I'm not robot

reCAPTCHA

Continue

Operationalization of variables table

For experimental research, where interval or relationship measurements are used, the scales are usually well defined and strict. Operationalization also puts down precise definitions of each variable, increasing the quality of results, and improving the robustness of the design. For many areas, such as social sciences, which often use order measurements, operationalization is important. It determines how scientists will measure a feeling or concept, such as the degree of anxiety or aggression. Such measurements are arbitrary, but allow others to replicate the research, as well as perform statistical analysis of the results. Fuzzy Concepts Fuzzy concepts are vague ideas, concepts that lack clarity or are only partially true. These are often called conceptual variables. It is important to define the variables in order to facilitate the correct replication of the research process. For example, a researcher might suggest the hypothesis: Children grow faster if they eat vegetables. What does the statement mean with children? Are they from America or Africa? What age are they? Are the children boys or girls? There are billions of children in the world, so how do you define the sample groups? How is growth defined? Is it weight, height, mental growth or strength? The statement does not strictly define the measurable, dependent variable. What does the term mean faster? Which devices, and what timescale, will be used to measure this? A short-term experiment, lasting a month, can produce completely different results than a longer-term study. The sampling frequency is also important for operationalization. If you conducted the experiment for a year, it would not be practical to test the weight every 5 minutes, or even every month. The first is impractical, and the latter will not generate enough analyzable data points. What are vegetables? There are hundreds of different types of vegetables, each containing different levels of vitamins and minerals. Are the kids fed raw vegetables, or are they cooked? How does the researcher standardize diets, and make sure children eat their greens? Operationalization The above hypothesis is not a bad statement, but it needs to be clarified and strengthened, a process known as operationalization. The researcher could limit the range of children, by specifying age, gender, nationality, or a combination of attributes. As long as the sample group is representative of the wider group, then the statement is more clearly defined. Growth can be defined as height or weight. The researcher must choose a definable and measurable variable, which will form part of the research problem and hypothesis. Again, more quickly would be redefined as a period of time, and prescribe the frequency of sampling. The original research design could specify three months or a year, giving a reasonable time and taking into account time and budget constraints. Each test group can be fed the same diet, or different combinations of vegetables. The researcher may decide that the hypothesis may revolve around vitamin C intake, so the vegetables could be analyzed for the average vitamin content. Alternatively, a researcher may decide to use a scale of measurement, asking subjects to complete a questionnaire about their diets. Already, the fuzzy concept has undergone a period of operationalization, and the hypothesis takes on a testable format. The importance of operationalization Of course, strictly speaking, concepts such as seconds, kilos and celsius are artificial constructs, a way in which we define variables. Pounds and Fahrenheit are no less accurate, but were discarded in favor of the metric system. A researcher must justify his scale of scientific measurement. Operationalization defines the exact measurement method used, and allows other researchers to follow the exact same method. An example of the dangers of non-operationalization is the failure of the Mars Climate Orbiter. This expensive satellite was lost, somewhere above Mars, and the mission failed completely. Later investigation revealed that the engineers at the subcontractor Lockheed had used imperial units instead of metric pound units. A failure in operationalization meant that the devices used during construction and simulations were not standardized. The American engineers used pound power, the other engineers and software designers, correctly, used metric Newtons. This led to a major failure in thrust calculations, and the spacecraft ended up in a lower orbit around Mars, burning up from atmospheric friction. This failure in operationalization cost hundreds of millions of dollars, and years of planning and construction were wasted. In: Methods of quantitative macro-comparative research Show page numbers [Page 51] Variable OperationalizationVariables are the building blocks of any quantitative data analysis. Variable operationalization involves processing raw data series into variables that can be used in statistical analyses. Some data comes prepackaged as useful variables and requires no further processing. For example, urbanization levels are available for almost all countries and raw data are (roughly) typically distributed with few outliers. Other types of data require extensive processing, but are used so often in quantitative macro-comparative research (QMCR) that standard treatments are available. For example, national income data is almost always standardized