template = boxplot_template_sex;
  where avisitn ne . and sex = "M";
  by param sex avisitn avisit;
  dynamic upperlim = "a1hi" lowerlim = "a1lo";
  format trtan trtfmt.;
run;

options printerpath = gif animation = stop;
ods printer close;
```

Animation Options and SGRENDER

Example 1: Animated Boxplot of Lab Results

```
options nobyline;
options papersize = ('8 in', '4.8 in')
   printerpath = gif
   animation = start animduration = 0.5
   animloop = yes   noanimoverlay;
ods printer
    file = "&outpath\boxplotM1.gif";
ods graphics /
   width = 8in height = 4.8in
   imagefmt = gif;
```

Animation Options Before SGRENDER

Example 1: Animated Boxplot of Lab Results

```
proc sgrender data =adlbc_all_n_gen
   template = boxplot_template_sex;
   where avisitn ne . and sex = "M";
   by param sex avisitn avisit;
   dynamic upperlim = "a1hi"
           lowerlim = "a1lo";
   format trtan trtfmt.;
run;

options printerpath = gif animation = stop;
ods printer close;
```

SGRENDER

Example 1: Animated Boxplot of Lab Results

Output

Animating Scatterplot of Laboratory Results

Example 2: Animated Scatterplot of Laboratory Results

Same data as in Example 1
But ...

	Actual Treatment	Actual Treatment (N)	Sex	Analysis Visit	Analysis Visit (N)	Analysis Range 1 Lower Limit	Analysis Range 1 Upper Limit	N Subjects with Abnormal Records / Visit
1	Placebo	0	M	Week 2	2	71	141	0
2	Xanomeline Low Dose	54	M	Week 2	2	71	141	4
3	Xanomeline High Dose	81	M	Week 2	2	71	141	2
4	Placebo	0	M	Week 4	4	71	141	1
5	Xanomeline Low Dose	54	M	Week 4	4	71	141	3
6	Xanomeline High Dose	81	M	Week 4	4	71	141	1
7	Placebo	0	M	Week 6	6	71	141	1
8	Xanomeline Low Dose	54	M	Week 6	6	71	141	2
9	Xanomeline High Dose	81	M	Week 6	6	71	141	2

Number of subjects with abnormal results were calculated at each visit for each treatment

The Data

Example 2: Animated Scatterplot of Laboratory Results

GTL

```
layout overlay / yaxisopts = (linearopts = (viewmin = 60
  viewmax = 180 tickvaluesequence = (start = 60 end = 180
  increment = 30))) xaxisopts = (type = discrete);
  scatterplot x = trtan y = aval / group = trtan
                groupdisplay = cluster jitter = auto
                jitteropts = (axis = x);
  referenceline y = lowerlim / lineattrs = (pattern = 2);
  referenceline y = upperlim / lineattrs = (pattern = 2);
  innermargin;
    axistable x = trtan value = nobs_abn_subject_visit /
                stat = mean label = "n"
                valueattrs = (size = 9);
  endinnermargin;
endlayout;
```

Example 2: Animated Scatterplot of Laboratory Results

Animation Options (the same as the Boxplot options)

```
ods printer file = "&outpath\scatterplotM1.gif";
ods graphics / width = 8in height = 4.8in
               imagefmt = gif;

proc sgrender data = adlbc_all_abnormal_n_gen
  template = scatterplot_template_sex;
  where avisitn ne . and sex = "M";
  by param sex avisitn avisit;
  dynamic upperlim = "a1hi" lowerlim = "a1lo";
  format trtan trtfmt.;
run;

