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## Opportunités d'apprentissage, styles de réponse et performance en culture mathématique : analyse des données de PISA 2012

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Faculté de Psychologie, Logopédie et Sciences de l'Éducation

# **Opportunités d'apprentissage, styles de réponse et performance en culture mathématique : analyse des données de PISA 2012**

Mémoire présenté en vue de l'obtention du grade de Master en Sciences  
de l'Éducation, à finalité spécialisée en Enseignement

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## **ANNEXES**

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## Annexe A : Illustration de la procédure de sélection des écoles avec pas d'échantillonnage.

### Box 4.1 Illustration of probability proportional to size (PPS) sampling

To illustrate these steps, suppose that in an explicit stratum in a participant country, the PISA-eligible student population is 105 000, then:

- the total measure of size,  $S$ , for all schools is 105 000;
- the number of schools,  $D$ , to be sampled is 150;
- calculating the sampling interval,  $I$ ,  $105\ 000/150 = 700$ ;
- generate a random number,  $RN$ , 0.3230;
- the first selection number is  $700 \times 0.3230 = 226$ . This first selection number is used to identify the first sampled school in the specified explicit stratum;
- the second selection number is  $226 + 700 = 926$ . The second selection number was used to identify the second sampled school; and
- the third selection number is  $926 + 700 = 1\ 626$ . The third selection number was used to identify the third sampled school, and so on until the end of the school list is reached. This will result in a school sample size of 150 schools.

The table below also provides these example data. The school that contains the generated selection number within its cumulative enrolment is selected for participation.

Table 4.1 Examples of PPS sampling

School	MOS	Cumulative MOS ( $C_i$ )	Selection number	School selection
001	550	550	226	Selected
002	364	914		
003	60	974	926	Selected
004	93	1067		
005	88	1155		
006	200	1355		
007	750	2105	1626	Selected
008	72	2177		
009	107	2284		
010	342	2626	2326	Selected
011	144	2770		
...	...	...	...	...

Tiré de OCDÉ (2014, p. 75)

## Annexe B : Syntaxe SAS de la partie 3.1

```
Libname PISA12 "C:\Users\Fabian\Documents\ULg\Memoire\pressia\PISA12" ;
options notes nofmterr ;
run;
%let path_macro=C:\Users\Fabian\Documents\ULg\Memoire\Macro\;
%include "&path_macro.brr_macro.sas";
run;

data temp1 ;
  set Pisa12.students
    (rename=( w_fstuwt=w_fstr0    pv1math=math1    pv2math=math2    pv3math=math3
      pv4math=math4 pv5math=math5));
  if (cnt="BEL" and substr(stratum,5,1)="2") ;
run;

%BRR_PROCMEAN(INFILE =temp1,
REPLI_ROOT =w_fstr,
BYVAR =cnt,
VAR =famconc,
STAT =mean,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE =out0a);
run;

%BRR_PROCMEAN(INFILE =temp1,
REPLI_ROOT =w_fstr,
BYVAR =cnt,
VAR =famconc,
STAT =std,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE =out0b);
run;

data temp2 ;
  set temp1;
  if (missing(escs)=1) then delete;
  if iscedo=1 then qualifiant=0;
  if (iscedo in (2,3)) then qualifiant=1;
  if (st01q01 in (7,8,9)) then redouble=1;
  else if (st01q01 in (10,11,12)) then redouble=0;
  else delete;
run;
```

```

%BRR_PROCMEAN(INFILE =temp2,
REPLI_ROOT =w_fstr,
BYVAR =cnt,
VAR =escs,
STAT =q1,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE =out1);
run;

%BRR_PROCMEAN(INFILE =temp2,
REPLI_ROOT =w_fstr,
BYVAR =cnt,
VAR =escs,
STAT =q3,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE =out2);
run;

%BRR_PROCMEAN(INFILE =temp2,
REPLI_ROOT =w_fstr,
BYVAR =cnt,
VAR =escs,
STAT =mean,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE =out3);
run;

data temp3 ;
  set temp2;
  if (ESCS < -0.58) then quartile=1;
  if (ESCS >= -0.58 and ESCS < 0.12) then quartile=2;
  if (ESCS >= 0.12 and ESCS < 0.86) then quartile=3;
  if (ESCS >= 0.86) then quartile=4;
run;

proc freq data=temp3;
  table escs*quartile / list missing;
run;

```

```

%BRR_CORR(INFILE=temp3,
REPLI_ROOT=w_fstr,
BYVAR=cnt ,
VAR1=famconc,
VAR2=qualifiant,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE=out4);
run;

%BRR_CORR(INFILE=temp3,
REPLI_ROOT=w_fstr,
BYVAR=cnt ,
VAR1=famconc,
VAR2=redouble,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE=out5);
run;

%BRR_CORR(INFILE=temp3,
REPLI_ROOT=w_fstr,
BYVAR=cnt ,
VAR1=famconc,
VAR2=escs,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE=out6);
run;

data corr;
merge out4 (rename=(stat=corr_qualifiant sestat=se_corr_qualifiant))
      out5 (rename=(stat=corr_redouble sestat=se_corr_redouble))
      out6 (rename=(stat=corr_escs sestat=se_corr_escs));
by cnt;
run;

proc export
  data=corr
  outfile="C:\Users\Fabian\Documents\ULg\Memoire\corr_famconc.xlsx"
  dbms=xlsx
  replace;
run;

