

Statistical Interpretation On Data And Its Implications

¹Dr. Somanchi Hari Krishna , ²Dr. K.Maheswari , ³Akash
Sadanand Naik Salgaonkar

¹Associate Professor Department of Business Management,
Vignana Bharathi Institute of Technology,
Aushapur Village Ghatkesar Mandal, Medchal Malkangiri
District -501301

²Assistant Professor, Department of Social Work,
Bharathidasan University, Tiruchirappalli -24.

³Designation: PhD Research Scholar Department: School of
Sanskrit, Philosophy and Indic Studies.
Uni: Goa University.

Abstract

Statistics in research serve as a tool for deceitful research, evaluating its data and portraying results drawn from it. Most research investigations produce a large amount of raw data, which must be adequately concentrated in order to be conveniently analyzed and used for more study. Even though a researcher does not always have the opportunity to employ statistical procedures in all of their details and implications, the science of statistics cannot be disregarded. However, classification and tabulation only partially succeed in achieving this goal; we must go one step further and create specific indices or measures to sum up the data that has been gathered and categorised. The process of generalization from small groups (i.e., samples) to the populous cannot be assumed until after this. In reality, descriptive statistics and inferential statistics are the two main subfields of statistics. Inferential statistics focus on the process of generalization, whereas descriptive statistics are based on the construction of specific indices from the fundamental initial raw data.

Keywords: statistical, descriptive, comparative.

Introduction

The development of all citizens' statistical literacy and numeracy skills has drawn more attention in the recent 10

years from the statistics and mathematics education groups (Gal, 2000). Most recently, the overarching theme of ICOTS-6, the 6th International Congress on Teaching Statistics (Cape Town, South Africa), "Developing a Statistically Literate Society," served as an illustration of this tendency. This theme was touched upon in a number of the conference's paper sessions and talks, either directly or indirectly (Phillips, 2002).

There is no universally accepted definition of "statistical literacy" among professionals and educators, and some individuals use it without defining it specifically (Cerrito, 1999). This paper's conception of statistical literacy is based on the supposition that most adults will consume statistics rather than create it. This premise has led to a variety of statistical literacy notions that are related to one another. According to Wallman (1993), statistical literacy is the capacity to comprehend and evaluate statistical findings that are present in all aspects of daily life as well as the understanding of the contributions that statistical thinking can make to both public and private, professional and personal decisions. Gal (2002a) defines statistical literacy as the capacity for individuals to comprehend, assess critically, and, when appropriate, express their opinions regarding statistical data, arguments based on data, or stochastic occurrences. Statistical literacy, according to Lehohla (2002), is the capacity to read and comprehend quantitative data, such as indices and indicators.

Although many adults, professionals, and government officials seem to view statistical literacy as a critical skill, there are few discussions on the kind of data that kids and people need to be able to use this skill. Many instructors place a strong emphasis on helping pupils learn how to recognize "biased" or "misleading" data and media stories, as well as how to avoid falling for them. The capacity to read and critically evaluate information from different sources is a topic on which very few sources concentrate. By analyzing the types of products made accessible to the public by statistics organizations and considering the skills these goods need, this study seeks to contribute to a growing conversation on the development of statistical literacy.

The arithmetic average or mean, median, and mode are the three most important central tendency measurements. Harmonic and geometric means are also commonly used. The standard deviation is the most often used measure of