ods printer close;
```

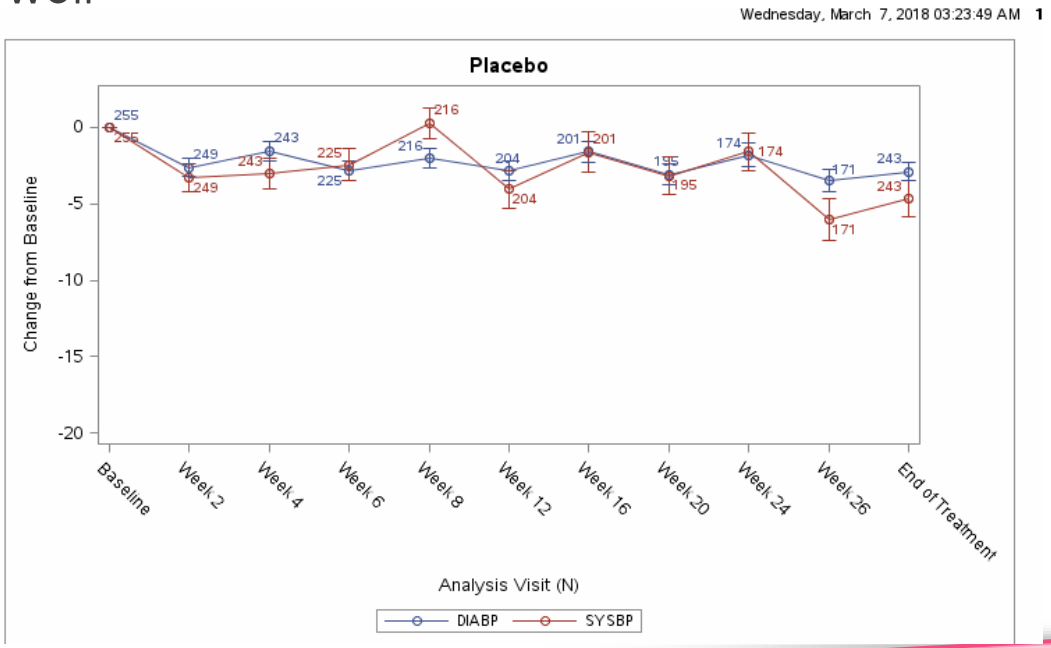
Example 2: Animated Scatterplot of Laboratory Results

Output

Animating Blood Pressure Change Across Treatments

Example 3: Change in Blood Pressure Across Treatments
Animation is Not Time Dependent

- Sometimes what we want is not based only on time but based on a category as well



Example 3: Change in Blood Pressure Across Treatments

The Data

	USUBJID	TRTA	TRTAN	PARAMCD	AVISIT	AVISITN	AVAL	BASE	CHG
1	01-701-1015	Placebo	0	DIABP	Baseline	0	56	56	0
2	01-701-1015	Placebo	0	DIABP	Week 2	2	56	56	0
3	01-701-1015	Placebo	0	DIABP	Week 4	4	64	56	8
4	01-701-1015	Placebo	0	SYSBP	Baseline	0	130	130	0
5	01-701-1015	Placebo	0	SYSBP	Week 2	2	114	130	-16
6	01-701-1015	Placebo	0	SYSBP	Week 4	4	138	130	8
7	01-701-1028	Xanomeline High Dose	81	DIABP	Baseline	0	85	85	0
8	01-701-1028	Xanomeline High Dose	81	DIABP	Week 2	2	78	85	-7
9	01-701-1028	Xanomeline High Dose	81	DIABP	Week 4	4	69	85	-16
10	01-701-1028	Xanomeline High Dose	81	SYSBP	Baseline	0	138	138	0
11	01-701-1028	Xanomeline High Dose	81	SYSBP	Week 2	2	134	138	-4
12	01-701-1028	Xanomeline High Dose	81	SYSBP	Week 4	4	130	138	-8
13	01-716-1298	Xanomeline Low Dose	54	DIABP	Baseline	0	82	82	0
14	01-716-1298	Xanomeline Low Dose	54	DIABP	Week 2	2	72	82	-10
15	01-716-1298	Xanomeline Low Dose	54	DIABP	Week 4	4	74	82	-8
16	01-716-1298	Xanomeline Low Dose	54	SYSBP	Baseline	0	156	156	0
17	01-716-1298	Xanomeline Low Dose	54	SYSBP	Week 2	2	160	156	4
18	01-716-1298	Xanomeline Low Dose	54	SYSBP	Week 4	4	138	156	-18

Comparison of Change in Blood Pressure Across Treatments

