"Research methods in Corrections".

- In Section 1 of this course you will cover these topics:
- Introduction To Criminal Justice Research Methods: Theory And Method
- Ethics In Criminal Justice Research
- Research Design: The Experimental Model And Its Variations

Topic : Introduction To Criminal Justice Research Methods: Theory And Method

Topic Objective:

At the end of this topic student would be able to:

- Comprehend the Research methods

- Learn about different forms of Researches

- Identify the types of Theories regarding Criminal Research

- Develop learning regarding the Future of Criminal Research

- Learn about the Dependent and independent variables

- Understand the Complementarity (in social psychology)

- Learn about the Factors affecting complementarity

Definition/Overview:

Crime Research: The goal of the research process is to produce new knowledge, which takes three main forms (although, as previously discussed, the boundaries between them may be fuzzy).

Key Points:

1.   Research methods

The goal of the research process is to produce new knowledge, which takes three main forms (although, as previously discussed, the boundaries between them may be fuzzy)

- Exploratory research, which structures and identifies new problems
- Constructive research, which develops solutions to a problem
- Empirical research, which tests the feasibility of a solution using empirical evidence

1.1 Exploratory research

Exploratory research is a type of research conducted because a problem has not been clearly defined. Exploratory research helps determine the best research design, data collection method and selection of subjects. Given its fundamental nature, exploratory research often concludes that a perceived problem does not actually exist. Exploratory research often relies on secondary research such as reviewing available literature and/or data, or qualitative approaches such as informal discussions with consumers, employees, management or competitors, and more formal approaches through in-depth interviews, focus groups, projective methods, case studies or pilot studies. The Internet allows for research methods that are more interactive in nature: E.g., RSS feeds efficiently supply researchers with up-to-date information; major search engine search results may be sent by email to researchers by services such as Google Alerts; comprehensive search results are tracked over lengthy periods of time by services such as Google Trends; and Web sites may be created to attract worldwide feedback on any subject. The results of exploratory research are not usually useful for decision-making by themselves, but they can provide significant insight into a given situation. Although the results of qualitative

research can give some indication as to the "why", "how" and "when" something occurs, it cannot tell us "how often" or "how many." Exploratory research is not typically generalizable to the population at large.

1.2 Constructive research

Constructive research is perhaps the most common computer science research method. This type of approach demands a form of validation that doesnt need to be quite as empirically based as in other types of research like exploratory research. Nevertheless the conclusions have to be objectively argued and defined. This may involve evaluating the construct being developed analytically against some predefined criteria or performing some benchmark tests with the prototype. The term construct is often used in this context to refer to the new contribution being developed. Construct can be a new theory, algorithm, model, software, or a framework.

The following phrases explain the above figure. The fuzzy info from many sources tab refers to different info sources like training materials, processes, literature, articles, working experience etc. In the solution tab, theoretical framework represents a tool to be used in the problem solving. The practical relevance tab it refers to empirical knowledge creation that offers final benefits. The theoretical relevance tab it gives the new theoretical knowledge that needs scientific acceptance: the back arrow to theoretical body of knowledge tab. Steps to be followed in practical utility tab (a):

- o set objectives and tasks
- o identify process model
- o select case execution
- o interview case organization
- o prepare simulation
- o run simulation
- o interpret simulation results
- o give feedback

Steps to be followed in epistemic utility tab (b):

- o constructive research
- o case research
- o surveys
- o qualitative and quantitative methods
- o theory creating
- o theory testing

Research is often conducted using the hourglass model. The hourglass model starts with a broad spectrum for research, focusing in on the required information through the methodology of the project (like the neck of the hourglass), then expands the research in the form of discussion and results.

1.3 Empirical research

Empirical research is any research that bases its findings on direct or indirect observation as its test of reality. Such research may also be conducted according to hypothetico-deductive procedures, such as those developed from the work of R. A. Fisher. The researcher attempts to describe accurately the interaction between the instrument (or the human senses) and the entity being observed. If instrumentation is involved, the researcher is expected to calibrate her/his instrument by applying it to known standard objects and documenting the results before applying it to unknown objects.

In practice, the accumulation of evidence for or against any particular theory involves planned research designs for the collection of empirical data, and academic rigor plays a large part of judging the merits of research design. Several typographies for such designs have been suggested, one of the most popular of which comes from Campbell and Stanley . They are responsible for popularizing the widely cited distinction among pre-experimental, experimental, and quasi-experimental designs and are staunch advocates of the central role of randomized experiments in educational research.

2.   Other Forms of Researches

Research can also fall into two distinct types:

- Primary research
- Secondary research

2.1 Primary research

Primary research (also called field research) involves the collection of data that does not already exist. This can be through numerous forms, including questionnaires and telephone interviews amongst others. This information may be used in such things as questionnaires, magazines, and Interviews.

- o   May be very expensive because many people need to be .
- o   By the time the research is complete it may be out of date.
- o   People may have to be employed or avoid their primary duties for the duration of the research.
- o   People may not reply if emails or letters are used.

2.2 Secondary research

Secondary research (also known as desk research) involves the summary, collation and/or synthesis of existing research rather than primary research, where data is collected from, for example, research subjects or experiments. The term is widely used in market research and in medical research. The principle methodology in medical secondary research is the systematic review, commonly using meta-analytic statistical techniques, although other methods of synthesis, like realist reviews and meta-narrative reviews, have been developed in recent years. Secondary research can come from either internal or external sources.

3.   Types of Theories regarding Criminal Research

3.1 Deductive Theory

Deductive reasoning, sometimes called deductive logic, is reasoning which constructs or evaluates deductive arguments. In logic, an argument is said to be deductive when the truth of the conclusion follows necessarily or is a logical consequence of the premises and (consequently) its corresponding conditional is a necessary truth. Or again, in a deductive argument the conclusion must be true if the premises are true. Deductive arguments are said to be valid. (Arguments are alternatively said to be deductive when the arguer intends the conclusion to follow necessarily form the premises. Under this definition, not all deductive arguments would be valid, as when the reasoner intends the argument to be valid, but in fact fails in this attempt.) If a deductive argument has true premises, the argument is sound. An example of a deductive argument and hence of deductive reasoning: All men are mortal. Deductive reasoning is often contrasted with inductive reasoning. In the simplest terms, inductive reasoning is the process of identifying general rules from observing multiple subjects, while deductive reasoning is the process of applying general rules to identify specific subjects (specific data).

3.2 Inductive Theory

Induction or inductive reasoning, sometimes called inductive logic, is reasoning which takes us "beyond the confines of our current evidence or knowledge to conclusions about the unknown." The premises of an inductive argument support the conclusion but do not entail it; i.e. they do not ensure its truth. Induction is used to ascribe properties or relations to types based on an observation instance (i.e., on a number of observations or experiences); or to formulate laws based on limited observations of recurring phenomenal patterns. Induction is employed, for example, in using specific propositions such as: This ice is cold. (or: All ice I have ever touched was cold.)

Inductive reasoning has been attacked several times. Historically, David Hume denied its logical admissibility. Sextus Empiricus questioned how the truth of the Universals can be established by examining some of the particulars. Examining all the particulars is

difficult as they are infinite in number. During the twentieth century, thinkers such as Karl Popper and David Miller have disputed the existence, necessity and validity of any inductive reasoning, including probabilistic (Bayesian) reasoning . Some say scientists still rely on induction but Popper and Miller dispute this: Scientists cannot rely on induction simply because it does not exist.

3.3 Grounded Theory

Grounded theory (GT) is a systematic qualitative research methodology in the social sciences emphasizing generation of theory from data in the process of conducting research.

It is a research method that operates almost in a reverse fashion to traditional research and at first may appear to be in contradiction of the scientific method. Rather than beginning by researching & developing a hypothesis, a variety of data collection methods are the first step. From the data collected from this first step, the key points are marked with a series of codes, which are extracted from the text. The codes are grouped into similar concepts, in order to make them more workable. From these concepts categories are formed, which are the basis for the creation of a theory, or a reverse engineered hypothesis. This contradicts the traditional model of research, where the researcher chooses a theoretical framework, and only then applies this model to the studied phenomenon

4.   The Future of Criminal Research

Although the preceding discussion has portrayed the two main research paradigms, quantitative and qualitative research methods, as two ends of the research continuum, it was not meant to imply that the two are mutually exclusive. On the contrary, the future of research methods in criminology and criminal justice lies in the combination of quantitative and qualitative research approaches. Illustrated below are two successful integrations. The first, by Eric Hirsch, used a combination of methods, including participant observation, intensive interviewing, and a standardized survey, to study the 1985 student movement that attempted to make Columbia University divest its stock in companies dealing with South Africa. Hirsch believed that the

combination of research methodologies provided a more comprehensive picture of student's motivations.

The second example is from John Laub and Robert Sampson. For quite some time, these two scholars have been working on the reanalysis of one of the classic data sets in criminology, the Unraveling Juvenile Delinquency (UJD) study that was initiated by Sheldon and Eleanor Glueck in 1940. The data contain the original case records of all one thousand sample members as well as detailed archival life records that included information from the "home investigation," which consisted of an interview with family members and offered an opportunity for the investigators to observe the home and family life of sample members. Furthermore, the UJD study included interviews with key informants such as social workers, settlement house workers, clergymen, schoolteachers, neighbors, employers, and criminal justice and social welfare officials. When this detailed information is combined with the statistical information on criminal behavior and other life events, one can begin to appreciate the richness with which Laub and Sampson have been able to document these one thousand lives and contribute much needed information regarding crime over the life course. The future of criminological and criminal justice research will likely come full circle. Early studies of crime and criminality began with qualitative observations almost to the exclusion of quantitative research. New research topics were observed and highlighted by scholars who wished to forge ahead in the understanding of crime and criminality. Once these topics were brought to the forefront of the field, quantitative research became the choice method of analysis.

5.   Dependent and independent variables

The terms "dependent variable" and "independent variable" are used in similar but subtly different ways in mathematics and statistics as part of the standard terminology in those subjects. They are used to distinguish between two types of quantities being considered, separating them into those available at the start of a process and those being created by it, where the latter (dependent variables) are dependent on the former (independent variables) In statistics, in an experiment, the dependent variable is the event studied and expected to change when the independent variable is changed.

In the design of experiments, independent variables are those whose values are controlled or selected by the person experimenting (experimenter) to determine its relationship to an observed phenomenon (the dependent variable). In such an experiment, an attempt is made to find evidence that the values of the independent variable determine the values of the dependent variable (that which is being measured). The independent variable can be changed as required, and its values do not represent a problem requiring explanation in an analysis, but are taken simply as given. The dependent variable on the other hand, usually cannot be directly controlled.| Controlled variables are also important to identify in experiments. They are the variables that are kept constant to prevent their influence on the effect of the independent variable on the dependent. Every experiment has a controlling variable, and it is necessary to not change it, or the results of the experiment won't be valid. "Extraneous variables" are those that might affect the relationship between the independent and dependent variables. Extraneous variables are usually not theoretically interesting. They are measured in order for the experimenter to compensate for them. For example, an experimenter who wishes to measure the degree to which caffeine intake (the independent variable) influences explicit recall for a word list (the dependent variable) might also measure the participant's age (extraneous variable). She can then use these age data to control for the uninteresting effect of age, clarifying the relationship between caffeine and memory.

In summary:

- Independent variables answer the question "What do I change?"
- Dependent variables answer the question "What do I observe?"
- Controlled variables answer the question "What do I keep the same?"
- Extraneous variables answer the question "What uninteresting variables might mediate the effect of the IV on the DV?"

In statistics, the dependent/independent variable terminology is used more widely than just in relation to controlled experiments. For example the data analysis of two jointly varying quantities may involve treating each in turn as the dependent variable and the other as the independent variable. However, for general usage, the pair "response variable" and "explanatory

variable" is preferable as quantities treated as "independent variables" are rarely statistically independent. Depending on the context, an independent variable is also known as a "predictor variable," "regressor," "controlled variable," "manipulated variable," "explanatory variable," "exposure variable," and/or "input variable." A dependent variable is also known as a "response variable," "regressand," "measured variable," "observed variable," "responding variable," "explained variable," "outcome variable," "experimental variable," and/or "output variable.

6.   Complementarity (in social psychology)

Complementarity in social psychology is defined on the basis of the interpersonal circle, according to which, interpersonal behaviors fall on a circle with two dimensions, namely dominance (i.e. dominant-submissive) and warmth (i.e. hostile-friendly). It states that each interpersonal behavior invites certain responses of another interactant. The behavior and the response it invites are said to be complementary when friendly behavior begets friendly behavior, and dominant behavior begets submissive behavior. When people fail to give the invited response, it is said to be a non-complementary interaction. If the first persons behavior invites a reaction from the second person that matches the second persons goals, then the second person is satisfied; otherwise, the second person is frustrated.