```

```

%BRR_PROCMEAN_DIF(INFILE =temp3,
REPLI_ROOT =w_fstr,
BYVAR =cnt,
VAR =famconc,
COMPARE =qualifiant,
CATEGORY =1 0,
STAT =mean,
OUTFILE =out7);
run;

%BRR_PROCMEAN_DIF(INFILE =temp3,
REPLI_ROOT =w_fstr,
BYVAR =cnt,
VAR =famconc,
COMPARE =redouble,
CATEGORY =1 0,
STAT =mean,
OUTFILE =out8);
run;

%BRR_PROCMEAN_DIF(INFILE =temp3,
REPLI_ROOT =w_fstr,
BYVAR =cnt,
VAR =famconc,
COMPARE =quartile,
CATEGORY =1 4,
STAT =mean,
OUTFILE =out9);
run;

data mean_dif;
merge out7 (drop=contrast rename=(stat=mean_dif_qualifiant
sestat=se_mean_dif_qualifiant))
        out8 (drop=contrast rename=(stat=mean_dif_redouble sestat=se_mean_dif_redouble))
        out9 (drop=contrast rename=(stat=mean_dif_escs sestat=se_mean_dif_escs));
by cnt;
run;

proc export
  data=mean_dif
  outfile="C:\Users\Fabian\Documents\ULg\Memoire\mean_dif_famconc.xlsx"
  dbms=xlsx
  replace;
run;

```

## Annexe C : Syntaxe SAS de la partie 3.2

```
Libname PISA12 "C:\Users\Fabian\Documents\ULg\Memoire\pressia\PISA12" ;
options notes nofmterr ;
run;
%let path_macro=C:\Users\Fabian\Documents\ULg\Memoire\Macro\;
%include "&path_macro.brr_macro.sas";
run;

data temp1 ;
  set Pisa12.students
    (rename=( w_fstuwt=w_fstr0    pv1math=math1    pv2math=math2    pv3math=math3
      pv4math=math4 pv5math=math5));
run;

data temp2 ;
  set temp1;
  if ((OECD=1) or (cnt in ("BGR","HRV","ROU","HKG","MAC","SGP")));
run;

data temp3 ;
  set temp2;
  if (cnt="BEL" and substr(stratum,5,1)="1") then cnt="BFL";
  if (cnt="BEL" and substr(stratum,5,1)="2") then cnt="BFR";
  if (cnt="BEL" and substr(stratum,5,1)="3") then cnt="BGE";
  if (cnt="NOR") then delete;
run;

%BRR_CORR_PV(INFILE=temp3,
REPLI_ROOT=w_fstr,
BYVAR=cnt,
EXPLICA=famcon,
PV_ROOT=math,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE=out1);
run;

%BRR_CORR_PV(INFILE=temp3,
REPLI_ROOT=w_fstr,
BYVAR=cnt,
EXPLICA=famconc,
PV_ROOT=math,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE=out2);
run;

proc freq data=temp3;
table cnt / out=SORTIE1;
run;
```

```

data corr_famcon_famconc;
    merge  out1 (rename=(stat=corr_famcon sestat=se_corr_famcon))
           out2 (rename=(stat=corr_famconc sestat=se_corr_famconc))
           sortie1 (drop=percent rename=(count=n));
    by cnt;
run;

proc export
    data=corr_famcon_famconc
    outfile="C:\Users\Fabian\Documents\ULg\Memoire\corr_famcon_famconc.xlsx"
    dbms=xlsx
    replace;
run;

%BRR_CORR_PV(INFILE=temp3,
REPLI_ROOT=w_fstr,
BYVAR=VER_STU,
EXPLICA=famcon,
PV_ROOT=math,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE=out3);
run;

%BRR_CORR_PV(INFILE=temp3,
REPLI_ROOT=w_fstr,
BYVAR=VER_STU,
EXPLICA=famconc,
PV_ROOT=math,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE=out4);
run;

```

## Annexe D : Syntaxe SAS de la partie 3.3

```
Libname PISA12 "C:\Users\Fabian\Documents\ULg\Memoire\pressia\PISA12";
options notes nofmterr ;
run;
%let path_macro=C:\Users\Fabian\Documents\ULg\Memoire\Macro\;
%include "&path_macro.brr_macro.sas";
run;

data temp1 ;
  set Pisa12.students
    (rename=( w_fstuwt=w_fstr0    pv1math=math1    pv2math=math2    pv3math=math3
      pv4math=math4 pv5math=math5));
run;

data temp2 ;
  set temp1;
  if ((OECD=1) or (cnt in ("BGR","HRV","ROU","HKG","MAC","SGP")));
run;

data temp3 ;
  set temp2;
  if (cnt="BEL" and substr(stratum,5,1)="1") then cnt="BFL";
  if (cnt="BEL" and substr(stratum,5,1)="2") then cnt="BFR";
  if (cnt="BEL" and substr(stratum,5,1)="3") then cnt="BGE";
  if (cnt="NOR") then delete;
  if (missing(st62q04)=1) then delete;
  if (missing(st62q11)=1) then delete;
  if (missing(st62q13)=1) then delete;
run;

proc freq data=temp3;
  table st62q04 st62q11 st62q13 / list missing;
run;

data temp4 ;
  set temp3;
  BIAS=st62q04+st62q11+st62q13;
run;

proc standard data=temp4 out=temp5 mean=0 std=1 vardef=wgt;
  var BIAS;
  weight w_fstr0;
run;
```

```

%BRR_PROCMEAN_PV(INFILE =temp5,
REPLI_ROOT =w_fstr,
BYVAR =cnt,
PV_ROOT =math,
STAT =mean,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE =out1);
run;

%BRR_PROCMEAN(INFILE =temp5,
REPLI_ROOT =w_fstr,
BYVAR =cnt,
VAR =BIAS,
STAT =mean,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE =out2);
run;

%BRR_CORR_PV(INFILE=temp5,
REPLI_ROOT=w_fstr,
BYVAR=cnt,
EXPLICA=BIAS,
PV_ROOT=math,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE=out3);
run;

proc freq data=temp5;
table cnt / out=SORTIE1;
run;

data BIAS_perf_raw;
merge out1 (rename=(stat=mean_perf sestat=se_mean_perf))
      out2 (rename=(stat=mean_bias sestat=se_mean_bias))
      out3 (rename=(stat=corr_perf_bias sestat=se_corr_perf_bias))
      sortie1 (drop=percent rename=(count=n));
by cnt;
run;

%BRR_PROCMEAN_PV(INFILE =temp5,
REPLI_ROOT =w_fstr,
BYVAR =VER_STU,
PV_ROOT =math,
STAT =mean,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE =out4);
run;

