

TYPES OF DATA

There exists a fundamental distinction between two types of data: **qualitative** and **quantitative**. The way we typically define them, we call data 'quantitative' if it is in numerical form and 'qualitative' if it is not. Notice that qualitative data could be much more than just words or text. Photographs, videos, sound recordings and so on, can be considered qualitative data.

The distinction between qualitative and quantitative data might have some utility, but most people draw too hard a distinction, and that can lead to all sorts of confusion. In some areas of social research, the qualitative-quantitative distinction has led to protracted arguments with the proponents of each arguing the superiority of their kind of data over the other. The quantitative types argue that their data is 'hard', 'rigorous', 'credible', and 'scientific'. The qualitative proponents counter that their data is 'sensitive', 'nuanced', 'detailed', and 'contextual'.

For many of us in social research, this kind of polarized debate has become less than productive. And, it obscures the fact that qualitative and quantitative data are intimately related to each other. **All quantitative data is based upon qualitative judgments; and all qualitative data can be described and manipulated numerically.** For instance, think about a very common quantitative measure in social research -- a self esteem scale. The researchers who develop such instruments had to make countless judgments in constructing them: how to define self esteem; how to distinguish it from other related concepts; how to word potential scale items; how to make sure the items would be understandable to the intended respondents; what kinds of contexts it could be used in; what kinds of cultural and language constraints might be present; and on and on. The researcher who decides to use such a scale in their study has to make another set of judgments: how well does the scale measure the intended concept; how reliable or consistent is it; how appropriate is it for the research context and intended respondents; and on and on. Believe it or not, even the respondents make many judgments when filling out such a scale: what is meant by various terms and phrases; why is the researcher giving this scale to them; how much energy and effort do they want to expend to complete it, and so on. Even the consumers and readers of the research will make lots of judgments about the self esteem measure and its appropriateness in that research context. What may look like a simple, straightforward, cut-and-dried quantitative measure is actually based on lots of qualitative judgments made by lots of different people.

On the other hand, all qualitative information can be easily converted into quantitative, and there are many times when doing so would add considerable value to your research. The simplest way to do this is to divide the qualitative information into units and number them! I know that sounds trivial, but even that simple nominal enumeration can enable you to organize and process qualitative information more efficiently. Perhaps more to the point, we might take text information (say, excerpts from transcripts) and pile these excerpts into piles of similar statements. When we do something even as easy as this simple grouping or piling task, we can describe the results quantitatively. For instance, if we had ten statements and we grouped these into five piles, we could describe the piles using a 10 x 10 table of **0**'s and **1**'s. If two statements were placed together in the same pile, we would put a **1** in their row-column juncture. If two statements were placed in different piles, we would use a **0**. The resulting matrix or table describes the grouping of the ten statements in terms of their similarity. Even though the data in this example consists of qualitative statements (one per card), the result of our simple qualitative procedure (grouping similar excerpts into the same piles) is *quantitative* in nature. "So what?" you ask. Once we have the data in numerical form, we can manipulate it numerically. For instance, we could have five different judges sort the 10 excerpts and obtain a 0-1 matrix like this for each judge. Then we could average the

five matrices into a single one that shows the proportions of judges who grouped each pair together. This proportion could be considered an estimate of the similarity (across independent judges) of the excerpts. While this might not seem too exciting or useful, it is exactly this kind of procedure that I use as an integral part of the process of developing 'concept maps' of ideas for groups of people (something that *is* useful!).

QUALITATIVE MEASURES

Qualitative research is a vast and complex area of methodology that can easily take up whole textbooks on its own. The purpose of this section is to introduce you to the idea of qualitative research (and how it is related to quantitative research) and give you some orientation to the major types of qualitative research data, approaches and methods.

There are a number of important questions you should consider before undertaking qualitative research:



Do you want to generate new theories or hypotheses?

