

# PhD Course on "Ranked Set Sampling"

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The Ph D course consists of nine seminars with presentations of the content of the Springer book: Lecture Notes in Statistics 176, "Ranked Set Sampling", Theory and Applications by Zehua Chen, Zhidong Bai, Bimal K. Sinha.

## Description of Ranked Set Sampling (RSS)

A general description of Ranked Set Sampling (RSS) procedure is as follows: First consider  $N$  independent i.i.d. samples each of size  $k$  from the same population:

$$\begin{aligned} &(X_{11}, \dots, X_{k1}) \\ &\dots \\ &(X_{1N}, \dots, X_{kN}) \end{aligned}$$

Then the elements of each sample are ranked by some mechanism (ranked with respect to a variable of interest, for instance by judgement without actual measurement) such that  $X_{[1]j}$  is "better" than  $X_{[2]j}$  in  $j$ 'th sample. We get

$$\begin{aligned} &(X_{[1]1}, \dots, X_{[k]1}) \\ &\dots \\ &(X_{[1]N}, \dots, X_{[k]N}). \end{aligned}$$

Now from each sample only one(!) variable with a predefined rank is measured exactly.

$$\begin{aligned} (X_{[1]1}, \dots, X_{[k]1}) \text{ rank } r_1 &: X_{[r_1]1} \\ &\dots \\ (X_{[1]j}, \dots, X_{[k]j}) \text{ rank } r_j &: X_{[r_j]j} \\ &\dots \\ (X_{[1]N}, \dots, X_{[k]N}) \text{ rank } r_N &: X_{[r_N]N} \end{aligned}$$

Sort it with respect to the ranks. Because the original samples are i.i.d. we can

renumber the measurements. Then the ranked set sample can be presented as:

$$\begin{array}{c} X_{[1]1} \dots X_{[1]n_1} \\ \dots \\ X_{[r]1} \dots X_{[r]n_r} \\ \dots \\ X_{[k]1} \dots X_{[k]n_k} \end{array}$$

with  $\sum n_r = N$ .

RSS is useful in situations, where sampling and ranking are easily carried out and cheaper than measuring.

## Timetable

1. Seminar 4/5, 13.15 room 74118, Introduction, Chapter 2, Silvelyn Zwanzig
2. Seminar 6/5, 10.15 room 74118, Chapter 2, 3, Silvelyn Zwanzig
3. Seminar 11/5, 13.15 room NN , Chapter 3, Måns Thulin
4. Seminar 13/5, 15.15 room NN , Chapter 4, Saeid Amiri
5. Seminar 18/5, 13.15 room 74118, Chapter 4, Saeid Amiri
6. Seminar 20/5, 10.15 room 74118, Chapter 5, Måns Thulin
7. Seminar 24/5, 13.15 room 74118, Chapter 5, Måns Thulin
8. Seminar 27/5, 13.15 room 74118 (?), Chapter 6, Saeid Amiri