```

```

%BRR_PROCMEAN(INFILE =temp5,
REPLI_ROOT =w_fstr,
BYVAR =VER_STU,
VAR =BIAS,
STAT =mean,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE =out5);
run;

%BRR_CORR_PV(INFILE=temp5,
REPLI_ROOT=w_fstr,
BYVAR=VER_STU,
EXPLICA=BIAS,
PV_ROOT=math,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE=out6);
run;

data BIAS_perf_raw_inter ;
merge out4 (rename=(stat=mean_perf sestat=se_mean_perf))
      out5 (rename=(stat=mean_bias sestat=se_mean_bias))
      out6 (rename=(stat=corr_perf_bias sestat=se_corr_perf_bias));
by VER_STU;
run;

proc export
  data=bias_perf_raw
  outfile="C:\Users\Fabian\Documents\ULg\Memoire\bias_perf_raw.xlsx"
  dbms=xlsx
  replace;
run;

proc export
  data=bias_perf_raw_inter
  outfile="C:\Users\Fabian\Documents\ULg\Memoire\bias_perf_raw_inter.xlsx"
  dbms=xlsx
  replace;
run;

data temp6 ;
  set temp5;
  if cnt="BFR";
  if iscedo=1 then qualifiant=0;
  if (iscedo in (2,3)) then qualifiant=1;
  if (st01q01 in (7,8,9)) then redouble=1;
  else if (st01q01 in (10,11,12)) then redouble=0;
  else delete;
run;

```

```

%BRR_CORR(INFILE=temp6,
REPLI_ROOT=w_fstr,
BYVAR=cnt,
VAR1=BIAS,
VAR2=qualifiant,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE=out7);
run;

%BRR_CORR(INFILE=temp6,
REPLI_ROOT=w_fstr,
BYVAR=cnt,
VAR1=BIAS,
VAR2=redouble,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE=out8);
run;

%BRR_CORR_PV(INFILE=temp6,
REPLI_ROOT=w_fstr,
BYVAR=cnt,
EXPLICA=BIAS,
PV_ROOT=math,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE=out9);
run;

data bias_perf_raw_fwb;
merge out7 (rename=(stat=QUALIFIANT sestat=se_QUALIFIANT))
      out8 (rename=(stat=REDOUBLE sestat=se_REDOUBLE))
      out9 (rename=(stat=PERF sestat=se_PERF));
run;

proc export
  data=bias_perf_raw_fwb
  outfile="C:\Users\Fabian\Documents\ULg\Memoire\bias_perf_raw_fwb.xlsx"
  dbms=xlsx
  replace;
run;

```

## Annexe E : Syntaxe SAS de la partie 3.4, modèle 1

```
option ps=60 ;
options nofmterr notes ;
run;

Libname PISA12 "C:\Users\Fabian\Documents\ULg\Memoire\pressia\PISA12" ;
run;

%let path_macro=C:\Users\Fabian\Documents\ULg\Memoire\Macro\;
%include "&path_macro.brr_macro.sas";
run;

data temp0 ;
    set pisa12.students;
    id+1;
run;

data temp1 ;
    set temp0 ;
    if (cnt="BEL" and substr(stratum,5,1)="2") ;
run;

data temp2 ;
    set temp1 ;
    array vecteur (16)      ST62Q01 ST62Q02 ST62Q03 ST62Q04
                      ST62Q06 ST62Q07 ST62Q08 ST62Q09
                      ST62Q10 ST62Q11 ST62Q12 ST62Q13
                      ST62Q15 ST62Q16 ST62Q17 ST62Q19;
    nbmis=0;
    do i=1 to 16;
        if (missing(vecteur(i)))=1 then do;
            vecteur(i)=9;
            nbmis=nbmis+1;
        end;
    end;
    if (nbmis=16) then delete;
    file "F:\pressia\bfr.txt" ;
    put      @1 (id) (f6.0)
            @21  (ST62Q01 ST62Q02 ST62Q03 ST62Q04
                  ST62Q06 ST62Q07 ST62Q08 ST62Q09 ST62Q10
                  ST62Q11 ST62Q12 ST62Q13 ST62Q15
                  ST62Q16 ST62Q17 ST62Q19) (16*f1.0);
run;
```