One of the major reasons for doing qualitative research is to become more experienced with the phenomenon you're interested in. Too often in applied social research (especially in economics and psychology) we have our graduate students jump from doing a literature review on a topic of interest to writing a research proposal complete with theories and hypotheses based on current thinking. What gets missed is the direct experience of the phenomenon. We should probably require of all students that before they mount a study they spend some time living with the phenomenon. Before doing that multivariate analysis of gender-based differences in wages, go observe several work contexts and see how gender tends to be perceived and seems to affect wage allocations. Before looking at the effects of a new psychotropic drug for the mentally ill, go spend some time visiting several mental health treatment contexts to observe what goes on. If you do, you are likely to approach the existing literature on the topic with a fresh perspective born of your direct experience. You're likely to begin to formulate your own ideas about what causes what else to happen. This is where most of the more interesting and valuable new theories and hypotheses will originate. Of course, there's a need for balance here as in anything else. If this advice was followed literally, graduate school would be prolonged even more than is currently the case. We need to use qualitative research as the basis for direct experience, but we also need to know when and how to move on to formulate some tentative theories and hypotheses that can be explicitly tested.



Do you need to achieve a deep understanding of the issues?

I believe that qualitative research has special value for investigating complex and sensitive issues. For example, if you are interested in how people view topics like God and religion, human sexuality, the death penalty, gun control, and so on, my guess is that you would be hard-pressed to develop a quantitative methodology that would do anything more than summarize a few key positions on these issues. While this does have its place (and its done all the time), if you really want to try to achieve a deep understanding of how people think about these topics, some type of in-depth interviewing is probably called for.



Are you willing to trade detail for generalizability?

Qualitative research certainly excels at generating information that is very detailed. Of course, there are quantitative studies that are detailed also in that they involve collecting lots

of numeric data. But in detailed quantitative research, the data themselves tend to both shape and limit the analysis. For example, if you collect a simple interval-level quantitative measure, the analyses you are likely to do with it are fairly delimited (e.g., descriptive statistics, use in correlation, regression or multivariate models, etc.). And, generalizing tends to be a fairly straightforward endeavor in most quantitative research. After all, when you collect the same variable from everyone in your sample, all you need to do to generalize to the sample as a whole is to compute some aggregate statistic like a mean or median.

Things are not so simple in most qualitative research. The data are more "raw" and are seldom pre-categorized. Consequently, you need to be prepared to organize all of that raw detail. And there are almost an infinite number of ways this could be accomplished. Even generalizing across a sample of interviews or written documents becomes a complex endeavor.

The detail in most qualitative research is both a blessing and a curse. On the positive side, it enables you to describe the phenomena of interest in great detail, in the original language of the research participants. In fact, some of the best "qualitative" research is often published in book form, often in a style that almost approaches a narrative story. One of my favorite writers (and, I daresay, one of the finest qualitative researchers) is Studs Terkel. He has written intriguing accounts of the Great Depression (*Hard Times*), World War II (*The Good War*) and socioeconomic divisions in America (*The Great Divide*), among others. In each book he follows a similar qualitative methodology, identifying informants who directly experienced the phenomenon in question, interviewing them at length, and then editing the interviews heavily so that they "tell a story" that is different from what any individual interviewee might tell but addresses the question of interest. If you haven't read one of Studs' works yet, I highly recommend them.

On the negative side, when you have that kind of detail, it's hard to determine what the generalizable themes may be. In fact, many qualitative researchers don't even care about generalizing -- they're content to generate rich descriptions of their phenomena.

That's why there is so much value in mixing qualitative research with quantitative. Quantitative research excels at summarizing large amounts of data and reaching generalizations based on statistical projections. Qualitative research excels at "telling the story" from the participant's viewpoint, providing the rich descriptive detail that sets quantitative results into their human context.

QUALITATIVE VALIDITY

Depending on their philosophical perspectives, some qualitative researchers reject the framework of validity that is commonly accepted in more quantitative research in the social sciences. They reject the basic realist assumption that there is a reality external to our perception of it. Consequently, it doesn't make sense to be concerned with the "truth" or "falsity" of an observation with respect to an external reality (which is a primary concern of validity). These qualitative researchers argue for different standards for judging the quality of research.

For instance, Guba and Lincoln proposed four criteria for judging the soundness of qualitative research and explicitly offered these as an alternative to more traditional quantitatively-oriented criteria. They felt that their four criteria better reflected the underlying assumptions involved in much qualitative research. Their proposed criteria and the "analogous" quantitative criteria are listed in the table.

| <i>Traditional Criteria for Judging Quantitative Research</i> | <i>Alternative Criteria for Judging Qualitative Research</i> |
|---|--|
| internal validity | credibility |
| external validity | transferability |
| reliability | dependability |
| objectivity | confirmability |

Credibility

The credibility criteria involves establishing that the results of qualitative research are credible or believable from the perspective of the participant in the research. Since from this perspective, the purpose of qualitative research is to describe or understand the phenomena of interest from the participant's eyes, the participants are the only ones who can legitimately judge the credibility of the results.