```
begingraph;
   entrytitle halign = center _byval_ ;
   layout overlay / xaxisopts = (type = discrete discreteopts
                                 (tickvaluelist = ('0' '2' '4' '6' '8'
                                                   '12' '16' '20' '24'
                                                   '26' '99')))
                    yaxisopts = (linearopts = (viewmin = -20
                                               viewmax = 2));

      seriesplot x = AVISITN y = mean / display = all  group = PARAMCD
                                datalabel = n  name = "prm";

      scatterplot x = AVISITN y = mean / group = PARAMCD
                  yerrorupper = eval(mean + se)
                  yerrorlower = eval(mean - se);

      discretelegend "prm" / across = 2 location = outside;
   endlayout;
endgraph;
```

Example 3: Change in Blood Pressure Across Treatments

Output

Interpolation

Creating Smooth Animations – Scatterplot Example

Why Interpolate?

Without Interpolation

With Interpolation

How to Interpolate?

- First step is determine variable that will drive animation (e.g., AVISITN)

	AVISITN
1	2
2	4
3	6
4	8
5	12
6	16
7	20
8	24
9	26
10	99

There are 10 visits

How to Interpolate?

- First step is determine variable that will drive animation (e.g., AVISITN)

	AVISITN
1	2
2	4
3	6
4	8
5	12
6	16
7	20
8	24
9	26
10	99

Add visits in between the original visits

	New AVISITN
1	2
2	2.4
3	2.8
4	3.2
5	3.6
6	4
7	4.4
8	4.8
9	5.2
10	5.6
11	6

How to Interpolate?

- Merge the data together so that the new visit records are between the existing visit records

Unique Subject Identifier	Analysis Visit	Analysis Visit (N)	New AVISITN	Actual Treatment (N)	Analysis Value	Analysis Visit (N)
01-701-1023	Week 2	2	2	0	132.6	2
01-701-1023	Week 2	2	2.4	0	.	.
01-701-1023	Week 2	2	2.8	0	.	.
01-701-1023	Week 2	2	3.2	0	.	.
01-701-1023	Week 2	2	3.6	0	.	.
01-701-1023	Week 4	4	4	0	114.92	4
01-701-1023	Week 4	4	4.4	0	.	.
01-701-1023	Week 4	4	4.8	0	.	.
01-701-1023	Week 4	4	5.2	0	.	.
01-701-1023	Week 4	4	5.6	0	.	.
01-701-1023	End of Treatment	99	99	0	114.92	99
01-701-1023	End of Treatment	99	99.8	0	.	.
01-701-1023	End of Treatment	99	100.2	0	.	.
01-701-1023	End of Treatment	99	100.6	0	.	.
01-701-1023	End of Treatment	99	101	0	.	.

Linear interpolation

LOCF

How to Interpolate?

Interpolated Data set

Unique Subject Identifier	Analysis Visit	Analysis Visit (N)	New AVISITN	Actual Treatment (N)	Analysis Value	Analysis Values with Interpolation	Analysis Visit (N)
01-701-1023	Week 2	2	2	0	132.6	132.6	2
01-701-1023	Week 2	2	2.4	0	.	129.064	.
01-701-1023	Week 2	2	2.8	0	.	125.528	.
01-701-1023	Week 2	2	3.2	0	.	121.992	.
01-701-1023	Week 2	2	3.6	0	.	118.456	.
01-701-1023	Week 4	4	4	0	114.92	114.92	4
01-701-1023	Week 4	4	4.4	0	.	114.92	.
01-701-1023	Week 4	4	4.8	0	.	114.92	.
01-701-1023	Week 4	4	5.2	0	.	114.92	.
01-701-1023	Week 4	4	5.6	0	.	114.92	.
01-701-1023	End of Treatment	99	99	0	114.92	114.92	99
01-701-1023	End of Treatment	99	99.8	0	.	114.92	.
01-701-1023	End of Treatment	99	100.2	0	.	114.92	.
01-701-1023	End of Treatment	99	100.6	0	.	114.92	.
01-701-1023	End of Treatment	99	101	0	.	114.92	.

Example 4: Scatterplot Animation with Linear Interpolation GTL

- This example uses GTL code similar to Example 2

