

**Selected Topics in Psychology**  
**Psychological Testing and Assessment**  
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**Issues and Challenges in Psychology Assessment**

Today, we will talk about psychometric assessment. It is very important in behavioral science to assess a human being. We assess human being through several procedures, and one such procedure is called testing. Now, test and experiment are two major methodologies, which are found in behavioral science. By experiment, generally, we try to understand; what are the commonalities amongst the individuals that are in hand. By test, we try to do just the opposite thing; we try to understand; what are the differences between the two individuals.

So, when we refer about assessment, we primarily refer about assessment, in terms of seeing the difference between two individuals or more than two individuals. But assessment, before we talk about it; what is the relevance in our day to day life; it is also important to understand that. What is the difference between assessment and diagnosis? Assessment is a more generic term in which, we try to understand the complete profile of human being, based on certain parameters. In diagnosis, we try to understand, using some form of deficiency model; the difficulties, the kind of disorders, the kind of abnormalities or aberration a person does have, and we try to pinpoint that assessment, which we generally refer as diagnosis.

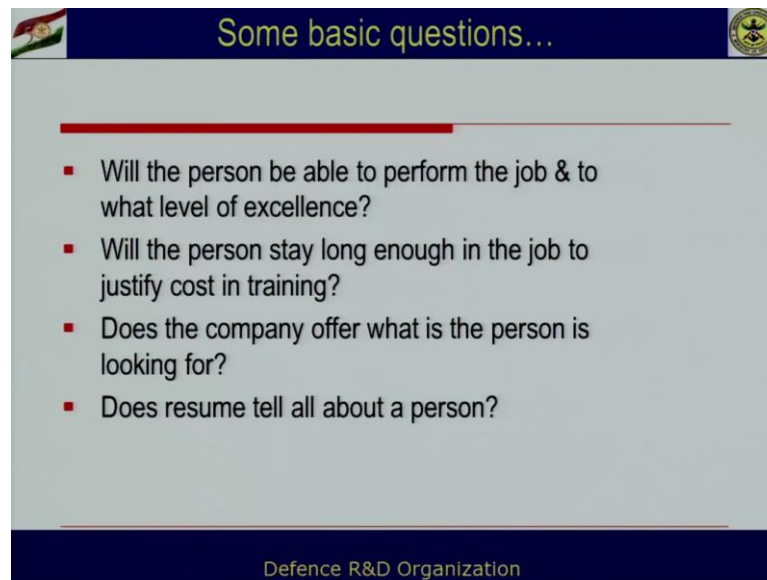
My talk today, would primarily, based on assessment, and the relevance of assessment into our day to day life; primarily, the psychometric assessment. Now, when we talk about assessment, as I said, generally, we refer about test as a procedure. Before we talk about test as a procedure, I am also supposed to talk to you about how experimental procedures are also done. When experiments are conducted, we follow certain procedures. In test also, is that; follow certain procedures. It is important to understand the difference between or the relevance experiment or test in behavioral science. When we conduct an experiment, we conduct an experiment through certain steps. One such step is that, we first decide how to develop a strategy to conduct an experiment. The strategy maybe an observational strategy or experimental strategy or a testing strategy.

Next, what we try to do is to understand the art and science of a given construct, based on which, the test or experiment would be conducted. That is called heuristics. After doing the heuristics, which is basically, a survey of literature; we try to understand the logistics that how we conduct the experiment, or how we do the testing. The logistics are primarily, the instrument, based on ways, these studies are conducted. In case of test; it maybe a standard tool, in case of experiment; it can be experimental hardware, based on which, we try to understand certain generic components or qualities of a human being. After we determined the logistics, we go to the tactics, which is basically, a research methodology.

So, either in experiment or test, we develop research methodology; that is how we conduct an experiment or a test. When we decide about the tactics or the research methodology, we also decide that how the data are to be collected, treated, and then, interpreted, following analysis, which we call statistics. So, statistics basically, is a procedure, based on which, we try to understand from the absolute values to the relative importance of those values, in understanding or quantifying or calibrating a human parameter, or a human quality. Therefore, statistics is a very important parameter or a step in any kind of research methodology. Finally, we try to communicate that research; even, doing any procedure, it may be completely experimental procedure; it maybe cost experimental procedure, or it can be completely based on a testing paradigm or a procedure, based on certain correlation analysis. To repeat, whenever, we conduct an experiment; we conduct experiment through certain steps. The steps are therefore, how we strategize an experimental test; how the heuristics are conducted; how the logistics are decided; how tactics are determined; how the statistics are analyzed, and then, finally, how we conduct it. In all such cases, the testing has a paradigm, based on which, human assessments are done, has got a certain relevance.

In my talk today, I would like to tell you how assessment is important first, and then, based on assessment, how a system is conducted to profile a human being, based on all parameters that are in hand for us. So, basically, I will try to tell you the relevance of assessment in our day to day life; how we can make use of it, and then, finally, how they can be utilized to get a deliverable out of our researches.

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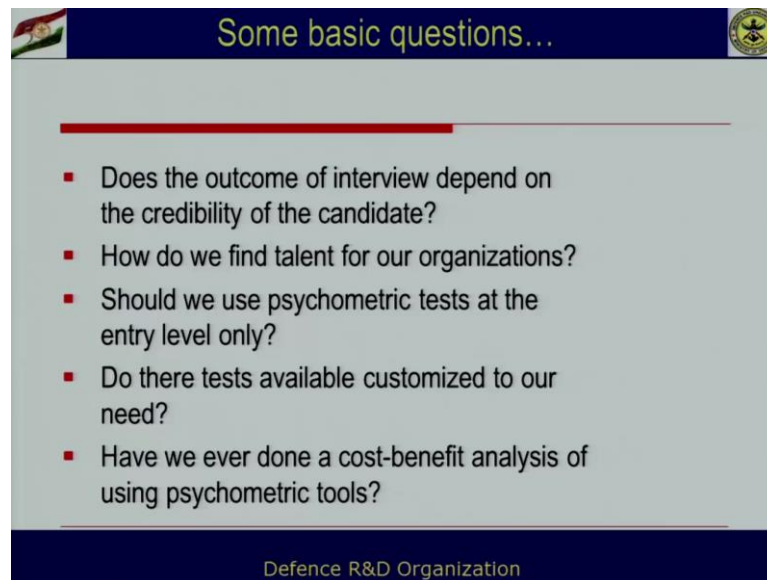


The slide features a dark blue header with the title "Some basic questions..." in yellow. On the left of the header is the Indian national flag, and on the right is a circular logo. The main content area is light grey and contains four red-bulleted questions. A red horizontal line is positioned above the first question. The footer is dark blue with the text "Defence R&D Organization" in yellow.

- Will the person be able to perform the job & to what level of excellence?
- Will the person stay long enough in the job to justify cost in training?
- Does the company offer what is the person is looking for?
- Does resume tell all about a person?

So, some of the basic questions that come to us in our mind that will the person be able to perform a job and to what level of excellence? Normally, we find all human beings have got almost average or similar characteristics, but all human being cannot do everything that is given to them. It is very important in psychometric assessment for us to understand that, whether the person would be able to perform a job, and if he is given that job, to what extent he will perform. Then, the question comes; will a person stay long enough in the job to justify the cost in training? Basically, we try to get a raw material through some kind of assessment, in order to understand the person's capability to do a job. But then, the question comes that even, if the person is capable and crosses a threshold in an assessment procedure, the problem is that all are not susceptible, or all are not equally trainable. So, trainability is also a component, which is also assessed. So, assessment is very important; not only at the selection point of view. Assessment is also important from the training point of view. Then, the question comes, whether the organization will offer what the person is looking for. Suppose, somebody goes for a job in an industry and I have to select him.