by dividing by population and normalized by logging. Still other types of data require tailored tailoring before they can be used properly, as there may be many conflicting operationalizations available, ... Define and give an example of Identify the three components of an operational definition Describe the purpose of multidimensional metrics such as indexes, scales, and typologies and why they are used Now that we've figured out how we define, or conceptualize, our terms we need to think about operationalizing them. Operationalization is the process by which researchers conducting quantitative research described exactly how a concept will be measured. It is about identifying the specific research procedures we will use to collect data on our concepts. This obviously requires us to know what research method(s) we will employ to learn about our concepts, and we will examine specific research methods later in the text. For now, let's take a broad look at how operationalization works. We can then review how this process works as we examine specific methods of data collection in later chapters. Remember, operationalization is just a process in quantitative research. Measurement in qualitative research will be discussed at the end of this section. Operationalization works by identifying specific indicators that will be taken to represent the ideas we are interested in studying. For example, if we are interested in studying masculinity, indicators of this concept may include some of the social roles prescribed for men in society such as breadwinning or paternity. Therefore, being a breadwinner or a father can be regarded as an indicator of a person's masculinity. The extent to which a man fulfills either, or both, of these roles can be understood as clues (or indicators) about the extent to which he is seen as masculine. Let's look at another example of indicators. Every day, Gallup researchers survey 1,000 randomly selected Americans to ask them about their well-being. To measure well-being, gallup asks these people to answer questions that cover six broad areas: physical health, emotional health, work environment, life evaluation, healthy behaviors, and access to basic necessities. Gallup uses these six factors as indicators of the concept that they are really interested in, which is well-being. Identifying indicators can be even easier than the examples described so far. What are the possible indicators for the concept of gender? Most of us would probably agree that male and female are both reasonable indicators of gender, but you may want to include other options for people who identify as non-binary or other gender. Political parties are another relatively easy concept for identifying indicators. In the United States, likely indicators include Democrat and Republican and, depending on your research interest, you can include additional indicators like Independent, Green, or Libertarian as well. Age and place of birth additional examples of concepts for which identifying indicators are a relatively simple process. What are the concepts is interest in you, and what are the possible indicators for these concepts? We have now considered some examples of concepts and their indicators, but it is important that we do not make the process of coming up with indicators for arbitrary or temporary. One way to avoid taking an overly relaxed approach to identifying indicators, as described earlier, is to turn to previous theoretical and empirical work in your area. Theories will point you in the direction of relevant concepts and possible indicators; empirical work will give you some very specific examples of how the important concepts in an area have been measured in the past and what kind of indicators have been used. Often it makes sense to use the same indicators as researchers who have come before you. On the other hand, you may notice some possible weaknesses in actions that have been used in the past that your own methodological approach will enable you to overcome. Speaking of your methodological approach, another very important thing to consider when deciding on indicators and how you will measure your key concepts is the strategy you will use for data collection. A survey provides a way to measure concepts, while focus groups provide a completely different way of measuring concepts. Your design choices will play an important role in shaping how you measure your concepts. Operationalizing your variables moving from identifying concepts to conceptualizing them and then operationalizing them is a matter of increasing specificity. You begin the research process with a general interest, identify some concepts that are important to study that interest you, work to define these concepts, and then pinpoint exactly how you will measure these concepts. In quantitative research, the last step is called operationalization. An operating definition consists of the following components: (1) the variable being measured, (2) the measure you are going to use, (3) how you plan to interpret the result of that metric. The first component, the variable, should be the simplest part. In highly quantitative research there is a research question that has at least one independent and at least one dependent variable. There must be able to vary. The United States, for example, is a member of the United States of America. Country of birth is a variable, as is patriotism. Similarly, if your test only includes men, sex is a constant in