```
layout overlay / yaxisopts =
          (linearopts = (viewmin = 60 viewmax = 180
           tickvaluesequence = (start = 60 end = 180
                                increment = 30)))
                xaxisopts = (type = discrete);
  scatterplot x = trtan y = aval / group = trtan
    groupdisplay = cluster jitter = auto
    jitteropts = (axis = x);
  referenceline y = lowerlim / lineattrs = (pattern = 2);
  referenceline y = upperlim / lineattrs = (pattern = 2);
endlayout;
```

Example 4: Scatterplot Animation with Linear Interpolation

Animation options

```
options papersize = ('8 in', '4.8 in')
     printerpath = gif animation = start
      animduration = 0.16 animloop = yes
       noanimoverlay nonumber;
```

Animation duration has been decreased compared to Example 2, because now there are a lot more frames, and we want to have a smooth animation.

Interpolation

Creating Smooth Animations – Adverse Events (AEs) over time Example

Example 5: AEs over time by Baseline Laboratory Results

- A great way to assess the AE counts and visualize the relationship

Example 5: AEs over time by Baseline Laboratory Results

Input and Intermediate Data sets

Week AE started was calculated

ADAE where TRTEMFL = "Y"

	Unique Subject Identifier	Dictionary-Derived Term	Actual Treatment (N)	Analysis Start Relative Day	Week AE started
1	01-701-1015	APPLICATION SITE ERYTHEMA	0	2	1
2	01-701-1015	APPLICATION SITE PRURITUS	0	2	1
3	01-701-1015	DIARRHOEA	0	8	2

No. of AEs for each week were calculated

Actual Treatment (N)	Unique Subject Identifier	week	count_week
0	01-701-1015	1	2
0	01-701-1015	2	1

Cumulative Counts ranged from Week 0 to Week 28

Unique Subject Identifier	Actual Treatment (N)	week	count_week	cum_counts
01-701-1015	0	0	0	0
01-701-1015	0	1	2	2
01-701-1015	0	2	1	3
01-701-1015	0	3	0	3

Example 5: AEs over time by Baseline Laboratory Results

Final Data set

Unique Subject Identifier	Actual Treatment (N)	Baseline Creatinine (umol/L)	Week	Cumulative TEAE counts with Interpolation
01-701-1015	0	79.56	0	0
01-701-1015	0	79.56	0.2	0.4
01-701-1015	0	79.56	0.4	0.8
01-701-1015	0	79.56	0.6	1.2
01-701-1015	0	79.56	0.8	1.6
01-701-1015	0	79.56	1	2
01-701-1015	0	79.56	1.2	2.2
01-701-1015	0	79.56	1.4	2.4
01-701-1015	0	79.56	1.6	2.6
01-701-1015	0	79.56	1.8	2.8
01-701-1015	0	79.56	2	3
01-701-1015	0	79.56	2.2	3
01-701-1015	0	79.56	2.4	3
01-701-1015	0	79.56	2.6	3
01-701-1015	0	79.56	2.8	3
01-701-1015	0	79.56	3	3

Interpolated Counts

Example 5: AEs over time by Baseline Laboratory Results

GTL