## **Annexe F : Syntaxe Mplus de la partie 3.4, modèle 1**

DATA :

```
FILE IS  
F:\pressia\bfr.txt;  
FORMAT IS  
(f6.0,t21,16f 1.0);
```

VARIABLE :

```
NAMES ARE  
    id  
    a b c d e f g h i j k l m n o p ;  
CATEGORICAL ARE  
    a b c d e f g h i j k l m n o p ;  
USEVARIABLES ARE  
    a b c d e f g h i j k l m n o p ;  
IDVARIABLE ARE  
    id;  
missing =all (9);
```

ANALYSIS:

```
TYPE=GENERAL ;  
ITERATIONS= 5000 ;  
MODEL :
```

```
f1 by a d g j l p e o;  
f2 by b d e f g h i k m c n;  
f3 by a c f h i n o p b e k;
```

```
f1 with f2@0;  
f3 with f2@0;  
f1 with f3@0;
```

OUTPUT :

```
MODINDICES STDYX ;
```

## Annexe G : Syntaxe SAS de la partie 3.4, modèle 2

```
option ps=60 ;
options nofmterr notes ;
run;

Libname PISA12 "C:\Users\Fabian\Documents\ULg\Memoire\pressia\PISA12";
run;

%let path_macro=C:\Users\Fabian\Documents\ULg\Memoire\Macro\;
%include "&path_macro.brr_macro.sas";
run;
data temp0 ;
    set pisa12.students;
    id+1;
run;

data temp1 ;
    set temp0;
    if (cnt="BEL");
run;

data temp2 ;
    set temp1;
    array vecteur (16)      ST62Q01 ST62Q02 ST62Q03 ST62Q04
                      ST62Q06 ST62Q07 ST62Q08 ST62Q09
                      ST62Q10 ST62Q11 ST62Q12 ST62Q13
                      ST62Q15 ST62Q16 ST62Q17 ST62Q19;
    nbmis=0;
    do i=1 to 16;
        if (missing(vecteur(i))=1) then do;
            vecteur(i)=9;
            nbmis=nbmis+1;
        end;
    end;
    if (nbmis=16) then delete;
    file "C:\Users\Fabian\Documents\ULg\Memoire\belgique.txt" ;
    put      @1 (id) (f6.0)
            @21  (ST62Q01 ST62Q02 ST62Q03 ST62Q04
                  ST62Q06 ST62Q07 ST62Q08 ST62Q09 ST62Q10
                  ST62Q11 ST62Q12 ST62Q13 ST62Q15
                  ST62Q16 ST62Q17 ST62Q19) (16*f1.0);
run;
```

## **Annexe H : Syntaxe Mplus de la partie 3.4, modèle 2**

DATA :

```
FILE IS  
F:\pressia\belgique.txt;  
FORMAT IS  
(f6.0,t21,16f1.0);
```

VARIABLE :

```
NAMES ARE  
    id  
    a b c d e f g h i j k l m n o p ;  
CATEGORICAL ARE  
    a b c d e f g h i j k l m n o p ;  
USEVARIABLES ARE  
    a b c d e f g h i j k l m n o p ;  
IDVARIABLE ARE  
    id;  
missing =all (9);
```

ANALYSIS:

```
TYPE=GENERAL ;  
ITERATIONS= 5000 ;  
MODEL :
```

```
f1 by a b c e f h i k m n o p g;  
f2 by a c d e f g b h m n;  
f3 by a d g j l o p e;
```

```
f1 with f2@0;  
f1 with f3@0;  
f2 with f3@0;
```

OUTPUT :

```
MODINDICES STDYX ;
```

## Annexe I : Syntaxe SAS de la partie 3.4, modèle 3, groupe 1

```
Libname PISA12 "C:\Users\Fabian\Documents\ULg\Memoire\pressia\PISA12" ;
options nonotes nofmterr ;
run;

%let path_macro=C:\Users\Fabian\Documents\ULg\Memoire\Macro\;
%include "&path_macro.brr_macro.sas";
run;

data temp1 ;
    set pisa12.students;
    id+1;
    if (cnt="BEL" and substr(stratum,5,1)="2") ;
    if (iscedo=1 and ST01Q01 in (10,11,12)) then groupe=1;
    if (iscedo=1 and ST01Q01 in (7,8,9)) then groupe=2;
    if (iscedo in (2,3)) then groupe=3;
run;

data temp2 ;
    set temp1;
    array vecteur (16)      ST62Q01 ST62Q02 ST62Q03 ST62Q04
                      ST62Q06 ST62Q07 ST62Q08 ST62Q09 ST62Q10
                      ST62Q11 ST62Q12 ST62Q13 ST62Q15
                      ST62Q16 ST62Q17 ST62Q19;
    nbmis=0;
    do i=1 to 16;
        if (missing(vecteur(i))=1) then do;
            vecteur(i)=9;
            nbmis=nbmis+1;
        end;
    end;
    if (nbmis=16) then delete;
run;

data temp3 ;
    set temp2;
    if (groupe=1);
    file "F:\pressia\groupe1.txt" ;
    put      @1 (id) (f6.0)
            @21 (ST62Q01 ST62Q02 ST62Q03 ST62Q04
                  ST62Q06 ST62Q07 ST62Q08 ST62Q09 ST62Q10
                  ST62Q11 ST62Q12 ST62Q13 ST62Q15
                  ST62Q16 ST62Q17 ST62Q19) (16*f1.0);
run;

data temp4 ;
    set temp3
        (rename=( w_fstuwt=w_fstr0  pv1math=math1  pv2math=math2  pv3math=math3
                  pv4math=math4  pv5math=math5));
run;
```

```

filename scores "f:\pressia\groupe1.sco";

data donnees;
    infile scores missover linesize = 500;
    input
        id      34-38
        OTL_RAW 44-49
        RS_BIAS 54-59
        AVANCE 64-69 ;
    format OTL_RAW RS_BIAS AVANCE f7.3 ;
run;

proc sort data=donnees;
    by id;
run;

proc sort data=temp4 ;
    by id;
run;

data fusion ;
    merge donnees temp4;
    by id;
run;

%BRR_CORR(INFILE=fusion,
REPLI_ROOT=w_fstr,
BYVAR=cnt ,
VAR1=famcon,
VAR2=RS_BIAS,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE=out1);
run;

%BRR_CORR(INFILE=fusion,
REPLI_ROOT=w_fstr,
BYVAR=cnt ,
VAR1=famconc,
VAR2=RS_BIAS,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE=out2);
run;

