Confidence Intervals for Neyman Type A-Distributed Events

J. Deperas-Standylo[1,3], A. Wojcik[1,2,7], J. Morand[2,5,6,], W. Urbanik[4], R. Moss[2], S. Hachem[5], W. Sauerwein[6]

1. Laboratory of Information Technologies, JINR

2. Institute for Energy – JRC, European Commission, Petten, Netherlands

3. Department of Radiation Biology and Health Protection, Institute of Nuclear Chemistry and Technology, Warszawa, Poland

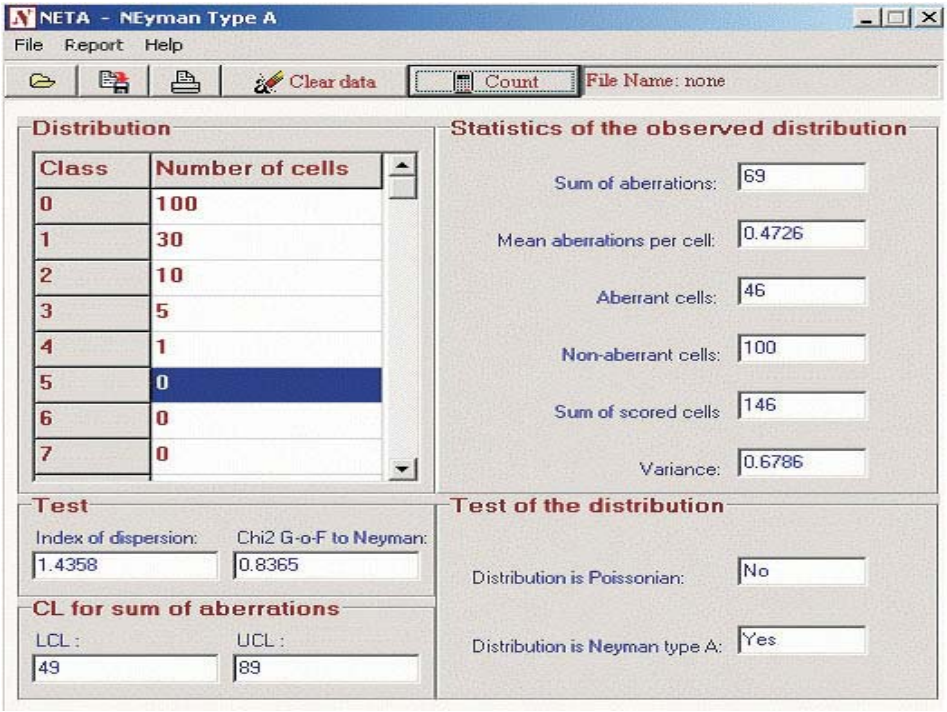
4. Economic University, Wroclaw, Poland

5. Faculté des Sciences, Université de Nice Sophia Antipolis, Nice, France

6. University Hospital Essen, Germany

7. Department of Radiation Biology and Immunology, Swietokrzyska Academy, Kielce, Poland

The Neyman type A distribution, a generalized, "contagious", Poisson distribution finds application in a number of disciplines such as biology, physics and economy. It was first described by Jerzy Neyman in 1939 (Neyman 1939). In radiation biology it best describes the distribution of chromosomal aberrations in cells that were exposed to neutrons, alpha radiation or heavy ions.



We have developed a freeware program for calculating the 95% confidence limits of Neyman type A-distributed events. The program can be downloaded here. The algorithm is based on the frequentist method published by Jerzy Neyman (1939). Although it has been developed in response to the requirements of radiation biology, it can find application in other fields of research.

Following entry of the distribution the user presses the COUNT button. NETA verifies if the distribution is Poissonian by the u-test as described by Edwards et al. (1979). In the

case of a Poissonian distribution the 95% confidence limits (LCL - lower confidence limit and UCL - upper confidence limit) are calculated for a Poisson distribution as described by Deperas et al. (2007). When the distribution is not Poissonian NETA verifies if it is a Neyman type A distribution by performing a chi-square goodness-of-fit test. The confidence limits are calculated when the distribution is a Neyman type A. Otherwise an error message is displayed. In addition to the confidence limits NETA also gives some information about the statistics of the entered distribution. The entered data can be saved and files can be opened. The CLEAR DATA button is used to delete the data: NETA is now ready to perform a new calculation.

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