

# Faultline Index for Groups (FIG)

A Guide for SAS Users

Version 1.0

(for categorical attributes)



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## Key Features of the SAS Faultline Index for Groups, Version 1.0 (FIG.sas)

Drawing on the faultline concept that Lau and Murnighan (1998) introduced to the group diversity literature, Shaw (2004) developed quantitative measures of faultlines that may capture subgrouping dynamics considering multiple individual attributes simultaneously.

This SAS program computes internal alignments, cross-subgroup alignments, and faultline strength based on Shaw (2004). The program has the following features:

1. The program assumes that attributes can be meaningfully represented as categorical data. The program is only applicable to categorical attribute data.
2. An unlimited number of attributes can be used to measure alignments and faultlines.
3. An unlimited number of categories can be used to represent each attribute.
4. The number of categories used to represent personal attributes may be different across variables.
5. The program can handle an unlimited number of team members.
6. The program will assign missing values to the computed indices if the response rate for the team is lower than 75%.

## Before Running the Program

Your data must be stored at the individual level of analysis for all variables, including the team identification number (team id), the individual identification number (individual id), and all individual attributes.

1. The following conditions must apply to your individual attribute data:
  - All individual attribute variables must be categorical variables. If they are continuous variables, you must convert them to categorical variables (e.g., age could be split into 4 categories: 20s, 30s, 40s, & 50+).
  - Category values must begin with 1, not 0 (e.g., males = 1, females = 2, *NOT* males = 0, females = 2; or for age, 20s = 1, 30s = 2, 40s = 3, & 50+ = 4; *NOT* 20s = 0, 30s = 1, 40s = 2, & 50+ = 3).
  - Category values must be consecutive; (e.g., 1, 2, 3 or 1, 2, 3, 4 *NOT* 1, 2, 4 or 1, 2, 3, 5).
  - Category values must be positive integers (the program does *NOT* recognize decimal numbers such as 3.5 or 4.5 or negative values such as -1).
  - Your data set must have at least one observation for each value of each attribute variable. For example, suppose ethnicity is categorized as 1, 2, 3, 4, & 5. Your data set must have at least one observation in each of the five categories. If your data set includes individuals whose ethnicity falls only into categories 1, 2, 3, 5, (but no individuals are in category 4), you will see error messages in the output. *To avoid this error*, you would need to recode the value of "5" to "4".
2. The variable name used to identify team membership must be 'teamid' and the variable name used to identify individuals must be named 'empid'.
3. If your data are in an SPSS data file, you must change your SPSS data file name to \*.por (portable file): e.g., salesdata.sav must become salesdata.por Use the "save as" menu in SPSS to change the file name.
4. In the input file, variables must appear in the following sequence: teamid, empid, and then the individual attribute variables.

## Example of Computing Faultlines Using The SAS Faultline Score Creation Program 1.0 (FIG.sas)

### Assumptions for this example:

1. You have available and understand how to use the SAS statistical analysis software package.
2. Your original data was in an SPSS data file named [salesdata.sav](#).
3. You have changed the name of your SPSS data file from [salesdata.sav](#) to [salesdata.por](#).
4. The SAS Faultline Index for Groups is named [FIG.sas](#) (this is the program we have provided to you).
5. You want the faultline scores calculated for your data to be placed in a file named [Results.xpt](#). This file is a SAS “export” file which can be opened and used by SPSS.
6. Both the [FIG.sas](#) program file and the [salesdata.por](#) data file are located in the directory [C:/My Data/Faultlines](#). You want the faultline score results file, [Results.xpt](#), placed in this same directory.

**To calculate faultline scores using the SAS Faultline Index for Groups program you must:**

1. Use the SAS statistical analysis software package to open the program file [FIG.sas](#).
2. Insert your input data file name ([salesdata.por](#)) and its correct directory location ([C:/My Data/Faultlines](#)) into the first two lines of the SAS program.

Line 1 of the program would be:

```
libname ilir "C:/My Data/Faultlines";
```

Line 3 of the program would be:

```
filename spss_in 'C:/My Data/Faultlines/salesdata.por';
```

3. Insert your output file name ([Results.xpt](#)) and the directory location to which you want that file to go ([C:/My Data/Faultlines](#)) into the last line of the [FIG.sas](#) program.