```
begingraph / designwidth = 1200px designheight = 960px;
  entrytitle textattrs = (size = 18pt) halign = center "Week = "_byval_;

  layout datapanel classvars = (trtan) / headerlabeldisplay = value
    headerlabelattrs = (size = 15pt) columns = 3 rows = 1
    rowaxisopts=(label = "TEAE counts" labelattrs = (size = 18pt)
      tickvalueattrs = (size = 16pt) linearopts = (viewmin = 0 viewmax = 25
      tickvaluesequence = (start = 0 end = 25 increment = 5)))
    columnaxisopts = (label = "Baseline Creatinine (umol/L)"
      labelattrs = (size = 18pt) tickvalueattrs = (size = 16pt));
    layout prototype;
      scatterplot x = baseline_creatinine y = aval / group = trtan
        markerattrs = (size = 15px symbol = circlefilled);
    endlayout;
  endlayout;

endgraph;
```

Example 5: AEs over time by Baseline Laboratory Results

Animation Options

```
ods printer file="&outpath\ae_anim1_scat.gif";
options papersize = ('8 in', '6.4 in') printerpath = gif
  animation = start animduration = 0.13 animloop = yes noanimoverlay
  nonumber;

ods graphics / reset = all width = 8in height = 6.4in
               imagefmt = png;

proc sgrender data = final_dataset template = aedecod_anim_scat;
  by avisitn;
  format trtan trtfmt.;
run;

