



»» TRANSFORMING PROMISING IDEAS INTO COMMERCIAL REALITY

How to improve your figure

An overview of annotation techniques in Graph Template Language

Konrad Żywno, inVentiv Health Clinical & Bartosz Kutyla, SAS Institute
14 October 2014



Why use annotation?

- Do you produce figures using GTL?
- Did you want to add any uncommon graphics elements to your graphs?
- You know how to do it but you do not want or cannot change the template?

USE ANNOTATION!

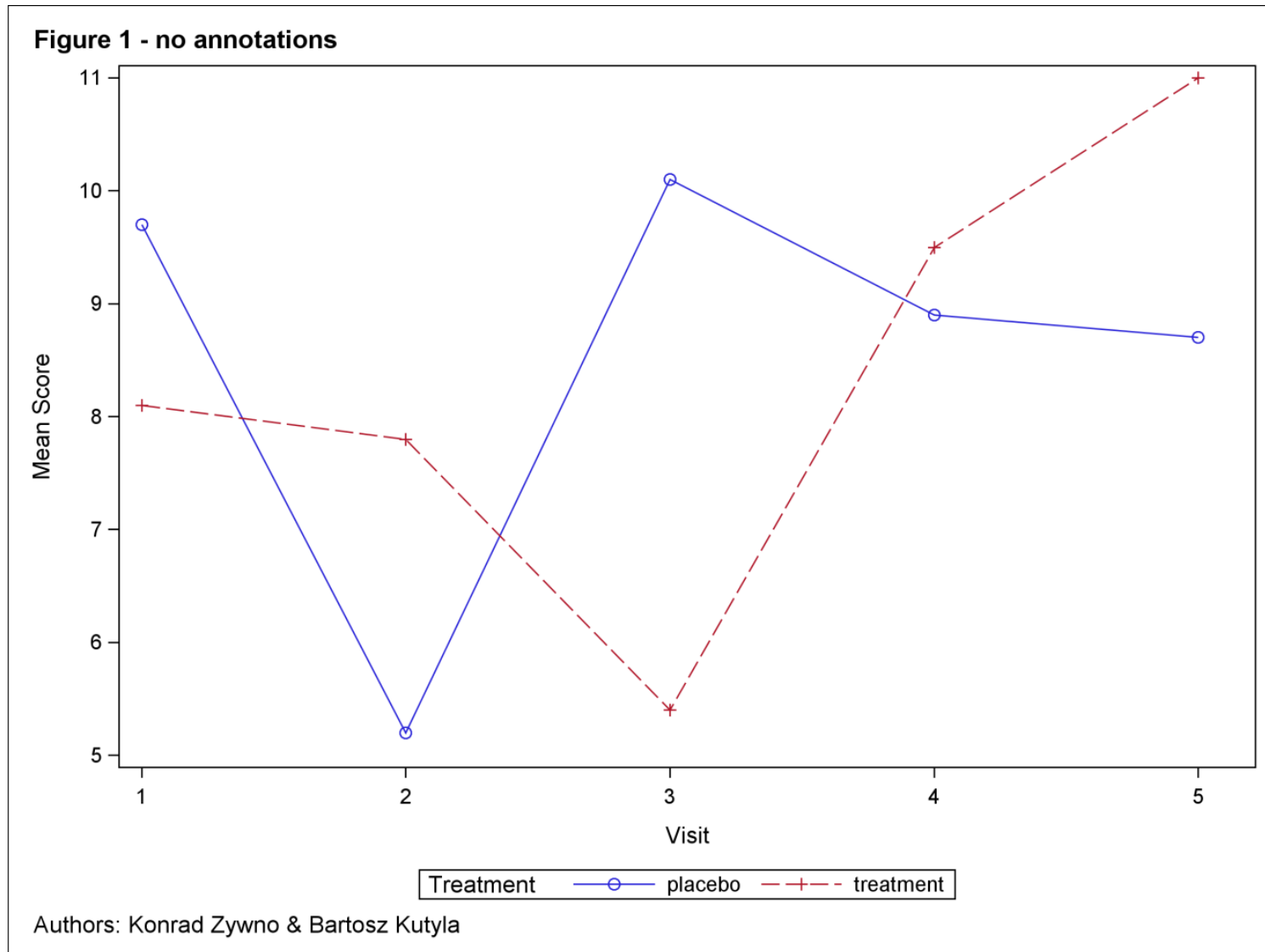


What can be achieved using annotation?

- › text
- › arrows and lines
- › geometric shapes, such as ovals, rectangles, polylines, and polygons
- › images



Sample figure





How to add annotations?

```
PROC SGRENDER TEMPLATE=tmp1 DATA=input sganno=anno;  
RUN;
```

```
PROC TEMPLATE;  
  DEFINE STATGRAPH Tmpl1;  
    BEGINGRAPH;  
      LAYOUT OVERLAY/ ... PAD=() ;  
  
    ...  
  
      ANNOTATE ;  
    ENDLAYOUT ;  
  ENDGRAPH ;  
END ;  
RUN ;
```

```
%SGANNO ;
```



Controlling the position and scaling

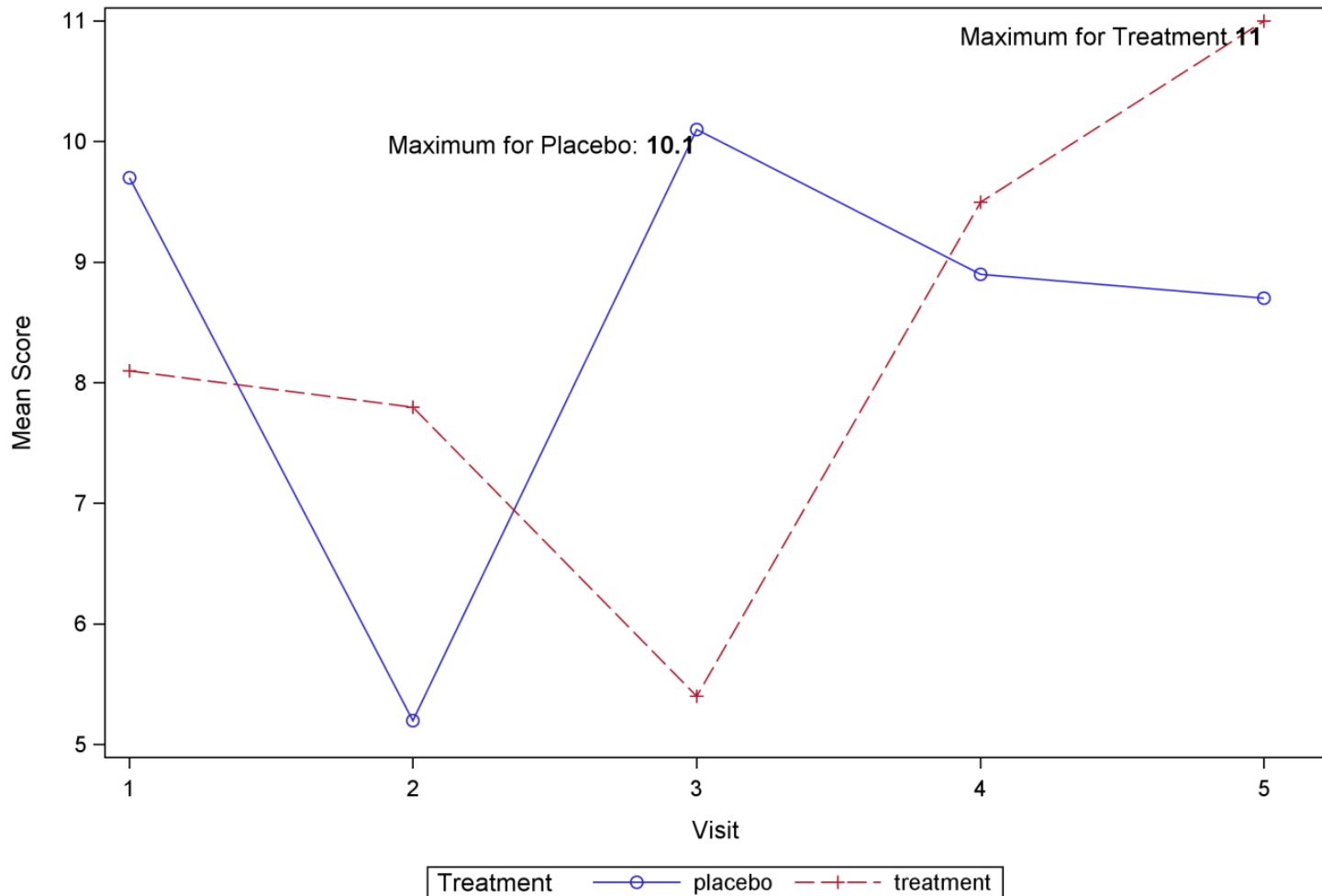
- › *DRAWSPACE* variable
- › Values for this variable take the form <area><unit>
 - GRAPHPERCENT, GRAPHPIXEL (drawspace area is the entire graph)
 - LAYOUTPERCENT, LAYOUTPIXEL (drawspace area is the entire graph excluding titles and footnotes)
 - WALLPERCENT, WALLPIXEL (drawspace area is the area within the axes including offsets)
 - DATAPERCENT, DATAPIXEL, DATAVALUE (drawspace area is the area within the axes not including offsets)
- › *X1SPACE, X2SPACE, Y1SPACE, Y2SPACE* variables



Annotation dataset requirements

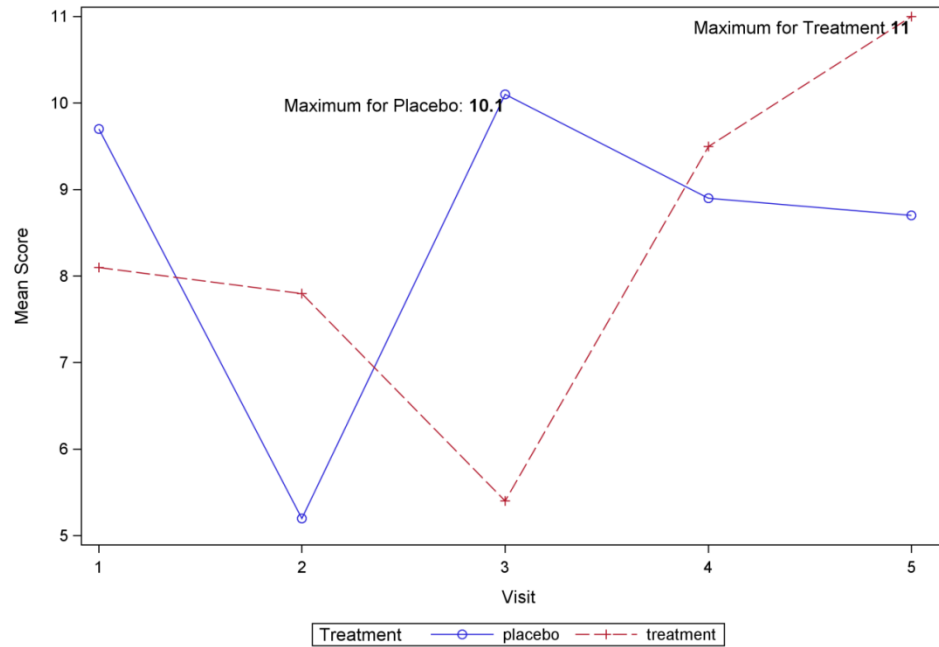
- › 4 types of variables:
 - function, which indicates what element should be drawn
 - variables, specifying the drawing space used by the annotation
 - position variables, specifying the point at which the annotation element is to be drawn
 - attribute variables, specifying the style of the annotation elements – e.g. colour or text font.