```

```

%BRR_CORR_PV(INFILE=fusion,
REPLI_ROOT=w_fstr,
BYVAR=cnt,
EXPLICA=famcon,
PV_ROOT=math,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE=out3);
run;

%BRR_CORR_PV(INFILE=fusion,
REPLI_ROOT=w_fstr,
BYVAR=cnt,
EXPLICA= RS_BIAS,
PV_ROOT=math,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE=out4);
run;

%BRR_CORR_PV(INFILE=fusion,
REPLI_ROOT=w_fstr,
BYVAR=cnt,
EXPLICA= famconc,
PV_ROOT=math,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE=out5);
run;

%BRR_CORR(INFILE=fusion,
REPLI_ROOT=w_fstr,
BYVAR=cnt ,
VAR1=famcon,
VAR2=famconc,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE=out6);
run;

data CORR;
merge out1 (rename=(stat=famcon_bias sestat=se_famcon_bias))
      out2 (rename=(stat=famconc_bias sestat=se_famconc_bias))
      out3 (rename=(stat=famcon_math sestat=se_famconmath))
      out4 (rename=(stat=bias_math sestat=se_bias_math))
      out5 (rename=(stat=famconc_math sestat=se_famconc_math))
      out6 (rename=(stat=famcon_famconc sestat=se_famcon_famconc));
by cnt;
run;

```

```

%BRR_REG_PV(INFILE=fusion,
REPLI_ROOT=w_fstr,
EXPLICA=famcon,
BYVAR=cnt,
PV_ROOT=math,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE=out7);
run;

%BRR_REG_PV(INFILE=fusion,
REPLI_ROOT=w_fstr,
EXPLICA=famcon RS_BIAS,
BYVAR=cnt,
PV_ROOT=math,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE=out8);
run;

%BRR_REG_PV(INFILE=fusion,
REPLI_ROOT=w_fstr,
EXPLICA=famconc,
BYVAR=cnt,
PV_ROOT=math,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE=out9);
run;

proc export
  data=corr
  outfile="C:\Users\Fabian\Documents\ULg\Memoire\corr_groupe1.xlsx"
  dbms=xlsx
  replace;
run;

proc export
  data=out7
  outfile="C:\Users\Fabian\Documents\ULg\Memoire\reg_groupe1_famcon.xlsx"
  dbms=xlsx
  replace;
run;

proc export
  data=out8
  outfile="C:\Users\Fabian\Documents\ULg\Memoire\reg_groupe1_famcon_RS_BIAS.xlsx"
  dbms=xlsx
  replace;
run;

```

```
proc export  
  data=out9  
  outfile="C:\Users\Fabian\Documents\ULg\Memoire\reg_groupe1_famconc.xlsx"  
  dbms=xlsx  
  replace;  
run;
```

## **Annexe J : Syntaxe Mplus de la partie 3.4, modèle 3, groupe 1**

DATA :

```
FILE IS  
G:\pressia\groupe1.txt;  
FORMAT IS  
(f6.0,t21,16f1.0);
```

VARIABLE :

```
NAMES ARE  
    id  
    a b c d e f g h i j k l m n o p ;  
CATEGORICAL ARE  
    a b c d e f g h i j k l m n o p ;  
USEVARIABLES ARE  
    a b c d e f g h i j k l m n o p ;  
IDVARIABLE ARE  
    id;  
missing =all (9);
```

ANALYSIS:

```
TYPE=GENERAL ;  
ITERATIONS= 5000 ;  
MODEL :
```

```
f1 by a b c d e f g h i j k l m n o p;  
f3 by a o p;  
piege by a d e g h j l o p;
```

```
f1 with piege@0;  
f3 with piege@0;  
f1 with f3@0;
```

OUTPUT :

```
MODINDICES STDYX;
```

SAVE :

```
FILE IS G:\pressia\groupe1.sco ;  
SAVE = FSCORES;
```

## **Annexe K : Syntaxe Mplus de la partie 3.4, modèle 3, groupe 2**

DATA :

```
FILE IS  
G:\pressia\groupe2.txt;  
FORMAT IS  
(f6.0,t21,16f 1.0);
```