The last line of the program would be:

```
libname dest XPORT "C:/My Data/Faultlines/Results.xpt";
```

4. Run the [FIG.sas](#) program.

## **Note for the SAS Faultline Index for Groups program**

- **It will take a few minutes to get results.**
  - For example, if you are using 4 individual attributes (e.g., age, sex, ethnicity, education level) and you have 180 teams of about 8 people, it will take approximately 10 minutes to get your results.
- **If you want to rerun the program, you may need to:**
  - Clear the log window and the output window. Click the window that you want to clear, click Edit, and click Clear.
  - Clear work files in libraries. Click Libraries folder in the Explorer window in SAS, click Work folder, and delete all work files and folders in the Work folder except Sasmacr folder.
  - Alternatively, you may just close the SAS program and reopen it. Then, lines in the log window and the output window and work files will be automatically removed.
- **Once the program has run --**
  - You will be able to open the result file (\*.xpt) in SPSS.
  - The output data format will be at the individual level.
- **In the result file, FLS scores in teams with one or two members will be zero.**

## Output in SPSS: Example with 5 team members in one team

teamid	empid	gender	ethnicity	age	IA12	IA13	IA21	IA23	IA31	IA32	CGAI12	CGAI13
1001	1	1	3	1	.5	.5	.5	.5	.5	.5	.5	.4
1001	2	2	1	2	.5	.5	.5	.5	.5	.5	.5	.4
1001	4	1	1	4	.5	.5	.5	.5	.5	.5	.5	.4
1001	5	1	5	2	.5	.5	.5	.5	.5	.5	.5	.4

CGAI21	CGAI23	CGAI31	CGAI32	FLS1	FLS2	FLS3	NFLS1	NFLS2	NFLS3
.6	.6	0	.5	.5	.6	.6	.5	.6	.6
.6	.6	0	.5	.5	.6	.6	.5	.6	.6
.6	.6	0	.5	.5	.6	.6	.5	.6	.6
.6	.6	0	.5	.5	.6	.6	.5	.6	.6

### Explanation of example data:

- 1) Attribute variables are: gender (column 3), ethnicity (column 4), age (column 5).  
Note that subsequent variable names refer to these attributes in the order they are listed. So, gender is referenced as 1, ethnicity as 2, and age as 3.
  
- 2) IA = internal alignment, e.g.,
  - IA12 = for gender-based subgroups, internal alignment across ethnicity, or
  - IA31 = for age-based subgroups, internal alignment across gender
  
- 3) CGAI = cross-group alignment, e.g.,
  - CGAI12 = for gender-based subgroups, cross-group alignment across ethnicity
  - CGAI31 = for age-based subgroups, cross-group alignment across gender
  
- 4) Two measures of Faultline Strength (FLS and NFLS) were calculated:
  - FLS1 and NFLS1 = faultline strength if subgroups are formed based on gender
  - FLS2 and NFLS2 = faultline strength if subgroups are formed based on ethnicity

- FLS3 and NFLS3 = faultline strength if subgroups are formed based on age

5) The two different calculation methods for FLS and NFLS are shown in the examples below:

- $FLS1 = \text{the average of } IA12 \cdot (1 - CGAI12) \text{ and } IA13 \cdot (1 - CGAI13) = \frac{IA12 \cdot (1 - CGAI12) + IA13 \cdot (1 - CGAI13)}{2}$
- $NFLS1 = \text{the average of } IA12 \text{ and } IA13 \cdot [1 - (\text{average of } (CGAI12 \text{ and } CGAI13)))] = \frac{IA12 + IA13}{2} \cdot [1 - \frac{CGAI12 + CGAI13}{2}]$

6) A global measure of FLS can be obtained by averaging FLS1 to FLS3, i.e.,

$$FLS_{\text{overall}} = (FLS1 + FLS2 + FLS3)/3$$

7) A global measure of NFLS can be obtained by averaging NFLS1 to NFLS3, i.e.,

$$NFLS_{\text{overall}} = (NFLS1 + NFLS2 + NFLS3)/3$$

8) A maximum FLS (MFLS) can be obtained by identifying a maximum value of FLS1 to FLS3 (or NFLS1 to NFLS3), i.e., if  $FLS1=.1$ ,  $FLS2=.3$ , and  $FLS3=.2$ ,  $MFLS=.3$

## Reference

Shaw, J. B. 2004. The development and analysis of a measure of group faultlines. *Organizational Research Methods*, 7(1), 66-100.

Lau, D. C. & Murnighan, J. K. 1998. Demographic diversity and faultlines: The compositional dynamics of organizational groups. *Academy of Management Review*, 23(2), 325-340.