

INTRODUCTION

There is great comfort in gathering information when you are faced with an unknown and this is particularly true when you or someone you love receives a medical diagnosis for which you have no context, like Lewy body dementia (LBD). For some, the need to understand the disease will lead to current scientific articles; unless you are a trained scientist, you will find yourself in a foreign land with no ability to understand the language. The good news is that the language is usually English and the information can be negotiated with a little patience and either a good medical dictionary or access to the Internet.

WHERE TO START

With a little work, you can interpret the language and acquire a good basic understanding of the study and its results. It is important to understand the definitions of the words in the study and how they apply to the research you are reading. Look up any words that you don't know and keep a list of definitions. Often an alternate definition of a word makes more sense in the scientific context, so be prepared to investigate words that are familiar to you if you cannot make the standard definition work. As you continue your research, the vocabulary will become more familiar to you, but it is helpful to be able to refer to your list of definitions. Once you have a grasp of the content of the study, spend some time thinking about the research. Critically interpret what the results mean and how relevant they are to the disease.

ORGANIZATION OF A PAPER

In most scientific journals, scientific papers follow a standard format. Such papers are divided into several sections, and each section serves a specific purpose in the paper.

A paper begins with a short summary or *abstract*. Generally, a paper gives a brief background to the topic, describes the major findings of the paper, and relates these findings to the field of study.

The next section of the paper is the *introduction*. This section presents the background knowledge necessary for the reader to understand why the findings of the paper are an advance on the knowledge in the field. The Introduction describes the state of knowledge in a specialized field.

Then the paper focuses more specifically on a particular aspect, usually describing a finding or set of *findings* that led directly to the work described in the paper. If the authors are testing a hypothesis, the source of that hypothesis is spelled out, findings are given with which the hypothesis is consistent, and one or more predictions are given. In many papers, one or several major *conclusions* of the paper are presented at the end of this section, so that the reader knows the major answers to the questions just



posed. Papers more descriptive or comparative in nature may begin with an introduction to an area which interests the authors, or the need for a broader database.

The *materials and methods* section describes the materials used in the experiments and the methods by which the experiments were carried out.

The *results* section describes the experiments and the reasons they were done. Generally, the introduction poses the questions addressed in the early part of results.

The *discussion* section serves several purposes. First, the data are analyzed to show what the authors believe the data show. Any limitations to the interpretations should be acknowledged, and fact should be separated clearly from speculation. Second, the findings of the paper are related to other findings in the field. This serves to show how the findings contribute to knowledge, or correct the errors of previous work.

Lastly, papers usually have a short *acknowledgements* section, in which various contributions of other workers are recognized and financial support is listed, followed by a *reference* list giving references to papers and other works cited in the text.

READING A SCIENTIFIC PAPER

When reading scientific papers, it is recommended that you organize the way you read. Generally, first read the *abstract* in order to understand the major points of the work. If you are very familiar with the field, the introduction can be skimmed or even skipped. The logical flow of most papers goes straight from the introduction to results. Accordingly, the paper should be read in that way as well, skipping materials and methods and referring back to this section as needed to clarify what was actually done. Many papers contain shorthand phrases referring to data that we might term *code words*, since they have connotations that are generally not understood. In many papers, not all the experimental data are shown, but are referred to by "(data not shown)." This is often for reasons of space; the practice is accepted when the authors have documented their competence to do the experiments properly, usually in previous papers. Other code words are "unpublished data" and "preliminary data." The former can either mean that the data are not of publishable quality or that the work is part of a larger story that will one day be published. The latter means different things to different people, but one connotation is that the experiment was done only once.

TYPES OF RESEARCH ARTICLES

Research articles about disease usually fall into two categories – basic biomedical research or clinical research.

Biomedical research is the study of how living things function. Human bodies are composed of smaller living systems that have unique life cycles. Disease has a life cycle also and how that cycle plays out in the



human system is the subject of many research papers. Basic research in the biomedical sciences investigates the way that basic protein sequences work in living things. It addresses how cells emerge, replicate, talk to one another, work, die, and then disappear. The number of systems and processes is limitless and can be influenced by many factors. These processes can effect disease or ensure good health.

Biomedical research seeks to define biological processes and to understand how they operate in both the presence or absence of disease. Defining the process allows for intervention through drugs and therapies that can reset the body to its normal routine or disrupt a disease process to enhance health. Basic biomedical science projects are designed to shed light on biological functions. These studies often involve the use of insect, fish, or animal models as a surrogate for human systems. Scientists conducting these studies do not usually interact with patients.

Clinical research includes three types of studies. Patient-oriented research is conducted with human subjects (or on material of human origin such as tissues and specimens). Investigators interact directly with the people participating in the study. Patient-oriented research may include studies to investigate human disease mechanisms, therapeutic interventions, clinical trials, and/or development of new technologies. Clinical research also includes epidemiology (the study of causes, distribution, and control of disease in a population) and behavioral studies as well as outcomes research and health services research.