Figure 2 - text annotations



Authors: Konrad Zywno & Bartosz Kutyla

Figure 2 - text annotations



Authors: Konrad Zywno & Bartosz Kutyla

FUNCTION	LABEL	X1	Y1	ANCHOR	WIDTHUNIT	DRAWSPACE	TEXTWEIGHT
text	Maximum for Placebo:	3	10.1	TOPRIGHT	DATA	DATAVALUE	
textcont	10.1	3	10.1	TOPRIGHT	DATA	DATAVALUE	BOLD
text	Maximum for Treatment:	5	11	TOPRIGHT	DATA	DATAVALUE	NORMAL
textcont	11	5	11	TOPRIGHT	DATA	DATAVALUE	BOLD

```
DATA anno;
  %SGTEXT (
    X1 = &max_x_plac.,
    Y1 = &max_y_plac.,
    ANCHOR = "TOPRIGHT",
    WIDTHUNIT = "DATA",
    DRAWSpace = "DATAVALUE",
    LABEL = "Maximum for Placebo:")

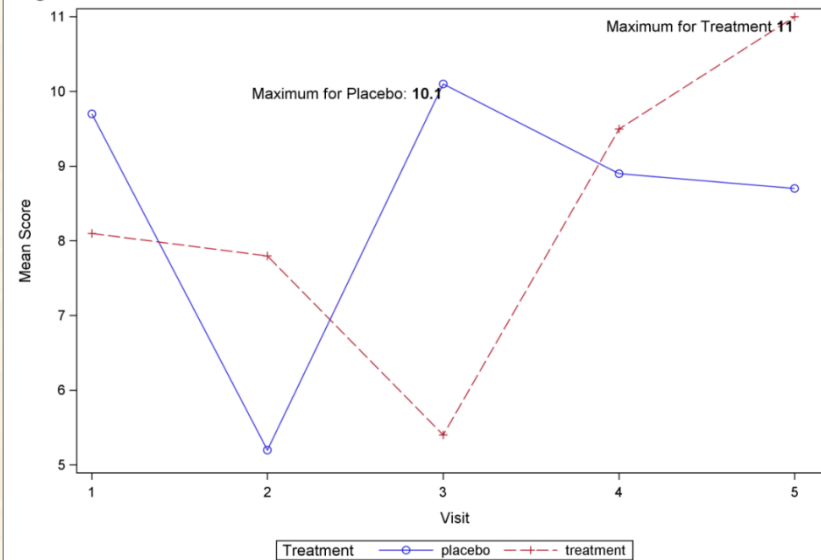
  %SGTEXTCONT (
    TEXTWEIGHT= "BOLD",
    LABEL = " &max_y_plac.")

  %SGTEXT (
    X1 = &max_x_trt.,
    Y1 = &max_y_trt.,
    ANCHOR = "TOPRIGHT",
    WIDTHUNIT = "DATA",
    DRAWSpace = "DATAVALUE",
    TEXTWEIGHT= "NORMAL",
    LABEL = "Maximum for Treatment:")

  %SGTEXTCONT (
    TEXTWEIGHT= "BOLD",
    LABEL = " &max_y_trt.")

RUN;
```

Figure 2 - text annotations

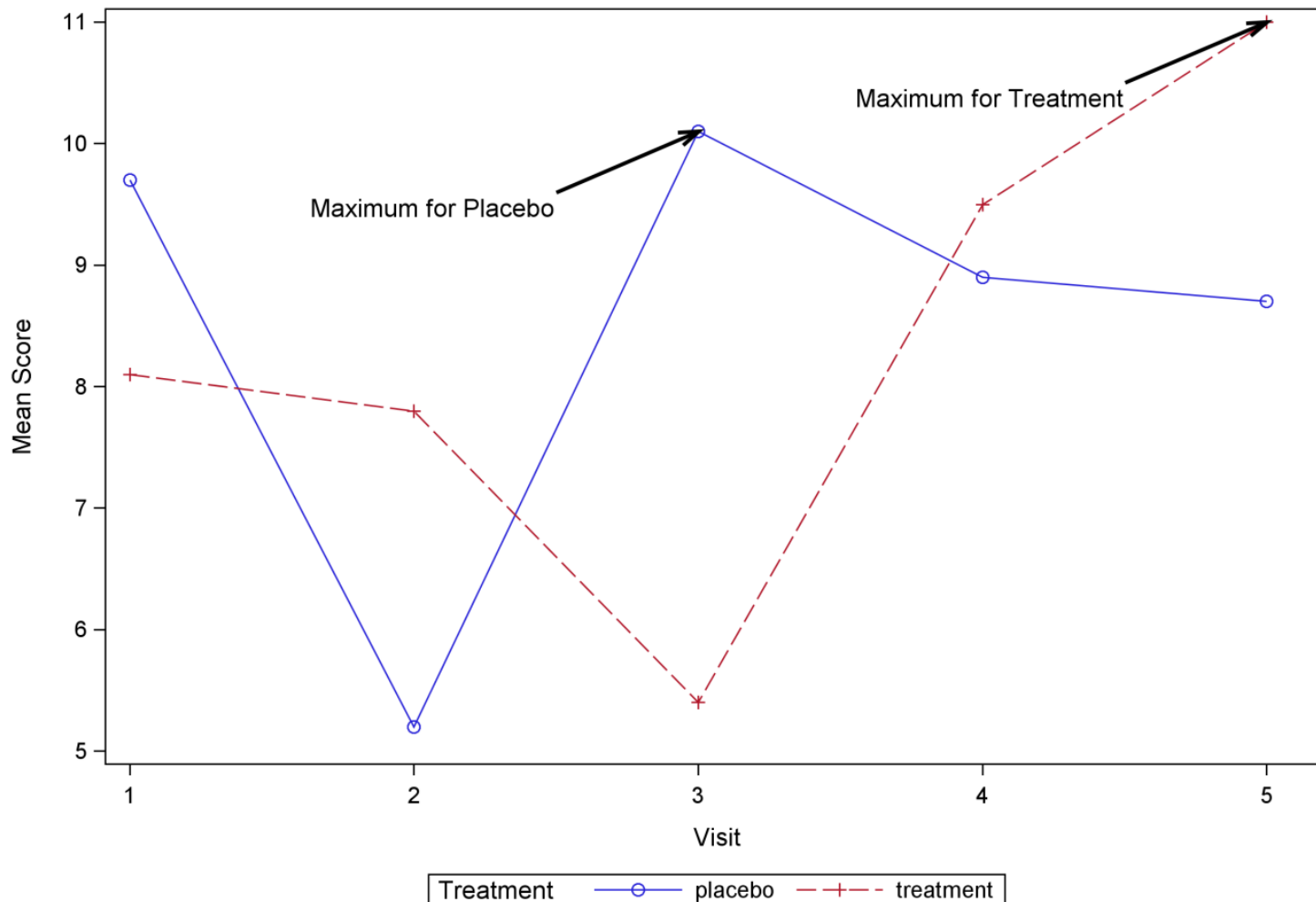


Authors: Konrad Zywno & Bartosz Kutyla

```
PROC TEMPLATE;  
  DEFINE STATGRAPH Tmpl;  
    BEGINGRAPH;  
      LAYOUT OVERLAY;  
  
      ...  
  
        DRAWTEXT "Maximum for Placebo" textattrs=(weight=bold) " &max_y_plac."/  
          x = &max_x_plac.  
          y = &max_y_plac.  
          ANCHOR = TOPRIGHT  
          WIDTHUNIT = DATA  
          DRAWSpace = DATAVALUE;  
  
        DRAWTEXT "Maximum for Treatment" textattrs=(weight=bold) " &max_y_trt."/  
          x = &max_x_trt.  
          y = &max_y_trt.  
          ANCHOR = TOPRIGHT  
          WIDTHUNIT = DATA  
          DRAWSpace = DATAVALUE;  
  
      ENDLAYOUT;  
    ENDGRAPH;  
  END;  
RUN;
```



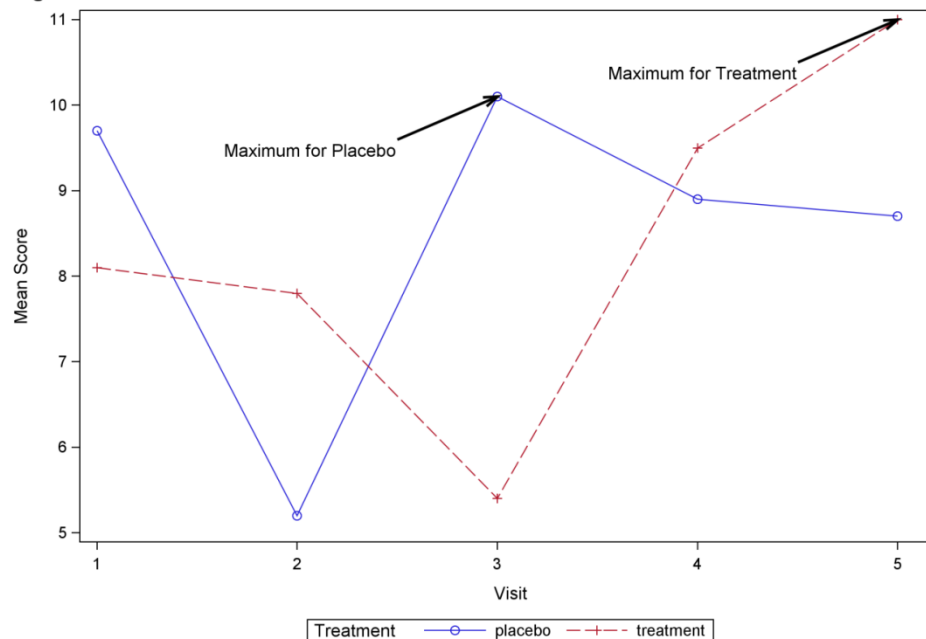
Figure 3 - arrow annotations



Authors: Konrad Zywno & Bartosz Kutyla



Figure 3 - arrow annotations



Authors: Konrad Zywno & Bartosz Kutyla

FUNCTION	LABEL	X1	Y1	ANCHOR	WIDTHUNIT	DRAWSPACE	X2	Y2	DIRECTION
text	Maximum for Placebo	2.5	9.6	TOPRIGHT	DATA	DATAVALUE	.	.	
text	Maximum for Treatment	4.5	10.5	TOPRIGHT	DATA	DATAVALUE	.	.	
arrow	Maximum for Treatment	3	10.1	TOPRIGHT	DATA	DATAVALUE	2.5	9.6	IN
arrow	Maximum for Treatment	5	11	TOPRIGHT	DATA	DATAVALUE	4.5	10.5	IN



ARROW

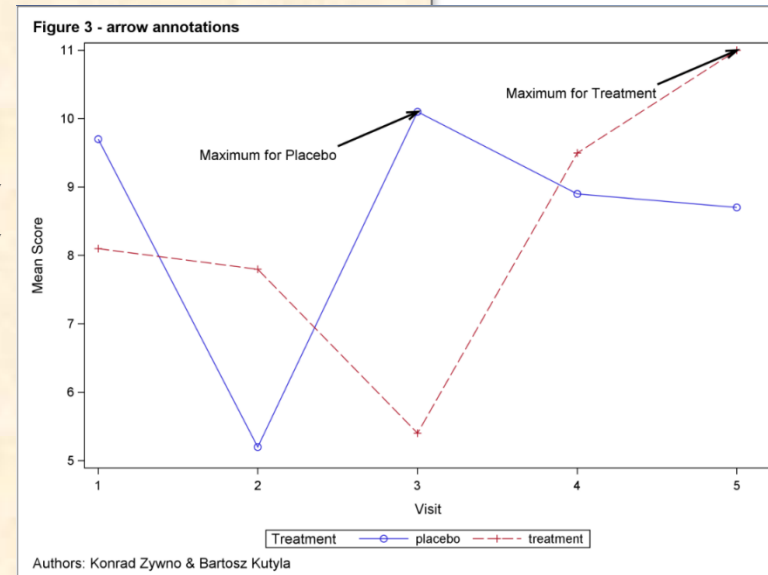
```
DATA anno;
```

```
... (TEXT FUNCTION) ...
```

```
%SGARROW (  
  X1 = &max_x_plac.,  
  Y1 = &max_y_plac.,  
  X2 = %sysevalf(&max_x_plac. - 0.5),  
  Y2 = %sysevalf(&max_y_plac. - 0.5),  
  DRAWSPACE = "DATAVALUE",  
  DIRECTION = "IN")
```

```
%SGARROW (  
  X1 = &max_x_trt.,  
  Y1 = &max_y_trt.,  
  X2 = %sysevalf(&max_x_trt. - 0.5),  
  Y2 = %sysevalf(&max_y_trt. - 0.5),  
  DRAWSPACE = "DATAVALUE",  
  DIRECTION = "IN")
```