7.   Factors affecting complementarity

7.1   Setting i.e. in work, at home, in recreation and others

High complementarity in agentic behaviors is found in office settings whereas high complementarity in communal behaviors is found in non-office settings. In an office setting, dominant agentic behaviors such as setting goals and making suggestions may be complemented with submissive agentic behaviors like avoiding taking the lead and not expressing their own views. At home, recreation and others, on the one hand, friendly communal behaviors such as smiling may invite similar behaviors like compromising about a decision. On the other hand, hostile communal behaviors like showing impatience may beget similar behaviors like showing no response to partners.

7.2 Social Role Status e.g. supervisors, coworker and supervisee

High complementarity is found in supervisors (high-status, high powered), they can act freely in their own way. Less complementarity is found in supervisees (low-status, low-powered), as they are normally guided by social norms which mold their behaviors.

7.3 Time e.g. strangers, old friends

High levels of complementarity are presumed to be stable over time than those low levels of complementarity . Greater levels of complementarity are developed when people have known each other for a long time than when they are newly acquainted. However, contradictory result is also found in a study conducted by Ansell . Moderating effect of gender difference in complementarity Complementary can be influenced by different relationship styles on male and female. Girls in general love communal behaviors such as social converzation and self-disclosure whereas boys love dominance behaviors such as competitive, organized or rough-and-tumble play. These developmentally differences can result in different peer relationships. A study by Ansell among 120 college students found that women reported significantly more complementarity than men among roommate dyads. The higher level of complementarity on dominance behaviors such as setting goals and making suggestions as found in both men and women dyads, the more cohesive the relationship was reported.

Topic : Ethics In Criminal Justice Research

Topic Objective:

After studying this topic the student should be able to:

- Define Morality and Criminal Justice
- Explain Ethics and Morality
- Understand Criminal Justice Practice
- Elaborate the Laws and Lawmaking process

- Explain Authority, Power, and Discretion
- Comprehend Generality and Moral Dilemmas

Definition/Overview:

Moral: A moral is a message conveyed or a lesson to be learned from a story or event. The moral may be left to the hearer, reader or viewer to determine for themselves, or may be explicitly encapsulated in a maxim

Authority: is the power to enforce laws, exact obedience, command, determine or judge.

Key Points:

1.   Morality and Criminal Justice

Crime, law, and justice cannot be separated from morality. There have been many recent controversies that include moral considerations. Ethical behavior is about how we should live, the decisions we should make, and the actions we should take as we confront a variety of personal and professional scenarios over the course of our lives.

2.   Ethics and Morality

There are several definitions for ethics, including:

- the philosophical study of morality,
- the study of what is morally right, wrong, good, bad, obligatory, and permissible,
- an effort to understand and justify moral concepts, principles, and theories,

- an effort to establish (justified) principles of moral behavior that can serve as guides for individuals and groups, and
- an investigation into the values and virtues that are important and/or necessary to leading and living the good life as individuals and societies.

Morality is defined as peoples beliefs about right and wrong, good and bad, and the choices they make and the actions that they take as a result of those beliefs. The field of ethics is largely prescriptive; it attempts to evaluate moral beliefs, principles, practices, etc., and makes normative statements about what should or should not be done in light of its evaluations. Ethics does not study what is, but what should be; ethics challenges us to achieve deeper understanding of what could be. Ethics critically considers moralitythis is more than just a study of morality, it is an in-depth investigation. We must construct principles that are practical and thus applicable in many contexts. Even something as seemingly straightforward as defining a human being can be a matter of significant moral contention.

- **The Role of Morality and the Value of Ethical Inquiry**

     The purpose of morality is to enable us to live a good life in a just society. Morality plays a role in preventing/reducing harm and enhances the well-being of all living things. Morality gives us the tools in with to resolve conflicts civilly and allows us to recognize and respond to the needs of others. Ethical inquiry is not about finding the solutions(s); it is a process of critical reflection.

- **The Examined Life: What Does it Mean to be Moral?**

     Socrates argued that the unexamined life is not worth living. We must critically examine our lives, our principles, our values, and our processes of decision making. Ethics asks that we live mindfully. Morality is the self-conscious living of life; it gives meaning to and provides purpose in our lives beyond ourselves. Socrates and other Greek philosophers felt that being moral was being happy and well. Yet, in todays society, being moral often leads to unhappiness and/or inconvenience. Some people feel that the law is in and of itself sufficient justification for their views. Critical reflection upon laws is still necessary.

3.   Law

- **Laws Are Not Infallible**

    Laws are made by people, usually through a process of ethical reasoning involving moral considerations. Statutory laws are created by local, state, and federal legislators Regulatory laws are created by administrative agencies. Case law is created by judges and justices. Laws are not infallible because they are created by humans, whom are naturally fallible

- **Laws Can Be Immoral**

    Law is not possible without ethics, and thus morality. Under the Nuremberg laws, persecution of the Jews in Nazi Germany was legal. Legality does not necessarily equal morality. Morality does not necessarily equal legality.

- **Right Does Not Always Make Good**

    If one does the right thing according to legality, it is not necessarily a moral action and vice versa; right does not equal righteous. A legal right does not constitute a moral right and vice versa. The relationship between law and morality is complex law and morality are interrelated, but are not one and the same. Laws are not definitions of morality; they are the subjects of ethical scrutiny

- **Law Is Not Inclusive of All Moral Concerns**

    Some aspects of morality are not covered by law. Morality is much more substantive and complex than law.

- **It Is Not Enough to Do the Right Thing**

    We must know why an action is right. In order to be moral, one must follow moral rules understanding why his or her conduct or the conduct of others is moral/immoral.

4. Criminal Justice Practice

- Professional ethics are utilized ethical values, principles, obligations, etc., and apply them to particular issues and practical scenarios that emerge within the context of a given field or occupation.
- Behavior always has a moral dimension.
- The ethics of criminal justice can be further subdivided into three primary components: police, courts, and corrections (these components are interrelated)

5. Laws and Lawmaking

- The sphere of law and lawmaking encompasses both substantive and procedural criminal law (as well as civil law, family law, and other types of legal decision making).
- Substantive law is defining law, whereas procedural law is carrying out the law (practical application).
- Policing entails upholding or enforcing substantive criminal laws in ways that are consistent with existing procedural guidelines or laws.
- Courts try accused persons according to the principles of criminal procedure.
- The correctional sphere deals with those who are convicted of violating laws.

6. Social Justice

Social justice is not easily defined. Arrigo defines social justice as a perspective of justice that evaluates how a society provides for the needs of its members and the extent to which it treats its subgroups equally. Social justice concerns the laws, policies, programs, and practices of various societies as they pertain to the distribution of and access to housing, health care, education, employment, and other social goods. Social justice/injustice deals with social concerns, not individual concerns. Social justice is concerned with the conditions in which criminals and criminal justice practitioners exist. The concerns of social justice are macro-level or large scale interests. Usually all things regarding crime, law, and criminology are linked in some way to matters of social justice.

Members within the field of criminal justice are expected and required to exhibit an increased level of moral character and to exercise a heightened degree of moral judgment. Practitioners are held to higher moral standards than the general public. Morality is of great significance in the field of criminal justice.

7.   Authority, Power, and Discretion

Practitioners within the criminal justice profession carry with them authority, power, freedom, and discretion to impose authority and/or employ force in various situations. Increased power and discretion creates the need for increased moral responsibility.

- **Criminal Justice Agents as Public Servants**

    Criminal justice agents are servants of the public with the interest of protecting and serving others. Professionals in the criminal justice system often serve as role models for the public.

- **Individual Behavior Reflects Institutional Morality**

    Individual behavior of people within the criminal justice system reflects those individuals character as well as the character of the institution in which those individuals are a part. Individual officers involved in criminal justice are often faceless and nameless, however, the institution in which they are a part of is usually memorable (e.g., the Rodney King beating).

- **What About Professional Codes of Conduct?**

    Criminal justice professions have progressively developed sophisticated codes of conduct. Ethical codes are sets of standards designed to regulate the ways in which participants or workers pursue their activities as professionals. Ethical codes also educate and guide us along our professional paths. Codes have workplace value, but are limited by situational factors. Regardless of professional value systems and codes of conduct, ethics are still necessary (morality is still very important).

- **The Problem of Enforcement**

  Codes of conduct express organizational values and ideals; however, violations of these values are inevitable. Codes of conduct are not easily enforced and when violated, are often not reported; even when reported, penalties are often minimal. Violations of codes of conduct frequently go unnoticed. Informal rules often override formal codes of conduct.

- **Minimalism**

  Embodying exemplary moral character often demands that one goes above and beyond mere expectations or requirements. Laws, codes of conduct, etc., may be read as examples of ideal moral character, when indeed they are often only minimal expectations. The idea of ethical minimalism is that when rules or standards are in place to guide our behavior, people may be inclined to adopt a minimalistic attitude toward morality, doing only what is dictated by the rules and standards in place. Thus, professional codes of conduct are not replacements for ethical inquiry, they are supplements.

- **Codes are External, Ethics are Internal**

  Morality should be an authentic expression of the self. Morality is not about what we do, but more importantly it is about why we do what we do. It is important that we internalize moral values and principles, making them a part of who we are as people rather than endorsing them as mere followers of rules.

8.   Generality and Moral Dilemmas

Like laws, codes of conduct do not provide all the answers to moral dilemmas or situations one will encounter during the course of his or her professional life. Codes of conduct often consist of broad guidelines rather than specific solutions to ethically charged situations; real life situations are manifold and diverse. Professional judgment is very important in all situations. Codes of conduct often have limited practical utility and usually fail to prioritize values and principles. Codes of conduct often fail to identify exceptions to general principles and can not account for all situational factors.

Topic : Research Design: The Experimental Model And Its Variations

Topic Objective:

At the end of this topic student would be able to:

- Learn about the origins of Design Research
- Identify the early work on Research Design
- Comprehend the Development of Research Design
- Learn about the Scientific control
- Understand the Necessity of controls

Definition/Overview:

Design research: Design research investigates the process of designing in all its many fields. It is thus related to Design methods in general or for particular disciplines. A primary interpretation of design research is that it is concerned with undertaking research into the design process. Secondary interpretations would refer to undertaking research within the process of design. The overall intention is to better understand and to improve the design process.

Key Points:

1.   Origins of Design Research

Design Research emerged as a recognisable field of study in the 1960s, initially marked by a conference on Design methods at Imperial College, London, in 1962. It led to the founding of the Design Research Society (DRS) in 1966. John Christopher Jones (who initiated the 1962

conference) founded a postgraduate Design Research Laboratory at the University of Manchester Institute of Science and Technology, and L. Bruce Archer founded the postgraduate Department of Design Research at the Royal College of Art, London, becoming the first Professor of Design Research.

The Design Research Society has always stated its aim as: to promote the study of and research into the process of designing in all its many fields. Its purpose therefore is to act as a form of learned society, taking a scholarly and domain independent view of the process of designing. Some of the origins of design methods and design research lay in the emergence after the 2nd World War of operational research methods and management decision-making techniques, the development of creativity techniques in the 1950s, and the beginnings of computer programs for problem solving in the 1960s. A statement by Bruce Archer (1965) encapsulated what was going on: The most fundamental challenge to conventional ideas on design has been the growing advocacy of systematic methods of problem solving, borrowed from computer techniques and management theory, for the assessment of design problems and the development of design solutions. Herbert Simon (1969) established the foundations for a science of design, which would be a body of intellectually tough, analytic, partly formalizable, partly empirical, teachable doctrine about the design process.

2.   Early work on Research Design

Early work was mainly within the domains of architecture and industrial design, but research in engineering design developed strongly in the 1980s; for example, through ICED the series of International Conferences on Engineering Design. These developments were especially strong in Germany and Japan. In the USA there were also some important developments in design theory and methodology, including the publications of the Design Methods Group and the series of conferences of the Environmental Design Research Association. The National Science Foundation initiative on design theory and methods led to substantial growth in engineering design research in the late-1980s. A particularly significant development was the emergence of

the first journals of design research. DRS initiated Design Studies in 1979, Design Issues appeared in 1984, and Research in Engineering Design in 1989.

3.   Development of Research Design

The development of design research has led to the establishment of design as a coherent discipline of study in its own right, based on the view that design has its own things to know and its own ways of knowing them. Bruce Archer again encapsulated the view in stating his new belief that there exists a designerly way of thinking and communicating that is both different from scientific and scholarly ways of thinking and communicating, and as powerful as scientific and scholarly methods of enquiry when applied to its own kinds of problems. Significantly, Donald Schn (1983) promoted the new view within his book The Reflective Practitioner, in which he challenged the technical rationality of Simon and sought to establish an epistemology of practice implicit in the artistic, intuitive processes which [design and other] practitioners bring to situations of uncertainty, instability, uniqueness and value conflict.