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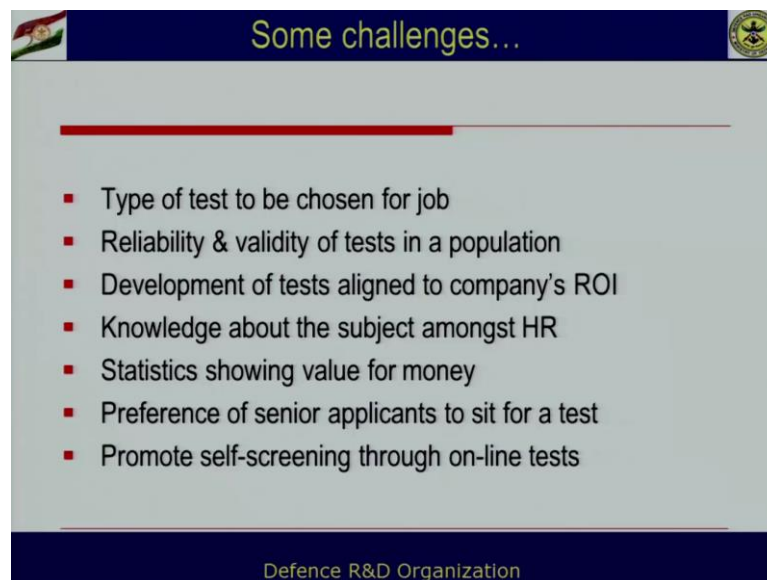
- Does the outcome of interview depend on the credibility of the candidate?
- How do we find talent for our organizations?
- Should we use psychometric tests at the entry level only?
- Do there tests available customized to our need?
- Have we ever done a cost-benefit analysis of using psychometric tools?

Now, the person may be having an expectation. The industry would like or the organization would like to understand to what extent he will perform and, whether the pay to be given to him, is in synchrony, with what he is looking for or not. Then, finally, whether a resume may tell all about a person or not; that is if a person tells that these are my qualities; can I ensure those qualities through some form of psychometric testing or not. This is what, is a very important question. Then, more questions come. Most of the assessments in our day to day affair do not follow a psychometric testing procedure. Generally, they depend on some kind of interview. The question comes, whether the outcome of interview, depend on the credibility of the candidate or not. The question is that at times, the heterogeneity in the assessment brings some kind of moderation in the overall credibility of the candidate. So, it often happens that the candidate's acceptance to a given organization is based primarily, on the heterogeneity of the assessment procedure, and not attributed to the credibility of the candidate's capability. Therefore, the question further comes up; how do we find talent for our organization? Is it really, possible to get right kind of talent for our institutions, organizations? Should we use psychometric test at entry level only, because in our country, almost all entry examinations are based on some form of examination. Can I call them as psychometric assessment? Most of the achievement test that we use in IIEEE, JE, AIPMT, PMT; can we call them as psychometric assessment? What is the relevance, and how they are different from these psychometric properties of other test that are used in this country, or in or in vogue in our country? Do their tests available, customized to our need; that is

also, a very important question. There are several tests which are available in the country or abroad. Point is, whether these tests are equally, suitable to all our conditions. If they are not suitable, why they are not suitable? Can you make use of those tests for other purposes as well? Have we ever done a cost benefit analysis using psychometric tools?

Now, a question comes here, that psychometric tool is a very different kind of tool. It is a very different proposition; it is not very easy to develop. One of the most important factors in psychometric tool development comes out of the definition of the construct, the selection of the items. Then, item selection procedure or analysis, the response analytic procedures, the reliability of the test, the validity of the test, determining the normative standards for the test, ability to predict or the predictive validity of the test, and finally, seeing, whether the test is producing longitudinally, the right kind of results for which, they are being used. These are the questions in psychometric testing. So, one of the most important questions in psychometric testing is that how we develop it? How we make use of it, and to what extent, the predictive validity of this psychometric test can be utilized?

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The slide features a dark blue header with the title 'Some challenges...' in yellow text. On the left is the Indian national flag, and on the right is the Defence R&D Organization logo. A red horizontal line is positioned above a list of seven challenges, each marked with a red square bullet point. The challenges are: 'Type of test to be chosen for job', 'Reliability & validity of tests in a population', 'Development of tests aligned to company's ROI', 'Knowledge about the subject amongst HR', 'Statistics showing value for money', 'Preference of senior applicants to sit for a test', and 'Promote self-screening through on-line tests'. The footer of the slide is dark blue with the text 'Defence R&D Organization' in white.

- Type of test to be chosen for job
- Reliability & validity of tests in a population
- Development of tests aligned to company's ROI
- Knowledge about the subject amongst HR
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Therefore, we have certain challenges in hand that what kind of test, we should be choosing for a job. If the person, candidate, appearing for a particular course; what kind of test should be utilized? If the person is using for an engineering college, what kind of test should be used? If a person is going for some kind of job, what kind of test should be

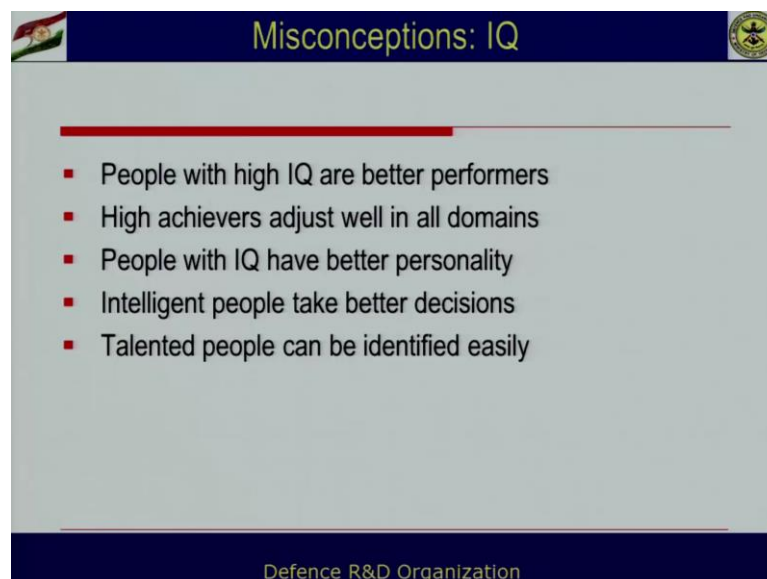
used? What are the reliabilities and validity of a test in a population; because, every test has some form of reliability and some form of validity. Now, the representativeness of the test in the population is a very important marker. All tests cannot be reliable in all kinds of populations. By reliability, we mean to say that, whether the test is capable of producing consistent results or not. In validity of test, we mean to say, whether the test is producing result for which, it has actually, been constructed or fabricated, but the most important part, after reliability and validity is the norm of the normative standards of the test; that is each population has a different form of the distribution.