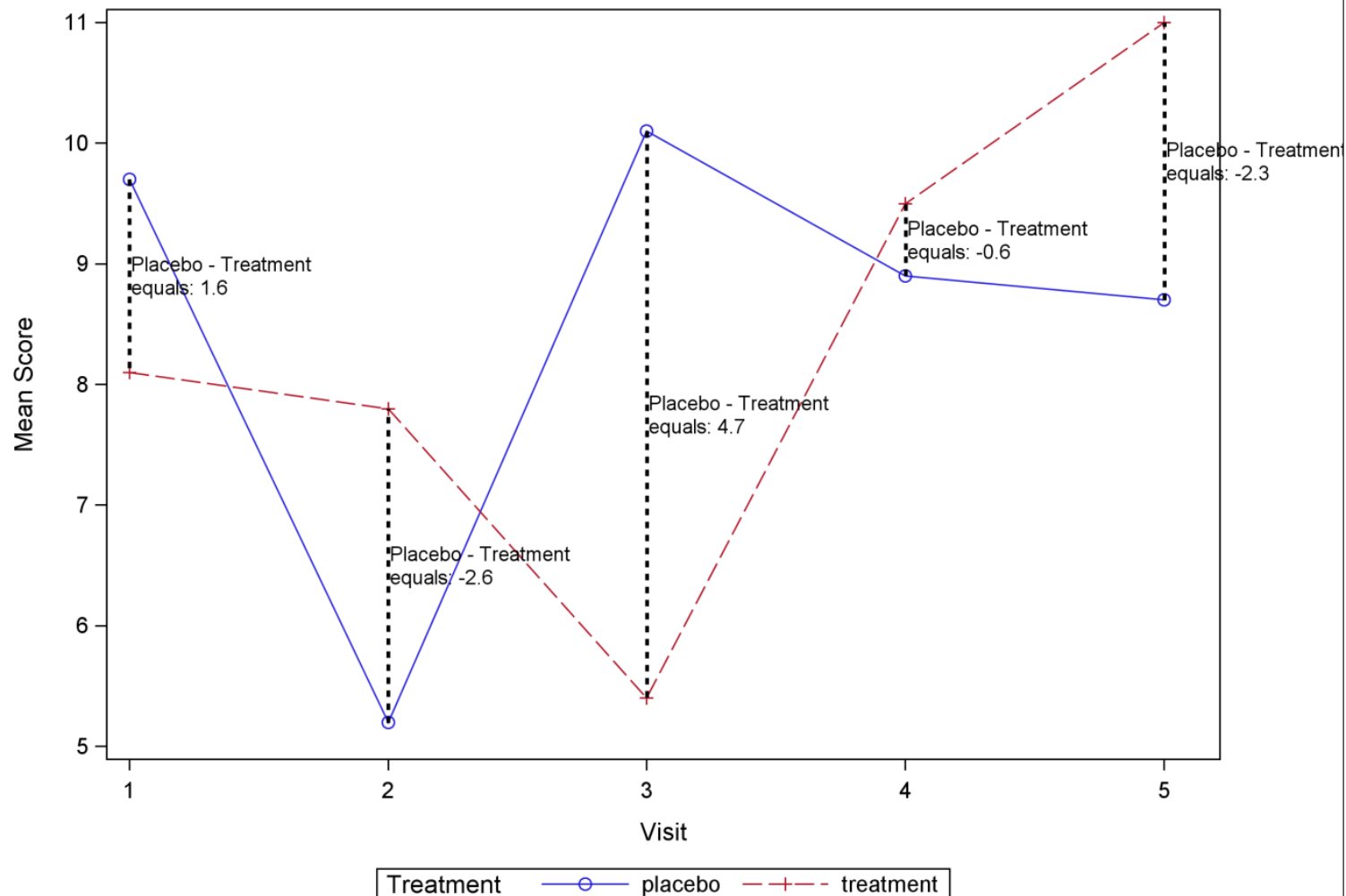
```
RUN;
```





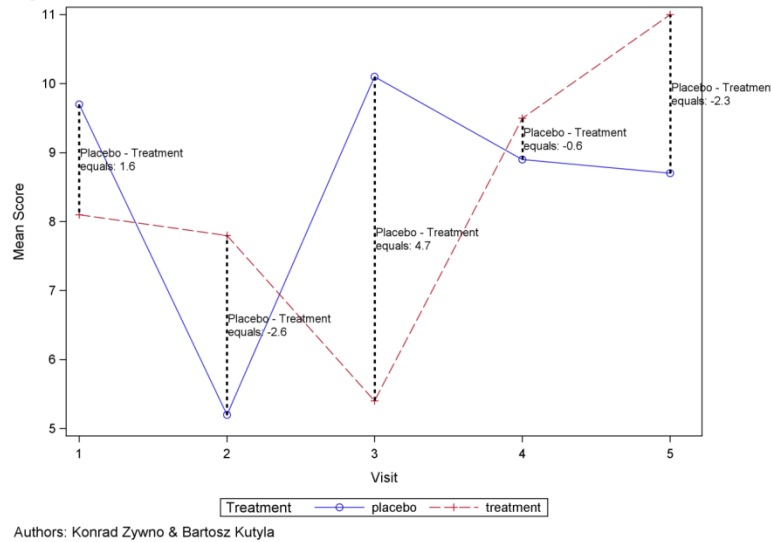
```
PROC TEMPLATE;  
  DEFINE STATGRAPH Tmpl;  
    BEGINGRAPH;  
      LAYOUT OVERLAY;  
  
  ... (DRAWTEXT) ...  
  
    DRAWARROW X1 = &max_x_plac. Y1 = &max_y_plac.  
              X2 = %sysevalf(&max_x_plac. - 0.5) Y2 = %sysevalf(&max_y_plac. - 0.5)  
              /ARROWHEADDIRECTION = IN DRAWSPACE = DATAVALUE;  
  
    DRAWARROW X1 = &max_x_trt. Y1 = &max_y_trt.  
              X2 = %sysevalf(&max_x_trt. - 0.5) Y2 = %sysevalf(&max_y_trt. - 0.5)  
              /ARROWHEADDIRECTION = IN DRAWSPACE = DATAVALUE;  
  
  ENDLAYOUT;  
ENDGRAPH;  
END;  
RUN;
```

Figure 4 - line annotations



Authors: Konrad Zywno & Bartosz Kutyla

Figure 4 - line annotations



FUNCTION	LABEL	Y1	X1	ANCHOR	DRAWSPACE	WIDTH	TEXTSIZE	Y2	X2	LINEPATTERN	LINECOLOR
text	Placebo - Treatment equals: 1.6	8.9	1	left	DATAVALUE	20	8	.	.		
text	Placebo - Treatment equals: -2.6	6.5	2	left	DATAVALUE	20	8	.	.		
text	Placebo - Treatment equals: 4.7	7.75	3	left	DATAVALUE	20	8	.	.		
text	Placebo - Treatment equals: -0.6	9.2	4	left	DATAVALUE	20	8	.	.		
text	Placebo - Treatment equals: -2.3	9.85	5	left	DATAVALUE	20	8	.	.		
line		9.7	1		DATAVALUE	.	.	8.1	1	2	black
line		5.2	2		DATAVALUE	.	.	7.8	2	2	black
line		10.1	3		DATAVALUE	.	.	5.4	3	2	black
line		8.9	4		DATAVALUE	.	.	9.5	4	2	black
line		8.7	5		DATAVALUE	.	.	11	5	2	black

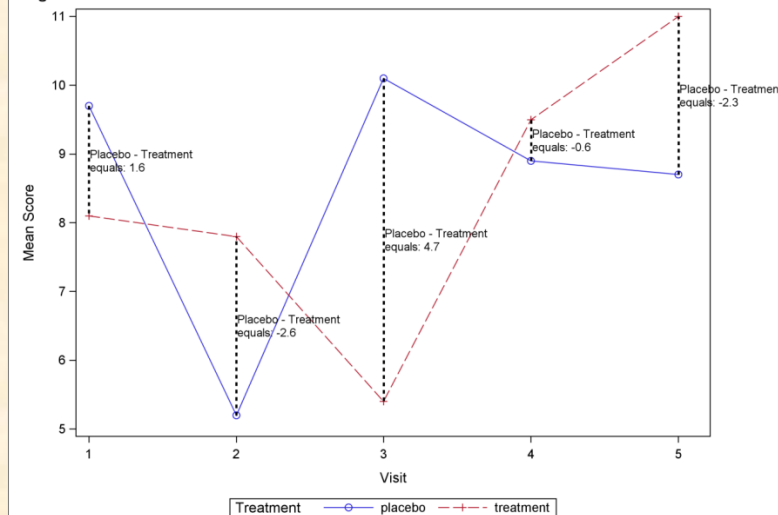
```
PROC TEMPLATE;
  DEFINE STATGRAPH Tmpl;
    BEGINGRAPH;
      LAYOUT OVERLAY / ... PAD=(RIGHT=10%);
    ...

    ENDLAYOUT;
  ENDGRAPH;
END;
RUN;
```

```
DATA anno;
  SET input(WHERE=(treatment = 0) RENAME=(mean_score = mean_score_plac));
  SET input(WHERE=(treatment_trt = 1) KEEP=mean_score treatment
  RENAME=(mean_score = mean_score_trt treatment=treatment_trt));
RUN;

DATA anno;
  SET anno(IN=_a) anno(IN=_b);
  IF _a THEN DO;
    ... (TEXT FUNCTION) ...
  END;
  IF _b THEN DO;
    %SGLINE(
      Y1 = mean_score_plac,
      Y2 = mean_score_trt,
      X1 = visit,
      X2 = visit,
      DRAWSPACE = "DATAVALUE",
      LINEPATTERN = "2", /*dash line*/
      LINECOLOR = "black")
  END;
RUN;
```