It might be said that design research came of age in the 1980s, since when we have seen a continuing period of expansion. More new journals have appeared, such as The Design Journal, the Journal of Design Research, and CoDesign. There has also been a major growth in conferences, with not only a continuing series by DRS, but also series such as Design Thinking, Doctoral Education in Design, Design Computing and Cognition, Design and Emotion, the European Academy, the Asian Design Conferences, etc., etc. Design research now operates on an international scale, acknowledged in the cooperation of DRS with the Asian design research societies in the founding in 2005 of the International Association of Societies of Design Research.

4.   Scientific control
Scientific controls allow experiments to study one variable at a time, and are a vital part of the scientific method. In a controlled experiment, two virtually identical experiments are conducted.

In one of them, the treatment, the factor being tested is applied. In the other, the control, the factor being tested is not applied. For example, in testing a drug, it is important to carefully verify that the supposed effects of the drug are produced only by the drug itself. Doctors achieve this with a double-blind study in a clinical trial: two (statistically) identical groups of patients are compared, one of which receives the drug and one of which receives a placebo. Neither the patients nor the doctor know which group receives the real drug, which serves both to curb bias and to isolate the effects of the drug.

A positive control is a procedure that is very similar to the actual experimental test, but which is known from previous experience to give a positive result. A negative control is known to give a negative result. The positive control confirms that the basic conditions of the experiment were able to produce a positive result, even if none of the actual experimental samples produce a positive result. The negative control demonstrates the base-line result obtained when a test does not produce a measurable positive result; often the value of the negative control is treated as a "background" value to be subtracted from the test sample results, or be used as the "100%" value against which the test sample results are weighed. For example, in an enzyme assay to measure the amount of an enzyme in a set of extracts, a positive control would be an assay where you add some of the purified enzyme, and a negative control would be where you do not add any extract. The positive control should give a large amount of enzyme activity, while the negative control should give very low to no activity.

5.   Necessity of controls

Controls are needed to eliminate alternate explanations of experimental results. For example, suppose a researcher feeds an experimental artificial sweetener to sixty laboratory rats and observes that ten of them subsequently die. The underlying cause of death could be the sweetener itself or something unrelated. Perhaps the rats were simply not supplied with enough food or water; or the water was contaminated and undrinkable; or the rats were under some psychological or physiological stress, or any other number of variables that may interfere with the experimental design many of which may not be readily obvious. Eliminating each of these possible explanations individually would be time-consuming and difficult. Instead, the researcher can use an experimental control, separating the rats into two groups: one group that receives the

sweetener and one that does not. The two groups are kept in otherwise identical conditions, and both groups are observed in the same ways. Now, any difference in morbidity between the two groups can be ascribed to the sweetener itself--and no other factor--with much greater confidence. In other cases, an experimental control is used to prevent the effects of one variable from being drowned out by the known, greater effects of other variables. For example, suppose a program that gives out free books to children in subway stations wants to measure the effect of the program on standardized test scores. However, the researchers understand that many other factors probably have a much greater effect on standardized test scores than the free books: household income, for example, and the extent of parents' education. In scientific parlance, these are called confounding variables. In this case, the researchers can either use a control group or use statistical techniques to control for the other variables.

- In Section 2 of this course you will cover these topics:
- An Introduction To Alternative Data-Gathering Strategies And The Special Case Of Uniform Crime Reports
- Sampling And Survey Research: Questionnaires

Topic : An Introduction To Alternative Data-Gathering Strategies And The Special Case Of Uniform Crime Reports

Topic Objective:

At the end of this topic student would be able to:

- Learn about the History of the UCR
- Understand the Data collection in UCR

- Comprehend the Criticism on the UCR

Definition/Overview:

Uniform Crime Reports: The Uniform Crime Reports (UCR) contains official data on crime that is reported to law enforcement agencies across the country that then provide the data to the Federal Bureau of Investigation (FBI). UCR focuses on index crimes, which include murder and non-negligent manslaughter, robbery, forcible rape, aggravated assault, burglary, larceny/theft, motor vehicle theft, and arson. UCR is a summary-based reporting system, with data aggregated to the city, county, state, and other geographic levels. Crime statistics are compiled from UCR data and published annually by the FBI in the Crime in the United States series. To address limitations of UCR, the FBI has developed the National Incident Based Reporting System (NIBRS) system, which is slowly being deployed by law enforcement agencies.

Key Points:

1.   History of the UCR

The UCR Program was based upon work by the International Association of Chiefs of Police (IACP) throughout the 1920s to create a uniform national set of crime statistics, reliable for analysis. In 1927, the IACP created the Committee on Uniform Crime Reporting to determine first for national comparisons. The committee determined seven crimes fundamental to comparing crime rates: murder and non-negligent manslaughter, forcible rape, burglary, aggravated assault, larceny and motor vehicle theft (the eighth, arson, was added under a congressional directive in 1978). The early program was managed by the IACP, prior to FBI involvement, done through a monthly report. The first report in January 1930 reported data from 400 cities throughout 43 states, covering more than 20 million individuals, approximately twenty percent of the total U.S. population.

June 11, 1930, through IACP lobbying, the United States Congress passed legislation enacting 28 USC 534, which granting the office of the Attorney General the ability to acquire, collect, classify, and preserve identification, criminal identification, crime, and other records with the ability appoint officials to oversee this duty, including the subordinate members of the Bureau of Investigation. In 1930, full authority was passed to the Bureau of Investigation, which was renamed numerous times throughout the 1930s eventually becoming the Federal Bureau of Investigation in 1935, the July 1930 issue of the IACP crime report serving as notice of the FBIs takeover of the program. While the IACP discontinued oversight of the program, they continued to advise the FBI to better the UCR.

Since 1935, the FBI served as a data clearinghouse; organizing, collecting, and disseminating information voluntarily submitted by local, state, federal and tribal law enforcement agencies. The UCR remained the primary tool for collection and analysis of data for the next half century. Throughout the 1980s, a series of National UCR Conferences were with members from the IACP, Department of Justice, including the FBI, and newly formed Bureau of Justice Statistics (BJS). The purpose was to determine necessary system revisions and then implement them. The result of these conferences was the release of a Blueprint for the Future of the Uniform Crime Reporting Program release in May 1985, detailing the necessary revisions. The report proposed splitting reported data into two separate categories, the eight serious crimes and twenty-one less commonly reported crimes. The eight serious crimes became known as Part I index crimes. The additional twenty-one crimes are considered Part II index crimes. In 2003, FBI UCR data were compiled from more than 16,000 agencies, representing 93 percent of the population in forty seven states. While nationally reporting is not mandated, many states have instituted laws requiring law enforcement within those states to provide UCR data. The continued growth an improvement of the UCR is unlikely as the US Department of Justice and other UCR Conference members have decided to integrate the UCR program into the NIBRS program, created in the late 1980s based on the UCR framework.

2.   Data collection in UCR

Each month, law enforcement agencies report the number of known index crimes in their jurisdiction to the FBI. This mainly includes crimes reported to the police by the general public, but may also include crimes that police officers discover, and known through other sources. Law enforcement agencies also report the number of crime cases cleared. For reporting purposes, criminal offenses are divided into two major groups: Part I offenses and Part II offenses. In Part I, the UCR indexes reported incidents in two categories: violent and property crimes. Aggravated assault, forcible rape, murder, and robbery are classified as violent while arson, burglary, larceny-theft, and motor vehicle theft are classified as property crimes. These are reported via the document named Return A - Monthly Return of Offenses Known to the Police. Part 1 crimes are collectively known as Index crimes, this name is used because the crimes are considered quite serious, tend to be reported more reliably than others, and are reported directly to the police and not to a separate agency (ex- IRS) that doesn't necessarily contribute to the UCR. In Part II, the following categories are tracked: simple assault, curfew offenses and loitering, embezzlement, forgery and counterfeiting, disorderly conduct, driving under the influence, drug offenses, fraud, gambling, liquor offenses, offenses against the family, prostitution, public drunkenness, runaways, sex offenses, stolen property, vandalism, vagrancy, and weapons offenses.

Two property reports are also included with the Return A. The first is the Property Stolen by Classification report. This report details the number of actual crimes of each type in the Return A and the monetary value of property stolen in conjunction with that crime. Some offenses are reported in greater detail on this report than on the Return A. For example, on the Report A, burglaries are divided into three categories: Forcible Entry, Unlawful Entry - No Force, and Attempted Forcible Entry. On the Property Stolen by Classification report, burglaries are divided into six categories based on location type and the time of the offense. Offenses are counted in residences with offense times of 6pm to 6am, 6am to 6pm and Unknown Time and Non-residences with the same three time groupings.

The second property report is the Property Stolen by Type and Value report. The monetary value of both stolen and recovered property are totaled and classified as one of eleven property types:

- Currency, Notes, Etc.
- Jewelry and Precious Metals
- Clothing and Furs
- Locally Stolen Motor Vehicles
- Office Equipment
- Televisions, Radios, Stereos, Etc.
- Firearms
- Household Goods
- Consumable Goods
- Livestock
- Miscellaneous

The FBI began recording arson rates, as part of the UCR, in 1979. This report details arsons of the following property types:

- Single Occupancy Residential (houses, townhouses, duplexes, etc)
- Other Residential (apartments, tenements, flats, hotels, motels, dormitories, etc)
- Storage (barns, garages, warehouses, etc)
- Industrial/Manufacturing
- Other Commercial (stores, restaurants, offices, etc)
- Community/Public (churches, jails, schools, colleges, hospitals, etc)
- All Other Structures (out buildings, monuments, buildings under construction, etc)
- Motor Vehicles (automobiles, trucks, buses, motorcycles, etc)
- Other Mobile Property (trailers, recreational vehicles, airplanes, boats, etc)
- Other (crops, timber, fences, signs, etc)

3.   Criticism on the UCR

Critics of the UCR note they do not accurately reflect crime rates in that they can only list crimes reported to law enforcement agencies. Also, should a number of crimes be connected, they only list the most serious one. For instance, if someone were murdered during a car theft, they would only list murder. Lastly, the list is biased in the reporting of rape. The UCR defines forcible rape as, "the carnal knowledge of a female forcibly and against her will." It does not list rapes against men, nor does it list same-sex rape. The UCR does not include simple assaults in part 1 and minor assaults, verbal assaults and other such crimes, which can account for between 50% and 90% of violent crimes in other countries, are not recorded.

Topic : Sampling And Survey Research: Questionnaires

Topic Objective:

At the end of this topic student would be able to:

- Comprehend Questionnaire
- Understand the Structure and standardization of Questionnaires
- Learn about the Serial surveys
- Develop learning regarding Advantages and disadvantages of surveys
- Identify the Disadvantages of the Surveys
- Learn about the Modes of Data Collection
- Elaborate Six Sigma

Definition/Overview:

Sampling: Sample selection is critical to the validity of the information that represents the populations that are being studied. The approach of the sampling helps to determine the focus of the study and allows better acceptance of the generalizations that are being made.

Key Points:

1. **Questionnaire**

A questionnaire is a research instrument consisting of a series of questions and other prompts for the purpose of gathering information from respondents. Although they are often designed for statistical analysis of the responses, this is not always the case. The questionnaire was invented by Sir Francis Galton. Careful use of biased sampling can be used if it is justified and as long as it is noted that the resulting sample may not be a true representation of the population of the study.

Statistical surveys are used to collect quantitative information about items in a population. Surveys of human populations and institutions are common in political polling and government, health, social science and marketing research. A survey may focus on opinions or factual information depending on its purpose, and many surveys involve administering questions to individuals. When the questions are administered by a researcher, the survey is called a structured interview or a researcher-administered survey. When the questions are administered by the respondent, the survey is referred to as a questionnaire or a self-administered survey. Questionnaires are used by sociologists, positivists prefer closed questions. Questionnaires have advantages over some other types of surveys in that they are cheap, do not require as much effort from the questioner as verbal or telephone surveys, and often have standardized answers that make it simple to compile data. However, such standardized answers may frustrate users. Questionnaires are also sharply limited by the fact that respondents must be able to read the

questions and respond to them. Thus, for some demographic groups conducting a survey by questionnaire may not be practical. As a type of survey, questionnaires also have many of the same problems relating to question construction and wording that exist in other types of opinion polls.

2.   Structure and standardization of Questionnaires

The questions are usually structured and standardized. The structure is intended to reduce bias. For example, questions should be ordered in such a way that a question does not influence the response to subsequent questions. Surveys are standardized to ensure reliability, generalizability, and validity . Every respondent should be presented with the same questions and in the same order as other respondents. In organizational development (OD), carefully constructed survey instruments are often used as the basis for data gathering, organizational diagnosis, and subsequent action planning. Some OD practitioners (e.g. Fred Nickols) even consider survey guided development as the sine qua non of OD.