CRITICAL ASSESSMENT OF THE WORK

Publishing is one way scientists share information with one another. Print publications are part of a long-standing academic tradition and study reports in established journals usually are reviewed by a panel of academic peers for validity. The ways in which scientists communicate are changing rapidly with technology and there are some things to consider when seeking information. For several years, there has been a movement to make all articles available free to the public through Internet sources. The group behind this effort is encouraging the publication of “no-result” studies; these usually have not been reported in journals because the findings were limited. It is exciting to have this much available to the general public but it comes with some responsibility to be critical of what we read.

KNOW THE SOURCE

If the article you have is not in a high-quality, peer-reviewed journal, be very critical of the content. Quality research is sometimes published in books, but generally a book is not reviewed by other scientists to evaluate the content. Make sure the article is written by scientists rather than a journalist or non-science government official. Reports commissioned by government departments usually are not scientific, so make sure you understand the source.



To determine whether a journal is peer-reviewed and of high quality, go to the journal's Web page. Look for the word's "peer-reviewed" and "acceptance rate." If the journal is not peer-reviewed or has an acceptance rate above 20 percent, you should be more skeptical of the content.

The same standard applies to conference proceedings. Cutting-edge science often is first presented in conferences. These meetings can be excellent sources of research findings, and reports often are available online, but you should investigate the source and support for the conference to determine whether reports presented there were peer-reviewed and selected for quality.

HOW WAS THE STUDY SUPPORTED?

Who financed the study? Did the funder have something to gain or lose from the results? For example, drug trials often are supported by the drug companies who have a vested interest in showing that a drug is safe and effective. Independent studies that show different results should be given as much consideration as a series of studies supported by pharmaceutical companies.

Often, studies that seem contradictory require further consideration. The reported outcomes can appear to be opposite statements when the studies actually agree on some of the subtle facts. Interpretation of findings is subjective and experts often disagree.

WHAT KIND OF STUDY IS IT?

Different types of studies require different evaluations. Studies involve experiments, surveys, animal models, meta-analyses, and qualitative studies. You should evaluate each of these differently.

Experiments

If the article talks about treatment groups and control groups, it's probably an experiment. Reviewers, if there were any, are very good at checking that the experiment is designed correctly and the results well-interpreted. You need to understand who participated in the study. If a clinical or drug trial was carried out with 100 white men aged 75-80, the results might not apply to you if you are a 23-year old black female,

Surveys

Research involving a large number of people filling out a questionnaire online, on paper, by telephone or in person, is based on a survey. Reviewers can assure that the questionnaire is correctly designed and the analysis is appropriate. Survey studies are usually trying to connect characteristics with outcomes, but often only state that one is correlated to the other. For example, a survey can determine that smoking and coffee consumption are statistically linked to a population with a chronic condition, proving there is a correlation. That does not, however, mean that those two activities caused the onset of disease. When evaluating a survey that claims that one thing causes another, ask yourself if there are alternative explanations that the authors did not rule out.



Meta-Analysis

A meta-analysis summarizes the results of many studies. These are great studies to provide an overview if you are new to a field. They tend to be inclusive about publications and can include both studies of varied quality. A meta-analysis is an overview; if possible, you should review more than one.

Qualitative Studies

Qualitative research comes in many shapes and sizes. Some is presented in a highly structured way; some is written like a story. A qualitative paper describes a study within a particular context, coming to conclusions about that context. These are often case studies. Make sure that the context makes sense to you. Think about how your situation differs from the case presented and if that matters in your situation.

WHAT IS THE POINT OF THE PAPER?

Did the paper test a theory or propose one? If the paper tested a theory, the conclusions should relate to the original hypothesis. Some papers are exploratory studies that never state a hypothesis and some propose theory and do not provide much evidence to support the theory. All are important parts of the scientific process, but the one giving you concrete information is the study that is testing a theory.

INTERPRET THE STATISTICS

Statistical analysis for those with no background can be very confusing. Try to follow the logic rather than worrying about understanding the rationale behind the specific statistical procedure. Statistical significance is the standard for proof, and you can assume in a paper that has been reviewed by independent reviewers that the specific approach is appropriate and has been done correctly. A simple translation of statistics would be as follows: “a difference between groups was statistically significant” means that group A and B are different from each other because of treatment or some other factor in the study. Language such as “factors A and B significantly predict outcome C” means that A and B are possible causes of C, though many other things need to be tested to determine causal relationships.

FINAL COMMENTS

Many great resources on the Web help interpret and understand research papers; several were used in the writing of this article.

One last piece of advice is to watch out for statistics. A study may state it has a 75 percent success rate, even if the sample size included only four people. In a case like that, a 75 percent success rate is not enough of a sample in which to believe the results can be interpreted to the larger population. The larger the sample size, the more reliable the results are likely to be.





How to Read a Research Paper

If you struggle for too long with any research paper, accept that it might be poorly written, as they often are, and know that scientists struggle with the same issues when reviewing papers for publications. The more you read, the easier it will become to understand the newest work. But be forewarned that understanding brings with it additional questions and even more research articles to read.





How to Read a Research Paper

**To learn more about LBD,
visit www.lbda.org**

LBD Caregiver Link:

I-800-LEWYSOS

I-800-539-9767

lbda@lbda.org

By supporting the work of LBDA, you too will be

Increasing Knowledge

Sharing Experience

Building Hope

Lewy Body Dementia Association

404-935-6444

www.lbda.org

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