Now, we all know that any characteristic of a human population, are normally, distributed. Statistically, they are distributed in a different, in a particular shape, which is called Gaussian shape or in Albert distribution, or a bell shaped curve, but each population is unique; each population has his own characteristic feature. Therefore, it is very important that after we develop a test, we try to see that, whether the test is population representative or not. Any test that has been developed in a different country, may not be very amicably, or effectively, utilized in all the countries in the world. Therefore, it is important to see the cultures specificity. What Harry Triandis once said that 70 percent of tests and models are developed, only based on 30 percent of the population in the world; that is most of the tests and theories and constructs are developed in the western population, which is just 30 percent of the world population. Whereas, 70 percent of the population, who are staying in the other side of the world; their population characteristic remains unknown to us. Then, the question comes, whether the development of tests are aligned to an organization's return or investment or not. The question also comes; the knowledge about the subject amongst the HR professional, who knows this subject. In industry, there is a big demand of psychometric testing. Most of the people, who go to the industry or organizations; they are very much keen on having some kind of psychometric testing, but the point is that psychometric testing is a very important form of science where, each and every component of psychometric testing, needs to be analyzed scientifically, with construct development, with proper item development, and then, following the construction of the item; proper testing procedure, testing their reliability, validity, norm formation; everything is so important.

So, it is more a science; the utilizations are generally, done by HR professional. Normally, they do not have all the depth that is required for psychometric assessment. Therefore, it is important that R and D efforts for HR professional should be separated from the making usage of those tests by other people. So, the question comes that the statistics showing the value for money that is being invested for a given training, or for a particular selection, needs to be understood from the perspective of utilizing psychometric testing. We have more concerns, more challenges; for example, preference of senior applicants to sit for a test. Normally, the people in organizations; they do not want to sit for a test. There is a stigma, which suggest that somebody, who is already very senior in the organization; they do not want to appear for it; it is only meant for youngsters; it is only meant for a entry level, but psychometric test actually, can be utilized at all level of our career; every level of our career.

So, it is important that in some organizations, to understand that, if such kinds of stigmas are inherent within the system, it is possible to have online test to promote self screening. So, that they understand where, they actually stand; where, they actually are; in order to correctly predict about their own capabilities for tomorrow's environment. Well, psychometric tests are generally, done for two purposes. One purpose is cognitive in nature. Other is non cognitive or the personality. When we refer about cognitive, we actually, refer about a large variety of psychological variables, which include sensation; that is acceptance of energy of any sense organ, through any sense organ.

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Misconceptions: IQ

- People with high IQ are better performers
- High achievers adjust well in all domains
- People with IQ have better personality
- Intelligent people take better decisions
- Talented people can be identified easily

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Perception; how we interpret the energy, attention; how we attend to some such energies; memory, learning, intelligence, decision making, concept formation, problem solving; there are varieties of concepts, which are inherent in the component called cognition. Cognition is nothing, but how we accept an energy; how we process an energy; and how we retrieve that, when it is actually required. Within that cognitive domain, IQ or the intelligence, is one thing that traditionally, psychometricians have been measuring since, 1904 or 1905, with the advent of the first being a test.

Now, there are certain misconceptions related to IQ. I would like to first, tell that what are the misconceptions, which are within the concept of intelligence quotient. It is generally believed for an outcome measure that people with high IQ, are better performers. Now, IQ is a construct; IQ tells about somebody's capability; it does not directly, corroborate always with the performance of a candidate. So, it is a misconception that people with high IQ, are better performers. They may be, or they may not be. We also have misconceptions that those who are high achievers; they are just well in all domains. We need to understand that IQ is something, which is separate from other domains of human behavior. We should not try to equate that high achievers or people with high IQ, will have good in every spheres. They may be able to adjust with their environment; they may not be able to adjust with other environment.

We also have the misconception that people with IQ have better personality. There is not much of correlation in this sphere; neither, high IQ people will have better personality, nor it is true that people with slightly low IQ, will not have a better personality. We also have a tendency to believe that intelligent people take better decisions; that those, who are intelligent, those who process things well; they also take decision well. With intelligent people, we generally, attribute or attach decision making, in terms of taking a very good decision, but intelligent people may always, try to take very good decisions, which are not wise in all occasions. Even, less intelligent people may not take good decision, but they may take right decisions. Decision making has its own variants, like best decision, good decision, and right decision. They cannot all be attributed or correlated with intelligence, and finally, we also believe that talented people can be identified easily. Those who have got talent, anybody can indentify; that may not also be true.



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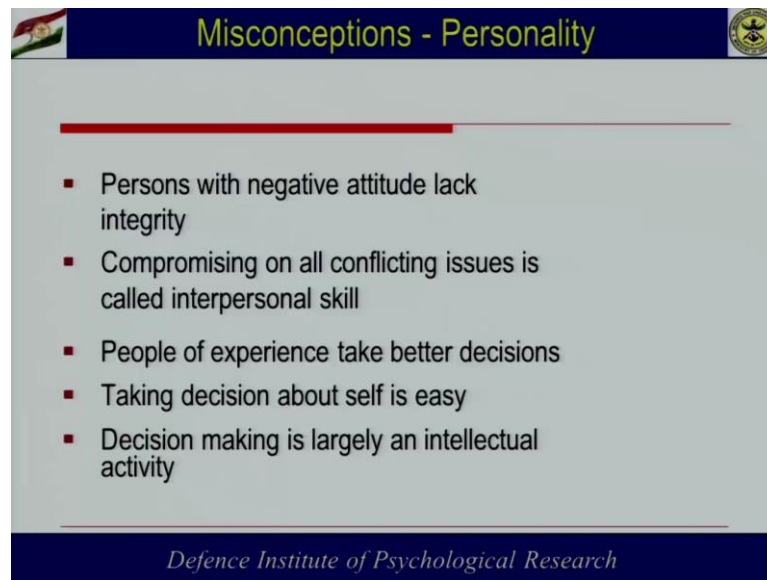
The slide features a dark blue header with the title "Misconceptions about talent search" in yellow text. To the left of the title is the Indian national flag, and to the right is the Defence R&D Organization logo. The main content area is light grey and contains four red square bullet points. A red horizontal line is positioned above the first bullet point. The footer is dark blue with the text "Defence R&D Organization" in yellow.

- Talent is always expressed somehow; therefore identifying talent is not a difficulty
- Only talented people can identify talent; therefore identifying talent is a difficulty
- Talented people are mostly available in top class institutes in India like IIT, IIM
- Only few people are talented; therefore stringent battery of tests are needed to identify them

So, there are certain misconceptions, based on which, IQ testing are done. There are varieties of IQ tests available in the world; varieties. These tests, very accurately measures the IQ of a given person, but the tendency to correlate IQ with other domains of human personality or human behavior, are not necessarily true. We also have certain misconceptions, whenever, we go for some kind of talents search. We believe that talent is always expressed somehow. If somebody has got talent or high IQ, that would be expressed, somehow. So, identifying talent is not a very difficult job, but some people believe that only talented people can identify talent. Therefore, identifying talent is a difficulty. Other people believe in the other way, wrong; there are misconceptions.

There are misconceptions; also the talented people are mostly available in top class institutes in India, like IITs, IIMs. There are talents, which are not greatly correlated or equated with IQ. Talent is something, which is found in some form of attitude; may not correlate always with or collaborate always, with the general IQ or the capability of a candidate. Also, we believe that only few people are talented; therefore, stringent battery of tests is needed to identify them. Some people believe that well, if our test is too hard, too stringent; then the people, who are coming out of those tests, will be able to probably, perform those, who perform better in such kind of stringent tests, are more talented people, people with better IQ; that is also not true. There are certain misconceptions.