3.   Serial surveys

Serial surveys are those which repeat the same questions at different points in time, producing time-series data. They typically fall into two types:

- Cross-sectional surveys which draw a new sample each time. In a sense any one-off survey will also be cross-sectional.
- Longitudinal surveys where the sample from the initial survey is recontacted at a later date to be asked the same questions.

4.   Advantages and disadvantages of surveys

- It is an efficient way of collecting information from a large number of respondents. Very large samples are possible. Statistical techniques can be used to determine validity, reliability, and statistical significance.

- Surveys are flexible in the sense that a wide range of information can be collected. They can be used to study attitudes, values, beliefs, and past behaviours.
- Because they are standardized, they are relatively free from several types of errors.
- They are relatively easy to administer.
- There is an economy in data collection due to the focus provided by standardized questions. Only questions of interest to the researcher are asked, recorded, codified, and analyzed. Time and money is not spent on tangential questions.

5.   Disadvantages of the Surveys

Surveys depend on subjects motivation, honesty, memory, and ability to respond. Subjects may not be aware of their reasons for any given action. They may have forgotten their reasons. They may not be motivated to give accurate answers, in fact, they may be motivated to give answers that present themselves in a favorable light. Structured surveys, particularly those with closed ended questions, may have low validity when researching affective variables. Although the chosen survey individuals are often a random sample, errors due to non-response may exist. That is, people who choose to respond on the survey may be different from those who do not respond, thus biasing the estimates. Survey question answer-choices could lead to vague data sets because at times they are relative only to a personal abstract notion concerning "strength of choice". For instance the choice "moderately agree" may mean different things to different subjects, and to anyone interpreting the data for correlation. Even yes or no answers are problematic because subjects may for instance put "no" if the choice "only once" is not available.

6. Six Sigma

Six Sigma is a business management strategy, originally developed by Motorola, that today enjoys widespread application in many sectors of industry. Six Sigma seeks to identify and remove the causes of defects and errors in manufacturing and business processes. It uses a set of quality management methods, including statistical methods, and creates a special infrastructure of people within the organization ("Black Belts" etc.) who are experts in these methods. Each Six Sigma project carried out within an organization follows a defined sequence of steps and has

quantified financial targets (cost reduction or profit increase). Quality in business is heavily dependent on six sigma methodology & tools in that it is focused on variance & error reduction in any process. Companies that are known for achieving well-publicized success of quality through six sigma implementation are Motorola, Honeywell (previously known as AlliedSignal), and General Electric.

Graph of the normal distribution, which underlies the statistical assumptions of the Six Sigma model. The Greek letter marks the distance on the horizontal axis between the mean, , and the curve's inflection point. The greater this distance is, the greater is the spread of values encountered. For the curve shown in red above, = 0 and = 1. The other curves illustrate different values of and . The following outlines the statistical background of the term Six Sigma: Sigma (the lower-case Greek letter) is used to represent the standard deviation (a measure of variation) of a statistical population. The term "six sigma process," comes from the notion that if one has six standard deviations between the mean of a process and the nearest specification limit, there will be practically no items that fail to meet the specifications; compare with the three sigma rule and computations there. This is based on the calculation method employed in a process capability study. In a capability study, the number of standard deviations between the process mean and the nearest specification limit is given in sigma units. As process standard deviation goes up, or the mean of the process moves away from the center of the tolerance, fewer standard deviations will fit between the mean and the nearest specification limit, decreasing the sigma number.

- In Section 3 of this course you will cover these topics:
- Survey Research: Interviews And Telephone Surveys
- Participant Observation And Case Studies

Topic : Survey Research: Interviews And Telephone Surveys

Topic Objective:

At the end of this topic student would be able to:

- Comprehend the Uses of survey data
- Understand about the Automated telephone survey
- Develop learning regarding Structured interview
- Understand the Uses of survey data

Definition/Overview:

Interview Survey: The Interview Survey is administered over a period of five quarters and collects expenditures from the previous three months. This survey is meant to capture large purchases, such as spending on furniture, clothing, and utilities.

Key Points:

1.   Uses of survey data

Data from the Consumer Expenditure Survey are used in a number of different ways by a variety of users. One important use of the survey is for the periodic revision of the Bureau of Labor Statistics's Consumer Price Index (CPI). The Bureau uses survey results to select new market baskets of goods and services for the CPI, to determine the relative importance of CPI components, and to derive new cost weights for the market baskets. Market researchers find the

data useful in analyzing the demand for groups of goods and services. The data allow them to track spending trends of different types of consumer units. Government and private agencies use the data to study the welfare of particular segments of the population, such as those consumer units with a reference person aged 65 and older or under age 25, or for low-income consumer units. Economic policymakers use the data to study the impact of policy changes on the welfare of different socioeconomic groups. Researchers use the data in a variety of studies, including those that focus on the spending behavior of different family types, trends in expenditures on various expenditure components including new types of goods and services, gift-giving behavior, consumption studies, and historical spending trends.

2.   Automated telephone survey

Automated surveys are used to collect information and gain feedback via the telephone and the internet. Automated surveys are used for customer research purposes by call centres for customer relationship management and performance management purposes. They are also used for political polling, market research and job satisfaction surveying. Many large organizations outsource their customer handling to call centres where another organization deals directly with their customers. Automated surveys give independent evaluation of the outsourced service from the customers themselves. In call centres automated surveys are used to improve service quality and increase customer loyalty.

3.   Structured interview

A structured interview (also known as a standardized interview or a researcher-administered survey) is a quantitative research method commonly employed in survey research. The aim of this approach is to ensure that each interviewee is presented with exactly the same questions in the same order. This ensures that answers can be reliably aggregated and that comparisons can be made with confidence between sample subgroups or between different survey periods. Structured interviews are a means of collecting data for a statistical survey. In this case, the data is collected by an interviewer rather than through a self-administered questionnaire. Interviewers read the questions exactly as they appear on the survey questionnaire. The choice of answers to the

questions is often fixed (close-ended) in advance, though open-ended questions can also be included within a structured interview.

A structured interview also standardises the order in which questions are asked of survey respondents, so the questions are always answered within the same context. This is important for minimising the impact of context effects, where the answers given to a survey question can depend on the nature of preceding questions. Though context effects can never be avoided, it is often desirable to hold them constant across all respondents.

4.   Uses of survey data

Data from the Consumer Expenditure Survey are used in a number of different ways by a variety of users. One important use of the survey is for the periodic revision of the Bureau of Labor Statistics's Consumer Price Index (CPI). The Bureau uses survey results to select new market baskets of goods and services for the CPI, to determine the relative importance of CPI components, and to derive new cost weights for the market baskets. Market researchers find the data useful in analyzing the demand for groups of goods and services. The data allow them to track spending trends of different types of consumer units. Government and private agencies use the data to study the welfare of particular segments of the population, such as those consumer units with a reference person aged 65 and older or under age 25, or for low-income consumer units. Economic policymakers use the data to study the impact of policy changes on the welfare of different socioeconomic groups. Researchers use the data in a variety of studies, including those that focus on the spending behavior of different family types, trends in expenditures on various expenditure components including new types of goods and services, gift-giving behavior, consumption studies, and historical spending trends.

Topic : Participant Observation And Case Studies

Topic Objective:

At the end of this topic student would be able to:

- Understand the concept of Method and Practice
- Identify the History and Development
- Comprehend the procedure of Case selection
- Learn about the Critical case
- Understand the Paradigmatic case
- Develop learning regarding the process of Generalizing from case studies

Definition/Overview:

Participant observation: Participant observation is a set of research strategies which aim to gain a close and intimate familiarity with a given group of individuals (such as a religious, occupational, or subcultural group, or a particular community) and their practices through an intensive involvement with people in their natural environment, often though not always over an extended period of time. The method originated in field work of social anthropologists, especially Bronisław Malinowski and his students in Britain, the students of Franz Boas in the US, and in the urban research of the Chicago School of sociology.

Key Points:

1.   Method and Practice

Such research usually involves a range of methods: informal interviews, direct observation, participation in the life of the group, collective discussions, analyses of personal documents produced within the group, self-analysis, and life-histories. Although the method is generally characterized as qualitative research, it can (and often does) include quantitative dimensions. Participant observation is usually undertaken over an extended period of time, ranging from several months to many years. An extended research time period means that the researcher will be able to obtain more detailed and accurate information about the people he/she is studying.

Observable details (like daily time allotment) and more hidden details (like taboo behavior) are more easily observed and understandable over a longer period of time. A strength of observation and interaction over long periods of time is that researchers can discover discrepancies between what participants say -- and often believe -- should happen (the formal system) and what actually does happen, or between different aspects of the formal system; in contrast, a one-time survey of people's answers to a set of questions might be quite consistent, but is less likely to show conflicts between different aspects of the social system or between conscious representations and behavior.

2.   History and Development

Participant observation has its roots in anthropology and as a methodology can be attributed to Frank Hamilton Cushing in his study of the Zuni Indians in the later part of the nineteenth century, followed by the studies of non-Western societies by people such as Bronislaw Malinowski, Edward Evans-Pritchard, and Margaret Mead in the first half of the twentieth century. It emerged as the principal approach to ethnographic research by anthropologists and relied on the cultivation of personal relationships with local informants as a way of learning about a culture, involving both observing and participating in the social life of a group. By living with the cultures they studied, these researchers were able to formulate first hand accounts of their lives and gain novel insights. This same method of study has also been applied to groups within Western society, and is especially successful in the study of sub-cultures or groups sharing a strong sense of identity, where only by taking part might the observer truly get access to the lives of those being studied. Since the 1980s, some anthropologists and other social scientists have questioned the degree to which participant observation can give veridical insight into the minds of other people.

At the same time, a more formalized qualitative research program known as grounded theory, initiated by Glaser and Strauss, began gaining currency within American sociology and related fields such as public health. In response to these challenges, some ethnographers have refined their methods, either making them more amenable to formal hypothesis-testing and replicability,

or framing their interpretations within a more carefully considered epistemology. "Observing" or "observant" participation has also been used to describe fieldwork in sexual minority subcultures by anthropologists and sociologists who are themselves lesbian, gay, bisexual, or transgender; the different phrasing is meant to highlight the way in which their partial or full membership in the community/subculture that they are researching both allows a different sort of access to the community and also shapes their perceptions in ways different from a full outsider. This is similar to considerations by anthropologists such as Lila Abu-Lughod on "halfie anthropology", or fieldwork by bicultural anthropologists on a culture to which they partially belong. The sociological methods known as grounded theory (Glazer and Strauss) overlap significantly with the more formalized versions of participant observation.

3.   Case selection

When selecting a case for a case study, researchers often use information-oriented sampling, as opposed to random sampling. This is because the typical or average case is often not the richest in information. Extreme or atypical cases reveal more information because they activate more basic mechanisms and more actors in the situation studied. In addition, from both an understanding-oriented and an action-oriented perspective, it is often more important to clarify the deeper causes behind a given problem and its consequences than to describe the symptoms of the problem and how frequently they occur. Random samples emphasizing representativeness will seldom be able to produce this kind of insight; it is more appropriate to select some few cases chosen for their validity.

4.   Critical case

A critical case can be defined as having strategic importance in relation to the general problem. For example, an occupational medicine clinic wanted to investigate whether people working with organic solvents suffered brain damage. Instead of choosing a representative sample among all those enterprises in the clinics area that used organic solvents, the clinic strategically located a single workplace where all safety regulations on cleanliness, air quality, and the like, had been

fulfilled. This model enterprise became a critical case: if brain damage related to organic solvents could be found at this particular facility, then it was likely that the same problem would exist at other enterprises which were less careful with safety regulations for organic solvents. Via this type of strategic sampling, one can save both time and money in researching a given problem. Another example of critical case sampling is the strategic selection of lead and feather for the test of whether different objects fall with equal velocity. The selection of materials provided the possibility to formulate a generalization characteristic of critical cases, a generalization of the sort, If it is valid for this case, it is valid for all (or many) cases. In its negative form, the generalization would be, If it is not valid for this case, then it is not valid for any (or only few) cases.

5.   Case study on Participant observation

Rather than using large samples and following a rigid protocol to examine a limited number of variables, case study methods involve an in-depth, longitudinal examination of a single instance or event: a case. They provide a systematic way of looking at events, collecting data, analyzing information, and reporting the results. As a result the researcher may gain a sharpened understanding of why the instance happened as it did, and what might become important to look at more extensively in future research. Case studies lend themselves to both generating and testing hypotheses.