Transferability

Transferability refers to the degree to which the results of qualitative research can be generalized or transferred to other contexts or settings. From a qualitative perspective transferability is primarily the responsibility of the one doing the generalizing. The qualitative researcher can enhance transferability by doing a thorough job of describing the research context and the assumptions that were central to the research. The person who wishes to "transfer" the results to a different context is then responsible for making the judgment of how sensible the transfer is.

Dependability

The traditional quantitative view of reliability is based on the assumption of replicability or repeatability. Essentially it is concerned with whether we would obtain the same results if we could observe the same thing twice. But we can't actually measure the same thing twice -- by definition if we are measuring twice, we are measuring two different things. In order to estimate reliability, quantitative researchers construct various hypothetical notions (e.g., true score theory) to try to get around this fact.

The idea of dependability, on the other hand, emphasizes the need for the researcher to account for the ever-changing context within which research occurs. The researcher is responsible for describing the changes that occur in the setting and how these changes affected the way the research approached the study.

Confirmability

Qualitative research tends to assume that each researcher brings a unique perspective to the study. Confirmability refers to the degree to which the results could be confirmed or corroborated by others. There are a number of strategies for enhancing confirmability. The researcher can document the procedures for checking and rechecking the data throughout the study. Another researcher can take a "devil's advocate" role with respect to the results, and this process can be documented. The researcher can actively search for and describe and *negative instances* that contradict prior observations. And, after he study, one can conduct a *data audit* that examines the data collection and analysis procedures and makes judgements about the potential for bias or distortion.

There has been considerable debate among methodologists about the value and legitimacy of this alternative set of standards for judging qualitative research. On the one hand, many quantitative researchers see the alternative criteria as just a relabeling of the very successful quantitative criteria in order to accrue greater legitimacy for qualitative research. They suggest that a correct reading of the quantitative criteria would show that they are not limited to quantitative research alone and can be applied equally well to qualitative data. They argue that the alternative criteria represent a different philosophical perspective that is subjectivist rather than realist in nature. They claim that research inherently assumes that there is some reality that is being observed and can be observed with greater or less accuracy or validity. If you don't make this assumption, they would contend, you simply are not engaged in research (although that doesn't mean that what you are doing is not valuable or useful).

Perhaps there is some legitimacy to this counter argument. Certainly a broad reading of the traditional quantitative criteria might make them appropriate to the qualitative realm as well. But historically the traditional quantitative criteria have been described almost exclusively in terms of quantitative research. No one has yet done a thorough job of translating how the same criteria might apply in qualitative research contexts. For instance, the discussions of external validity have been dominated by the idea of statistical sampling as the basis for generalizing. And, considerations of reliability have traditionally been inextricably linked to the notion of true score theory.

But qualitative researchers do have a point about the irrelevance of traditional quantitative criteria. How could we judge the external validity of a qualitative study that does not use formalized sampling methods? And, how can we judge the reliability of qualitative data when there is no mechanism for estimating the true score? No one has adequately explained how the operational procedures used to assess validity and reliability in quantitative research can be translated into legitimate corresponding operations for qualitative research.

While alternative criteria may not in the end be necessary (and I personally hope that more work is done on broadening the "traditional" criteria so that they legitimately apply across the entire spectrum of research approaches), and they certainly can be confusing for students and newcomers to this discussion, these alternatives do serve to remind us that qualitative research cannot easily be considered only an extension of the quantitative paradigm into the realm of nonnumeric data.

THE QUALITATIVE-QUANTITATIVE DEBATE

There has probably been more energy expended on debating the differences between and relative advantages of qualitative and quantitative methods than almost any other methodological topic in social research. The "qualitative-quantitative debate" as it is sometimes called is one of those hot-button issues that almost invariably will trigger an intense debate in the hotel bar at any social research convention. I've seen friends and colleagues degenerate into academic enemies faster than you can say "last call."

After years of being involved in such verbal brawling, as an observer and direct participant, the only conclusion I've been able to reach is that this debate is "much ado about nothing." To say that one or the other approach is "better" is, in my view, simply a trivializing of what is a far more complex topic than a dichotomous choice can settle. Both quantitative and qualitative research rest on rich and varied traditions that come from multiple disciplines and both have been employed to address almost any research topic you can think of. In fact, in almost every applied social research project I believe there is value in consciously combining both qualitative and quantitative methods in what is referred to as a "mixed methods" approach.