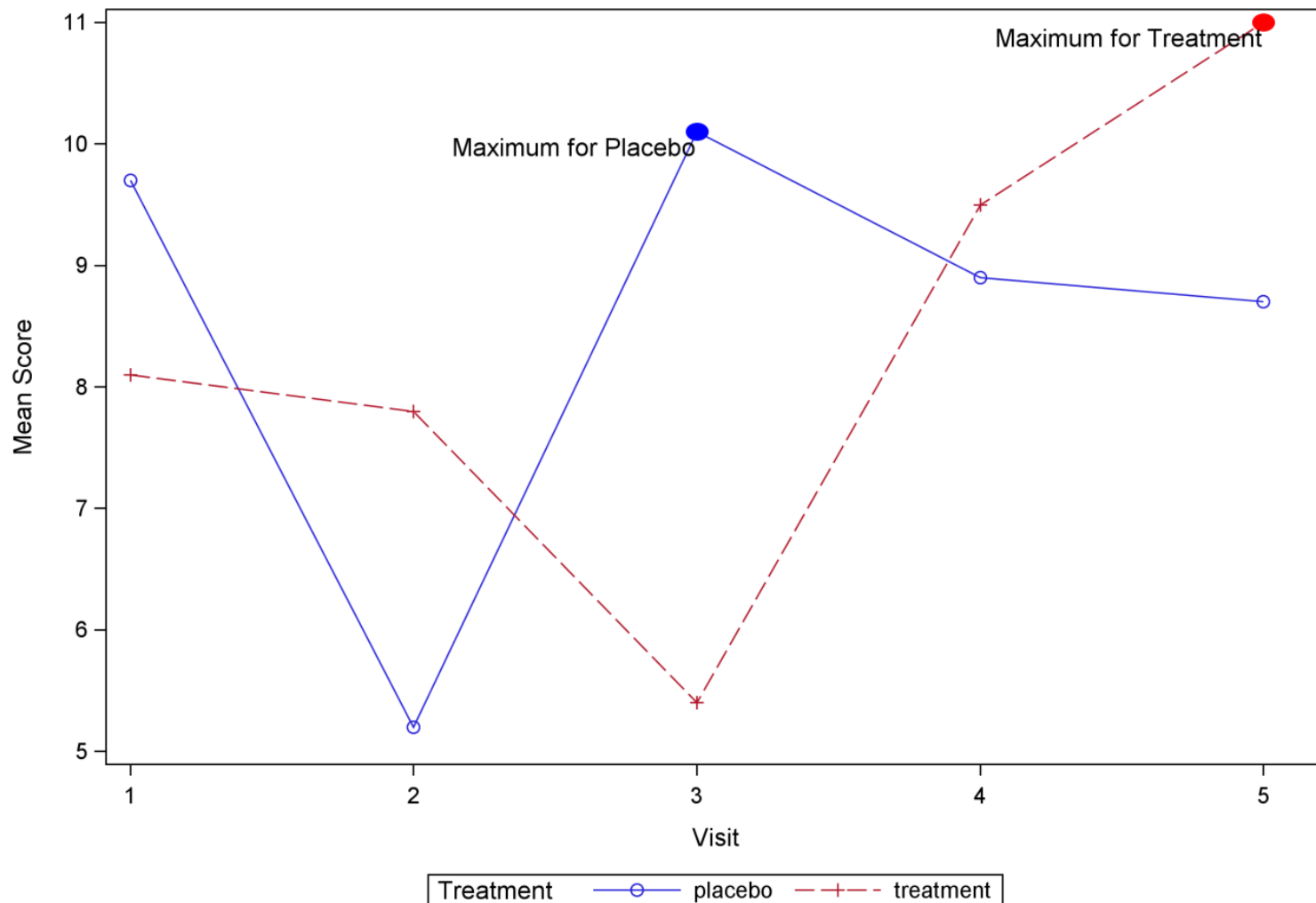
Figure 4 - line annotations



Authors: Konrad Zywno & Bartosz Kutyla

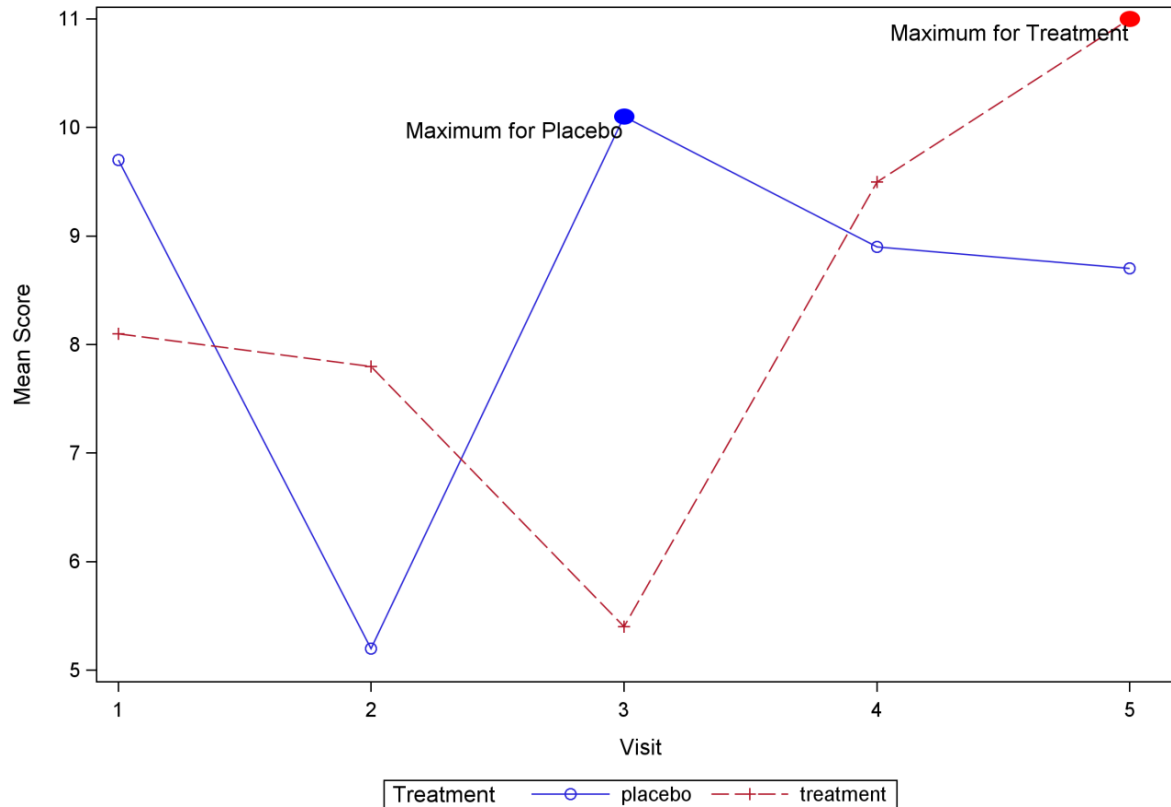
```
%MACRO _tmpl;  
PROC TEMPLATE;  
    DEFINE STATGRAPH Tmpl;  
        BEGINGRAPH;  
            LAYOUT OVERLAY;  
                %DO i = 1 %TO 5;  
                    DRAWLINE Y1 = &&mean_score_plac_&i.. Y2 = &&mean_score_trt_&i.. X1 = &i.  
                    X2 = &i. / DRAWSpace = DATAVALUE  
                    LINEATTRS =(PATTERN = "2" /*dash line*/ COLOR = "black");  
  
... (DRAWTEXT) ...  
  
                %END;  
  
            ENDLAYOUT;  
        ENDGRAPH;  
    END;  
RUN;  
%MEND _tmpl;  
%_tmpl;
```

Figure 5 - oval annotations



Authors: Konrad Zywno & Bartosz Kutyla

Figure 5 - oval annotations



Authors: Konrad Zywno & Bartosz Kutyla

FUNCTION	LABEL	X1	Y1	WIDTH	HEIGHT	DRAWSPACE	FILLCOLOR	DISPLAY	ANCHOR	WIDTHUNIT
oval		3	10.1	2	2.5	DATAVALUE	BLUE	FILLED		
oval		5	11	2	2.5	DATAVALUE	RED	FILLED		
text	Maximum for Placebo	3	10.1	2	2.5	DATAVALUE	RED	FILLED	TOPRIGHT	DATA
text	Maximum for Treatment	5	11	2	2.5	DATAVALUE	RED	FILLED	TOPRIGHT	DATA

```
DATA anno;
```

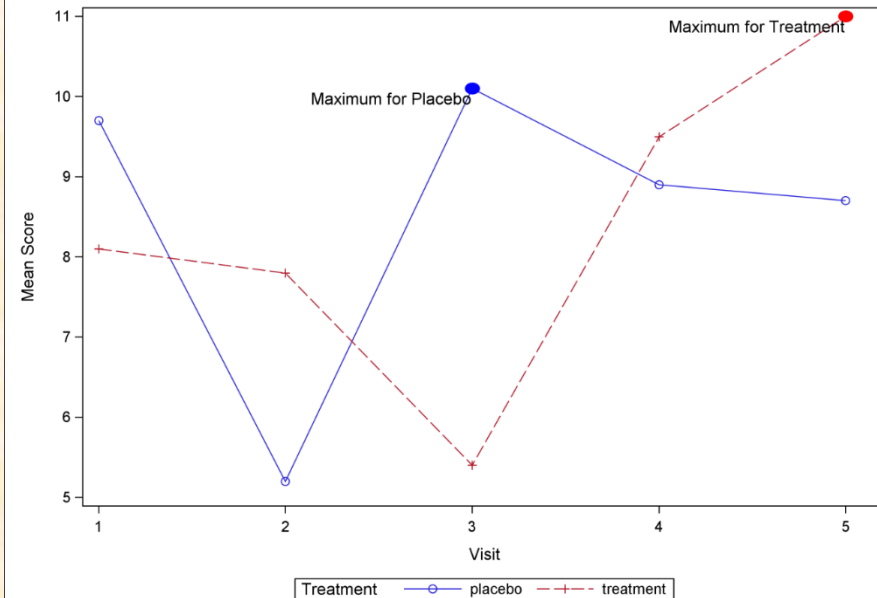
```
... (TEXT FUNCTION) ...
```

```
%SGOVAL (
    X1 = &max_x_plac.,
    Y1 = &max_y_plac.,
    WIDTH=2,
    HEIGHT=2.5,
    DRAWSPACE = "DATAVALUE",
    FILLCOLOR="BLUE",
    DISPLAY = "FILLED")
```

```
%SGOVAL (
    X1 = &max_x_trt.,
    Y1 = &max_y_trt.,
    WIDTH=2,
    HEIGHT=2.5,
    DRAWSPACE = "DATAVALUE",
    FILLCOLOR="RED",
    DISPLAY = "FILLED")
```

```
RUN;
```

Figure 5 - oval annotations



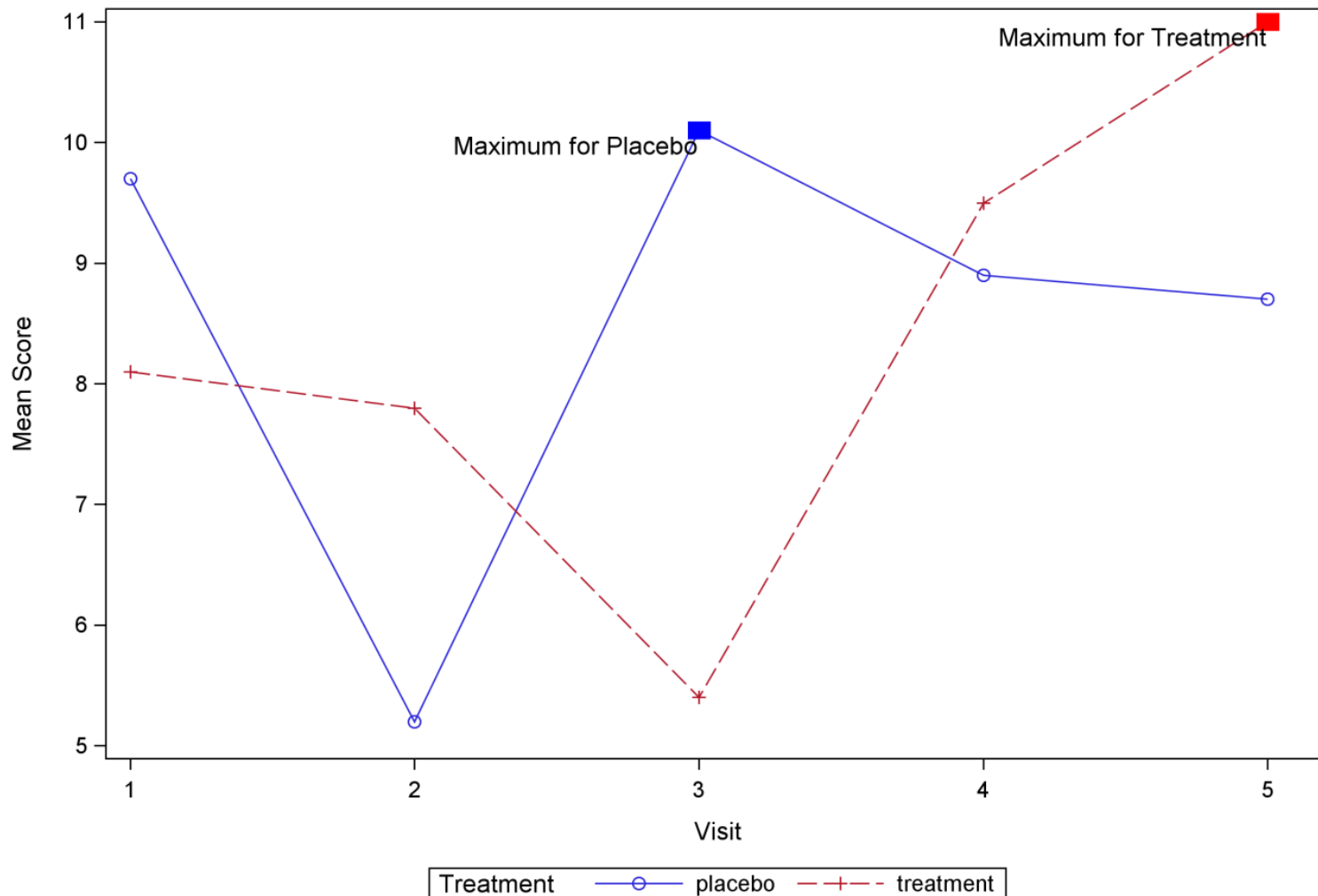
Authors: Konrad Zywno & Bartosz Kutyla

```
PROC TEMPLATE;  
  DEFINE STATGRAPH Tmpl1;  
    BEGINGRAPH;  
      LAYOUT OVERLAY;  
  
    ... (DRAWTEXT) ...  
  
      DRAWOVAL x= &max_x_plac. y=&max_y_plac. width=2 height=2.5 /  
        DRAWSPACE=DATAVALUE  
        FILLATTRS=(COLOR=BLUE)  
        DISPLAY = (FILL);  
  
      DRAWOVAL x= &max_x_trt. y=&max_y_trt. width=2 height=2.5 /  
        DRAWSPACE=DATAVALUE  
        FILLATTRS=(COLOR=RED)  
        DISPLAY = (FILL);  
  
    ENDLAYOUT;  
  ENDGRAPH;  
END;  
RUN;
```