Another suggestion is that case study should be defined as a research strategy, an empirical inquiry that investigates a phenomenon within its real-life context. Case study research means single and multiple case studies, can include quantitative evidence, relies on multiple sources of evidence and benefits from the prior development of theoretical propositions. Case studies should not be confused with qualitative research and they can be based on any mix of quantitative and qualitative evidence. Single-subject research provides the statistical framework for making inferences from quantitative case-study data. This is also supported and well-formulated in : "The case study is a research approach, situated between concrete data taking techniques and methodologic paradigms."

6.   Paradigmatic case

A Paradigmatic case may be defined as an exemplar or prototype. Thomas Kuhn has shown that the basic skills, or background practices, of natural scientists are organized in terms of exemplars or 'paradigms' the role of which in the scientific process can be analyzed. Similarly, scholars like Clifford Geertz and Michel Foucault have often organized their research around specific cultural paradigms: a paradigm for Geertz lay for instance in the deep play of the Balinese cockfight, while for Foucault, European prisons and the Panopticon are examples. Both instances are examples of paradigmatic cases, that is, cases that highlight more general characteristics of the societies or issues in question. Kuhn has shown that scientific paradigms cannot be expressed as rules or theories. There exists no predictive theory for how predictive theory comes about. A scientific activity is acknowledged or rejected as good science by how close it is to one or more exemplars; that is, practical prototypes of good scientific work. A paradigmatic case of how scientists do science is precisely such a prototype. It operates as a reference point and may function as a focus for the founding of schools of thought.

7.   Generalizing from case studies

The case study is effective for generalizing using the type of test that Karl Popper called falsification, which forms part of critical reflexivity. Falsification is one of the most rigorous tests to which a scientific proposition can be subjected: if just one observation does not fit with the proposition it is considered not valid generally and must therefore be either revised or rejected. Popper himself used the now famous example of, "All swans are white," and proposed that just one observation of a single black swan would falsify this proposition and in this way have general significance and stimulate further investigations and theory-building. The case study is well suited for identifying "black swans" because of its in-depth approach: what appears to be "white" often turns out on closer examination to be "black."

For instance, Galileos rejection of Aristotles law of gravity was based on a case study selected by information-oriented sampling and not random sampling. The rejection consisted primarily of a conceptual experiment and later on of a practical one. These experiments, with the benefit of hindsight, are self-evident. Nevertheless, Aristotles incorrect view of gravity dominated scientific inquiry for nearly two thousand years before it was falsified. In his experimental thinking, Galileo reasoned as follows: if two objects with the same weight are released from the same height at the same time, they will hit the ground simultaneously, having fallen at the same speed. If the two objects are then stuck together into one, this object will have double the weight and will according to the Aristotelian view therefore fall faster than the two individual objects. This conclusion seemed contradictory to Galileo. The only way to avoid the contradiction was to eliminate weight as a determinant factor for acceleration in free fall. Galileos experimentalism did not involve a large random sample of trials of objects falling from a wide range of randomly selected heights under varying wind conditions, and so on. Rather, it was a matter of a single experiment, that is, a case study.

Galileos view continued to be subjected to doubt, however, and the Aristotelian view was not finally rejected until half a century later, with the invention of the air pump. The air pump made it possible to conduct the ultimate experiment, known by every pupil, whereby a coin or a piece of lead inside a vacuum tube falls with the same speed as a feather. After this experiment, Aristotles view could be maintained no longer. What is especially worth noting, however, is that the matter was settled by an individual case due to the clever choice of the extremes of metal and feather. One might call it a critical case, for if Galileos thesis held for these materials, it could be expected to be valid for all or a large range of materials. Random and large samples were at no time part of the picture. However it was Galileo's view that was the subject of doubt as it was not reasonable enough to be Aristotelian view

- In Section 4 of this course you will cover these topics:
- Unobtrusive Measures, Secondary Analysis, And The Uses Of Official Statistics
- Validity, Reliability, And Triangulated Strategies

Topic : Unobtrusive Measures, Secondary Analysis, And The Uses Of Official Statistics

Topic Objective:

At the end of this topic student would be able to:

- Comprehend Unobtrusive Measures
- Learn about the Secondary data analysis
- Understand the Sources of secondary data
- Identify Bureau of Labor Statistics
- Elaborate Qualitative Data Sources
- Develop learning regarding Combining Existing Secondary Data Sources with New Primary Data Sources
- Understand the Technical Challenges in Combining Data Sets
- Comprehend the Design and Purpose of Research
- Learn about Challenges of secondary data analysis
- Understand Surveys
- Develop learning regarding the Crime statistics

Definition/Overview:

The term unobtrusive measures was first coined by Webb, Campbell, Schwartz, & Sechrest in a 1966 book titled Unobtrusive methods: Nonreactive research in the social science. They described methodologies which do not involve direct elicitation of data from the research subjects. Unobtrusive measures are contrasted with interviews and questionnaires, in that they try

to find indirect ways to obtain the necessary data. The unobtrusive approach often seeks unusual data sources, such as garbage, graffiti and obituaries, as well as more conventional ones such as published statistics.

Key Points:

1.   Unobtrusive Measures

Unobtrusive measures should not be perceived as an alternative to more reactive methods such as interviews, surveys and experiments, but rather as an additional tool in the tool chest of the social researcher. Unobtrusive measures can assist in tackling known biases such as selection bias and experimenter's bias. Webb and his colleagues emphasize the importance of triangulating the results obtained through various methodologies, each with its own unique set of (usually unknown) biases.

The proliferation of digital media opened a new era for communication researchers in search of unobtrusively obtained data sources. Online communication creates digital footprints that can allow an analysis of data that are obtained through unobtrusive methods, and are also massively larger than any corpora obtained via elicitation and human transcription. These footprints can now be used to analyze topics such as the content of communication events, the process of communication, and the structure of the communicative network. The surge of Internet-sourced research data rekindled the discussion of the ethical aspects of using unobtrusively obtained data. For example, can all data collected in the public domain be used for research purposes? When should we seek consent, and is it realistic to require informed consent from sources of unobtrusively collected data? These questions do not have a simplistic answer, and the solution is a result of a careful and ongoing dialog between researchers, and between researchers and society in large.

2.   Secondary data analysis

There are two different types of sources that need to be established in order to conduct a good analysis. The first type is a primary source which is the initial material that is collected during the research process. Primary data is the data that the researcher is collecting themselves using methods such as surveys, direct observations, interviews, as well as logs(objective data sources). Primary data is a reliable way to collect data because the researcher will know where it came from and how it was collected and analyzed since they did it themselves. Secondary sources on the other hand are sources that are based upon the data that was collected from the primary source. Secondary sources take the role of analyzing, explaining, and combining the information from the primary source with additional information.

Secondary data analysis is commonly known as second-hand analysis. It is simply the analysis of preexisting data in a different way or to answer a different question than originally intended. Secondary data analysis utilizes the data that was collected by someone else in order to further a study that you are interested in completing. In contrast to secondary data, primary data comes from observations made by the researchers themselves. This often creates credibility issues that do not arise with secondary data. Common sources of secondary data are social science surveys and data from government agencies, including the Bureau of the Census, the Bureau of Labor Statistics and various other agencies. The data collected is most often collected via survey research methods. Data from experimental studies may also be used.

3.   Sources of secondary data

Sources of secondary data may be classified into qualitative and quantitative. Examples of qualitative sources are biographies, memoirs, newspapers, etc. Quantitave sources include published statistics (e.g., census, survey), data archives, market research, etc. Today, with Internet capabilities, thousands of large scale datasets are at the click of a mouse for secondary data analyst. Globally, there are many sources available. These sources can arrive from the data arranged by governmental and private organizations, to data collected by any social researcher.

Secondary data analysis is a growing research tool in our modern day society. Social scientists have the opportunity to explore massive amounts of secondary data.

The United States Government has kept track of the census of the population for over two hundred years. Moreover, the census includes housing, the labor force, manufacturers, business, agriculture, foreign aspects, and so on. Census data can be used for a number of research questions. For example, a researcher can study the behavior of persons not only in one state, or one region, but they can specifically study a small area such as one city block. Anyone has access to the large amounts of statistics, and information on the nearly one hundred surveys conducted by the bureau, by visiting their Web site at. Samples of U.S. census gathered for over one hundred years, including historical census files from other countries, are available through this microdata series. These samples are on an individual level. They are available at the University of Minnesotas Minnesota Population Center. These data provide codes and names for all samples in an easy-to-use format. Samples can include demographic measures, educational, occupational, and all work indicators. You can view this data at www.ipums.umn.edu.

4.   Bureau of Labor Statistics

This source collects data on employment, industrial relations, prices, earnings, living conditions, occupational safety, technology, and productivity. Reports are published each month in this Bureau and they can be viewed at.

5.   Qualitative Data Sources

Qualitative datasets are far less available as secondary data sources. Several university-based secondary data sources are qualitative, yet at the same time, most have limited access to them. Cross-cultural research is made available through the Human Relations Area Files, a Yale

University source. ICPSR also carries some qualitative sources, but the data in these sources can be difficult to interpret.

For what different purposes can data from archives be used? The first and simplest case would be for descriptive purposes, such as a phone book. A particular contribution of the data archives can be made to comparative research, both, across nations and over time. In the early years of data archives, when secondary analysis was not yet a popular research strategy, the idea of comparative research based on archival data was promoted in conferences already some 40 years ago. In the first case this would allow for comparative analysis over time, in the second for comparative analysis across societies or nations. Therefore, the design of comparative surveys is crucial for making empirical knowledge cumulative over space and time. Equally important are longitudinal studies which can be compiled over time. For example, in a research project on "Attitudes Towards Technology" it is of crucial importance to include data collected in the fifties and sixties in order to answer the research question whether potential threats from new technologies have decreased the level of technology acceptance or whether tendencies to reject new developments concentrate on particular technologies only, and if so, under what circumstances.

6.   Combining Existing Secondary Data Sources with New Primary Data Sources

Imagine that we could get hold of a good collection of surveys taken in earlier years, such as detailed studies about changes going on in this phase and hopefully additional studies in the years to come. Analyzing this data base over time could give us a good picture of what changes actually have taken place in the orientation of the population and of the extent to which new technical concepts did have an impact on subgroups of the population. Furthermore, data archives can help to prepare studies on change over time by monitoring what questions have been asked in earlier years and alerting principal investigators to important questions which should be repeated in planned research projects. Actually, data archives should consider including funds in their budgets which allow them to collect data for relevant questions in order to avoid interruptions in important time series.

7.   Technical Challenges in Combining Data Sets

A number of methodological and technical requirements have to be observed and should be implemented rigorously. Just to mention the most important: Some methodologists require that the questions should be functionally equivalent, whereas others claim that the question texts must be phrased identically. Frequently, it is not the linguistic identity which matters. Sometimes it is much more important, whether the questions are understood by the respondent in the same way. Thus, a thermometer or scale used as a representation for intensity of attitudes in the more developed societies may be replaced by a ladder in less developed societies. Both, thermometer and ladder, would still measure the same dimension in the conceptual world of the respective respondents. A second requirement would be comparability of samples, thus, a cross-national representative random sample would be hard to compare with the local quota sample in one community in a different nation. Several other factors have to be controlled as well, in particular contextual influences at the time of field work or political or environmental events, which are related to the topic of the research.

8.   The Design and Purpose of Research

Secondary data analysis consists of collecting data that was compiled through research by another person and using that data to get a better understanding of a concept. A good way to begin your research using secondary data that you are collecting to further support your concept is to clearly define the goals of your research and the design that you anticipate using. An important thing to remember when defining your plan is to ensure that you have established what kind of data you plan on using for your research and the exact goal. Establishing what type of research design is an important component. In terms of using secondary data for research it helps to create an outline of what the final product will look like consisting of all the types of data to be used along with a list of sources that were used to compile the research.

Locating the data can be easily done with the advancements of searching sources online. However, people need to be aware of the details when searching online since pages can be out of date or poorly put together. Therefore, use caution and pay attention to whether it is a reliable data source online and check when the last update was. To evaluate the data a researcher must carefully examine the secondary data they are considering to ensure that it meets their needs and purpose of study. The person must look at the population and what the sample strategy and type were. It is also important to look at when the data was collected, how it was collected, how it was coded and edited, along with the operational definitions of measures that were used. Finally, the data must be verified to ensure good quality material to be used in new research. In secondary data analysis, most individuals who do not have much experience in research training or technical expertise can be trained accordingly. However, this advantage is not without difficulty as the individual must be able to judge the quality of the data or information that has been gathered. These key tips will assist you in assessing the quality of the data: Determine the original purpose of the data collection, attempt to discover the credentials of the source(s) or author(s) of the information, consider if the document is a primary or secondary source, verify that the source well-referenced, and finally find out the: date of the publication; the intended audience, and coverage of the report or document.