I find it useful when thinking about this debate to distinguish between the general *assumptions* involved in undertaking a research project (qualitative, quantitative or mixed) and the *data* that are collected. At the level of the data, I believe that there is little difference between the qualitative and the quantitative. But at the level of the assumptions that are made, the differences can be profound and irreconcilable (which is why there's so much fighting that goes on).

Qualitative and Quantitative Data

It may seem odd that I would argue that there is little difference between qualitative and quantitative *data*. After all, qualitative data typically consists of words while quantitative data consists of numbers. Aren't these fundamentally different? I don't think so, for the following reasons:



All qualitative data can be coded quantitatively.

What I mean here is very simple. Anything that is qualitative can be assigned meaningful numerical values. These values can then be manipulated to help us achieve greater insight into the meaning of the data and to help us examine specific hypotheses. Let's consider a simple example. Many surveys have one or more short open-ended questions that ask the respondent to supply text responses. The simplest example is probably the "Please add any additional comments" question that is often tacked onto a short survey. The immediate responses are text-based and qualitative. But we can always (and usually will) perform some type of simple classification of the text responses. We might sort the responses into simple categories, for instance. Often, we'll give each category a short label that represents the theme in the response.

What we don't often recognize is that even the simple act of categorizing can be viewed as a quantitative one as well. For instance, let's say that we develop five themes that each respondent could express in their open-ended response. Assume that we have ten respondents. We could easily set up a simple coding table like the one in the figure below to represent the coding of the ten responses into the five themes.

| Person | Theme 1 | Theme 2 | Theme 3 | Theme 4 | Theme 5 |
|--------|---------|---------|---------|---------|---------|
| 1 | ✓ | ✓ | | ✓ | |
| 2 | ✓ | | ✓ | | |
| 3 | ✓ | ✓ | | ✓ | |
| 4 | | ✓ | | ✓ | |
| 5 | | ✓ | | ✓ | ✓ |
| 6 | ✓ | ✓ | | | ✓ |
| 7 | | | ✓ | ✓ | ✓ |
| 8 | | ✓ | | ✓ | |
| 9 | | | ✓ | | ✓ |
| 10 | | | | ✓ | ✓ |

This is a simple qualitative thematic coding analysis. But, we can represent exactly the same information quantitatively as in the following table:

| Person | Theme 1 | Theme 2 | Theme 3 | Theme 4 | Theme 5 | Totals |
|---------------|----------|----------|----------|----------|----------|--------|
| 1 | 1 | 1 | 0 | 1 | 0 | 3 |
| 2 | 1 | 0 | 1 | 0 | 0 | 2 |
| 3 | 1 | 1 | 0 | 1 | 0 | 3 |
| 4 | 0 | 1 | 0 | 1 | 0 | 2 |
| 5 | 0 | 1 | 0 | 1 | 1 | 3 |
| 6 | 1 | 1 | 0 | 0 | 1 | 3 |
| 7 | 0 | 0 | 1 | 1 | 1 | 3 |
| 8 | 0 | 1 | 0 | 1 | 0 | 2 |
| 9 | 0 | 0 | 1 | 0 | 1 | 2 |
| 10 | 0 | 0 | 0 | 1 | 1 | 2 |
| Totals | 4 | 6 | 3 | 7 | 5 | |

Notice that this is the exact same data. The first would probably be called a qualitative coding while the second is clearly quantitative. The quantitative coding gives us additional useful information and makes it possible to do analyses that we couldn't do with the qualitative coding. For instance, from just the table above we can say that Theme 4 was the most frequently mentioned and that all respondents touched on two or three of the themes. But we can do even more. For instance, we could look at the similarities among the themes based on which respondents addressed them. How? Well, why don't we do a simple correlation matrix for the table above. Here's the result:

| | Theme 1 | Theme 2 | Theme 3 | Theme 4 |
|---------|---------|---------|---------|---------|
| Theme 2 | 0.250 | | | |
| Theme 3 | -0.089 | -0.802 | | |
| Theme 4 | -0.356 | 0.356 | -0.524 | |
| Theme 5 | -0.408 | -0.408 | 0.218 | -0.218 |

The analysis shows that Themes 2 and 3 are strongly negatively correlated -- People who said Theme 2 seldom said Theme 3 and vice versa (check it for yourself). We can also look at the similarity among respondents as shown below:

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 | P8 | P9 |
|-----|----|--------|--------|--------|--------|--------|--------|--------|--------|
| P2 | | -0.167 | | | | | | | |
| P3 | | 1.000 | -0.167 | | | | | | |
| P4 | | 0.667 | -0.667 | 0.667 | | | | | |
| P5 | | 0.167 | -1.000 | 0.167 | 0.667 | | | | |
| P6 | | 0.167 | -0.167 | 0.167 | -0.167 | 0.167 | | | |
| P7 | | -0.667 | -0.167 | -0.667 | -0.167 | 0.167 | -0.667 | | |
| P8 | | 0.667 | -0.667 | 0.667 | 1.000 | 0.667 | -0.167 | -0.167 | |
| P9 | | -1.000 | 0.167 | -1.000 | -0.667 | -0.167 | -0.167 | 0.667 | -0.667 |
| P10 | | -0.167 | -0.667 | -0.167 | 0.167 | 0.667 | -0.167 | 0.667 | 0.167 |

We can see immediately that Persons 1 and 3 are perfectly correlated ($r = +1.0$) as are Persons 4 and 8. There are also a few perfect opposites ($r = -1.0$) -- P1 and P9, P2 and P5, and P3 and P9.

We could do much more. If we had more respondents (and we often would with a survey), we could do some simple multivariate analyses. For instance, we could draw a similarity "map" of the respondents based on their intercorrelations. The map would have one dot per respondent and respondents with more similar responses would cluster closer together.

The point is that the line between qualitative and quantitative is less distinct than we sometimes imagine. All qualitative data can be quantitatively coded in an almost infinite varieties of ways. This doesn't detract from the qualitative information. We can still do any kinds of judgmental syntheses or analyses we want. But recognizing the similarities between qualitative and quantitative information opens up new possibilities for interpretation that might otherwise go unutilized.

Now to the other side of the coin...

 **All quantitative data is based on qualitative judgment.**

Numbers in and of themselves can't be interpreted without understanding the assumptions which underlie them. Take, for example, a simple 1-to-5 rating variable:

Capital punishment is the best way to deal with convicted murderers.

| | | | | |
|-------------------|----------|---------|-------|----------------|
| 1 | 2 | 3 | 4 | 5 |
| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |

Here, the respondent answered 2=Disagree. What does this mean? How do we interpret the value "2" here? We can't really understand this quantitative value unless we dig into some of the judgments and assumptions that underlie it:

-  Did the respondent understand the term "capital punishment"?
-  Did the respondent understand that a "2" means that they are disagreeing with the statement?
-  Does the respondent have any idea about alternatives to capital punishment (otherwise how can they judge what's "best")?
-  Did the respondent read carefully enough to determine that the statement was limited only to convicted murderers (for instance, rapists were not included)?
-  Does the respondent care or were they just circling anything arbitrarily?
-  How was this question presented in the context of the survey (e.g., did the questions immediately before this one bias the response in any way)?
-  Was the respondent mentally alert (especially if this is late in a long survey or the respondent had other things going on earlier in the day)?
-  What was the setting for the survey (e.g., lighting, noise and other distractions)?
-  Was the survey anonymous? Was it confidential?
-  In the respondent's mind, is the difference between a "1" and a "2" the same as between a "2" and a "3" (i.e., is this an interval scale)?

We could go on and on, but my point should be clear. All numerical information involves numerous judgments about what the number means.

The bottom line here is that quantitative and qualitative data are, at some level, virtually inseparable. Neither exists in a vacuum or can be considered totally devoid of the other. To ask which is "better" or more "valid" or has greater "verisimilitude" or whatever ignores the intimate connection between them. To do good research we need to use both the qualitative and the quantitative.

Qualitative and Quantitative Assumptions

To say that qualitative and quantitative data are similar only tells half the story. After all, the intense academic wrangling of the qualitative-quantitative debate must have some basis in reality. My sense is that there are some fundamental differences, but that they lie primarily at the level of assumptions about research (epistemological and ontological assumptions) rather than at the level of the data.

First, let's do away with the most common myths about the differences between qualitative and quantitative research. Many people believe the following:



Quantitative research is confirmatory and deductive in nature.

Qualitative research is exploratory and inductive in nature.