RECTANGLE

Figure 6 - rectangle annotations

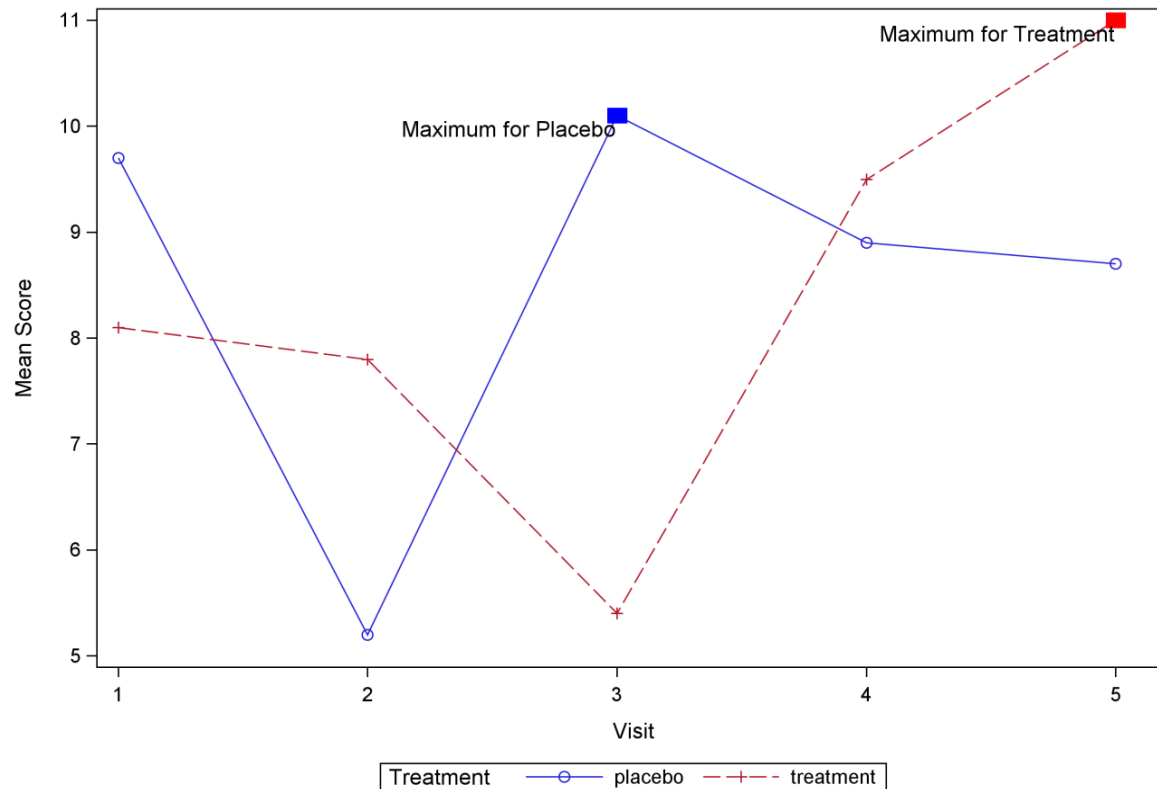


Authors: Konrad Zywno & Bartosz Kutyla



RECTANGLE

Figure 6 - rectangle annotations



Authors: Konrad Zywno & Bartosz Kutyla

FUNCTION	LABEL	X1	Y1	WIDTH	HEIGHT	DRAWSPACE	FILLCOLOR	DISPLAY	ANCHOR	WIDTHUNIT
rectangle		3	10.1	2	2.5	DATAVALUE	BLUE	FILLED		
rectangle		5	11	2	2.5	DATAVALUE	RED	FILLED		
text	Maximum for Placebo	3	10.1	2	2.5	DATAVALUE	RED	FILLED	TOPRIGHT	DATA
text	Maximum for Treatment	5	11	2	2.5	DATAVALUE	RED	FILLED	TOPRIGHT	DATA



RECTANGLE

```
DATA anno;
```

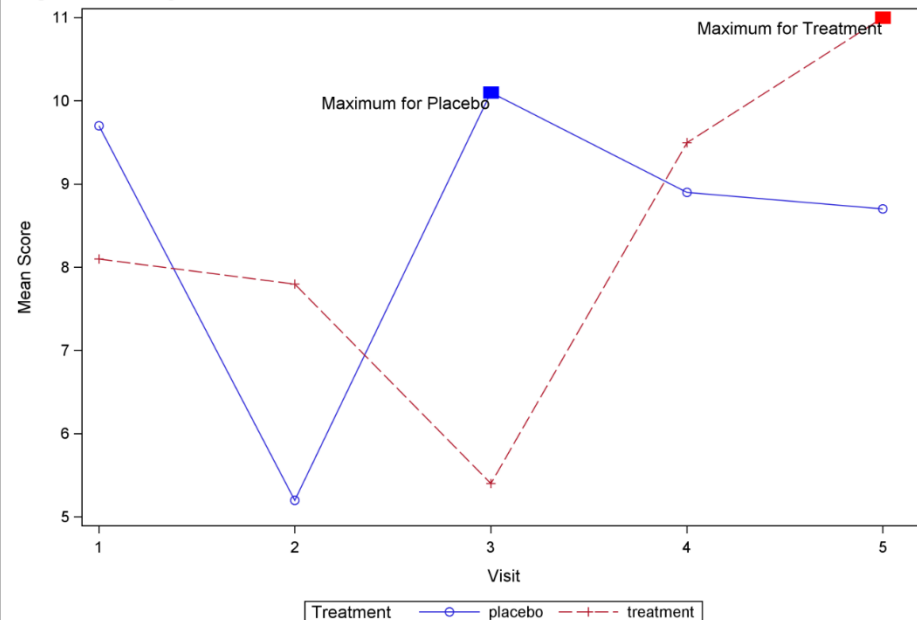
```
... (TEXT FUNCTION) ...
```

```
%SGRECTANGLE(  
    X1 = &max_x_plac.,  
    Y1 = &max_y_plac.,  
    WIDTH=2,  
    HEIGHT=2.5,  
    DRAWSPACE = "DATAVALUE",  
    FILLCOLOR="BLUE",  
    DISPLAY = "FILLED")
```

```
%SGRECTANGLE(  
    X1 = &max_x_trt.,  
    Y1 = &max_y_trt.,  
    WIDTH=2,  
    HEIGHT=2.5,  
    DRAWSPACE = "DATAVALUE",  
    FILLCOLOR="RED",  
    DISPLAY = "FILLED")
```

```
RUN;
```

Figure 6 - rectangle annotations



Authors: Konrad Zywno & Bartosz Kutyla



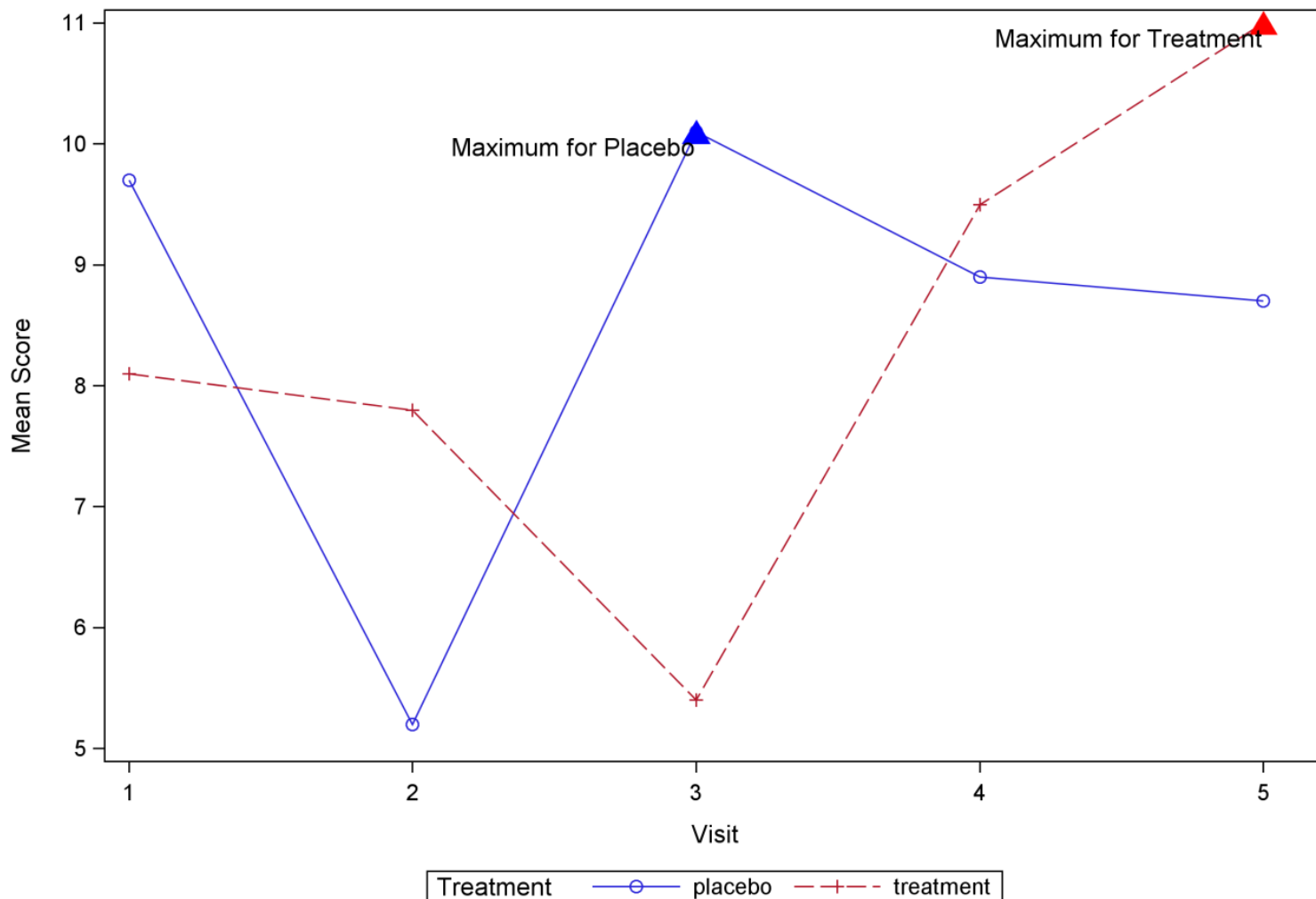
RECTANGLE

```
PROC TEMPLATE;  
  DEFINE STATGRAPH Tmpl;  
    BEINGRAPH;  
      LAYOUT OVERLAY;  
  
    ... (DRAWTEXT) ...  
  
      DRAWRECTANGLE x= &max_x_plac. y=&max_y_plac. width=2 height=2.5 /  
        DRAWSpace=DATAVALUE  
        FILLATTRS=(COLOR=BLUE)  
        DISPLAY = (FILL);  
  
      DRAWRECTANGLE x= &max_x_trt. y=&max_y_trt. width=2 height=2.5 /  
        DRAWSpace=DATAVALUE  
        FILLATTRS=(COLOR=RED)  
        DISPLAY = (FILL);  
  
    ENDLAYOUT;  
  ENDGRAPH;  
END;  
RUN;
```