9.   Challenges of secondary data analysis

Using secondary data can allow for the analyses of social processes in what would otherwise be inaccessible settings. It also saves time and money since the work has already been done to collect the data. That lets the researcher avoid problems with the data collection process. Using someone else's data can also facilitate a comparison with other data samples and allow multiple sets of data to be combined. There is also the chance that other variables could be included, resulting in a more diverse sample than would have been feasible before. There are several things to take into consideration when using preexisting data. Secondary data does not permit the progression from formulating a research question to designing methods to answer that question. It is also not feasible for a secondary data analyst to engage in the habitual process of making observations and developing concepts. These limitations hinder the ability of the researcher to focus on the original research question. Data quality is always a concern because it's source may

not be trusted. Even data from official records may be bad because the data is only as good as the records themselves. There are six questions that a secondary analyst should be able to answer about the data they wish to analyze.

10. Crime statistics

Crime statistics attempt to provide a statistical measure of the level, or amount, of- crime that is prevalent in societies. Given that crime, by definition, is an illegal activity, every way of measuring it is likely to be inaccurate. There are many forms of measuring crime, including household surveys or checking hospital or insurance records, but the term "crime statistic" usually refers to figures compiled by the Police and similar law enforcement agencies. However, it is well known that many if not most offences are not reported to the police, and changes in police procedures can have a big impact on how such reported crimes are categorized. This is why public surveys are sometimes conducted to estimate the amount of crime not reported to police and to ascertain levels of victimization. Such surveys are usually more reliable in providing reliable trends over time, but they rarely encompass all crime (eg separate surveys are required to measure retail crime such as shoplifting, as distinct from crime against the public), rarely give local statistics useful for local crime prevention or enforcement, often ignore offences against children, and do not count offenders brought before the criminal justice system.

Crime statistics are gathered and reported by many countries and are of interest to several international organizations, including Interpol and the United Nations. Law enforcement agencies in some countries, such as the FBI in the United States and the Home Office in England & Wales, publish crime indices, which are compilations of statistics for various types of crime. Because laws vary between jurisdictions, comparing crime statistics between, and even within, countries can be difficult, sometimes even problematic. Even overall international trends can be difficult to interpret authoritatively. Research using a series of victim surveys in 18 countries of the European Union funded by the European Commission has reported (2005) that the level of crime in Europe has fallen back to the levels of 1990, and notes that levels of common crime have shown declining trends in the U.S.A., Canada, Australia and other industrialised countries

as well. The European researchers say a general consensus identifies demographic change as the leading cause for this international trend. However they suggest that "increased use of crime prevention measures may indeed be the common factor behind the near universal decrease in overall levels of crime in the Western world", since decreases have been most pronounced in property crime and less so, if at all, in contact crimes.

Crime indexes are generated to analyze crime statistics. The most common source of such statistics are records reported to the police. Critics do not feel that crime indexes are particularly useful as they only list reported crimes. This makes it difficult to know whether a "10% increase" has any real meaning. An alternative source of data is the victimization survey, usually conducted via annual interviews with households, whose occupants are asked whether they have been the victim of crime. Critics note that surveys are generally unreliable, especially when they involve discussions of criminal activity. Victims surveys however provide more reliable data than police recorded crime for the volume (or common) crimes. Rare but serious crimes such as intentional homicide and armed robberies have frequencies that are too low to be measured accurately by a survey. Considering the seriousness of these crimes and the amount work done on them, police statistics are more accurate here, at least in the developed countries.

Crime statistics recording practices vary, not only between countries and jurisdictions but sometimes within jurisdictions and even between two individual law enforcement officers encountering the same situation. Because many law enforcement officers have powers of discretion, they have the ability to affect how much crime is recorded based on how they record their activities. Even though a member of the public may report a crime to a law enforcement officer, it will not be counted unless that crime is then recorded in a way that allows it to be incorporated into the crime statistics. As a consequence, offending, particularly minor offending, may be significantly undercounted in situations where law enforcement officers are overloaded with work or do not perceive the offending as worth recording. Similarly certain high profile categories of crime may be well reported when there is an incentive (such as a financial or performance incentive) for the law enforcement officer to do so.

Crime rate is a measure of the rate of occurrence of crimes committed in a given area and time. Most commonly, crime rate is given as the number of crimes committed among a given number of persons.Often, the type of crime is exactly specified. Thus, a crime rate might be given as the number of murders (or rapes, thefts, etc.) per 100,000 persons per year within a city. Crime rate is a useful statistic for many purposes, such as evaluating the effectiveness of crime prevention measures or the relative safety of a particular city or neighborhood. Crime rate statistics are commonly used by politicians to advocate for or against a policy designed to deal with crime. The calculation of crime rates uses data that is obtained either from criminal justice systems or from public surveys. Comparisons between the two types of data are problematic, and so are comparisons using the same type of data between different jurisdictions. The United Nations publishes international reports of both Crime Trends and Operations of Criminal Justice A European initiative has resulted in the European sourcebook . an utmost attempt is made to harmonise the criminal justice data for the purpose of international (European) comparison.

11. Surveys

Because of the difficulties in quantifying how much crime actually occurs, researchers generally take two approaches to gathering statistics about crime. Statistics from law enforcement organizations are often used. These statistics are normally readily available and are generally reliable in terms of identifying what crime is being dealt with by law enforcement organizations, as they are gathered by law enforcement officers in the course of their duties and are often extracted directly from law enforcement computer systems. However, these statistics often tend to reflect the productivity and law enforcement activities of the officers concerned and may bear little relationship to the actual amount of crime, as officers can only record crime that comes to their attention and might not record a matter as a crime if the matter is considered minor and is not perceived as a crime by the officer concerned. The statistics may also be biased because of routine actions and pragmatic decisions that law enforcement officers make in the field. For example, when faced with a domestic violence dispute between a couple, a law enforcement officer may decide it is far less trouble to arrest the male party to the dispute, because the female

may have children to care for, despite both parties being equally culpable for the dispute. This sort of pragmatic decisionmaking would mean the statistics had a gender bias because of what officers did to resolve such disputes.

Researchers also conduct population surveys in order to identify victims of crime and their experiences. These surveys are often known as victimization surveys as they seek to identify the victims of crime, especially for crime that is not reported to a law enforcement officer. Victimization surveys also suffer from problems as they are perception surveys. In these surveys people are being asked if they are victims of crime, without needing to provide any supporting evidence. In these surveys it is the participant's perception, or opinion, that a crime occurred, or even their understanding about what constitutes a crime that is being measured. As a consequence victimization surveys can also exhibit a subjective bias. Also, differing methodologies may make comparisons with other surveys difficult. One way in which victimization surveys are useful is that they show some types of crime are well reported to law enforcement officials, while other types of crime are under reported. These surveys also give insights as to why crime is reported, or not. The surveys show that the need to make an insurance claim, seek medical assistance, and the seriousness of an offence tend to increase the level of reporting, while the inconvenience of reporting, the involvement of intimate parters and the nature of the offending tend to decrease reporting. This allows degrees of confidence to be assigned to various crime statistics. For example: Motor vehicle thefts are generally well reported because the victim may need to make the report for an insurance claim, while domestic violence, domestic child abuse and sexual offences are frequently significantly under-reported because of the intimate relationships involved, embarrassment and other factors that make it difficult for the victim to make a report.

Topic : Validity, Reliability, And Triangulated Strategies

Topic Objective:

At the end of this topic student would be able to:

- Comprehend the Test Validity
- Learn about the Types of Validity
- Understand Factors jeopardizing validity
- Develop learning regarding Internal validity
- Understand about External validity

Definition/Overview:

Validity: In psychology, validity has two distinct fields of application. The first involves test validity, a concept that has evolved with the field of psychometrics: "Validity refers to the degree to which evidence and theory support the interpretations of test scores entailed by proposed uses of tests". The second involves research design. Here the term refers to the degree to which a study supports the intended conclusion drawn from the results. In the Campbellian tradition, this latter sense divides into four aspects: support for the conclusion that the causal variable caused the effect variable in the specific study (internal validity), support that the same effect generalizes to the population from which the sample was drawn (statistical conclusion validity), support for the intended interpretation of the variables (construct validity), and support for the generalization of the results beyond the studied population (external validity).

Key Points:

1. Test Validity

An early definition of test validity identified it with the degree of correlation between the test and a criterion. Under this definition, one can show that reliability of the test and the criterion places

an upper limit on the possible correlation between them (the so-called validity coefficient). Intuitively, this reflects the fact that reliability involves freedom from random error and random errors do not correlate with one another. Thus, the less random error in the variables, the higher the possible correlation between them. Under these definitions, a test cannot have high validity unless it also has high reliability. However, the concept of validity has expanded substantially beyond this early definition and the classical relationship between reliability and validity need not hold for alternative conceptions of reliability and validity. Within classical test theory, predictive or concurrent validity (correlation between the predictor and the predicted) cannot exceed the square root of the correlation between two versions of the same measure that is, reliability limits validity.

Test validity can be assessed in a number of ways and thorough test validation typically involves more than one line of evidence in support of the validity of an assessment method (e.g. structured interview, personality survey, etc). The current Standards for Educational and Psychological Measurement follow Samuel Messick in discussing various types of validity evidence for a single summative validity judgment. These include construct related evidence, content related evidence, and criterion related evidence which breaks down into two subtypes (concurrent and predictive) according to the timing of the data collection. Construct related evidence involves the empirical and theoretical support for the interpretation of the construct. Such lines of evidence include statistical analyses of the internal structure of the test including the relationships between responses to different test items. They also include relationships between the test and measures of other constructs. As currently understood, construct validity is not distinct from the support for the substantive theory of the construct that the test is designed to measure. As such, experiments designed to reveal aspects of the causal role of the construct also contribute to construct validity evidence.

Content related evidence involves the degree to which the content of the test matches a content domain associated with the construct. For example, a test of the ability to add two-digit numbers should cover the full range of combinations of digits. A test with only one-digit numbers, or only even numbers, would not have good coverage of the content domain. Content related evidence typically involves subject matter experts (SME's) evaluating test items against the test

specifications. Criterion related evidence involves the correlation between the test and a criterion variable (or variables) taken as representative of the construct. For example, employee selection tests are often validated against measures of job performance. Measures of risk of recidivism among those convicted of a crime can be validated against measures of recidivism. If the test data and criterion data are collected at the same time, this is referred to as concurrent validity evidence. If the test data is collected first in order to predict criterion data collected at a later point in time, then this is referred to as predictive validity evidence.

Face validity is an estimate of whether a test appears to measure a certain criterion; it does not guarantee that the test actually measures phenomena in that domain. Indeed, when a test is subject to faking (malingering), low face validity might make the test more valid. In contrast to test validity, assessment of the validity of a research design generally does not involve data collection or statistical analysis but rather evaluation of the design in relation to the desired conclusion on the basis of prevailing standards and theory of research design.

2. Types of Validity

2.1 Internal validity
Internal validity is an inductive estimate of the degree to which conclusions about causes of relations are likely to be true, in view of the measures used, the research setting, and the whole research design. Good experimental techniques in which the effect of an independent variable on a dependent variable is studied under highly controlled conditions, usually allow for higher degrees of internal validity than, for example, single-case designs.

2.2 External validity
The issue of External validity concerns the question to what extent one may safely generalize the (internally valid) causal inference (a) from the sample studied to the defined target population and (b) to other populations (i.e. across time and space).

2.3 Ecological validity

This issue is closely related to external validity and covers the question to which degree your experimental findings mirror what you can observe in the real world (ecology= science of interaction between organism and its environment). Ecological validity is whether the results can be applied to real life situations. Typically in science, you have two domains of research: Passive-observational and active-experimental. The purpose of experimental designs is to test causality, so that you can infer A causes B or B causes A. But sometimes, ethical and/or methological restrictions prevent you from conducting an experiment (e.g. how does isolation influence a child's cognitive functioning?) Then you can still do research, but it's not causal, it's correlational, A occurs together with B. Both techniques have their strengths and weaknesses. To get an experimental design you have to control for all interfering variables. That's why you conduct your experiment in a laboratory setting. While gaining internal validity (excluding interfering variables by keeping them constant) you lose ecological validity because you establish an artificial lab setting. On the other hand with observational research you can't control for interfering variables (low internal validity) but you can measure in the natural (ecological) environment, thus at the place where behavior occurs.

2.4 Construct validity

Construct validity refers to the totality of evidence about whether a particular operationalization of a construct adequately represents what is intended by theoretical account of the construct being measured. (Demonstrate an element is valid by relating it to another element that is supposively valid.) There are two approaches to construct validity- sometimes referred to as 'convergent validity' and 'divergent validity'.

2.5 Content validity

This is a non-statistical type of validity that involves the systematic examination of the test content to determine whether it covers a representative sample of the behavior domain to be measured. A test has content validity built into it by careful selection of which items to include. Items are chosen so that they comply with the test specification which is drawn up through a thorough examination of the subject domain. By using a

panel of experts to review the test specifications and the selection of items the content validity of a test can be improved. The experts will be able to review the items and comment on whether the items cover a representative sample of the behavior domain.