ods graphics / reset = all;
options printerpath = gif animation = stop;
ods printer close;
```

Expansion

Electrocardiogram (ECG) Heart Rate over Time

Example 6: ECG Heart Rate over Time

- On TV and in real life, we've all seen a heart rate monitor that display's how someone heart is beating over time.
- How is this heart rate monitor display achieved with SAS?

Example 6: ECG Heart Rate over Time

Data sets

	USUBJID	paramcd	param	ATPT	HR	AVISITN
1	001-001	HR	Heart Rate (beat per minute)	1	84.2697	1
2	001-001	HR	Heart Rate (beat per minute)	2	84.2697	1
3	001-001	HR	Heart Rate (beat per minute)	3	84.0619	1
4	001-001	HR	Heart Rate (beat per minute)	4	85.6542	1
5	001-001	HR	Heart Rate (beat per minute)	5	87.2093	1
6	001-001	HR	Heart Rate (beat per minute)	6	87.1246	1
7	001-001	HR	Heart Rate (beat per minute)	7	86.8726	1
8	001-001	HR	Heart Rate (beat per minute)	8	86.7052	1
9	001-001	HR	Heart Rate (beat per minute)	9	87.5899	1
10	001-001	HR	Heart Rate (beat per minute)	10	89.1475	1
11	001-001	HR	Heart Rate (beat per minute)	11	89.8204	1
12	001-001	HR	Heart Rate (beat per minute)	12	89.8204	1

Example 6: ECG Heart Rate over Time

Data sets

	USUBJID	paramcd	param	ATPT	HR	AVISITN
1	001-001	HR	Heart Rate (beat per minute)	1	84.2697	1
2	001-001	HR	Heart Rate (beat per minute)	2	84.2697	1
3	001-001	HR	Heart Rate (beat per minute)	3	84.0619	1
4	001-001	HR	Heart Rate (beat per minute)	4	85.6542	1
5	001-001	HR	Heart Rate (beat per minute)	5	87.2093	1
6	001-001	HR	Heart Rate (beat per minute)	6	87.1246	1
7	001-001	HR	Heart Rate (beat per minute)	7	86.8726	1
8	001-001	HR	Heart Rate (beat per minute)	8	86.7052	1
9	001-001	HR	Heart Rate (beat per minute)	9	87.5899	1
10	001-001	HR	Heart Rate (beat per minute)	10	89.1475	1
11	001-001	HR	Heart Rate (beat per minute)	11	89.8204	1
12	001-001	HR	Heart Rate (beat per minute)	12	89.8204	1

Each row represents 0.5 seconds

Example 6: ECG Heart Rate over Time

Data sets

	USUBJID	paramcd	param	ATPT	HR	AVISITN
1	001-001	HR	Heart Rate (beat per minute)	1	84.2697	1
2	001-001	HR	Heart Rate (beat per minute)	2	84.2697	1
3	001-001	HR	Heart Rate (beat per minute)	3	84.0619	1
4	001-001	HR	Heart Rate (beat per minute)	4	85.6542	1
5	001-001	HR	Heart Rate (beat per minute)	5	87.2093	1
6	001-001	HR	Heart Rate (beat per minute)	6	87.1246	1