POLYGON

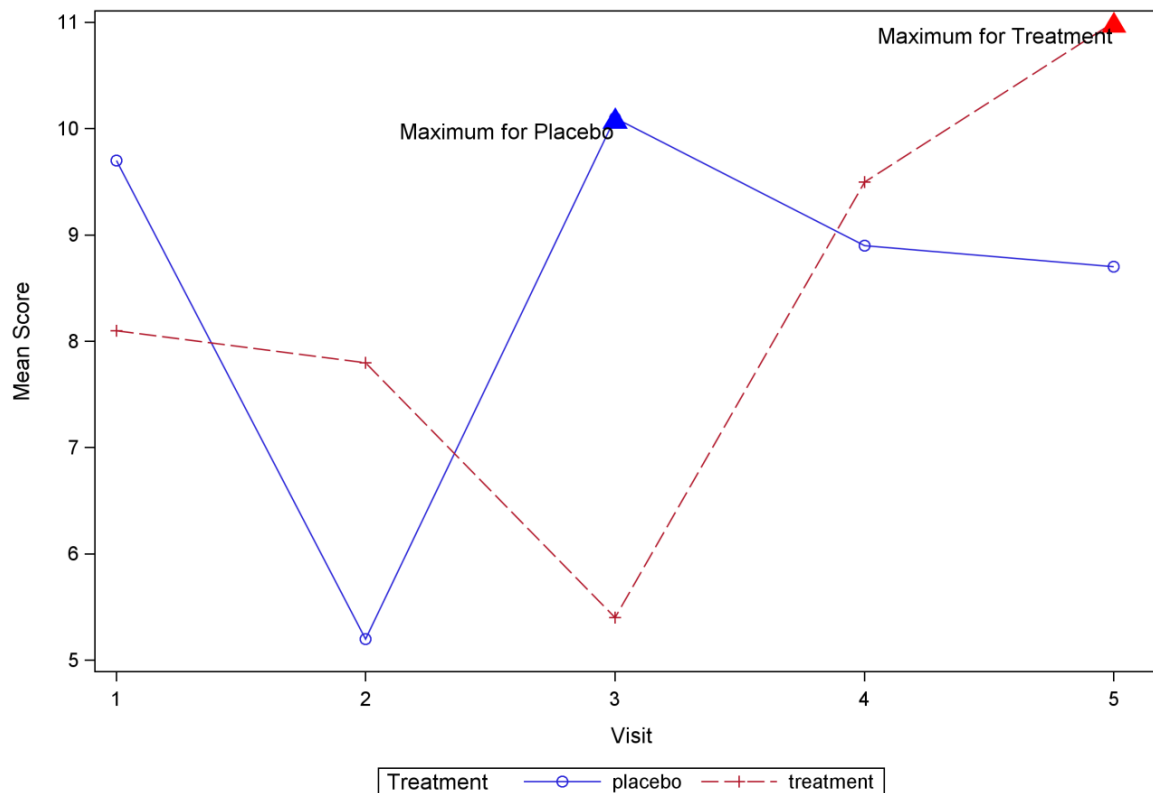
Figure 7 - polygon annotations



Authors: Konrad Zywno & Bartosz Kutyla



Figure 7 - polygon annotations



Authors: Konrad Zywno & Bartosz Kutyla

FUNCTION	LABEL	X1	Y1	DRAWSPACE	FILLCOLOR	DISPLAY	ANCHOR	WIDTHUNIT
polygon		2.95	10	DATAVALUE	BLUE	FILLED		
polycont		3	10.2	DATAVALUE	BLUE	FILLED		
polycont		3.05	10	DATAVALUE	BLUE	FILLED		
polygon		4.95	10.9	DATAVALUE	RED	FILLED		
polycont		5	11.1	DATAVALUE	RED	FILLED		
polycont		5.05	10.9	DATAVALUE	RED	FILLED		
text	Maximum for Placebo	3	10.1	DATAVALUE	RED	FILLED	TOPRIGHT	DATA
text	Maximum for Treatment	5	11	DATAVALUE	RED	FILLED	TOPRIGHT	DATA

```
DATA anno;
```

```
... (TEXT FUNCTION) ...
```

```
%SGPOLYGON (
  X1 = %sysevalf(&max_x_plac. - 0.05),
  Y1 = %sysevalf(&max_y_plac. - 0.1),
  DRAWSPACE = "DATAVALUE",
  FILLCOLOR="BLUE",
  DISPLAY = "FILLED")
```

```
%SGPOLYCONT (
  X1 = %sysevalf(&max_x_plac.),
  Y1 = %sysevalf(&max_y_plac. + 0.1))
```

```
%SGPOLYCONT (
  X1 = %sysevalf(&max_x_plac. + 0.05),
  Y1 = %sysevalf(&max_y_plac. - 0.1))
```

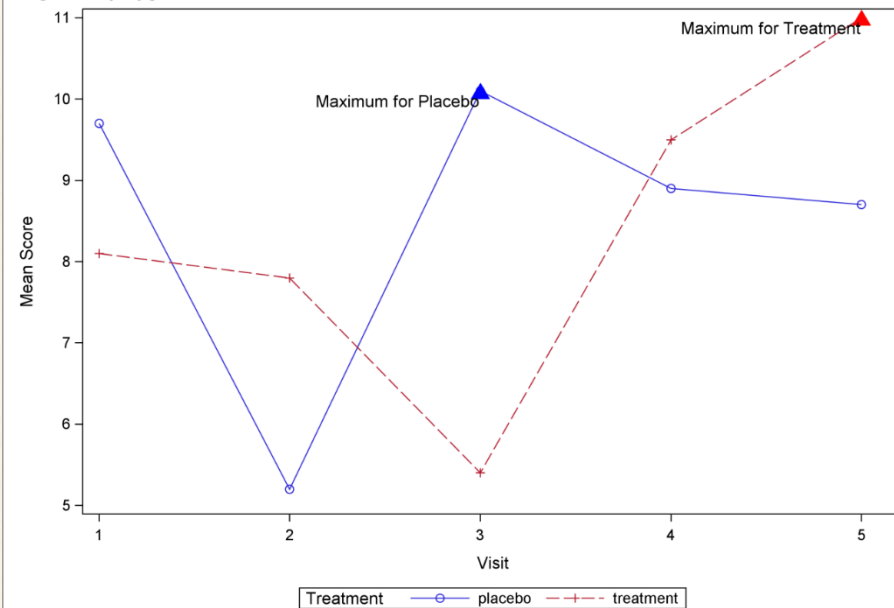
```
%SGPOLYGON (
  X1 = %sysevalf(&max_x_trt. - 0.05),
  Y1 = %sysevalf(&max_y_trt. - 0.1),
  DRAWSPACE = "DATAVALUE",
  FILLCOLOR="RED",
  DISPLAY = "FILLED")
```

```
%SGPOLYCONT (
  X1 = %sysevalf(&max_x_trt.),
  Y1 = %sysevalf(&max_y_trt. + 0.1))
```

```
%SGPOLYCONT (
  X1 = %sysevalf(&max_x_trt. + 0.05),
  Y1 = %sysevalf(&max_y_trt. - 0.1))
```

```
RUN;
```

Figure 7 - polygon annotations



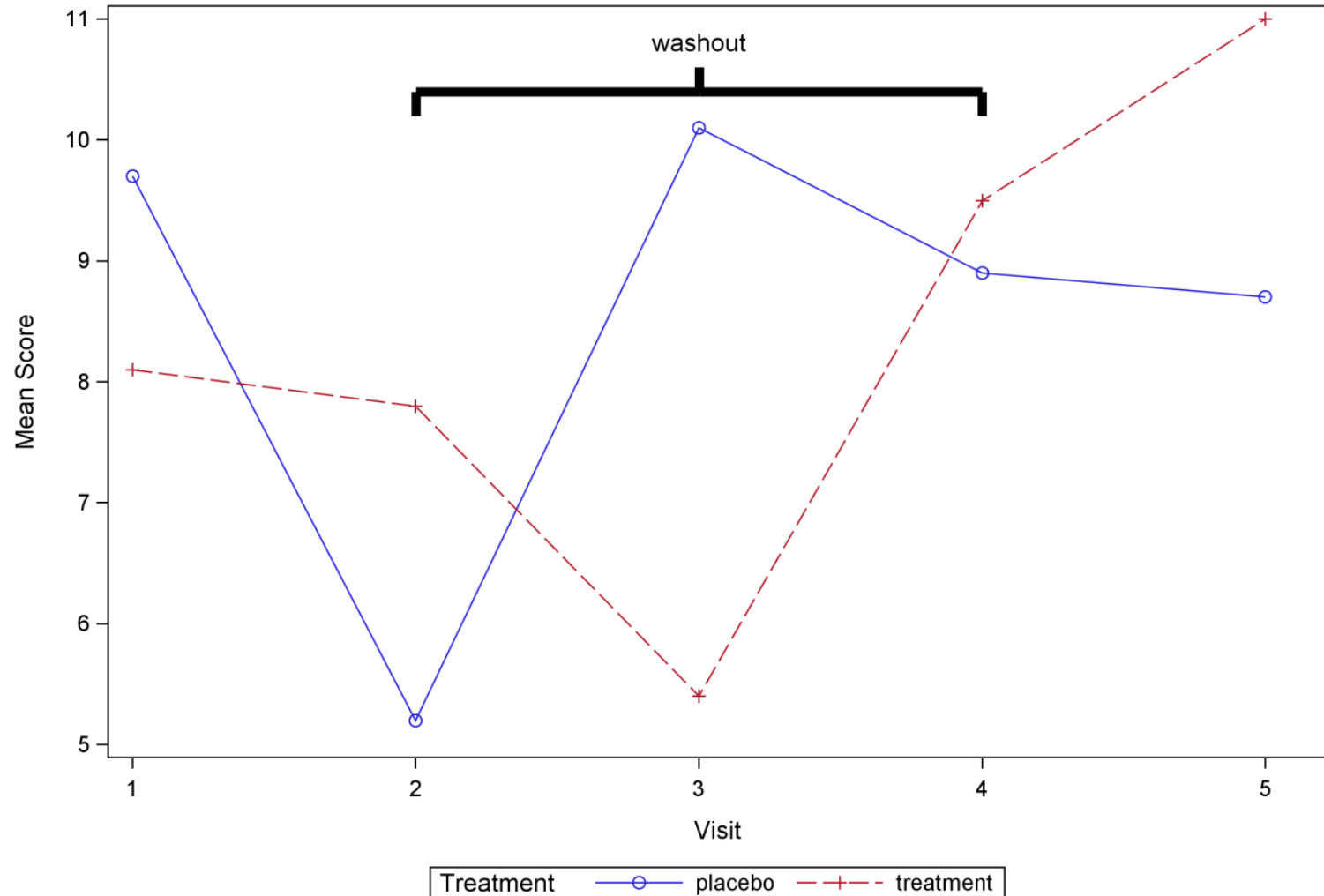
Authors: Konrad Zywno & Bartosz Kutyla



```
PROC TEMPLATE;  
  DEFINE STATGRAPH Tmpl;  
    BEGINGRAPH;  
      LAYOUT OVERLAY;  
  
    ... (DRAWTEXT) ...  
  
    BEGINPOLYGON x = %sysevalf(&max_x_plac. - 0.05) y = %sysevalf(&max_y_plac. - 0.1) /  
      DRAWSPACE=DATAVALUE  
      FILLATTRS=(COLOR=BLUE)  
      DISPLAY = (FILL);  
      DRAW x = %sysevalf(&max_x_plac.) y = %sysevalf(&max_y_plac. + 0.1);  
      DRAW x = %sysevalf(&max_x_plac. + 0.05) y = %sysevalf(&max_y_plac. - 0.1);  
    ENDPOLYGON;  
  
    BEGINPOLYGON x = %sysevalf(&max_x_trt. - 0.05) y = %sysevalf(&max_y_trt. - 0.1) /  
      DRAWSPACE=DATAVALUE  
      FILLATTRS=(COLOR=RED)  
      DISPLAY = (FILL);  
      DRAW x = %sysevalf(&max_x_trt.) y = %sysevalf(&max_y_trt. + 0.1);  
      DRAW x = %sysevalf(&max_x_trt. + 0.05) y = %sysevalf(&max_y_trt. - 0.1);  
    ENDPOLYGON;  
    ENDLAYOUT;  
  ENDGRAPH;  
END;  
RUN;
```