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**Misconceptions - Personality**

- Persons with negative attitude lack integrity
- Compromising on all conflicting issues is called interpersonal skill
- People of experience take better decisions
- Taking decision about self is easy
- Decision making is largely an intellectual activity

*Defence Institute of Psychological Research*

Likewise, we have got misconceptions in the personality assessment as well. When we find that some of the people, as I said, that people with high IQ, may not be able to adjust well also. Likewise, person with negative attitude have got lack of integrity. Integrity is a component of personal or somebody's personal. Attitude also, is a component of somebody's personal. Some people believe that if somebody has got a negative attitude, also, have got lack of integrity. Compromising on all conflict in skills or all conflicting issues is also called interpersonal skill. Some people believe that if there is a conflict, conflict of interest, conflict of some kind of ideas where, there are two opposing motives of equal strength; if I continue to compromise with them, then probably, person will have higher form of interpersonal skill, which is also not true.

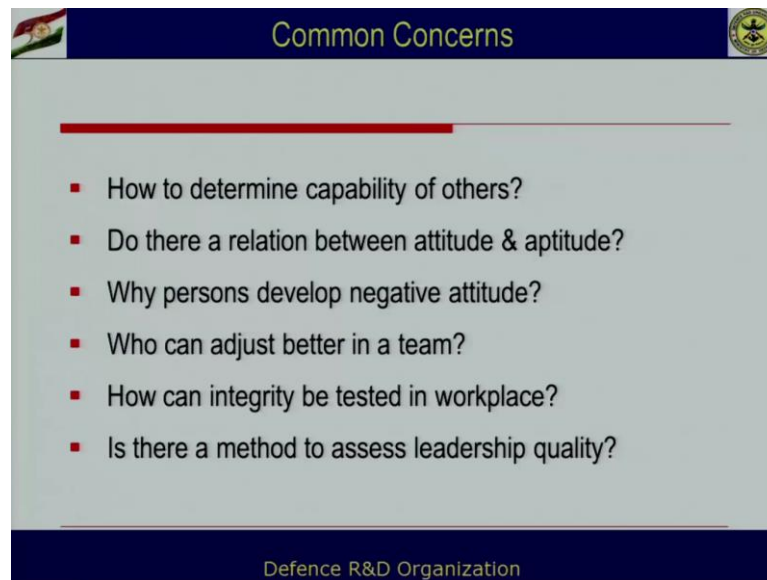
So, compromising in all conflicting issues cannot be termed as interpersonal skill. This can also be measured through psychometric assessment. Likewise, the attitude of a person, whether positive or negative can also be assessed through a psychometric test. Likewise, integrity, commitment **mariguasnal** potential; all such attributes, which are primarily, non cognitive personality based attributes can be assessed. People with experience take better decision, is also a misconception. Actually, people of experience know that taking decision is more important than taking right decision or taking good decisions.

So, with people having experience; they do not bank exclusively, on right or good decisions. They know that taking decision is more important than taking good or right decisions. Like, there is a misconception that taking decision about self is very easy. Now, when we assess ourselves with, or we assess somebody through psychometric testing, which are generally, some form of projective testing; we understand that assessment of self is very difficult. In fact, assessment of others is pretty easy, but assessment of self is very difficult, but when you try to understand others after assessment of oneself, is absolutely more difficult. Therefore, when a psychologists try to understand others with the use of his psychometric test, it is generally a very easy affair, but the psychologists also have to assess themselves, using certain test, and those assessment make them understand that how to understand others. Therefore, when we do psychometric assessment, it is important that we profile ourselves as well; we understand where, we have got errors; where, we make errors; where, we have got biases. In fact, errors and biases are two different things. We make mistakes; those are called errors. We also make mistakes, which are irreversible; they are called biases. When we called it bias, it is a irreversible error. When we called errors, it is reversible biases.

So, errors and biases in our judgment are also, possible in psychometric assessment. This is possible only, when we understand ourselves, first, whether we are making some kind of error, or whether we are making some kind of biases. If it is a bias in psychometric testing, then we will never develop an insight, and this is possible in personality testing. This is not generally possible in cognitive testing where, there is a very objective way of understanding somebody's IQ, somebody's ability to conceive, somebody's ability to solve a problem, somebody's ability to take decisions, somebody's attentional level, somebody's memory level. All these things under cognitive assessment system, is very easily possible without having subjective biases.

But in personality testing, it is possible that we have got subjective biases, and based on those subjective biases, it is very important that we understand ourselves; our own profile, first. We analyze it and then, we try to understand others, based on some form of projective testing or personality testing. We also believe that decision making is largely an intellectual activity; is actually, not always. It maybe an intellectual activity, but at the same time, decision may also possible; decision making is also possible through certain motivational components, which are either, conscious or at an unconscious level.

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Common Concerns

- How to determine capability of others?
- Do there a relation between attitude & aptitude?
- Why persons develop negative attitude?
- Who can adjust better in a team?
- How can integrity be tested in workplace?
- Is there a method to assess leadership quality?

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Therefore, with this backdrop, we need to understand what are the common concerns for people at large in the society? How different people at different disciplines, can make use of psychometric testing or psychometric assessment procedures? Now, these tests and procedures are developed by psychometricians, by psychologists, by behavioral scientists. These are important tools, but these tools how they are to be used, is possible to understand only, when we understand what are the common concerns. For example, how to determine capability of others? What are the procedures? Do we try to understand the capability of others, only by your experience, like our mother; mothers are very good psychologists. Actually, they can tell about their children, everything, even, if they do not read psychology, but the question comes; will the mother be able to tell other about other children? They may not be able to. So, the question comes, whether understanding others capability is based exclusively, on experience or based exclusively, on knowledge? In fact, it is based on both. We need to use knowledge as well as experience, both.

So, how to determine capability of others is a very important concern. Do there relation between attitude and aptitude in any organization, is a very important consideration. Because if there are aptitude, there may not be possible attitude; may not be a good attitude. It is also possible that there are good attitude, but the aptitudinal level is very low. So, it is important in any organization to understand, both aptitude and attitude. Normally, in any organization, the people are getting an entry through their aptitude or

intellectual level, but if they have a bad attitude, they would not be able to sustain in that organization. Question comes; why person develop negative attitude? That also, needs to be understood. Who can adjust better in a team; can we assess them? There are controversies of identity and integrity in any organization. Some people want their identity; their individual identity. Some people want their integrity; how to prioritize them? Who has got better integrity in comparison to identity craving? Who has got more need for identity as compared to integrity? These need to be assessed in any organization, whenever, there is a team. The team may be in a production agency; the team may be in a manufacturing company; the team maybe in a consultancy firm; the team maybe in educational institutes; anywhere.

So, the question, whether the person has a priority for identity over integrity or integrity over identity, should also be assessed using psychometric testing. It is possible to assess these components through psychometric assessment. How can integrity be tested in workplace? This is a very important consideration, because testing integrity is a very difficult job. There are social desirability factors, which are very important to understand that social desirabilities are some form of socially accepted lies, which are embedded into our grooming system; how can we test them? Whether the person deliberately, tells lie or it is part of the social desirability. Finally, is there a method to assess the leadership quality in organization; these are important considerations.