dispersion among variance and its square root. You may also utilize other metrics like mean deviation, range, etc. We frequently utilize the coefficient of variation or the coefficient of standard deviation for comparative purposes. We do, however, adopt the first measure of skewness based on mean and mode or mean and median with regard to the measurements of skewness and kurtosis. Rarely used as well are other skewness measurements based on quartiles or moments approaches. Kurtosis is also used to graphically depict the frequency distribution's curve peakedness. The two stages of the scientific method are typically thought to be discovery and justification (e.g. Hanson, 1958). Most frequently, statistical techniques are crucial in the discovery stage. These techniques represent a transitional stage between the theoretical hypotheses or anecdotal evidence that inspire discovery research and the justification stage of the research process, where detailed ideas and thorough comprehension are formed. Most discovery research is started because anecdotal evidence, theory based on prior study, or parallels from other areas imply a potential link or impact, whether in medicine, parapsychology, or any other subject. Researchers are aiming to replicate the precognitive effect in the lab since, for instance, claims of precognitive visions and dreams have been made throughout recorded history. According to medical theory, aspirin and related medications may help lower the risk of a heart attack since they tend to thin the blood. Therefore, in order to assess the effectiveness of aspirin-type medications to placebos in preventing the development of vascular disease, researchers have created randomized controlled studies (e.g. Antiplatelet Trialists Collaboration, 1988). Psychologists previously hypothesized that listening to classical music would improve spatial-temporal thinking based on studies on cortical circuits in the brain. They thus devised a randomized experiment to test that idea, and they did discover that participants' spatial abilities were improved after listening to Mozart rather than after silence or a relaxation tape (Rauscher, Shaw and Ky, 1993). Uncertainty surrounds the effect's "cause." In order to develop more precise hypotheses, scientists are continuing the discovery phase by examining the effects of various musical experiences on spatial thinking (such as listening to music or training youngsters to play an instrument, for example, Rauscher et al., 1997). Some scientists appear to have a misunderstanding of the function of statistical methods in research, and more especially, of the circumstances in which

these approaches are most helpful. This fallacy has occasionally been invoked in an effort to disprove the existence of abnormal events. Before any explanation has been established, it is the responsibility of statistics to uncover and measure significant effects and correlations. One of the most popular ways to achieve this is to utilize empirical data to disprove the "null hypothesis" that there is no relationship or impact. Numerous scientific breakthroughs would not have been conceivable without the application of such statistical techniques. These developments often occur during the discovery phase, when anecdotal evidence or scientific theory raises the possibility of a link or an impact, and studies are created to see how much of that possibility can be statistically confirmed. Scientists don't start looking for a cause or explanation until such investigations have shown that there is virtually likely a link. For instance, the association between smoking and lung cancer was originally discovered when a perceptive physician saw that many of his patients with lung cancer were smokers. A statistical association was established long before a causative mechanism was discovered as a result of the numerous research that were conducted to investigate the connection between smoking habit and future lung cancer. It is clear that society cannot function effectively on the basis of gut instinct or trial and error, and that a significant amount of commercial and economic decision-making depends on the appropriate and precise interpretation of numerical data. Data-driven decisions will provide better outcomes than those based just on feelings or intuition. Researching the larger universe follows the same rules that apply to this entire planet. Additionally, understanding how to apply statistics in an inquiry or survey will have advantages beyond just advancing your career. Once the language and some of the procedures necessary to grasp the whole inquiry or investigation have been learned, the supply of knowledge and comprehension will make it possible to deal with the information encountered in daily life. All social contact is permeated by statistical ideas. A significant portion of daily living depends on making projections, and company cannot advance without the ability to assess research revolutions or plan actions. [6] Calculations are made in the research process with regards to areas like purchasing, manufacturing, capital investment, long-term development, quality control, human resource development, recruiting and selection, marketing, credit risk assessment, financial predictions, and others. And for this reason, the

proper use of statistics is crucial for gathering and analyzing data.

Parametric tests are used to analyze numerical data (quantitative variables) that are typically distributed. The following are the two prerequisites for parametric statistical analysis:

- The normality assumption, which states that the sample group's means have a normal distribution.
- The assumption of equal variance, which states that samples' variances and their corresponding populations' variances are identical in scope.

Non-parametric statistical approaches are utilized, nonetheless, if the sample's distribution is skewed to one side or if the distribution is uncertain due to the small sample size. Ordinal and categorical data are analyzed using non-parametric tests.

