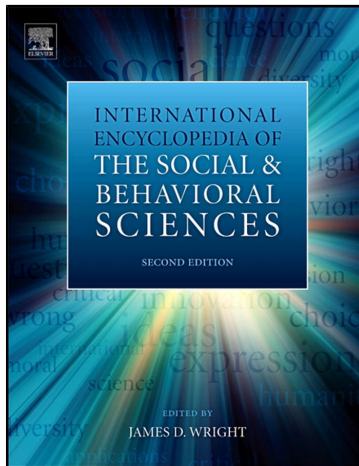


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Experimental Laboratories: Social and Economic

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Abstract

The experimental laboratory has become a key component in social and economic research. The article discusses how to prioritize the equipment and personnel needed to create a fully operational laboratory to answer research questions.

What is an experimental laboratory in social and economic sciences? A laboratory (lab) is defined as a place that contains equipment necessary for one's scientific work. Under this definition, the key phrase is 'equipment necessary.' In practice, the contents of a lab are dictated by the kind of research one does and the tools required to implement that research. The social psychologist studying communication patterns within a married couple requires a different lab than a social scientist studying the psychophysiological correlates of aggressive behavior or an experimental economist testing an implication of game theory. Sometimes a social science lab is merely a small room with a computer. As long as that space, and the equipment it houses, allows the research to be conducted, then the room can be called a lab. Much as Pygmalion carved his ideal mate out of ivory, a researcher creates a research environment from the equipment, setting, and people necessary to conduct research. Research labs will vary depending on the needs of the researcher.

The Computer

One piece of equipment that has become indispensable in just about all social and economic labs is the computer. At a minimum, the computer facilitates the editing of manuscripts. Writing experts claim that the ability to edit and rewrite one's prose is critical for clear, crisp writing. A sophisticated user of a word-processing program can format a manuscript in the manner required by a journal editor and easily construct a reference list from an electronic database. An Internet connection allows collaborators to exchange working drafts of articles either through electronic mail or shared disk space, and authors can submit manuscripts for publication electronically, as well as distribute reports to other interested parties. In this sense, the computer has replaced the typewriter as the machine used to write and the copier as the machine used to disseminate the written product of one's research. Dissemination of results is an important feature of all research projects – others need to benefit from the new knowledge that has been created.

There are, of course, more advanced uses of the computer in social and economic research. For instance, the computer can be useful in the selection of the research sample, data collection, and data analysis. Unlike the traditional paper-and-pencil questionnaire, administering a survey by computer permits automatic tailoring of follow-up questions depending on the answers the respondent provides to previous questions. Software can help to create and administer complicated sampling

designs, and can facilitate elaborate laboratory procedures such as the presentation of research stimuli at a rapid rate, presenting questions in random order, or measuring the timing of a participant's response.

Some researchers have started placing their studies on the World Wide Web to complement their lab and field data collection (e.g., see <http://www.socialpsychology.org/expts.htm> and Amazon's Mechanical Turk Web site <https://www.mturk.com/mturk/welcome>). Researchers may allow unlimited access to their study or grant limited access to a select subsample. Care must be taken to create a representative sample. Sampling issues aside, conducting studies over the World Wide Web makes it convenient to collect data at multiple sites from any number of computer platforms. This permits data collection anywhere in the world at relatively little expense.

Computers are also used to analyze data. A simple spreadsheet program can be used for descriptive statistics and simple inferential tests, whereas specialized software is needed for more computationally intensive data analytic techniques such as bootstrapping and Bayesian algorithms. Even the analysis of some forms of qualitative data (such as narratives) can be facilitated through the use of software programs designed to code original text. For example, a word in the text could be coded as a noun, as a positive or negative word, or any number of other categories relevant to the particular research question.

The computer also aids lab management. For instance, scheduling and calendaring software can help organize interdependent parts of a research project on a time line. Such time lines are useful not only for facilitating the scheduling of lab facilities and lab meetings, but also for planning and writing grant proposals.

How many computers should a lab contain? What kind of computer should a lab have? These questions are difficult to answer in the abstract because so much depends on the research question. For example, one project may involve 200 handheld tablet computers because the study requires 200 married couples to answer questions each evening at home for a month. On the other hand, a researcher who studies social interaction through computer simulation may only need one computer with fast processors and extra memory. In sum, the needs of the research drive the equipment required in the lab.

What Is Your Research Question?

It is useful to consider three factors when designing a lab for social or economic research: the experimental context the

researcher needs to conduct the research, the methods the researcher will use, and the measurements the researcher will make. Each of these three issues is subsumed by the following more general question: what is the research question? If your research question addresses how Mayans conceptualize kinship terms, then you would need a special setting, special materials, and special measures – the lab will likely need to be portable. This research question requires a different lab setup than, say, a research question about trust in the context of an economic game that can be conducted in a controlled setting of lab located in a university building.

What Experimental Context Does the Research Require?

What context does the research require? For example, if one wants to study social behaviors in a bar, then it might be useful to design a lab setting that resembles a bar (complete with mood music, barstools, and liquor cabinets). If one wants to study jury deliberation, then it is useful to design a lab setting that resembles an actual jury room. These labs can be constructed to reproduce, or mimic, a real-world setting, and hence increase the external validity of the research, especially if these details influence behavior to be more realistic.