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- Aptitude vs. Attitude
- Logical vs. Intuitive
- Versatility vs. Specificity
- Creativity vs. Proficiency
- Purpose vs. Passion
- Integrity vs. Identity

So, these concerns, I am trying to project from two major angles. One angle is obviously, the organizational requirement, outside the domain of the educational purview where, people are not really, aware of relevance of psychometric assessment in all spheres of life, which I am trying to project it in a common man's view. The other is the use of psychometric assessment in understanding some form of ability, within the academic environment. Within the academic environment, to use of variety of tests, but those tests also, vary in a great deal from typical psychometric testing. In some of the following slides, we try to understand the difference between two. But before we do that, we also need to understand that in a human behavior, how the attributes of achievements are generally measured? What are the different attributes of achievements, which are common concerns for each one of us to understand a human being? The attributes of aptitude and attitude; they always are very complement to each other. They are opposing type of constructs. How do we assess them? In some form togetherness; whether the person is a sequential person or logical person or intuitive person or a parallel processor person.

So, the logicity and intuitiveness are the two opposite and complementary characteristics of a human being. Is it possible to assess both in the same human being, to understand their complementarity of their functionalities within the system? That is another challenge. Versatility versus specificity is nothing, but whether somebody's capability in all spheres of life, or whether I am trying to measure somebody's capability in a particular atmosphere, or a particular specific career of their capability. Whether we are trying to measure some form of creativity in a student, or we are trying to measure some kind of general proficiency? So, creativity and proficiency may be altogether different forms of attributes and constructs, they are interested in measuring. Whether somebody is action orientedness is more driven by purpose, or more driven by passion; what is more important? The person is purpose driven person or a passion driven person.

So, the action orientedness to do a particular job can also, be understood by some form of testing procedure. They are complementary and conflicting characteristics of constructs of human being or a individual, but they can also be measured separately, with some form of togetherness, in order to understand how they coexist, being the opposite motives or opposing characteristics, within the same individual. Likewise, integrity and

identity; what is more important for a given job? Do I require identity or do I require integrity, or do I need to prioritize integrity and identity, for accomplishing the job; either, identity first, integrity later or integrity first, identity later; all these human characteristics, which are not a psychologically defined nomenclatures. In order to understand the function, a human being is supposed to execute in a given organization; these conflicting attributes are being kept here.

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So, when generally, we try to understand or assess the potential of a new human being, we try to assess in two different formats. One format is cognitive; purely cognitive. As I said when a cognitive assessment is made, we try to understand some of the capabilities for which, we will say they may be general ability, they may be job specific aptitude, they maybe decision making capabilities, and they maybe cognitive skills, which we call all as cognitive skills. So, one of the important purposes of psychometric testing is to assess some of the cognitive skills, and these cognitions are nothing, but how a person register information; how a person process information; and how a person retrieve the information. So, these tests are available for all kinds of general abilities in the world. These general abilities are based on certain theoretical constructs, but there are certain job specific aptitudes also. There may be job specific constructs. A job may not require all kinds of general abilities. There are certain job specific aptitudes are also available.

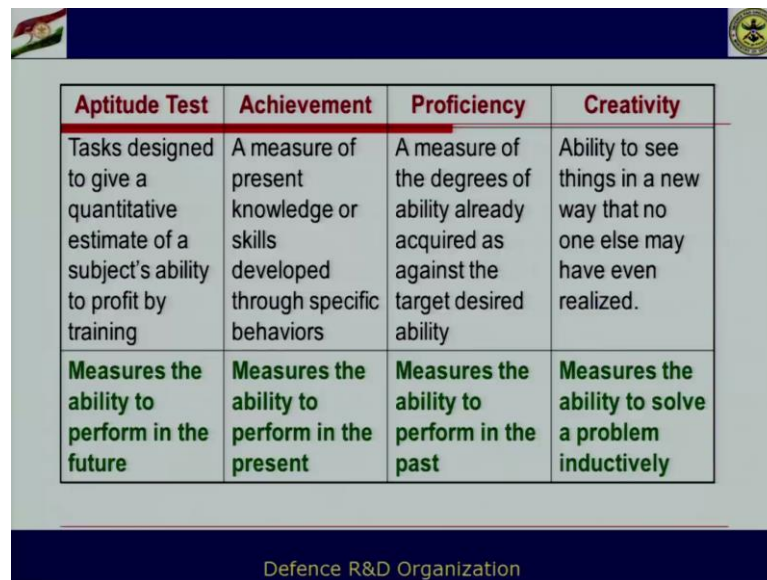
So, cognitive tests are also possible for job specific aptitude, decision making capability, as well as, some form of cognitive skill. There are certain non cognitive tests, which are also available for which; the potentials can be assessed using psychometric testing. They are personality and integrity, emotional and social skills, leadership and teamwork, positive attitude and commitment. Generally, in industries and educational institutes, the cognitive traits are primarily given the importance, but in our country, non cognitive attributes are not generally, given much of importance, but it is in today's environment where, the society is changing very fast, with radicalization of the ideas, which are drawn from different other sources, cross culturally. It is important that how they are impacting in our overall performance level. How they are changing our personality? How they are changing our already embedded social skills to a new form of skills?

How we are actually adjusting in the conflicts of values social aspiration and the realities? People often suffer from the conflicts of value orientation, social expectation or aspiration orientation, and reality orientation. Value orientation is something, what is written in the book, which our former generations used to always advocate for. The current generation, maybe looking for more towards the reality orientation, and the people in between the two generations, maybe looking for something to do, which is in between reality and value orientation; that I call social aspiration based orientation.

Now, how these conflicts are attracting us; how these conflicting are creating turbulence into us; should be measured in any organization to understand the performance level. Therefore, understanding emotional and social skills, understanding personality and integrity component, understanding leadership and teamwork, understanding positive attitude and commitment are absolutely important. There was a time; maybe, generation back, when we used to believe that presence of positive trait automatically, ensures absence of negative trait. This may not be true today. There is a coexistence possible of having positive traits, as well as negative traits in the same set of individuals. Therefore, it is very important that we understand all those potentials in a given individual at one go.



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<b>Aptitude Test</b>	<b>Achievement</b>	<b>Proficiency</b>	<b>Creativity</b>
Tasks designed to give a quantitative estimate of a subject's ability to profit by training	A measure of present knowledge or skills developed through specific behaviors	A measure of the degrees of ability already acquired as against the target desired ability	Ability to see things in a new way that no one else may have even realized.
<b>Measures the ability to perform in the future</b>	<b>Measures the ability to perform in the present</b>	<b>Measures the ability to perform in the past</b>	<b>Measures the ability to solve a problem inductively</b>