7	001-001	HR	Heart Rate (beat per minute)	7	86.8726	1
8	001-001	HR	Heart Rate (beat per minute)	8	86.7052	1
9	001-001	HR	Heart Rate (beat per minute)	9	87.5899	1
10	001-001	HR	Heart Rate (beat per minute)	10	89.1475	1
11	001-001	HR	Heart Rate (beat per minute)	11	89.8204	1
12	001-001	HR	Heart Rate (beat per minute)	12	89.8204	1

There is 15 minutes of data and so we thought to speed the animation up 6 times faster.

Example 6: ECG Heart Rate over Time

Data sets

	USUBJID	paramcd	param	ATPT	HR	AVISITN	ATPT2	final_visit	final_animation_visit
1	001-001	HR	Heart Rate (beat per minute)	1	84.2697	1	0.5	1	1
2	001-001	HR	Heart Rate (beat per minute)	2	84.2697	1	1	1	1
3	001-001	HR	Heart Rate (beat per minute)	3	84.0619	1	1.5	1	1
4	001-001	HR	Heart Rate (beat per minute)	4	85.6542	1	2	1	1
5	001-001	HR	Heart Rate (beat per minute)	5	87.2093	1	2.5	1	1
6	001-001	HR	Heart Rate (beat per minute)	6	87.1246	1	3	1	1

This was achieved by grouping the animations every 3 seconds.

Example 6: ECG Heart Rate over Time

Data sets

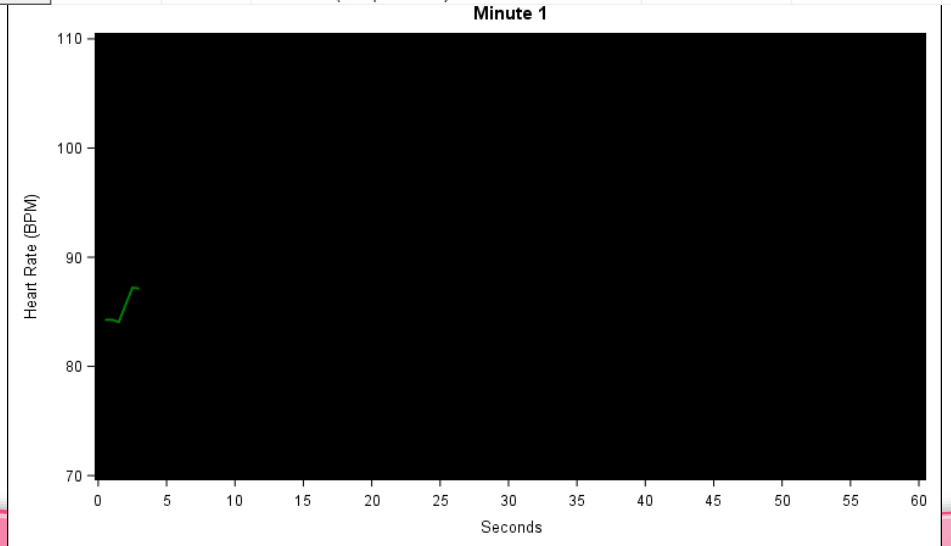
	USUBJID	paramcd	param	ATPT	HR	AVISITN	ATPT2	final_visit	final_animation_visit
1	001-001	HR	Heart Rate (beat per minute)	1	84.2697	1	0.5	1	2
2	001-001	HR	Heart Rate (beat per minute)	2	84.2697	1	1	1	2
3	001-001	HR	Heart Rate (beat per minute)	3	84.0619	1	1.5	1	2
4	001-001	HR	Heart Rate (beat per minute)	4	85.6542	1	2	1	2
5	001-001	HR	Heart Rate (beat per minute)	5	87.2093	1	2.5	1	2
6	001-001	HR	Heart Rate (beat per minute)	6	87.1246	1	3	1	2
7	001-001	HR	Heart Rate (beat per minute)	7	86.8726	1	3.5	2	2
8	001-001	HR	Heart Rate (beat per minute)	8	86.7052	1	4	2	2
9	001-001	HR	Heart Rate (beat per minute)	9	87.5899	1	4.5	2	2
10	001-001	HR	Heart Rate (beat per minute)	10	89.1475	1	5	2	2
11	001-001	HR	Heart Rate (beat per minute)	11	89.8204	1	5.5	2	2
12	001-001	HR	Heart Rate (beat per minute)	12	89.8204	1	6	2	2

A drawing effect was achieved by keeping records from previous animation and adding the heart rate information of the current visit.

Example 6: ECG Heart Rate over Time

Data sets

	USUBJID	paramcd	param	ATPT	HR	AVISITN	ATPT2	final_visit	final_animation_visit
1	001-001	HR	Heart Rate (beat per minute)	1	84.2697	1	0.5	1	2
2	001-001	HR	Heart Rate (beat per minute)	2	84.2697	1	1	1	2