VARIABLE :

```
NAMES ARE  
    id  
    a b c d e f g h i j k l m n o p ;  
CATEGORICAL ARE  
    b c d e f g h i j k l m n ;  
USEVARIABLES ARE  
    b c d e f g h i j k l m n ;  
IDVARIABLE ARE  
    id;  
missing =all (9);
```

ANALYSIS:

```
TYPE=GENERAL ;  
ITERATIONS= 5000 ;  
MODEL      :
```

```
f1 by b c d e f g h i j k l m n ;  
piege by d e g h j l ;
```

```
f1 with piege@0;  
m with k;
```

OUTPUT :

```
MODINDICES(ALL) STDYX ;
```

## **Annexe L : Syntaxe Mplus de la partie 3.4, modèle 3, groupe 3**

DATA :

```
FILE IS  
G:\pressia\groupe3.txt;  
FORMAT IS  
(f6.0,t21,16f1.0);
```

VARIABLE :

```
NAMES ARE  
    id  
    a b c d e f g h i j k l m n o p ;  
CATEGORICAL ARE  
    a b c d e f g h i j k l m n o p ;  
USEVARIABLES ARE  
    a b c d e f g h i j k l m n o p ;  
IDVARIABLE ARE  
    id;  
missing =all (9);
```

ANALYSIS:

```
TYPE=GENERAL ;  
ITERATIONS= 5000 ;  
MODEL :
```

```
f1 by a b c d e f g h i j k l m n o p;  
f2 by a d g h j l p o n;  
f3 by a c e n o p b k;
```

```
f1 with f2@0;  
f1 with f3@0;  
f2 with f3@0;
```

OUTPUT :

```
MODINDICES STDYX ;
```

## Annexe M : Syntaxe SAS du modèle 4 (Van de Gaer)

```
option ps=60;
options nofmterr notes;
run;

Libname PISA2012 "C:\Users\Fabian\Documents\ULg\Memoire\pressia\PISA12";
options nonotes nofmterr;
run;
%let path_macro=C:\Users\Fabian\Documents\ULg\Memoire\Macro\;
%include "&path_macro.brr_macro.sas";
run;

data temp0;
    set pisa2012.students;
    if (questid=2);
    id+1;
run;

data temp1;
    set temp0;
    if (oecd=1);
run;

data temp2;
    set temp1;
    id+1;
    array vecteur1 (*)      ST29Q01 ST29Q03 ST29Q04 ST29Q06
                      ST37Q01 ST37Q02 ST37Q03 ST37Q04
                      ST37Q05 ST37Q06 ST37Q07 ST37Q08
                      ST42Q02 ST42Q04 ST42Q06 ST42Q07 ST42Q09;
    nbmis=0;
    do i=1 to dim(vecteur1);
        if (missing(vecteur1(i))=1) then do;
            vecteur1(i)=.;
            nbmis=nbmis+1;
        end;
        end;
        if (nbmis=17) then delete;
        st42q02=5-st42q02;
run;

data temp3;
    set temp2;
    id=id+1000;
    array vecteur2 (17)     ST29Q01 ST29Q03 ST29Q04 ST29Q06
                      ST37Q01 ST37Q02 ST37Q03 ST37Q04
                      ST37Q05 ST37Q06 ST37Q07 ST37Q08
                      ST42Q02 ST42Q04 ST42Q06 ST42Q07 ST42Q09;
    do i=1 to 17;
        vecteur2(i)=5-vecteur2(i);
    end;
    do i=1 to 17;
        if (missing(vecteur2(i))=1) then vecteur2(i)=9;
    end;
```

```

end;
file "f:\pressia\vdg_questid2.txt";
put @1 (id) (f6.0)

@21 ( ST29Q01 ST29Q03 ST29Q04 ST29Q06
      ST37Q01 ST37Q02 ST37Q03 ST37Q04 ST37Q05 ST37Q06 ST37Q07 ST37Q08
      ST42Q02 ST42Q04 ST42Q06 ST42Q07 ST42Q09) (17*f1.0);

run;

filename score "f:\pressia\vdgscores.txt";
data resultat;
  infile score missover linesize = 500;
  input
    id          35-40
    INTMAT_VDG 46-51
    MATHEFF_VDG 56-61
    SCMAT_VDG   66-71
    RS_BIAS_VDG 76-81;

format INTMAT_VDG MATHEFF_VDG SCMAT_VDG RS_BIAS_VDG f6.3;
run;

proc sort data=temp3;
  by id;
run;

proc sort data=resultat;
  by id;
run;

data temp4;
  merge temp3 resultat;
  by id;
run;

data temp5;
  set temp4
  (rename=( w_fstuwt=w_fstr0    pv1math=math1    pv2math=math2    pv3math=math3
  pv4math=math4 pv5math=math5));
  if (cnt="BEL" and substr(stratum,5,1)="1") then cnt="BFL";
  if (cnt="BEL" and substr(stratum,5,1)="2") then cnt="BFR";
  if (cnt="BEL" and substr(stratum,5,1)="3") then cnt="BGE";
run;

% BRR_CORR_PV(INFILE=temp5,
REPLI_ROOT=w_fstr,
BYVAR=VER_STU,
EXPLICA=RS_BIAS_VDG,
PV_ROOT=math,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE=out1);
run;