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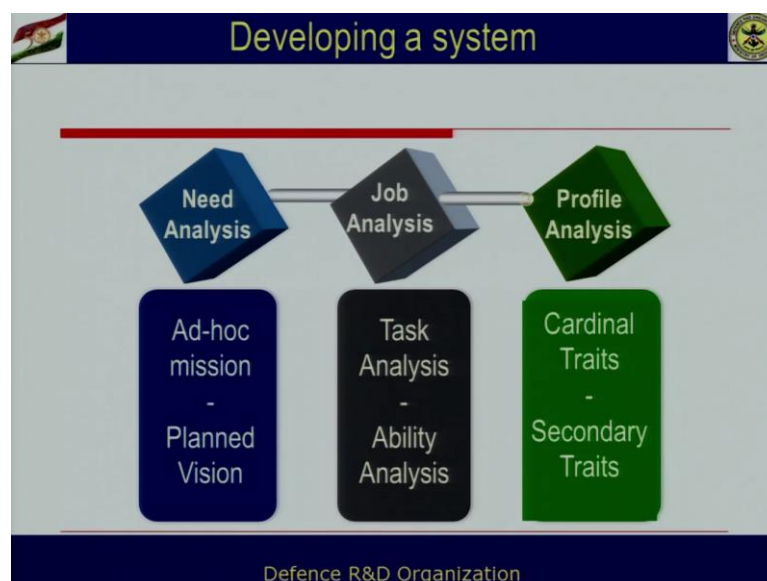
Now, I would like to give you an example of how different forms of achievement test or aptitude test, are used for understanding somebody's capability. Now, there are four types of tests are generally utilized. They are called aptitude test, achievement test, proficiency test and test of creativity. They are different attributes within the cognitive set of test procedures. Aptitude test is something that measures the ability to perform in the future. I mean we do not measure what the person is capable of right now; we only try to understand, how good he is a raw material, and under certain training conditions, how well he would be performing for tomorrow. But, when we try to measure somebody's achievement, we try to understand the measures; the ability to perform in the present. It is possible that he may not have good potential for tomorrow, or he may not have done something, in the past, but he has been doing currently, very well. So, if I am interested to understand his current level of performance, we generally, use a psychometric test, which is achievement oriented test. There is a proficiency based test, which actually, measures the ability to perform in the past; what the person has achieved in the past?

So, when I take a student in a given educational institution, I may test his proficiency level; that is whatever, he has started earlier; whether he has got good marks or not; apart from giving him a test for which, he has been given training for the last several years. So, proficiency test is based on the past capability. The achievement test is based on the present capability, and the aptitude test is based on the future capability. Along with it,

there are test of creativity where, it measures the ability to solve a problem, inductively. Creativity is something different, slightly different from the pure cognitive ability, which we term as intelligence. Intelligence is something where, the person's capability is understood, but capability is generally, understood in a deductive manner; that is whenever, there is a solution of a problem, inherent within the problem; intelligent people often try to get it, or capable, are capable of getting it, very quickly. But if the solution of a problem is not inherent within the problem, which is to be accessed inductively, people with high degree of creativity; they can actually do it. Therefore, creativity is a domain of thinking. Thinking is not really, a domain of intelligence where, the person's capability to think differently, actually, make him creative, rather than his processing ability or intelligence level to solve a particular problem.

So, within the domain of cognitive test, there are various forms of test available, which we can make use of. People based on the job, based on the performance, based on the level; we can actually, test what kind of test we should be availing for tomorrow. If we are interested in having a test for tomorrow where, the training would be given afterwards, we can test; we can take a aptitude test, or if we think that the current level is very important to induct a person, we can use the achievement test, or if we think that the person's past experience is good enough to achieve a particular outcome, then a proficiency test would be good. But we can always test creativity from altogether, a different angle, as I have said just now.

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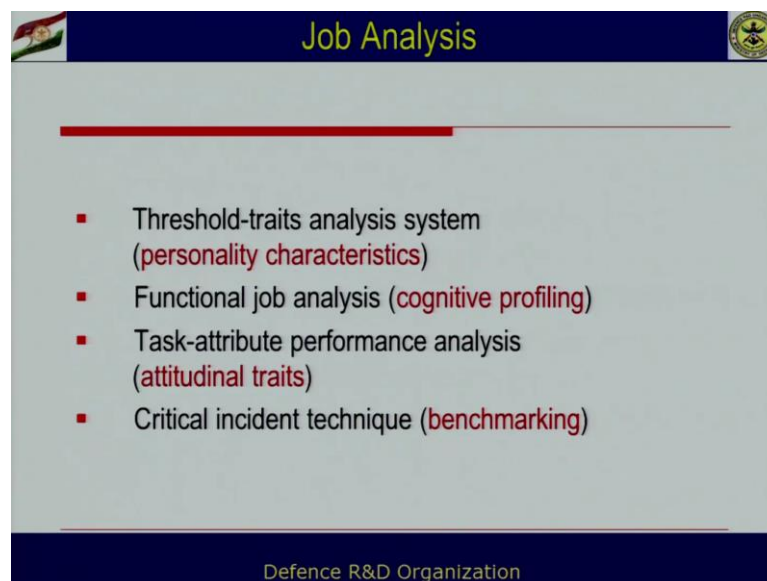


So, how to develop a system now? Wherever, we did the test; it maybe a personality test; it maybe a intelligence test; whenever, we try to test a system, we do not test a system in isolation. We do not try to understand a particular attribute in isolation. It is although, done worldwide, that some people try to understand the motivational levels. Some people try to understand the personality. Some people try to understand the interest level. Some people try to understand the IQ levels. Some people try to understand the decision making capability. Most important thing is that whenever, we try to understand these attributes in separation, in some kind of isolation, then it does not allow us to predict the person's outcome in totality. Therefore, it is important to develop a system. Whenever, we refer about a system, it actually, comprises of in battery of a test or system of systems where, we develop a complete profile of human being, based on the job, based on the need and based on the profile. So, whenever, we develop a system, a psychometric system; we do three kinds of things. One we call as need analysis. One we call as job analysis, and one we call as profile analysis.

Now, in order to develop a system, which is basically, a battery of tests, we must understand that what is the need? What are the current requirements for which, a system is to be developed? Because developing a system is a very difficult task. Question is, whether we have got a short term mission for that, or we have a planned vision? The need is to be understood. Once the need is understood, then we have to see that what job we have in hand. What are the jobs involved in it? What are the tasks involved in it? And based on the task, we need to understand what are the abilities required to undertake that task. So, task analysis and ability analysis are the two other components, which we call collectively, as job analysis. Some people do this job analysis, based on theory as well. They do not require a job; they do not have a job in hand. So, they may be having a theoretical basis behind making an assessment, but that there also, we need to do, we need to understand, what are the constructs that we are interested in understanding, which can be replaced as task analysis? What are the abilities under that construct that we are interested in measuring? Finally, we need to create a profile. The profile making in a system development is absolutely, important in psychometric assessment. In today's environment, we do not test a particular ability in isolation as I said. We create a complete profile and each individual has a unique profile.

Now, that profile is very important for making a overall prediction of somebody's capability for tomorrow. Now, this profile, once it is created, the cardinal traits are understood separately; the secondary traits are understood separately. Cardinal traits are those traits, like temperament, which do not change under certain context. They do not, the content of the personality, do not change with the change of the context. There are certain traits, which are called secondary traits. The content of the personality may change ultimately, with some kind of change in the state or some kind of context. So, context and content, in understanding a profile, is very important. In order to understand the intent of a person, the context, the content and the intent; all three are very important. By profile analysis, we try to understand what are those traits, which do not change under varieties variations in the context? And the secondary traits are those traits, which are traits available, but they may subject to change with some kind of change in the context. With these, we understand to develop a system.