I think that while there's a shred of truth in each of these statements, they are not exactly correct. In general, a lot of quantitative research tends to be confirmatory and deductive. But there's lots of quantitative research that can be classified as exploratory as well. And while much qualitative research does tend to be exploratory, it can also be used to confirm very specific deductive hypotheses. The problem I have with these kinds of statements is that they don't acknowledge the richness of both traditions. They don't recognize that both qualitative and quantitative research can be used to address almost any kind of research question.

So, if the difference between qualitative and quantitative is not along the exploratory-confirmatory or inductive-deductive dimensions, then where is it?

My belief is that the heart of the quantitative-qualitative debate is philosophical, not methodological. Many qualitative researchers operate under different **epistemological assumptions** from quantitative researchers. For instance, many qualitative researchers believe that the best way to understand any phenomenon is to view it in its context. They see all quantification as limited in nature, looking only at one small portion of a reality that cannot be split or unitized without losing the importance of the whole phenomenon. For some qualitative researchers, the best way to understand what's going on is to become immersed in it. Move into the culture or organization you are studying and experience what it is like to be a part of it. Be flexible in your inquiry of people in context. Rather than approaching measurement with the idea of constructing a fixed instrument or set of questions, allow the questions to emerge and change as you become familiar with what you are studying. Many qualitative researchers also operate under different **ontological assumptions** about the world. They don't assume that there is a single unitary reality apart from our perceptions. Since each of us experiences from our own point of view, each of us experiences a different reality. Conducting research without taking this into account violates their fundamental view of the individual. Consequently, they may be opposed to methods that attempt to aggregate across individuals on the grounds that each individual is unique. They also argue that the researcher is a unique individual and that all research is essentially

biased by each researcher's individual perceptions. There is no point in trying to establish "validity" in any external or objective sense. All that we can hope to do is interpret our view of the world as researchers.

Let me end this brief excursion into the qualitative-quantitative debate with a few personal observations. Any researcher steeped in the qualitative tradition would certainly take issue with my comments above about the similarities between quantitative and qualitative data. They would argue (with some correctness I fear) that it is not possible to separate your research assumptions from the data. Some would claim that my perspective on data is based on assumptions common to the quantitative tradition. Others would argue that it doesn't matter if you can code data thematically or quantitatively because they wouldn't do *either* -- both forms of analysis impose artificial structure on the phenomena and, consequently, introduce distortions and biases. I have to admit that I would see the point in much of this criticism. In fact, I tend to see the point on both sides of the qualitative-quantitative debate.

In the end, people who consider themselves primarily qualitative or primarily quantitative tend to be almost as diverse as those from the opposing camps. There are qualitative researchers who fit comfortably into the post-positivist tradition common to much contemporary quantitative research. And there are quantitative researchers (albeit, probably fewer) who use quantitative information as the basis for exploration, recognizing the inherent limitations and complex assumptions beneath all numbers. In either camp, you'll find intense and fundamental disagreement about both philosophical assumptions and the nature of data. And, increasingly, we find researchers who are interested in blending the two traditions, attempting to get the advantages of each. I don't think there's any resolution to the debate. And, I believe social research is richer for the wider variety of views and methods that the debate generates.

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2. What are the criteria for choosing a qualitative measure?
3. Point out to some aspects of the qualitative-quantitative debate. In particular, to what extent can the two measures be separated from each other? What are major qualitative and quantitative assumptions? What are the advantages and disadvantages to each measure?

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1. What are the two major types of statistics? How do they differ?
2. What does descriptive statistics deal with? Discuss in particular: distribution measurements, central tendency measurements, and dispersion measurements.

RELIABILITY AND VALIDITY OF STUDIES

1. The questions of reliability and validity are central to doing research. Define them.
2. How is reliability estimated?
3. What major types of error are there?
4. What types of reliability are there, and how do they differ?
5. How can measurement errors be reduced?
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| RELIABILITY | VALIDITY |
|---|--|
| How consistently a method measures within itself? | Are the results of the study really due to the variables the researchers suggest were tested by their methodology? |
| How consistently a method measures over time when repeated? | Can the results be generalized only different environments or participants? |
| Are two (or more) observers consistent in their observations / ratings? | Does the test look like it measures what it is supposed to measure; in other words, does the test look credible? |
| | Does the method correlates highly and positively with a method already well established and trustworthy? |
| | Will the method be able to predict future performance indicated by its results? |
| | Does the method measure behaviour that is representative of naturally occurring behaviour? |

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