your study... not a variable. Let's choose a social work research issue and go through the process of operationalizing variables. Suppose we hypothesize that individuals in a residential psychiatric unit who are more depressed are less likely to be satisfied with care than those who are less depressed. In a quantitative relationship—as depression increases, satisfaction decreases. In this matter, depression is the independent variable (cause) and with care, the dependent variable (effect). We have our two variables—depression and satisfaction with care—so the first component is made. Now, we move on to the second component—the metric. How do you measure depression or satisfaction? Many students start by thinking that they could look at body language to see if a person was depressed. Perhaps they would also verbally express feelings of sadness or hopelessness more often. A satisfied person can be happy around service providers and express gratitude more often. These may indicate depression, but they lack consistency. Unfortunately, what this action is actually saying is that I know depression and satisfaction when I see them. While you are likely a decent judge of depression and satisfaction, you need to provide more information in a research study on how you plan to measure your variables. Your judgment is subjective, based on your own idiosyncratic experiences of depression and satisfaction. They could not be copied by another scientist. Nor can they be done consistently for a large group of people. Operationalization requires you to come up with a specific and rigorous action to see who is depressed or satisfied. Finding a good metric for your variable can take less than a minute. To measure a variable like age, you would probably ask a question on a survey that asked, How old are you? To evaluate someone's length of stay in a hospital, you can ask for access to their medical records and count the days from when they were admitted when they were discharged. Measuring a variable like income may require a little more thought, though. Are you interested in this person's individual income or the income of their family unit? This may ask if your participant is not working or is dependent on other family members for income. Do you count income from social welfare programs? Are you interested in their income per month or per year? The measures must be specific and clear. Depending on your research design, your action may be something you put on a survey or before/after the test that you give to your students. For a variable like age or income, a well-formulated question may suffice. Unfortunately, most variables in the social world are not that simple. Depression and satisfaction are multidimensional variables, as they each contain several elements. Asking someone Are you depressed? does not do justice to the complexity of depression, which includes problems with mood, sleep, eating, relationships and happiness. Asking someone Are you satisfied with the services you received? similarly omitting several dimensions of satisfaction, such as timeliness, respect, meeting needs and probability of recommending to a friend, among many others. INDEX, SCALE And TYPICATION To take into account the dimensions of a variable, a researcher on an index, scale, or typology. An index is a type of measure that contains several indicators and is used to summarize a more general concept. An index of depression may ask if the person has experienced any of the following indicators in the past month: pervasive feelings of hopelessness, thoughts of suicide, over- or under-eating, and a lack of enjoyment in normal activities. On their own, some of these indicators like over- or under-eating may not be considered depression, but collectively, responses to each of these indicators add up to an overall experience of depression. The index allows the researcher in this case to better understand what form a respondent's depression experience takes. If the researcher had only asked if a defendant had ever experienced depression, she would not know what kind of behaviors actually made up the defendant's experience of depression. Taking things a step further, if the researcher decides to rank the order of the different behaviors that make up depression, perhaps weighting suicidal thoughts heavier than eating disorders, then she will have created a scale rather than an index. Like an index, a scale is also a measure that consists of multiple objects or queries. However, unlike indexes, scales are designed in a way that accounts for the possibility that different objects can vary in intensity. If creating your own scale makes it difficult to create your own scale, don't worry! For most variables, this work has already been carried out by other researchers. You don't need to create a scale for depression because scales like the Patient Health Questionnaire (PHQ-9) and the Center for Epidemiological Studies Depression Scale (CES-D) and Beck's Depression Inventory (BDI) have been developed and refined over dozens of years to measure variables like depression. Similarly, scales have been developed as the Patient Satisfaction Questionnaire (PSQ-18) to measure satisfaction with healthcare. As we will discuss in the next section, these scales have proven to be reliable and valid. While you can create a new scale to measure depression or satisfaction, a study with rigor would pilot and refine that scale over time to make sure it measures the concept