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**Job Analysis**

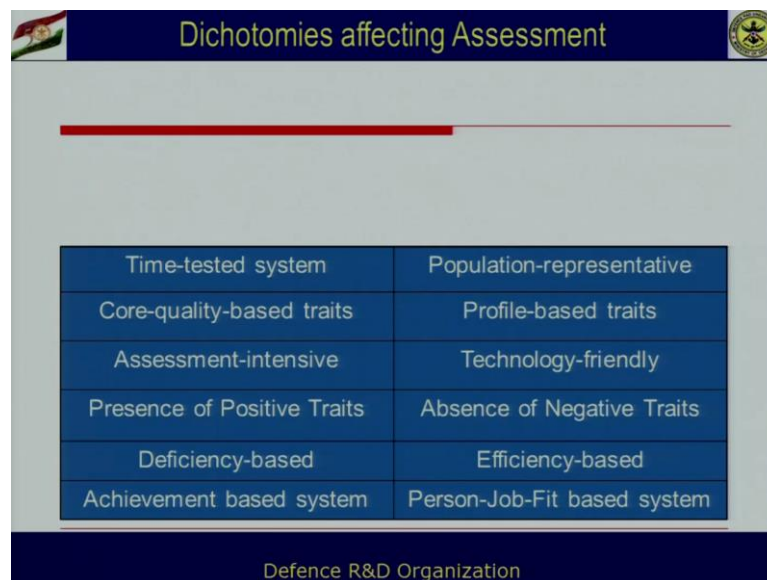
- Threshold-traits analysis system (personality characteristics)
- Functional job analysis (cognitive profiling)
- Task-attribute performance analysis (attitudinal traits)
- Critical incident technique (benchmarking)

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Now, there are various forms of job analysis, are available, which are already there in the different literature. One is called threshold trait analysis system where, we try to understand different kinds of personality characteristics. There are functional job analysis kind of system where, there are various forms of cognitive profiling is done. Now, some people do exclusive personality profiling. Some people do exclusive cognitive profiling, based on the job. Some people do exclusive task attribute performance analysis, which is nothing, but analysis of their attitudinal traits, and finally,

some people do some kind of profiling, based on some critical incident technique, which is nothing, but benchmarking; to create a threshold beyond which, the subject would be taken and below which, they would not be taken. So, in order to determine, the benchmark critical incident technique is used to do the job analysis. When we call, develop a system based on theories; theoretical constructs are already defined in the literature. So, we do not have much of difficulty when we develop a system, or psychometric assessment system or system of systems, based on theories. Theories are already available. Based on theories, dimensions are already defined. Based on the dimensions, the items can very easily be constructed, and naturally, the test can be developed, based on all these capabilities. Then, when we do a job analysis, the job analysis is unique for every organization where, we try to first, understand in order to perform in that test, in that particular job, whether personality is more important or cognitive profile is more important or attitude, the orientation towards the job is very important, or what are the benchmarking, based on which, below which or above which; we would be able to do a cutoff, develop a cutoff score for taking a particular individual.

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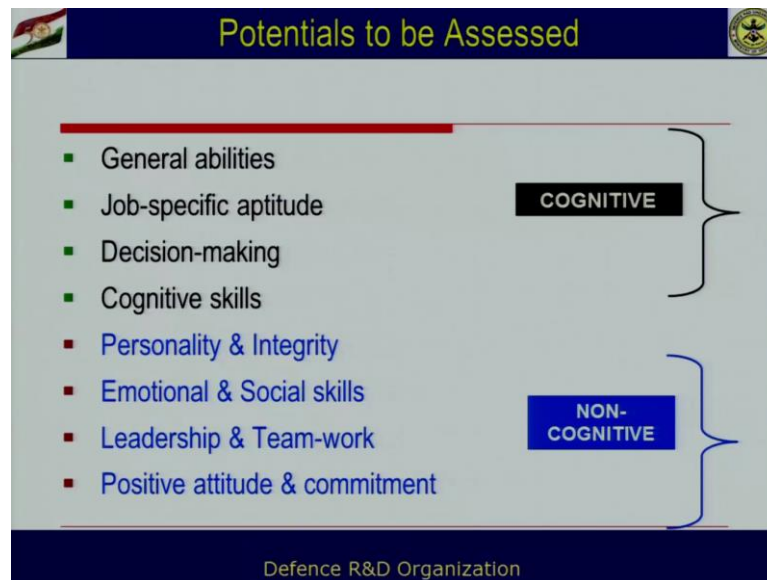


The slide features a title bar with the Indian national flag on the left and the Defence R&D Organization logo on the right. Below the title bar is a red horizontal line. The main content is a table with two columns and six rows of dichotomies. At the bottom of the slide is the text 'Defence R&D Organization'.

Dichotomies affecting Assessment	
Time-tested system	Population-representative
Core-quality-based traits	Profile-based traits
Assessment-intensive	Technology-friendly
Presence of Positive Traits	Absence of Negative Traits
Deficiency-based	Efficiency-based
Achievement based system	Person-Job-Fit based system

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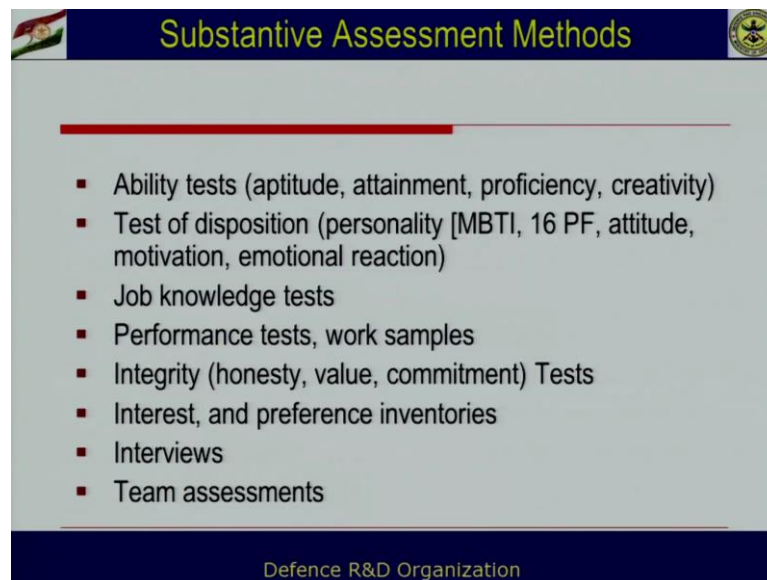
So, when we try to understand the assessment system, I should be able to refer that after developing a system, we should try to understand, whether we should go for a new system or we should bank on a time tested system. There are various systems available in the world. They are time tested systems. They are personality system assessment. There are assessment systems for cognitive level. Whether we should use those test systems at a generic level for all populations across the world, considering identical or equal; that is one question. The other question is; whether we should develop a test, based on population or not? Each population is separate; each population is different.

So, population representativeness is a different issue as compared to time tested system. Some people opt for a time tested system, irrespective of the population. Some people try to develop population representative system, and not banking exclusively, on time tested system. Some people develop a psychometric assessment system, based on core qualities; that is what, are the cardinal features, and some people; they develop a test based on a complete profile, which includes cardinal traits, primary traits and secondary traits. That is also a difference in observation, and these are critical distinctions, which are to be made, when a system is developed for personality assessment. Some people develop a system, which are assessment intensive. Some people develop system, which are technology friendly; that is I develop a system, which is fully computerized, which

does not require the assessment by the assessors, who are trained in the system. So, we can make it is technology friendly assessment system, or we make it as a system, which is purely, assessment intensive. For example, projective test in psychology is a psychometric assessment, is an assessment intensive test; they cannot be fully computerized or made technology friendly, in order to make predictions.