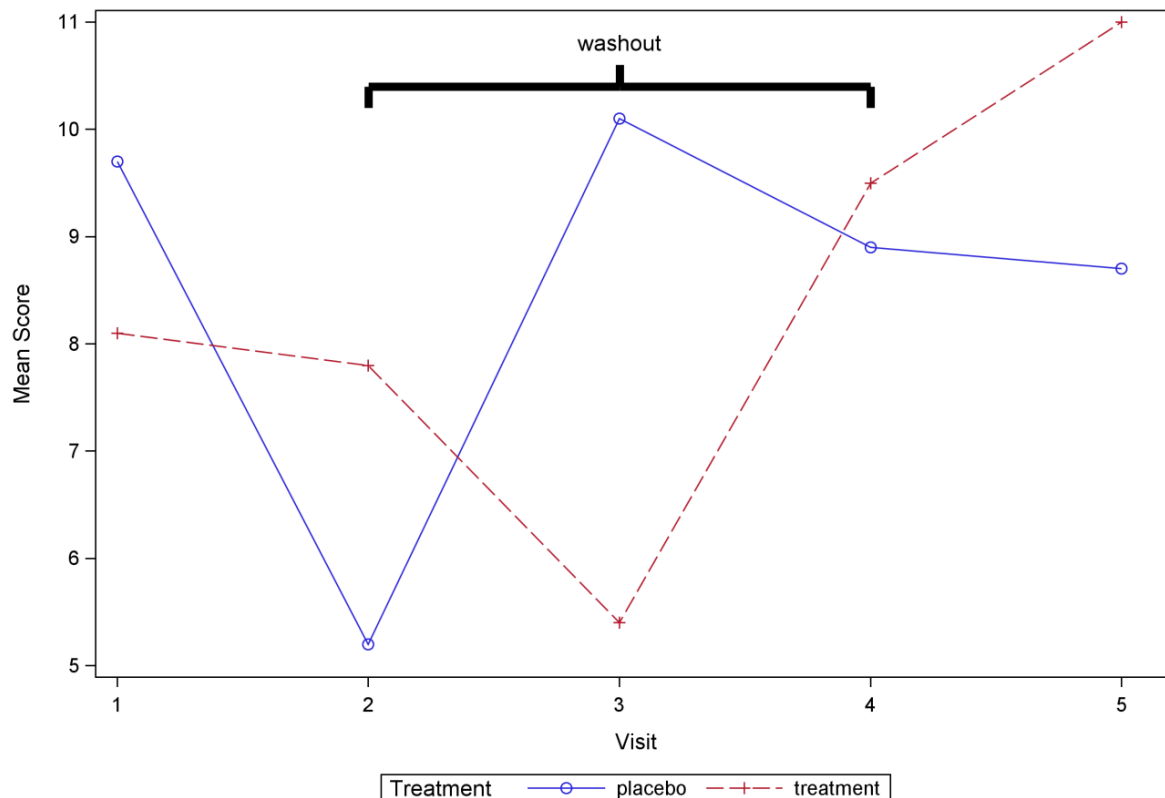
Figure 8 - polyline annotations



Authors: Konrad Zywno & Bartosz Kutyla



Figure 8 - polyline annotations



Authors: Konrad Zywno & Bartosz Kutyla

FUNCTION	LABEL	X1	Y1	DRAWSPACE	LINETHICKNESS	ANCHOR	WIDTHUNIT
polyline		2	10.2	DATAVALUE	5		
polycont		2	10.4	DATAVALUE	5		
polycont		3	10.4	DATAVALUE	5		
polycont		3	10.6	DATAVALUE	5		
polycont		3	10.4	DATAVALUE	5		
polycont		4	10.4	DATAVALUE	5		
polycont		4	10.2	DATAVALUE	5		
text	washout	3	10.8	DATAVALUE	5	CENTER	DATA

```
DATA anno;

... (TEXT FUNCTION) ...

%SGPOLYLINE (
  X1 = 2,
  Y1 = %sysevalf(&max_mean_score_washout. + 0.1),
  DRAWSPACE = "DATAVALUE",
  LINETHICKNESS = 5)

%SGPOLYCONT (
  X1 = 2,
  Y1 = %sysevalf(&max_mean_score_washout. + 0.3))

%SGPOLYCONT (
  X1 = 3,
  Y1 = %sysevalf(&max_mean_score_washout. + 0.3))

%SGPOLYCONT (
  X1 = 3,
  Y1 = %sysevalf(&max_mean_score_washout. + 0.5))

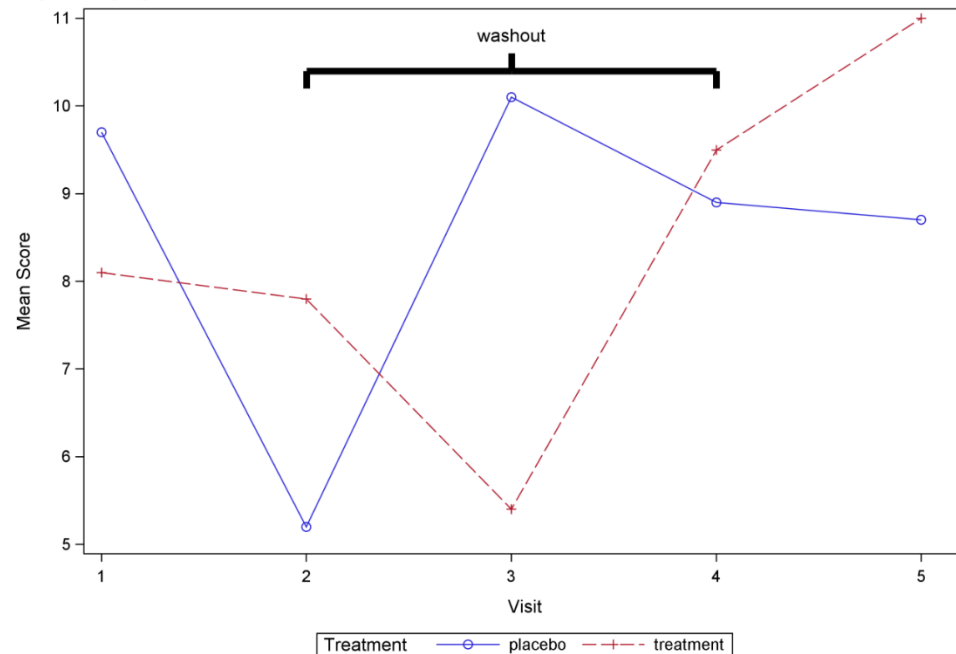
%SGPOLYCONT (
  X1 = 3,
  Y1 = %sysevalf(&max_mean_score_washout. + 0.3))

%SGPOLYCONT (
  X1 = 4,
  Y1 = %sysevalf(&max_mean_score_washout. + 0.3))

%SGPOLYCONT (
  X1 = 4;
  Y1 = %sysevalf(&max_mean_score_washout. + 0.1))

RUN;
```

Figure 8 - polyline annotations



Authors: Konrad Zywno & Bartosz Kutyla



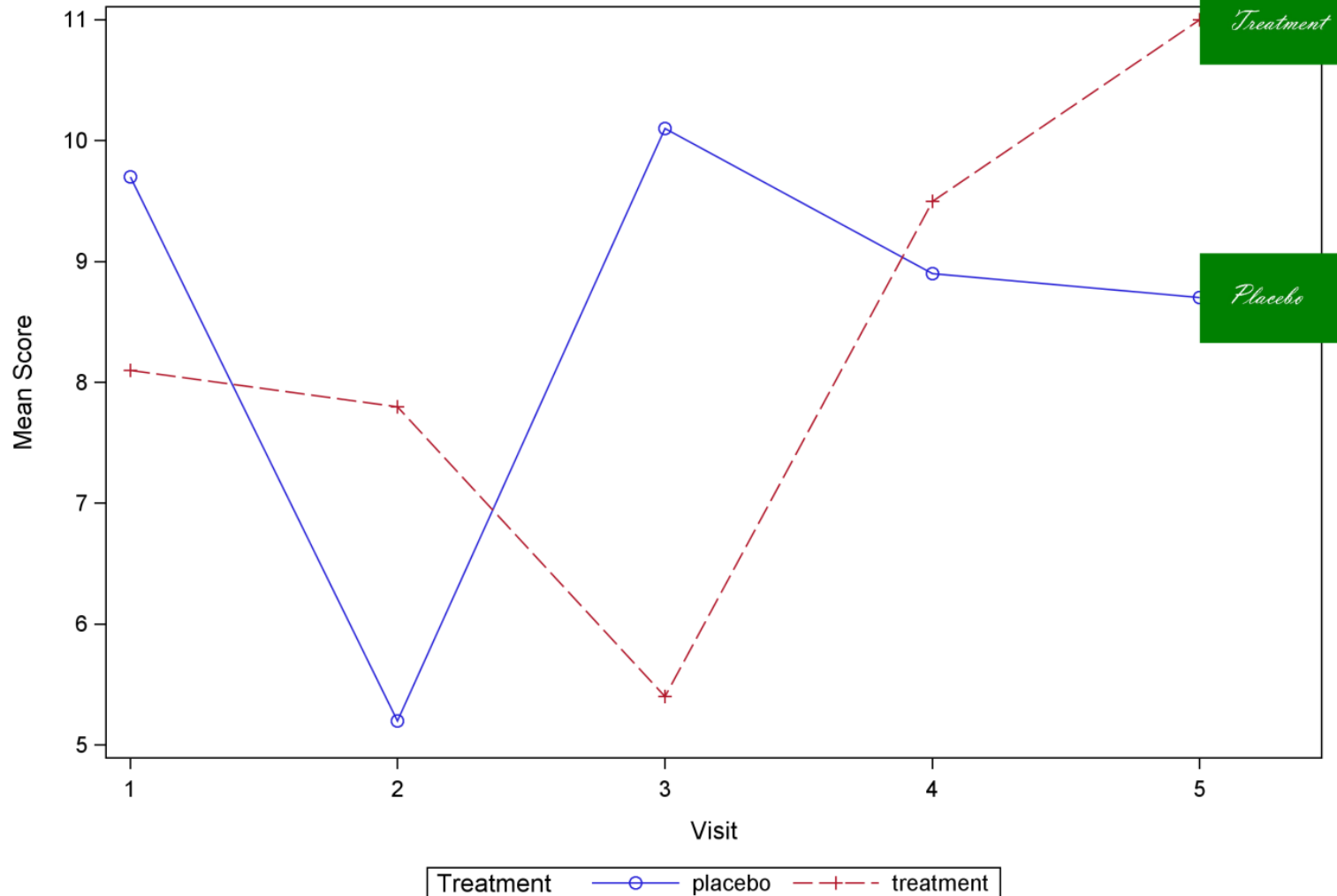
POLYLINE

```
PROC TEMPLATE;  
  DEFINE STATGRAPH Tmpl;  
    BEGINGRAPH;  
      LAYOUT OVERLAY;  
  
    ... (DRAWTEXT) ...  
  
    BEGINPOLYLINE x = 2 y = %sysevalf(&max_mean_score_washout. + 0.1) /  
      DRAWSPACE=DATAVALUE  
      LINEATTRS=(THICKNESS=5) ;  
      DRAW x = 2 y = %sysevalf(&max_mean_score_washout. + 0.3) ;  
      DRAW x = 3 y = %sysevalf(&max_mean_score_washout. + 0.3) ;  
      DRAW x = 3 y = %sysevalf(&max_mean_score_washout. + 0.5) ;  
      DRAW x = 3 y = %sysevalf(&max_mean_score_washout. + 0.3) ;  
      DRAW x = 4 y = %sysevalf(&max_mean_score_washout. + 0.3) ;  
      DRAW x = 4 y = %sysevalf(&max_mean_score_washout. + 0.1) ;  
  
    ENDPOLYLINE ;  
    ENDLAYOUT ;  
  ENDGRAPH ;  
END ;  
RUN ;
```