2.6 Face validity

Face validity is very closely related to content validity. While content validity depends on a theoretical basis for assuming if a test is assessing all domains of a certain criterion (e.g. does assessing addition skills yield in a good measure for mathematical skills? - To answer this you have to know, what different kinds of arithmetic skills mathematical skills include) face validity relates to whether a test appears to be a good measure or not. This judgment is made on the "face" of the test, thus it can also be judged by the amateur.

2.7 Criterion validity

Criterion-related validity reflects the success of measures used for prediction or estimation. There are two types of criterion-related validity: Concurrent and predictive validity. A good example of criterion-related validity is in the validation of employee selection tests; in this case scores on a test or battery of tests is correlated with employee performance scores.

2.8 Concurrent validity

Concurrent validity refers to the degree to which the operationalization correlates with other measures of the same construct that are measured at the same time. Going back to the selection test example, this would mean that the tests are administered to current employees and then correlated with their scores on performance reviews.

2.9 Predictive validity

Predictive validity refers to the degree to which the operationalization can predict (or correlate with) with other measures of the same construct that are measured at some time in the future. Again, with the selection test example, this would mean that the tests are administered to applicants, all applicants are hired, their performance is reviewed at a later time, and then their scores on the two measures are correlated.

2.10 Convergent validity

Convergent validity refers to the degree to which a measure is correlated with other measures that it is theoretically predicted to correlate with.

2.11 Discriminant validity

Discriminant validity describes the degree to which the operationalization does not correlate with other operationalizations that it theoretically should not correlated with.

3.   Factors jeopardizing validity

Campbell and Stanley define internal validity as the basic requirements for an experiment to be interpretable did the experiment make a difference in this instance? External validity addresses the question of generalizability to whom can we generalize this experiment's findings?

4.   Internal validity

Eight extraneous variables can interfere with internal validity:

- History, the specific events occurring between the first and second measurements in addition to the experimental variables
- Maturation, processes within the participants as a function of the passage of time (not specific to particular events), e.g., growing older, hungrier, more tired, and so on.
- Testing, the effects of taking a test upon the scores of a second testing.
- Instrumentation, changes in calibration of a measurement tool or changes in the observers or scorers may produce changes in the obtained measurements.
- Statistical regression, operating where groups have been selected on the basis of their extreme scores.
- Selection, biases resulting from differential selection of respondents for the comparison groups.
- Experimental mortality, or differential loss of respondents from the comparison groups.
- Selection-maturation interaction, etc. e.g., in multiple-group quasi-experimental designs

5. *External validity*

Four factors jeopardizing external validity or representativeness are:

- Reactive or interaction effect of testing, a pretest might increase the scores on a posttest
- Interaction effects of selection biases and the experimental variable.
- Reactive effects of experimental arrangements, which would preclude generalization about the effect of the experimental variable upon persons being exposed to it in non-experimental settings
- Multiple-treatment interference, where effects of earlier treatments are not erasable.

Example/Case Study:

- In Section 5 of this course you will cover these topics:
- Scaling And Index Construction
- Policy Analysis And Evaluation Research

Topic : Scaling And Index Construction

Topic Objective:

At the end of this topic student would be able to:

- Comprehend the Types of Variables
- Understand the Types of Statistics based on Number of DVs
- Learn the Level of measurement
- Develop learning regarding the Ratio measurement
-

Definition/Overview:

Overview: Statistics is the study of relationships between things. Rarely are we interested in the relationship between two things that always stay the same. Most often, we are interested in the relationship between things that change from person to person, from place to place. Things that never change are referred to as constants. Water boils at 212 degrees. This temperature is a constant (given that it is pure water at standard pressure). Sex can change. Some people are male and some are female. This means that sex is a variable. The temperature outside is variable because it can and does change. Statistics generally requires that we be able to assign a number to a variable. That is we must be able to quantify it. This does not mean that the number expresses any specific magnitude. Variables are often divided into two categories: Qualitative (categorical) and Quantitative (continuous). This can lead to some confusion when we assign numbers to qualitative (categorical) data. Carefully examine the context of the statement to determine what the author/speaker means when using the terms. Qualitative or categorical data tells us to what group, kind, or type an element belongs. Sex is a categorical variable. Usually qualitative and quantitative are used to generally describe a study or method, and categorical and continuous are used to describe specific sets of data. Four other common descriptions are used to describe the level of information a variable gives us. Nominal gives us the least amount of information while ratio data gives us the most. Always use the highest level of data measurement possible.

Key Points:

1. **Types of Variables**

   1.1 Nominal Variables
   Numbers on a football jersey do not express any magnitude or size; they only serve to name the player. These naming variables are referred to as nominal. If we divide a sample into groups based on sex, we have group 1 and group 2. The numbers do not suggest any specific magnitude; they just allow us to tell which group is being

considered. This is less important for us than it is for the computer program that is going to do the hard work for us. Nominal is the lowest level of measurement.

1.2 Ordinal Variables

Ordinal variables have numbers that allow us to put things in order, but do not refer to a standard difference between the elements. If you tell me that you graduated high school third in your class, I understand what order you come in, but have no idea how much better you were than the person that came in fourth, and how much worse you are than the person that came in second. If we arrange a list of items from least to greatest, we have rank-ordered it. Rank ordered data is ordinal.

1.3 Interval Variables

Interval level measurement is so called because in addition to telling us the rank of an element, it also tells us the magnitude of that difference. The distance between 4 feet and 5 feet is the same as the difference between 11 feet and 12 feet: one foot. The critical idea is that a foot is the same magnitude or size every time. The intervals along points of the scale are always the same.

1.4 Ratio Variables

Ratio Level variables provide the same information as Interval variables, as well as having an absolute zero to the scale. That is, when you reach a value of zero, the variable is no longer present. Calories in various beverages are an example of ratio level data. We can determine which beverages have more calories than others do, so we can rank them. This means that we have met the requirements for the ordinal level of measurement. We know the size of a calorie does not change along the scale, so we meet the requirements of interval level data. We can also have a beverage, such as water, that does not have any calories, or an absolute zero.   Sentence lengths would be ratio level data because the judge may impose no sentence. Most statistical procedures used in criminal justice research make no real distinction between interval and ratio levels of measurement. Often they are depicted together with a slash mark between them: interval/ratio.

1.5 Dependent and Independent Variables

These terms are often very confusing to the student because they imply causation. These terms were first used by scientists conducting true experiments where the Independent Variable (IV) was thought to cause the Dependent Variable (DV). Causation is determined strictly by experimental design, not statistical mathematics (more on this later). Even with this caveat, it is often helpful to think of the DV as the effect and the IV as the cause. The DV in a study is the variable that we want to explain or predict. Thus if we wanted to explain crime rates, crime rate would be the DV in our study. If we think poverty causes crime, poverty is our IV.

2.   Types of Statistics based on Number of DVs

Statistics are generally divided into three general categories. If we want to explain one variable, we say that we are using univariate statistical methods. Univariate methods are generally descriptive, since no comparison of variables is made. If we want to describe a relationship between two variables (correlations), we say that we are using bivariate statistical techniques. If we are interested in two or more dependent variables, we use multivariate statistics.

3.   Level of measurement

The "levels of measurement" is an expression which typically refers to the theory of scale types developed by the Harvard psychologist Stanley Smith Stevens. Stevens proposed his theory in a 1946 article titled "On the theory of scales of measurement" in the journal Science. In this article Stevens claimed that all measurement in science was conducted using four different types of numerical scales which he called "nominal", "ordinal", "interval" and "ratio".

4.   Scale types and Stevens' "operational theory of measurement"

The theory of scale types is the intellectual handmaiden to Stevens' "operational theory of measurement," which was to become definitive within psychology and the behavioral sciences, despite it being quite at odds with the understanding of measurement held in the natural sciences . Essentially, the operational theory of measurement was a reaction to the conclusions of a

committee established in 1932 by the British Association for the Advancement of Science to investigate the possibility of genuine scientific measurement in the psychological and behavioral sciences. This committee, which became known as the Ferguson committee, published a Final Report in which Stevens' sone scale was an object of criticism:

...any law purporting to express a quantitative relation between sensation intensity and stimulus intensity is not merely false but is in fact meaningless unless and until a meaning can be given to the concept of addition as applied to sensation.

That is, if Stevens' sone scale was genuinely measuring the intensity of auditory sensations, then evidence for such sensations being quantitative attributes must be produced. The evidence needed was the presence of additive structure - a concept comprehensively treated by the German mathematician Otto Hlder . Given the physicist and measurement theorist Norman Robert Campbell dominated the Ferguson committee's deliberations, the committee concluded that real measurement in the social sciences was impossible due to the lack of concatenation operations. This conclusion was later rendered false by the discovery of the theory of conjoint measurement by Debreu and independently by Luce & Tukey .

4.1 Nominal scale

Nominal scales are mere codes assigned to objects as labels, they are not measurements. For example, rocks can be generally categorized as (1) igneous, (2) sedimentary and (3) metamorphic. A code of "3" given to any particular stone observed does not mean that stone possesses more "rockness" than a stone coded as "1", anymore than a person with red hair does not possess more "hairness" than a person with blonde hair.
Stevens must have known that claiming nominal scales to measure obviously non-quantitative things would have attracted criticism, so he invoked his theory of measurement to justify nominal scales as measurement:

...the use of numerals as names for classes is an example of the assignment of numerals according to rule. The rule is: Do not assign the same numeral to different

classes or different numerals to the same class. Beyond that, anything goes with the nominal scale.

The only kind of measure of central tendency that remains invariant under one-one transformations is the mode. The median and mean cannot be defined.

4.2 Ordinal scale

In this scale type, the numbers assigned to objects or events represent the rank order (1st, 2nd, 3rd etc.) of the entities assessed. An example of ordinal measurement is the results of a horse race, which say only which horses arrived first, second, third, etc. but include no information about times. Another is the Mohs scale of mineral hardness, which characterizes the hardness of various minerals through the ability of a harder material to scratch a softer one, saying nothing about the actual hardness of any of them. Interestingly, Stevens' writings

betrayed a critical view of psychometrics as he argued:

As a matter of fact, most of the scales used widely and effectively by psychologists are ordinal scales. In the strictest propriety the ordinary statistics involving means and standard deviations ought not to be used with these scales, for these statistics imply a knowledge of something more than the relative rank order of data Psychometricians like to theorise that psychometric tests produce interval scale measures of cognitive abilities but there is little prima facie evidence to suggest that such attributes are anything more than ordinal. The central tendency of an ordinal attribute can be represented by its mode or its median, but the mean cannot be defined.

4.3 Interval scale

Quantitive attributes are all able to be measured on interval scales, as any difference between the levels of an attribute can be multiplied by any real number to exceed or equal another difference. A highly familiar example of interval scale measurement is temperature with the Celsius scale. In this particular scale, the unit of measurement is 1/100 of the difference between the melting temperature and the boiling temperature of water in atmospheric pressure. The "zero point" on an interval scale is arbitrary; and negative values can be used. The formal mathematical term is an affine space (in this case

an affine line). Variables measured at the interval level are called "interval variables" or sometimes "scaled variables" as they have units of measurement. Ratios between numbers on the scale are not meaningful, so operations such as multiplication and division cannot be carried out directly. But ratios of differences can be expressed; for example, one difference can be twice another.

The central tendency of a variable measured at the interval level can be represented by its mode, its median, or its arithmetic mean. Statistical dispersion can be measured in most of the usual ways, which just involved differences or averaging, such as range, interquartile range, and standard deviation. Since one cannot divide, one cannot define measures that require a ratio, such as studentized range or coefficient of variation. More subtly, while one can define moments about the origin, only central moments are useful, since the choice of origin is arbitrary and not meaningful. One can define standardized moments, since ratios of differences are meaningful, but one cannot define coefficient of variation, since the mean is a moment about the origin, unlike the standard deviation, which is (the square root of) a central moment.

5.   Ratio measurement

Most measurement in the physical sciences and engineering is done on ratio scales. Mass, length, time, plane angle, energy and electric charge are examples of physical measures that are ratio scales. The scale type takes it name from the fact that measurement is the estimation of the ratio between a magnitude of a continuous quantity and a unit magnitude of the same kind. Informally, the distinguishing feature of a ratio scale is the possession of a non-arbitrary zero value. For example, the Kelvin temperature scale has a non-arbitrary zero point of absolute zero, which is denoted 0K and is equal to -273.15 degrees Celsius. This zero point is non arbitrary as the particles which comprise matter at this temperature have zero kinetic energy. Examples of ratio scale measurement in the behavioral sciences are all but non-existant. Luce argues that an example of ratio scale measurement in psychology can be found in rank and sign dependent expected utility theory.