The quantitative (numerical) size of the data and the underlying population's normal distribution are assumptions made in the parametric tests. The samples' variance is comparable (homogeneity of variances). The samples are chosen at random from the population, and there is no interdependence between the observations made within a single group. The Student's t-test, analysis of variance (ANOVA), and repeated measures ANOVA are the most often used parametric tests. ANOVA-like repeated measurements ANOVA examines how closely three or more groups' means are comparable. However, a follow-up action When all of a sample's variables are tested under different circumstances or at various times, an ANOVA is performed. The dependent variable is measured repeatedly as the variables are determined from samples at various times. It is incorrect to apply a typical ANOVA in this situation since it does not account for the correlation between the repeated measurements: The data go against the independence premise of the ANOVA. Therefore, repeated measures are used to measure repeated dependent variables. ANOVA ought to be used. Distributed parametric tests may provide false positives when the assumptions of normality are not made and the sample means are not normally distributed. In this case, non-parametric tests (also known as distribution-free tests) are performed since they do not call on the normality assumption. When compared to a parametric test, non-parametric tests might not be able to

identify a significant difference. In other words, they often have less dominance [15] The test statistic is compared to accepted values for the sample distribution of that statistic, as is done with parametric tests, and the null hypothesis is either accepted or rejected. There are currently many statistical software programs accessible. Statistical Package for the Social Sciences (SPSS), created by IBM Corporation, Statistical Analysis System (SAS), R, Minitab, Stata, Stata Corp, and Microsoft Excel are some of the frequently used software programs. R was created by Ross Ihaka and Robert Gentleman from the R core team (developed by Microsoft).

Numerous online resources are available that deal with statistical power assessments. Several are:

Links to several online power calculators are available on StatPages.net.

- G-Power offers a free, DOS-compatible power analysis application that may be downloaded.
- A site that determines the power or sample size required to achieve a certain power for one effect in a factorial ANOVA design is called power analysis for ANOVA.

An application named Sample Power is produced by SPSS. It displays all of the information on the computer screen as an output that may be copied and pasted into another document.

A researcher should be familiar with the fundamental statistical principles utilized in research studies. This will make it easier to perform an acceptable, well-designed study that will produce solid data. Using statistical methods incorrectly can result in flawed results, inaccuracies, and a reduction in the article's relevance. Bad statistics can result in poor research, and poor research can result in unethical behaviour. Therefore, having sufficient statistical knowledge and using statistical tests appropriately are crucial. A thorough understanding of the fundamental statistical techniques can help to create high-quality medical research that may be used to develop strategies based on evidence and improve study designs. These techniques include: (1) Generating trustworthy data (2) Appropriately analyzing the data

- Reaching logical conclusions. In practically every discipline, statistical analyses are utilized to interpret the enormous amount of data that is accessible. Even if statistics is not your primary area of study, it can still help you succeed in your

chosen career. The likelihood is quite high that you will require practical experience with statistical methods in order to both develop new insights in your discipline and comprehend the work of others. In contrast, there is a great need for statisticians' talents in a variety of settings, including universities, research facilities, the government, business, etc.

Statistical techniques cannot offer unambiguous evidence of the physical causes behind a connection or an effect. The antiplatelet and vascular disease studies, for instance, were based on randomized controlled trials, thus all variables except the blind, random assignment of the antiplatelet or placebo should have been comparable between groups. As a result, we can confidently assume that using the antiplatelet contributed to the decrease in the prevalence of vascular disease. But that still says nothing about the bodily mechanism creating that link in humans. You won't find the answer to that query in statistics. Meta-analyses of ganzfeld and other parapsychological experiments can also produce strong evidence that the null hypothesis is false, but they cannot explain the process underlying the outcomes of non-chance experiments. The conclusion that psychic activity is at work relies on ruling out all other potential explanations for the non-chance findings, which creates an intractable argument regarding whether or not psi exists. Even if they cannot name it, skeptics frequently believe that a different explanation is more plausible. The government investigations on remote viewing and a number of ganzfeld experiments were compared, and results that were similar between them were used to draw statistical conclusions. Although they use quite distinct methodologies, the ganzfeld process and remote seeing both aim to determine whether or not information may be obtained by a manner other than the conventional five senses. Therefore, it would be improbable that the other technique would provide identical results if a methodological defect in one approach was the cause of the results. One may claim that information is somehow sent from the sender to the receiver in the ganzfeld operation, for instance, where one-way speech communication frequently leads from the receiver to the sender. However, in remote viewing tests, the receiver is entirely isolated and far from anybody who is aware of the proper target; therefore, if the same findings are obtained under the two processes, the common explanation is discredited.

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