accurately and consistently. This high level of rigor is often inescapable in student research projects, so using existing scales is recommended. Another reason existing scales are preferred is that they can save time and effort. The mental measurements yearbook provides a searchable database of metrics for various variables. You can access this database from the library's list of databases. At the University of Texas at Arlington, the Mental Health Yearbook can be searched directly or viewed online. If you don't find anything in there, your next stop should be the methods section of the articles in your literature review. Methods section each article will detail how the researchers measured their variables. In a quantitative study, the researchers likely used a scale to measure key variables and will provide a brief description of this scale. A Google Scholar search such as depression scale or satisfaction scale should also produce some relevant results. As a last resort, a public web search can take you to a scale for your variable. Unfortunately, not all of these approaches guarantee that you will actually be able to see the wave itself or get information about how it is interpreted. Many scales cost money to use and may require training to properly administer. You can also find scales that are related to your variable but would need to be slightly changed to match your study needs. Adapting a scale to fit your study is a possibility; However, you should remember that changing even small parts of a scale can affect its accuracy and consistency. Pilot tests are always recommended for custom scales. A final way to measure multidimensional variables is a typology. A typology is a way to categorize concepts according to specific themes. Probably the most famous version of a typology is micro, meso, macro framework. Students classify specific parts of the social world by their ecological relationship with the person. Let's take the example of depression again. The lack of sleep associated with depression would be classified as a micro-level element while a severe economic recession would be classified as a macro-level element. Typologies require clearly defined rules on which tasks will be assigned to which categories, so carefully following the rules of typology is important. Once you have (1) your variable and (2) your metric, you must (3) describe how you plan to interpret your metric. Sometimes it's incredibly easy to interpret an action. If you ask someone their age, you will probably interpret the results by adding the raw number (e.g. 22) someone gives. But you can also recode the age in categories (eg, under 25, 20-29 years, etc.). An index can also be easy to interpret. If there is a checklist of problem behaviors, one can simply add up the number of behaviors checked by-with a higher total indicating worse behavior. Sometimes an index will assign people to categories (e.g. normal, borderline, moderate, significant, severe) based on their total number of ticks. As long as the rules are clearly defined, you are welcome to interpret measures in a way that makes sense to you. Theory can guide you to use certain categories or you may be affected by the types of statistical tests you plan to run later in data analysis. For more complex actions like scales, you should look at the information provided by the scale authors for how to interpret the scale. About can not find enough information from the wave creator, look at how the results of that scale are reported in the results section of research articles. For example, Beck's Depression Inventory (BDI-II) uses 21 questions to measure depression. A person indicates on a scale of 0-3 how much they agree with a statement. The results for each question are added together, and the respondent is put into one of three categories: low levels of depression (1-16), moderate levels of depression (17-30), or severe levels of depression (31 and above). In summary, operationalization specifies which metric to use to measure your variable and how you plan to interpret that metric. Operationalization is probably the most difficult component of basic research methods. Don't get frustrated if it takes some drafts and a lot of feedback to get to a working definition. Qualitative research and operationalization As discussed in the previous section, qualitative research takes a more open approach to defining the concepts of your research question. The questions you choose to ask in your interview, focus group, or content analysis will determine what data you end up receiving from your participants. For example, if you are researching depression qualitatively, you wouldn't use a scale like Beck's Depression Inventory, which is a quantitative measure we described above. Instead, you would start with a tentative definition of what depression means based on your literature review and use this definition to bring questions to your participants. We will cover how these issues fit into qualitative research design later in the textbook. At the moment, remember that qualitative researchers use the questions they ask participants to measure their variables and that qualitative researchers can change their questions as they collect more information from participants. Ultimately, the concepts of a qualitative study will be defined by the researcher's interpretation of what her participants say. Unlike in quantitative research where definitions need to be explicitly specified in