However, it is also possible to study social and economic behavior in an artificial setting, an analog setting that evokes similar processes as the real-world setting but is easier to create and easier to control. One example is the classic [Milgram \(1975\)](#) study on obedience. Milgram claimed that his obedience findings could help us understand how citizens in a totalitarian government may be pressured to follow superiors, *but* his research setting was low in external validity with respect to totalitarian governments. Milgram's research setting was successful at evoking the processes that make it difficult to refuse requests or refuse to follow orders. Milgram's lab setting involved an elaborate stage production that the experiment was about the effects of punishment on learning. *However*, the actual purpose of the study was to examine the social interaction between the participant (who believed he or she was playing the role of the 'teacher' in the study on learning) and the experimenter. Milgram's work is useful in demonstrating that much can be learned from artificial experimental settings. One must be careful, however, not to extrapolate too much from such artificial circumstances because of the loss of external validity.

Sometimes the researcher must assume the role of a stage manager in a theatrical company. The researcher attempts to create the setting that produces the reaction in the participant required by the research question. This may frequently include the use of stage props, as in the Milgram study that used a machine to administer (bogus) electric shock to the 'learner.' The role of a stage manager should not be underestimated. Social psychology experiments frequently are criticized for being low in external validity, but a study that engages the participant in the task is high in another important feature mundane realism (see [Aronson et al., 1992](#), for a discussion of validity and mundane realism). As much as possible, studies should try to engage the participant because a bored, disengaged participant is likely to provide low-quality data.

Some research questions can be studied in a relatively simple setting. For instance, research investigating people's

facial reactions to disturbing photographs would need a means for displaying the pictures (a slide projector, a computer, a photo album), so an appropriately lit room would be a sufficient setting. The participants could be videotaped while viewing the photographs and trained coders could rate the facial expressions. With the proper cameras and software it is also possible to use computer algorithms to automatically code the facial expressions in real time.

Tools for the Research Method

One of the defining features of an experiment is that it includes a manipulation, also known as an independent variable. The goal is to create at least two conditions that differ only on the particular feature that is manipulated. Random assignment of research participants to condition facilitates this goal.

Laboratory equipment may be needed to conduct the manipulation. For instance, work on eyewitness identification of a criminal suspect may require that the composition of the lineup be varied to include foils that are either high in physical similarity to the suspect or low in physical similarity. Thus, if the researcher uses a photolineup, then the lab should include a broad range of photographs so that many different lineups could be constructed.

A computer can be useful in carrying out experimental manipulations. For instance, if the manipulation requires varying the duration a stimulus is presented, then the computer can be used to control such durations. Experimental stimuli may involve presentation of video or animation and a computer can facilitate the creation, editing, and presentation of such material.

Sometimes the manipulation requires the use of drugs. For instance, research on arousal may require the participant in one condition to receive a dose of epinephrine whereas a participant in another condition to receive a dose of a neutral sugar pill. Some researchers in decision-making use oxytocin to manipulate trust while playing an economic game. Such research requires equipment necessary to store and administer the drugs and in some cases appropriate medical professionals on site. Careful attention should be given to proper tracking of the use of the substances such as storing them in a safe that requires two people with different keys to access. Participants should be cleared for safety prior to leaving the study. For example, a study examining behavior in an experimental bar that involves consuming alcohol should ensure that participants are not intoxicated when leaving the lab.

Measurement Devices

An important feature of empirical work is that something is measured. Even qualitative research has measurement, such as the recording and interpretation of a narrative. The lab must include the tools necessary to make and store such measurements.

Standard measurement devices include an audio recorder, a video recorder, a computer with interactive software, and pencils for participants to write responses. Some research may also require measurements of the electrophysiology of the brain or autonomic nervous system, which requires specialized equipment to store and analyze samples (e.g., measurement of cortisol level in saliva).

Some experiments may require the use of standardized scales such as personality tests, intelligence tests, or scales to measure depression. Because some of these scales are copyrighted, researchers may need to contact the developers of the scale for permission to use. Again, which scales are needed in the lab depend on the research question. For instance, if the research question examines the relation between intelligence and aggressive behavior, then scales to assess intelligence would be needed on hand.

Managing a Lab

Much like large offices, some experimental labs may require a lab manager to handle the day-to-day functioning of the lab. The manager's tasks may include scheduling the use of lab resources, monitoring research budgets, and staying abreast of manuscript and grant proposal deadlines. Sometimes a lab requires more specialized personnel, such as a technician when electrophysiological recording equipment is used or a programmer if specialized software is needed. Lab personnel may also handle maintenance of lab equipment and storage of data.

Summary

New researchers frequently ask, 'What kind of equipment should I include in my lab?' As argued in this article, one should reply with the following questions: What is the research question? What experimental setting is needed for the research? What equipment is needed to conduct the research? What

equipment is needed to collect and analyze the measurements? How will the administration of the lab be handled?

Further Reading

For details on how to conduct experiments and an explanation of experimental methodology see Aronson et al. (1992). For an explanation of how to analyze data from an experiment see Gonzalez (2009). For suggestions on how to write an article describing empirical work in social psychology see Bem (1986) and the *Publication Manual of the American Psychological Association* (see <http://www.apa.org>). For information on the ethical treatment of research participants see professional society Web sites such as the American Psychological Association (e.g., <http://www.apa.org/monitor/jan03/principles.aspx>).

See also: Experimental Laboratories: Psychological; Experimental Laboratories: Social and Economic; Laboratory Studies: Historical Perspectives; Problem Selection in the Social Sciences: Methodology.

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