3	001-001	HR	Heart Rate (beat per minute)	3	84.0619	1	1.5	1	2
4	001-001	HR	Heart Rate (beat per minute)	4	85.6542	1	2	1	2
5	001-001	HR	Heart Rate (beat per minute)	5	87.2093	1	2.5	1	2
6	001-001	HR	Heart Rate (beat per minute)	6	87.1246	1	3	1	2
7	001-001	HR	Heart Rate (beat per minute)	7	86.8726	1	3.5	2	2
8	001-001	HR	Heart Rate (beat per minute)	8	86.7052	1	4	2	2
9	001-001	HR	Heart Rate (beat per minute)	9	87.5899	1	4.5	2	2
10	001-001	HR	Heart Rate (beat per minute)	10	89.1475	1	5	2	2
11	001-001	HR	Heart Rate (beat per minute)	11	89.8204	1	5.5	2	2
12	001-001	HR	Heart Rate (beat per minute)	12	89.8204	1	6	2	2

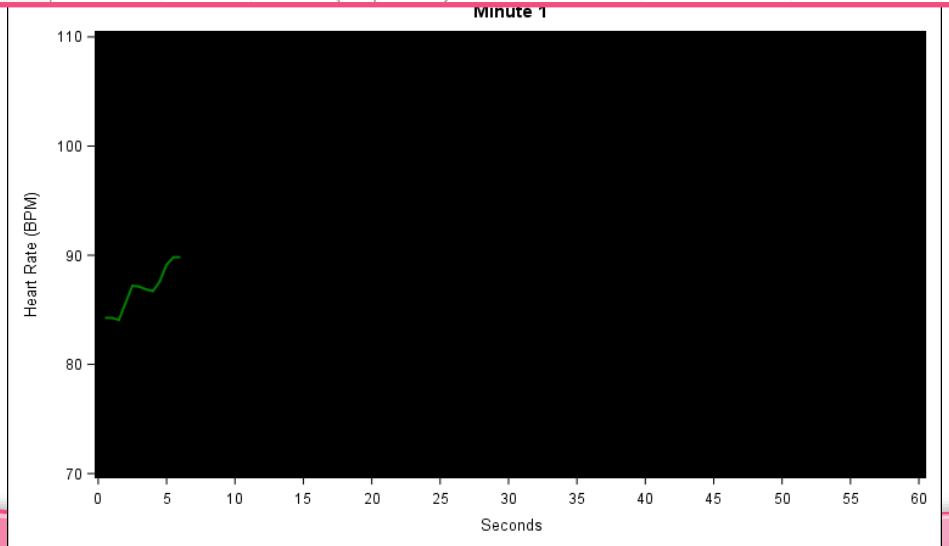


Animation Series 1

Example 6: ECG Heart Rate over Time

Data sets

	USUBJID	paramcd	param	ATPT	HR	AVISITN	ATPT2	final_visit	final_animation_visit
1	001-001	HR	Heart Rate (beat per minute)	1	84.2697	1	0.5	1	2
2	001-001	HR	Heart Rate (beat per minute)	2	84.2697	1	1	1	2
3	001-001	HR	Heart Rate (beat per minute)	3	84.0619	1	1.5	1	2
4	001-001	HR	Heart Rate (beat per minute)	4	85.6542	1	2	1	2
5	001-001	HR	Heart Rate (beat per minute)	5	87.2093	1	2.5	1	2
6	001-001	HR	Heart Rate (beat per minute)	6	87.1246	1	3	1	2
7	001-001	HR	Heart Rate (beat per minute)	7	86.8726	1	3.5	2	2
8	001-001	HR	Heart Rate (beat per minute)	8	86.7052	1	4	2	2
9	001-001	HR	Heart Rate (beat per minute)	9	87.5899	1	4.5	2	2
10	001-001	HR	Heart Rate (beat per minute)	10	89.1475	1	5	2	2
11	001-001	HR	Heart Rate (beat per minute)	11	89.8204	1	5.5	2	2
12	001-001	HR	Heart Rate (beat per minute)	12	89.8204	1	6	2	2



Animation Series 2

Conclusions

- Animations can be done quite easily with SAS 9.4. All that is needed is to wrap the appropriate OPTIONS and the ODS PRINTER statements around the plots.
- Smoother animations can be created by interpolating results in between the visits (if there are not enough visits for smooth animation), and then producing the animation on the data set which contains interpolated results.
- A drawing effect can be achieved by grouping data into series and retaining a duplicate of set of records for each subsequent series.

Questions?

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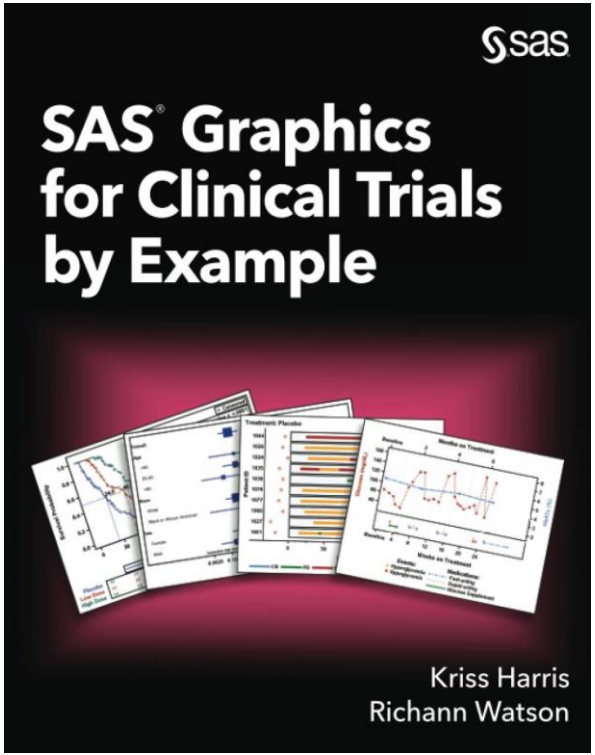
For More Information on Graphs



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