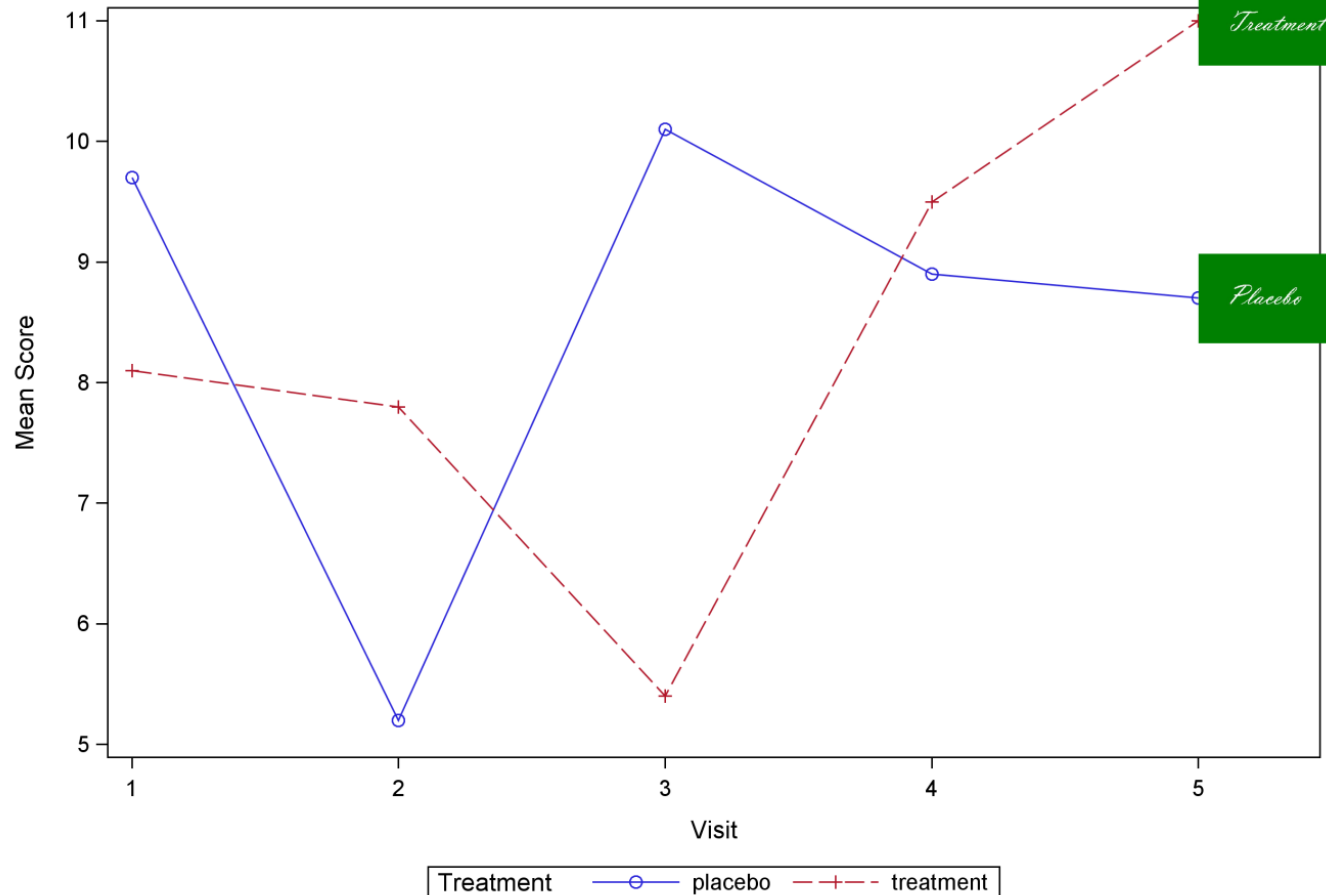
IMAGE

Figure 9 - image annotations



Authors: Konrad Zywno & Bartosz Kutyla

Figure 9 - image annotations



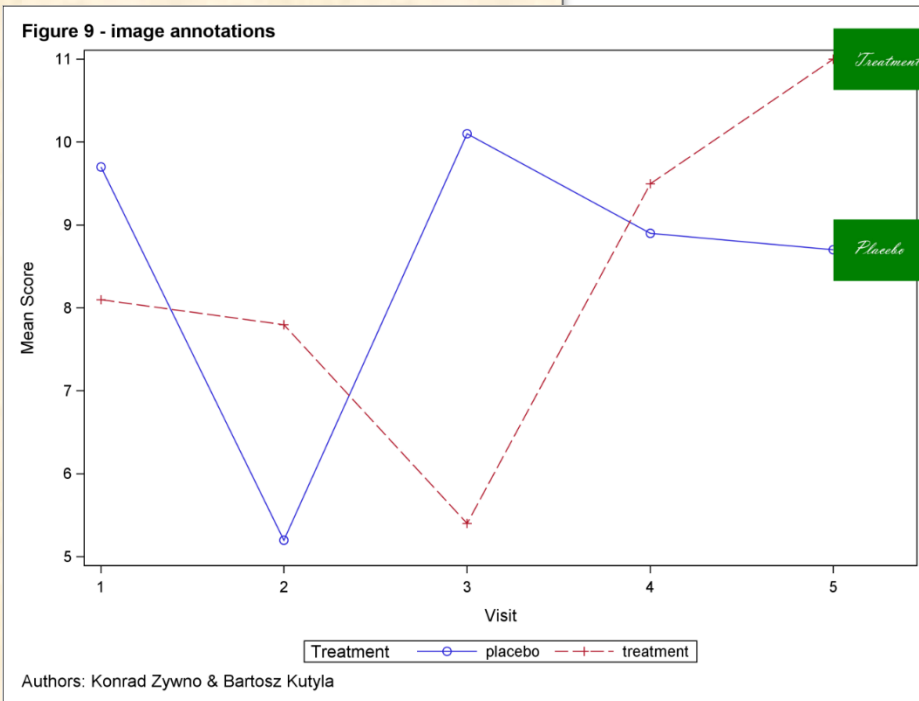
Authors: Konrad Zywno & Bartosz Kutyla

IMAGE	FUNCTION	X1	Y1	Y1SPACE	X1SPACE	WIDTH	WIDTH UNIT
C:\placebo.jpg	image	107	8.7	DATAVALUE	DATAPERCENT	14	pixel
C:\treatment.jpg	image	107	8.7	DATAVALUE	DATAPERCENT	14	pixel

```
DATA anno;
  %SGIMAGE (
    IMAGE = "C:\placebo.jpg",
    X1 = 107,
    Y1 = &mean_score_plac_5.,
    Y1SPACE = "DATAVALUE",
    X1SPACE = "DATAPERCENT",
    WIDTH = 14,
    WIDTHUNIT = "pixel")

  %SGIMAGE (
    IMAGE = "C:\treatment.jpg",
    X1 = 107,
    Y1 = &mean_score_trt_5.,
    Y1SPACE = "DATAVALUE",
    X1SPACE = "DATAPERCENT",
    WIDTH = 14,
    WIDTHUNIT = "pixel")

RUN;
```



```
PROC TEMPLATE;  
  DEFINE STATGRAPH Tmpl;  
    BEGINGRAPH;  
      LAYOUT OVERLAY;  
        DRAWIMAGE "C:\placebo.jpg" /  
          X = 107  
          Y = &mean_score_plac_5.  
          YSPACE = DATAVALUE  
          XSPACE = DATAPERCENT  
          WIDTH = 14  
          WIDTHUNIT = pixel;  
  
        DRAWIMAGE "C:\treatment.jpg" /  
          X = 107  
          Y = &mean_score_trt_5.  
          YSPACE = DATAVALUE  
          XSPACE = DATAPERCENT  
          WIDTH = 14  
          WIDTHUNIT = pixel;  
  
      ENDLAYOUT;  
    ENDGRAPH;  
  END;  
RUN;
```

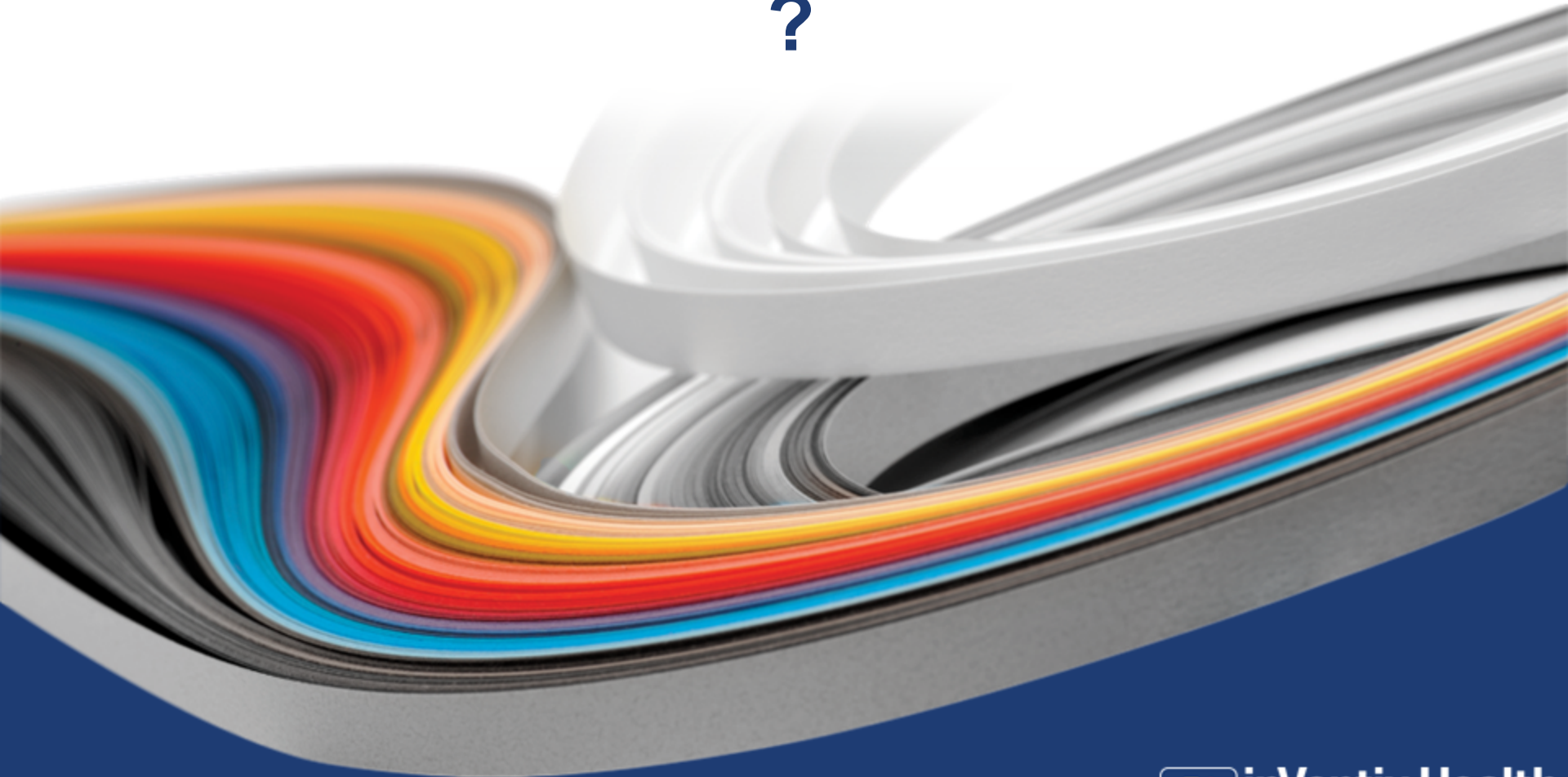


Conclusion

- Difficult to enhance your graphic just by using proc template or the SG procedures
- We may not want or be able to modify the template, so we cannot use the draw statements introduced in SAS 9.3 to add graphics elements
- The annotation facility provides an easy way to add graphics elements to our figures which are not available using the SG procedures.
- Furthermore, the SG annotation macros introduced with Maintenance One of SAS 9.4 make it very easy to create an annotation dataset.



Questions ?

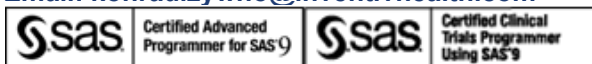




Your comments and questions are valued and encouraged.

Contact the author at:

Konrad Zywno, M.Sc.
inVentiv Health Clinical
Joachimstaler Str. 10-12
10719 Berlin Germany
Email: konrad.zywno@inventivhealth.com



Or co-author at:

Bartosz Kutyla
SAS Institute
ul. Gdańska 27/31
01-633 Warszawa Poland
Email: bartosz.kutyla@sas.com