```

```

%BRR_CORR(PV(INFILE=temp5,
REPLI_ROOT=w_fstr,
BYVAR=cnt,
EXPLICA=RS_BIAS_VDG,
PV_ROOT=math,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE=out2);
run;

%BRR_CORR(INFILE=temp5,
REPLI_ROOT=w_fstr,
BYVAR=VER_STU,
VAR1=RS_BIAS_VDG,
VAR2=INTMAT,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE=out3);
run;

%BRR_CORR(INFILE=temp5,
REPLI_ROOT=w_fstr,
BYVAR=VER_STU,
VAR1=RS_BIAS_VDG,
VAR2=SCMAT,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE=out4);
run;

%BRR_CORR(INFILE=temp5,
REPLI_ROOT=w_fstr,
BYVAR=VER_STU,
VAR1=RS_BIAS_VDG,
VAR2=MATHEFF,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE=out5);
run;

proc export
  data=out2
  outfile="C:\Users\Fabian\Documents\ULg\Memoire\corr_vdg_cnt.xlsx"
  dbms=xlsx
  replace;
run;

```

```

%BRR_CORR_PV(INFILE=temp5,
REPLI_ROOT=w_fstr,
BYVAR=VER_STU,
EXPLICA=intmat,
PV_ROOT=math,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE=out6);
run;

%BRR_CORR_PV(INFILE=temp5,
REPLI_ROOT=w_fstr,
BYVAR=VER_STU,
EXPLICA=intmat_vdg,
PV_ROOT=math,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE=out7);
run;

%BRR_CORR_PV(INFILE=temp5,
REPLI_ROOT=w_fstr,
BYVAR=cnt,
EXPLICA=intmat,
PV_ROOT=math,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE=out8);
run;

%BRR_CORR_PV(INFILE=temp5,
REPLI_ROOT=w_fstr,
BYVAR=cnt,
EXPLICA=intmat_vdg,
PV_ROOT=math,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE=out9);
run;

data corr_intmat;
merge out8 (rename=(stat=corr_intmat sestat=se_corr_intmat))
      out9 (rename=(stat=corr_intmat_vdg sestat=se_corr_intmat_vdg));
by cnt;
run;

```

```

proc export
  data=corr_intmat
  outfile="C:\Users\Fabian\Documents\ULg\Memoire\corr_intmat_cnt.xlsx"
  dbms=xlsx
  replace;
run;

%BRR_CORR_PV(INFILE=temp5,
REPLI_ROOT=w_fstr,
BYVAR=VER_STU,
EXPLICA=matheff,
PV_ROOT=math,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE=out10);
run;

%BRR_CORR_PV(INFILE=temp5,
REPLI_ROOT=w_fstr,
BYVAR=VER_STU,
EXPLICA=matheff_vdg,
PV_ROOT=math,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE=out11);
run;

%BRR_CORR_PV(INFILE=temp5,
REPLI_ROOT=w_fstr,
BYVAR=cnt,
EXPLICA=matheff,
PV_ROOT=math,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE=out12);
run;

%BRR_CORR_PV(INFILE=temp5,
REPLI_ROOT=w_fstr,
BYVAR=cnt,
EXPLICA=matheff_vdg,
PV_ROOT=math,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE=out13);
run;

```

```

data corr_matheff;
    merge  out12 (rename=(stat=corr_matheff sestat=se_corr_matheff))
           out13 (rename=(stat=corr_matheff_vdg sestat=se_corr_matheff_vdg));
    by cnt;
run;

proc export
    data=corr_matheff
    outfile="C:\Users\Fabian\Documents\ULg\Memoire\corr_matheff_cnt.xlsx"
    dbms=xlsx
    replace;
run;

%BRR_CORR_PV(INFILE=temp5,
REPLI_ROOT=w_fstr,
BYVAR=VER_STU,
EXPLICA=scmat,
PV_ROOT=math,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE=out14);
run;

%BRR_CORR_PV(INFILE=temp5,
REPLI_ROOT=w_fstr,
BYVAR=VER_STU,
EXPLICA=scmat_vdg,
PV_ROOT=math,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE=out15);
run;

%BRR_CORR_PV(INFILE=temp5,
REPLI_ROOT=w_fstr,
BYVAR=cnt,
EXPLICA=scmat,
PV_ROOT=math,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE=out16);
run;

```

```
%BRR_CORR_PV(INFILE=temp5,
REPLI_ROOT=w_fstr,
BYVAR=cnt,
EXPLICA=scmat_vdg,
PV_ROOT=math,
LIMIT=no,
LIMIT_CRITERIA=,
ID SCHOOL=schoolid,
OUTFILE=out17);
run;

data corr_scmat;
merge out16 (rename=(stat=corr_scmat sestat=se_corr_scmat))
          out17 (rename=(stat=corr_scmat_vdg sestat=se_corr_scmat_vdg));
by cnt;
run;

proc export
  data=corr_scmat
  outfile="C:\Users\Fabian\Documents\ULg\Memoire\corr_scmat_cnt.xlsx"
  dbms=xlsx
  replace;
run;
```

## **Annexe N : Syntaxe Mplus du modèle 4 (Van de Gaer)**

DATA:

```
FILE IS  
G:\pressia\vdg_questid2.txt;  
FORMAT IS  
(f6.0,t21,17f1.0);
```