advance, qualitative research allows the definitions of concepts to emerge during data analysis. Spotlight at UTA School of Social Work Robust measurement is very important in research. In addition, providing a clear explanation of the measures used in a study helps others to understand the concepts studied and interpret the results and helps other researchers to accurately replicate the study in different environments. Dr. Noelle Fields and Ling Xu from the University of Texas at Arlington's School of Social Work collaborated with Dr. Julienne Greer from the College of Liberal Arts on a pilot study that included a participatory art intervention with the social robot, the NAO. The intervention took place with older adults living in a assisted living The overall aim of this study was to help older adults improve their mental health through participation in a theatrical arts business led by the NAO. The main result variables for this pilot study were psychological well-being as measured by depression, loneliness and engagement with the robot. Depression and loneliness were measured by two standardized scales: the 15-post Geriatric Depression Scale (Sheikh & Yesavage, 1986) and the revised 3-item UCLA loneliness scale (Hughes, Waite, Hawkley, & Cacioppo, 2004). However, engagement with the robot did not have a standardized measure. Thus, the research team used a measure to capture engagement with the robot based on previous research. In this study, engagement with robot was defined as the degree of interaction or engagement with a robot. One way to measure engagement is for members of the research group (i.e. observers) to rate the participant assignment (see Table 1). Table 1. Please call 0-5 to specify the participant's engagement levels (definitions for each level can be found in the sample column). Rating Sentence Example 0 Intense non-compliance Participants stood and walked away from the table where the robot interaction took place 1 Noncompliance Participants hung their heads and refused to follow the interviewer's request to speak to the robot 2 Neutral Participants followed instructions to speak to the robot after several quick From the Confederate 3 Small Interest Participants required two or three requests from the Confederate before responding to the robot 4 Engagement Participant who immediately after the Confederate request to speak to the robot 5 Intense engagement Participants spontaneously engaged with the robot This measurement was easy to apply in this study; However, it may lack the sensitivity to capture more detailed information about engagement, especially among older adult populations. Therefore, in this pilot study, the researchers designed additional indicators to describe participants' reactions when interacting with a robot. More specifically, after watching a video of each participant interacting with the NAO, each researcher gave a commitment score based on the following concepts: (1) attention including focus on the face robot or gesture of robot, (2) smiling and/or laughter, (3) head nodded, and (4) facial/vocal expressions that included eye widening, eyebrow arching, and tonal changes in the voice. Through video analysis, each of the concepts was counted and tabulated by independent researchers, and the average scores of engagement were then calculated. Total points on total engagement were also adjusted for analysis. See Table 2 for detailed information on this measurement. Table 2: Each researcher should give a score on each entry below based on your observation of participants' interaction with the 1.Disagree sharply 2. Disagree 3. Neither agree nor do not 4. Agrees 5.Strongly Agree Attention a. focus on face robot b. focus on gesture of robot Smiling and/or Laughter Head nodded Facial/Vocal expression a. Eyes wide st B. Eyebrow arch c. Tonal changes in voice study found that participants reported improvements in mood, loneliness, and depression. The degree of difference/change was slightly greater in participants without dementia, perhaps suggesting social engagement and connectivity were a more profound attribute in cognitively intact older adults. Further research would be needed to confirm this hypothesis. Although the study is limited by its small-scale and non-intervention control group, this exploratory pilot study supports the continued development of participatory arts interventions with older adults using a social robotic platform. The benefits of performative participatory art between social robots and older adults is an emerging area of research for human-robot social interactions and communication. Operational definitions must include the variable, the metric, and how you plan to interpret the metric. Multidimensional concepts can be measured by an index, scale, or typology. It is a good idea to look at how researchers have measured the concept in previous studies. Index measures that contain several indicators are used to summarize a more general concept Indicators- represent the concepts that we are interested in studying the Operationalization process by which researchers conducting quantitative research specify exactly how a concept will be measured and how to interpret that measure Skala- composite metric sdesigned in a way that accounts for the possibility that different objects on an index may vary in intensity Typology metrics that categorize concepts according to specific themes Business charts by Pixabay CC-0 Checklist by TeroVesalainen CC-0 CC-0