All statistical measures can be used for a variable measured at the ratio level, as all necessary mathematical operations are defined. The central tendency of a variable measured at the ratio level can be represented by, in addition to its mode, its median, or its arithmetic mean, also its geometric mean or harmonic mean. In addition to the measures of statistical dispersion defined for interval variables, such as range and standard deviation, for ratio variables one can also define measures that require a ratio, such as studentized range or coefficient of variation.

5.1 Likert scale

Likert scaling is a bipolar scaling method, measuring either positive or negative response to a statement. Sometimes a four-point scale is used; this is a forced choice method since the middle option of "Neither agree nor disagree" is not available. Likert scales may be subject to distortion from several causes. Respondents may avoid using extreme response categories (central tendency bias); agree with statements as presented (acquiescence bias); or try to portray themselves or their organization in a more favorable light (social desirability bias). Designing a scale with balanced keying (an equal number of positive and negative statements) can obviate the problem of acquiescence bias, since acquiescence on positively keyed items will balance acquiescence on negatively keyed items, but central tendency and social desirability are somewhat more problematic.

5.2 Guttman scale

In statistical surveys conducted by means of structured interviews or questionnaires, a subset of the survey items having binary (e.g., YES or NO) answers forms a Guttman scale if they can be ranked in some order so that, for a rational respondent, the response pattern can be captured by a single index on that ordered scale. In other words, on a Guttman scale, items are arranged in an order so that an individual who agrees with a particular item also agrees with items of lower rank-order. For example, a series of items could be (1) "I am willing to be near ice cream"; (2) "I am willing to smell ice cream"; (3) "I am willing to eat ice cream"; and (4) "I love to eat ice cream". Agreement with any one item implies agreement with the lower-order items.

The concept of Guttman scale likewise applies to series of items in other kinds of tests, such as achievement tests, that have binary outcomes. For example, a test of math achievement might order questions based on their difficulty and instruct the examinee to begin in the middle. The assumption is if the examinee can successfully answer items of that difficulty (e.g., summing two 3-digit numbers), s/he would be able to answer the earlier questions (e.g., summing two 2-digit numbers). Some achievement tests are organized in a Guttman scale to reduce the duration of the test. Another example is the original Beaufort wind force scale, assigning a single number to observed conditions of the sea surface ("Flat", ..., "Small waves", ..., "Sea heaps up and foam begins to streak", ...), was in fact a Guttman scale. The observation "Flat = YES" implies "Small waves = NO".

By designing surveys and tests such that they contain Guttman scales, researchers can simplify the analysis of the outcome of surveys, and increase the robustness. Guttman scales also make it possible to detect and discard randomized answer patterns, as may be given by uncooperative respondents. A class of unidimensional models that contrast with Guttman's model are unfolding models. These models also assume unidimensionality but posit that the probability of endorsing an item is proportional to the distance between the items standing on the unidimensional trait and the standing of the respondent. For example, items like "I think immigration should be reduced" on a scale measuring attitude towards immigration would be unlikely to be endorsed both by those favoring open policies and also by those favoring no immigration at all. Such an item might be endorsed by someone in the middle of the continuum. Some researchers feel that many attitude items fit this unfolding model while most psychometric techniques are based on correlation or factor analysis, and thus implicitly assume a linear relationship between the trait and the response probability. The effect of using these techniques would be to only include the most extreme items, leaving attitude instruments with little precision to measure the trait standing of individuals in the middle of the continuum.

5.3 Thurstone scale

In psychology, the Thurstone scale was the first formal technique for measuring an attitude. It was developed by Louis Leon Thurstone in 1928, as a means of measuring attitudes towards religion. It is made up of statements about a particular issue, and each statement has a numerical value indicating how favorable or unfavorable it is judged to be. People check each of the statements to which they agree, and a mean score is computed, indicating their attitude.

Thurstone's method of pair comparisons can be considered a prototype of a normal distribution-based method for scaling-dominance matrices. Even though the theory behind this method is quite complex , the algorithm itself is straightforward. For the basic Case V, the frequency dominance matrix is translated into proportions and interfaced with the standard scores. The scale is then obtained as a left-adjusted column marginal average of this standard score matrix . The underlying rationale for the method and basis for the measurement of the "psychological scale separation between any two stimuli" derives from Thurstone's Law of comparative judgment . The principal difficulty with this algorithm is its indeterminacy with respect to one-zero proportions, which return z values as plus or minus infinity, respectively. The inability of the pair comparisons algorithm to handle these cases imposes considerable limits on the applicability of the method.

The most frequent recourse when the 1.00-0.00 frequencies are encountered is their omission. Thus, e.g., Guilford has recommended not using proportions more extreme than .977 or .023, and Edwards has suggested that if the number of judges is large, say 200 or more, then we might use pij values of .99 and .01, but with less than 200 judges, it is probably better to disregard all comparative judgments for which pij is greater than .98 or less than .02." Since the omission of such extreme values leaves empty cells in the Z matrix, the averaging procedure for arriving at the scale values cannot be applied, and an elaborate procedure for the estimation of unknown parameters is usually employed. An alternative solution of this problem was suggested by Krus and Kennedy .

With later developments in psychometric theory, it has become possible to employ direct methods of scaling such as application of the Rasch model or unfolding models such as the Hyperbolic Cosine Model (HCM). The Rasch model has a close conceptual relationship to Thurstone's law of comparative judgment, the principal difference being that it directly incorporates a person parameter. Also, the Rasch model takes the form of a logistic function rather than a cumulative normal function.

5.4 Semantic differential Scale

Semantic differential is a type of a rating scale designed to measure the connotative meaning of objects, events, and concepts. The connotations are used to derive the attitude towards the given object, event or concept. Osgood's semantic differential was designed to measure the connotative meaning of concepts. The respondent is asked to choose where his or her position lies, on a scale between two bipolar adjectives (for example: "Adequate-Inadequate", "Good-Evil" or "Valuable-Worthless"). Semantic differentials can be used to describe not only persons, but also the connotative meaning of abstract conceptsa capacity used extensively in affect control theory.

The development of this instrument provides an interesting insight into the border area between linguistics and psychology. People have been describing each other since they developed the ability to speak. Most adjectives can also be used as personality descriptors. The occurrence of thousands of adjectives in English is an attestation of the subtleties in descriptions of persons and their behavior speakers of English developed over millennia. Roget's Thesaurus is an early attempt to classify most adjectives into categories and was used within this context to reduce the number of adjectives to manageable subsets, suitable for factor analysis.

Osgood performed a factor analysis of large collections of semantic differential scales and found three recurring attitudes that people use to evaluate words and phrases: evaluation, potency, and activity. Evaluation loads highest on the adjective pair 'good-

bad'. The 'strong-weak' adjective pair defines the potency factor. Adjective pair 'active-passive' defines the activity factor. These three dimensions of affective meaning were found to be cross-cultural universals in a study of dozens of cultures. This factorial structure msakes intuitive sense. When our ancestors encountered a person, the initial perception had to be whether that person represents a danger. Is the person good or bad? Next, is the person strong or weak? Our reactions to a person markedly differ if perceived as good and strong, good and weak, bad and weak, or bad and strong. Subsequently, we might extend our initial classification to include cases of persons who actively threaten us or represent only a potential, danger, and so on. The evaluation, potency and activity factors thus encompass a detailed descriptive system of personality. Osgood's semantic differential measures these three factors. It contains sets of adjective pairs such as warm-cold, bright-dark, beautiful-ugly, sweet-bitter, fair-unfair, brave-cowardly, meaningful-meaningless.

Topic : Policy Analysis And Evaluation Research

Topic Objective:

At the end of this topic student would be able to:

- Learn about the Approaches to policy analysis
- Understand the Methodology of Policy Analysis
- Develop learning regarding the Models of policy analysis
- Comprehend the Research processes

Definition/Overview:

Policy analysis: Policy analysis can be defined as "determining which of various alternative policies will most achieve a given set of goals in light of the relations between the policies and

the goals". However, policy analysis can be divided into two major fields. Analysis of policy is analytical and descriptive -- i.e., it attempts to explain policies and their development. Analysis for policy is prescriptive -- i.e., it is involved with formulating policies and proposals (e.g., to improve social welfare). The area of interest and the purpose of analysis determines what type of analysis is conducted. A combination of policy analysis toghther with program evaluation would be defined as Policy studies.

Key Points:

1.   Approaches to policy analysis

Although various approaches to policy analysis exist, three general approaches can be distinguished: the analycentric, the policy process, and the meta-policy approach. The analycentric approach focuses on individual problems and its solutions; its scope is the micro-scale and its problem interpretation is usually of a technical nature. The primary aim is to identify the most effective and efficient solution in technical and economic terms (e.g. the most efficient allocation of resources). The policy process approach puts its focal point onto political processes and involved stakeholders; its scope is the meso-scale and its problem interpretation is usually of a political nature. It aims at determining what processes and means are used and tries to explain the role and influence of stakeholders within the policy process. By changing the relative power and influence of certain groups (e.g., enhancing public participation and consultation), solutions to problems may be identified.

The meta-policy approach is a systems and context approach; i.e., its scope is the macro-scale and its problem interpretation is usually of a structural nature. It aims at explaining the contextual factors of the policy process; i.e., what are the political, economic and socio-cultural factors influencing it. As problems may result because of structural factors (e.g., a certain economic system or political institution), solutions may entail changing the structure itself. Policy Analysis is frequently deployed in the public sector, but is equally applicable to other

kinds of organizations. Most policy analysts have graduated from public policy schools with public policy degrees. Policy analysis has its roots in systems analysis as instituted by United States Secretary of Defense Robert McNamara during the Vietnam War. Policy analysts can come from many backgrounds including sociology, psychology, economics, geography, law, political science, american studies, anthropology, public policy, policy studies, social work, environmental planning, and public administration.

2.   Methodology of Policy Analysis

Policy analysis is methodologically diverse using both qualitative methods and quantitative methods, including case studies, survey research, statistical analysis, and model building among others. One common methodology is to define the problem and evaluation criteria; identify all alternatives; evaluate them; and recommend the best policy option.

3.   Models of policy analysis

Many models exist to analyze the creation and application of public policy. Analysts use these models to identify important aspects of policy, as well as explain and predict policy and its consequences. Some models are discussed under:

3.1 Institutional model

Public policy is determined by political institutions, which give policy legitimacy. Government universally applies policy to all citizens of society and monopolizes the use of force in applying policy.

3.2 Process model

Policy creation is a process following these steps:

Firstly, Identification of a problem and demand for government action. Secondly, Formulation of policy proposals by various parties (e.g., congressional committees, think tanks, interest groups). Thridly, Selection and enactment of policy; this is known as Policy Legitimation and lastly, evaluation of policy.

3.3 Rational model

Policy is intended to achieve maximum social gain. Rationally, the policy that maximizes benefits while minimizing costs is the best policy. It is a part of rational choice theory.

3.4 Incremental model

Policy is a continuation of previous government activity, with minimal changes made to previous policy. The goal is a systematic periodic review.

3.5 Group model

The political system's role is to establish and enforce compromise between various, conflicting interests in society.

3.6 Elite model

Policy is a reflection of the interests of those individuals within a society that have the most power, rather than the demands of the mass.

Policy Analysis in six easy steps:

- Verify, define and detail the problem
- Establish an evaluation criteria
- Identify alternative policies
- Evaluate alternative policies
- Display and distinguish among alternative policies
- Monitor the implemented policy

4.   Research processes

Generally, research is understood to follow a certain structural process. Though step order may vary depending on the subject matter and researcher, the following steps are usually part of most formal research, both basic and applied:

- Formation of the topic
- Hypothesis
- Conceptual definitions
- Operational definitions
- Gathering of data
- Analysis of data
- Test, revising of hypothesis
- Conclusion, iteration if necessary

A common misunderstanding is that by this method a hypothesis can be proven. Generally a hypothesis is used to make predictions that can be tested by observing the outcome of an experiment. If the outcome is inconsistent with the hypothesis, then the hypothesis is rejected. However, if the outcome is consistent with the hypothesis, the experiment is said to support the hypothesis. This careful language is used because researchers recognize that alternative hypotheses may also be consistent with the observations. In this sense, a hypothesis can never be proven, but rather only supported by surviving rounds of scientific testing and, eventually, becoming widely thought of as true (or better, predictive), but this is not the same as it having been proven. A useful hypothesis allows prediction and within the accuracy of observation of the

time, the prediction will be verified. As the accuracy of observation improves with time, the hypothesis may no longer provide an accurate prediction. In this case a new hypothesis will arise to challenge the old, and to the extent that the new hypothesis makes more accurate predictions than the old, the new will supplant it.

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