Likewise, there are systems, which exclusively, measure the presence of positive traits. There are systems, which exclusively, measure the absence of negative traits; that is something, we have to decide; whether we are interested in developing a profile of positive traits, or we are interested in ensuring the absence of negative traits. So, systems also developed based on the presence of positive traits, and absence of negative traits. Likewise, systems are also developed, based on deficiency, as well as based on efficiency. Some systems are actually, developed to pinpoint some form of deficiency and some systems are developed to pinpoint some form of efficiency. Finally, whether we are interested in developing an achievement based system, which is normally done, or whether we are interested in a person job fit based system; that is also a distinction, we have to make.

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**Substantive Assessment Methods**

- Ability tests (aptitude, attainment, proficiency, creativity)
- Test of disposition (personality [MBTI, 16 PF, attitude, motivation, emotional reaction])
- Job knowledge tests
- Performance tests, work samples
- Integrity (honesty, value, commitment) Tests
- Interest, and preference inventories
- Interviews
- Team assessments

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So, these critical issues come in psychometric assessment from time to time, and one has to understand, realize that these conflicting issues will come finally, when we try to develop a system, and until and unless, we are aware of dichotomies, which affect the



assessment system, provided until and unless we understand it, probably, we are not in a position to effectively, make use of it for future. Finally, there are certain substantive testing assessment methods which, I would like to give, a sort of inventory. There are different forms of ability test, like aptitude test, attainment test, proficiency test, creativity test. There are certain tests, which are primarily, which we call as test of dispositions or predispositions, which are personality test, motivational test, and emotional reaction test. There are some tests, which are not exclusively, based on psychometric properties, but they are job knowledge test; that kind of tests are also available.

There are performance tests also available. Work samples are possible. There are integrity tests, which includes honesty, value commitment. There are interest and preference inventories. There are interview techniques, which are also, a form of assessment, and there are group activities, or team assessments; all kinds of assessment tests are available. All kinds of assessment tests are possible, but they need to be devised; they need to be customized. A test can be translated; a test can be adapted; a test can be standardized; a test can also be customized. Customization is a process, which seems to me, as a very important thing for which, we should be able to adopt some form of test to the requirement of the current population.

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The slide features a dark blue header with the title 'Rationale...' in yellow. On the left is the Indian national flag, and on the right is the Defence Research and Development Organisation (DRDO) logo. A red horizontal line is positioned above a list of seven bullet points. The footer is a dark blue bar with the text 'Defence R&D Organization' in yellow.

- Increased regulation & legislation (EOE)
- Increased predictive validity
- Reduction of training wastages
- Usage as part of global HR
- Invariance to academic qualification
- Ease of screening large number of candidates
- Increased demand for specialized skill

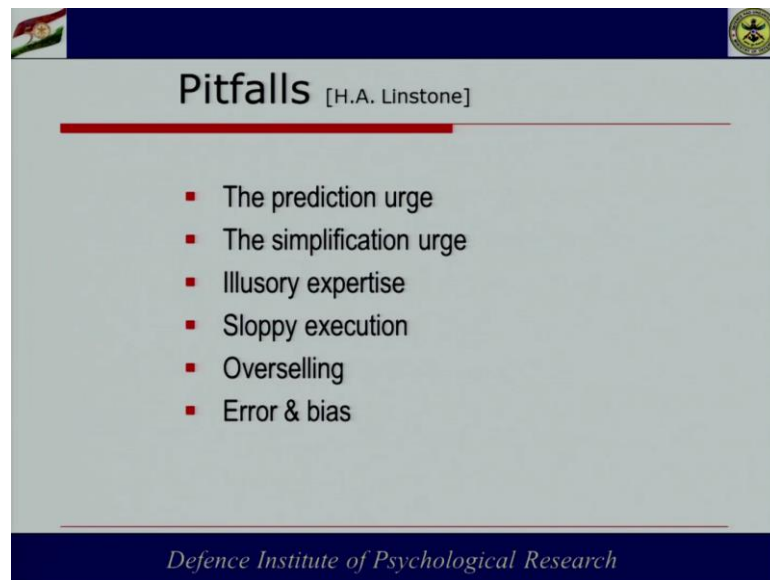
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So, the rationale for using all such kind of tests is that there are increase regulations and legislations coming up for making use of the human skill. There are; this assessment is something, which we must understand that the assessment, in terms of some form of understanding of the predictive validity, is absolutely important. In fact, what the person would be able to do 10 years down the lane, is a very important consideration. So, if a psychometric assessment device can tell the predictive validity of somebody's assessments score, it would be of absolutely, very high usage. Reduction of training wastages by doing so, by predicting, whether the person would be able to do very well or will be able to get himself trained very well; will also reduce the training wastages. Likewise, the usage as part of global HR; all kinds of HR professionals are started using psychometric assessment, either in educational institutions or for organizations, which include some form of industries, some form of corporate world. The invariance to academic qualification has also come to light, that psychometric assessment does not depend exclusively, on academic qualification. Academic qualification is some form of benchmark, but psychometric assessment actually, goes beyond that.

So, invariance to psychometric qualification is today, understood, when as far as psychometric assessment is concerned. The ease of screening with large number of candidates is also possible, through some form of technological innovations in all kinds of psychometric assessment, and finally, the increased demand for specialized skills; this tomorrow's environment will actually, require lot of specialized skills. In order to a keep pace with the technological development and the human development, or human skill development; it is very important that we understand what kind of personal or human skill is available, in a given person. If the distance between the technological skill development and human skill development is too much, then either, technological will become obsolete, or human skill would not be utilized, effectively. Therefore, it is very important that we reduce the gap between human skill and the technological development, which is possible by only, selecting the right kind of person for the right kind of job. In any case, it is important that to reduce training wastages; to get the right kind of person for right kind job; to have predictive validity; to understand the invariance of psychometric assessment in academic qualification; it is very important that psychometric assessment to be used, very effectively.

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**Pitfalls** [H.A. Linstone]

- The prediction urge
- The simplification urge
- Illusory expertise
- Sloppy execution
- Overselling
- Error & bias

*Defence Institute of Psychological Research*

Finally, I would like to tell that though, we use it very often, this psychometric testing; those, who are using it or developing some kind of competence about it; we must understand that there is always a prediction urge that after making an assessment, I would like to predict that somebody is going to do, or somebody is going to become like this; we should try to avoid it. There is a simplification urge also, that it is technologically, very simple. One can make use of it easily, with some form of training that should also be avoided. Illusory expertise is also, another thing. It takes decades for a person to ultimately, develop masterian psychometric assessment. So, after having some kind of training, one should not try to make use of it. Sloppy execution is another thing; that should be avoided. Primarily, because if the test is not administered properly, there is a possibility that there is the prediction is completely wrong. We should not try to oversell it, as well as, we should try to avoid all kinds of errors and biases, which are involved in the interpretation of psychometric testing.

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Finally, it is important to understand the test technology is no less simpler, than any other form of technologies, including space technology. It is a different technology. One has to develop mastery. It has got great potentials, and I am sure, with the understanding of how it can be useful to various conditions, we would be able to make best use of it for tomorrow's future.

Thank you.