VARIABLE:

```
NAMES ARE  
id  
a b c d e f g h i j k l m n o p q;  
CATEGORICAL ARE  
a b c d e f g h i j k l m n o p q;  
USEVARIABLES ARE  
a b c d e f g h i j k l m n o p q;  
IDVARIABLE ARE  
id;  
missing =all (9);
```

ANALYSIS:

```
TYPE=GENERAL ;  
ITERATIONS= 5000;  
MODEL :
```

```
f1 by a b c d ;  
f3 by m n o p q ;  
f2 by e f g h i j k l ;
```

i with k;

f4 by a b c d m n o p q;

```
f4 with f1 @0;  
f4 with f2 @0;  
f4 with f3 @0;
```

OUTPUT:

```
MODINDICES(all) STDYX ;
```

## **Annexe O : Corrélations entre MATHEFF et la performance en culture mathématique dans 37 systèmes éducatifs, sans et avec prise en compte des styles de réponse.**

CNT	corr_matheff	se_corr_matheff	corr_matheff_vdg	se_corr_matheff_vdg
AUS	0,58*	0,01	0,60*	0,01
AUT	0,50*	0,03	0,53*	0,03
BFL	0,45*	0,02	0,46*	0,02
BFR	0,51*	0,03	0,53*	0,03
BGE	0,46*	0,06	0,47*	0,06
CAN	0,55*	0,01	0,58*	0,01
CHE	0,56*	0,02	0,57*	0,02
CHL	0,31*	0,02	0,35*	0,02
CZE	0,52*	0,03	0,55*	0,02
DEU	0,53*	0,02	0,55*	0,02
DNK	0,57*	0,02	0,60*	0,02
ESP	0,49*	0,02	0,52*	0,02
EST	0,51*	0,02	0,55*	0,02
FIN	0,55*	0,02	0,58*	0,02
FRA	0,54*	0,02	0,56*	0,02
GBR	0,55*	0,02	0,57*	0,02
GRC	0,47*	0,02	0,50*	0,02
HUN	0,57*	0,02	0,59*	0,02
IRL	0,52*	0,02	0,55*	0,02
ISL	0,53*	0,03	0,57*	0,02
ISR	0,46*	0,02	0,45*	0,02
ITA	0,47*	0,01	0,50*	0,01
JPN	0,56*	0,02	0,58*	0,02
KOR	0,63*	0,02	0,65*	0,02
LUX	0,49*	0,02	0,51*	0,02
MEX	0,30*	0,02	0,33*	0,01
NLD	0,45*	0,03	0,46*	0,03
NOR	0,61*	0,02	0,63*	0,02
NZL	0,56*	0,02	0,57*	0,02
POL	0,63*	0,02	0,67*	0,02
PRT	0,62*	0,02	0,64*	0,02
SVK	0,52*	0,02	0,54*	0,02
SVN	0,46*	0,02	0,51*	0,02
SWE	0,51*	0,02	0,54*	0,02
TUR	0,42*	0,03	0,43*	0,03
USA	0,54*	0,02	0,55*	0,02
OCDÉ	<b>0,45*</b>	<b>0,01</b>	<b>0,46*</b>	<b>0,01</b>

**Annexe P : Corrélations entre SCMAT et la performance en culture mathématique dans 37 systèmes éducatifs, sans et avec prise en compte des styles de réponse.**

CNT	corr_scmat	se_corr_scmat	corr_scmat_vdg	se_corr_scmat_vdg
AUS	0,44*	0,01	0,50*	0,01
AUT	0,39*	0,02	0,44*	0,02
BFL	0,21*	0,02	0,27*	0,02
BFR	0,32*	0,04	0,38*	0,04
BGE	0,29*	0,06	0,34*	0,06
CAN	0,46*	0,01	0,52*	0,01
CHE	0,31*	0,02	0,40*	0,02
CHL	0,36*	0,02	0,40*	0,02
CZE	0,43*	0,03	0,48*	0,02
DEU	0,36*	0,03	0,42*	0,02
DNK	0,56*	0,02	0,60*	0,02
ESP	0,37*	0,02	0,43*	0,02
EST	0,46*	0,02	0,52*	0,02
FIN	0,59*	0,01	0,62*	0,01
FRA	0,40*	0,03	0,46*	0,02
GBR	0,42*	0,02	0,47*	0,02
GRC	0,43*	0,03	0,47*	0,02
HUN	0,37*	0,03	0,46*	0,03
IRL	0,42*	0,02	0,48*	0,02
ISL	0,51*	0,02	0,55*	0,02
ISR	0,23*	0,03	0,33*	0,02
ITA	0,32*	0,01	0,37*	0,01
JPN	0,28*	0,02	0,34*	0,02
KOR	0,48*	0,02	0,53*	0,02
LUX	0,32*	0,02	0,39*	0,02
MEX	0,32*	0,01	0,36*	0,01
NLD	0,19*	0,03	0,26*	0,03
NOR	0,61*	0,02	0,64*	0,02
NZL	0,41*	0,02	0,48*	0,02
POL	0,57*	0,02	0,63*	0,02
PRT	0,44*	0,02	0,51*	0,02
SVK	0,30*	0,03	0,39*	0,03
SVN	0,37*	0,03	0,43*	0,02
SWE	0,53*	0,02	0,56*	0,02
TUR	0,22*	0,03	0,29*	0,03
USA	0,43*	0,02	0,49*	0,02
OCDÉ	<b>0,30*</b>	<b>0,01</b>	<b>0,37</b>	<b>0,01</b>