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Journal of the American Medical Association

“This book should be an essential addition to the personal libraries of all health care workers who need to use articles in journals. In these days of evidence-based medicine, this should apply to all physicians, nurses and other health professionals.”

Oncology

“The writing style is amazingly clear and does not require formal course work in biostatistics or epidemiology ... This friendly informal paperback book is a bargain at the price and should have wide use. We strongly recommend it for beginners and for easy entry into a complex domain and to experts who we think will enjoy it and who will find it useful as they teach, advise and help others.” Quality in Health Care

“The great strength of this book lies in the lively and accessible way in which it is written, making it particularly appealing to its target audience of practitioners and clinicians. Dealing with an already well-covered topic, which can be dry and unpalatable, the authors manage to present their material in a colourful and interesting way. The language is clear and readable; it is well-structured, logically mirroring the sequence of good quality papers. The examples from studies are well chosen, interesting and at times entertaining in themselves. References are informative and help to contextualise the information. This is a most useful book which I would recommend in particular for students of all disciplines and practitioners involved in research activity.”

Accident & Emergency Nursing

“In summary, this book provides a great overview of how to read clinical papers in an informed way … it provides accessible and simple skills to assess research.”

Journal of Substance Use
Understanding
Clinical Papers
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Preface to the Third Edition  

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Preface to the First Edition

Buy this book if you are a health-care professional and you want some guidance in understanding the clinical research literature. It is designed to help you with reading research papers, by explaining their structure and the vocabulary they use. These essential first steps will make interpretation of clinical research that much easier for you. For example, the book will help with questions like:

- “Who were the authors, what is their standing, and can they be trusted?”
- “What question or questions did they want to answer, and what was the clinical importance of doing so?”
- “Who were the subjects in the study, how were they chosen, and were the methods used the most suitable?”
- “How were the data collected? Was this the best approach?”
- “What methods did the authors use to analyse the data, and were the methods employed appropriate?”
- “What did they find? Were their conclusions consistent with their results”
- “Were there any shortcomings in the study? Do the authors acknowledge them?”
- “What are the clinical implications of their results?”
- “Does it all make sense?”

This book is not an introduction to medical statistics, study design, epidemiology, systematic reviews, evidence-based medicine, or critical appraisal, although we inevitably touch on all of these things (and more). Even so, if you are not already well versed in some of these fields, you should know a lot more by the time you get to the end.

We have concentrated on improving our readers understanding of quantitative research papers, and while qualitative papers contain several important elements which we have not been able to cover here, there are many other areas, particularly at the beginning and ends of papers, which readers of qualitative papers will find relevant to their needs.

Primarily, this book should be of interest to the following individuals:

- Clinicians currently practising. This would include GPs, doctors in hospitals, in the community and in public health, nurses, midwives, health visitors, health educators and promoters, physiotherapists, dietitians, chiropodists, speech therapists, radiographers, pharmacists, and other clinically-related specialists.
- Clinicians of all types engaged in research activities: as part of their training; as a condition of their clinical duties; for postgraduate studies and courses; or for professional qualifications.
- Those involved with the education and training of health professionals in colleges of health, in universities, and in in-house training and research departments.
- College, undergraduate, and postgraduate students in all medical and clinical disciplines which involve any element of research methods, medical statistics, epidemiology, critical appraisal, clinical effectiveness, evidence-based medicine, and the like.

In addition, this book should appeal to individuals who although are not themselves clinicians none-the-less find themselves in a clinical setting, and need some understanding of what the published clinical research in their area means. These people would include
Clinical auditors and quality assessors.
Clinical managers.
Service managers, administrators and planners.
Those working in health authorities and in local government social and health departments.
Purchasers of health provision.
People not actually employed in a clinical arena but who none-the-less have a professional or personal interest in the medical literature. For example, members of self-help and support groups (e.g. migraine, stroke, diabetes, Alzheimer’s, etc.); medical journalists; research-fund-providers; the educated, interested, lay public.

We have structured the contents of the book into a series of units whose sequence mirrors that of papers in most of the better-quality journals. Thus we start with the preliminaries (title, authors, institution, journal type and status, and so on) and end with the epilogue (discussion, conclusions and clinical implications). Throughout the book we have used a wide variety of extracts from recently published papers to illuminate our textual comments. In these we have focussed largely, but not solely, on examples of good practice in the hope that this will provide readers with some “how it should be done” benchmarks. Any errors remain of course our own.

David Bowers, Allan House, David Owens

Leeds, 2001
Preface to the Third Edition

It seems to us quite a long time since the second edition of *Understanding Clinical Papers* was published (in 2005). In the intervening years we have again (as we did for the previous editions) received from readers many favourable comments, as well as some useful suggestions. One suggestion that struck us as being eminently sensible, coinciding with our own thoughts, was that we should introduce material into the book which would help readers understand clinical papers with a *qualitative* design. Such papers are increasingly seen in the mainstream clinical journals (in addition of course to the specialist qualitative journals) and we feel that we should be providing readers with some help in making sense of this content.

The inclusion of five new chapters containing this qualitative material is the most important change in our book from the second edition. We are very pleased to have been able to welcome an experienced qualitative researcher as a co-author, who has contributed this new material.

In addition, we have, not surprisingly, taken the opportunity to update many of the examples of clinical papers with which we illustrate the ideas contained throughout the book. At the same time, we have sharpened and clarified the text where we felt it was needed. We have added small amounts of new material here and there – where we felt that these additions, drawn from our familiarity with the evolving health research literature, would improve the book.

The book should appeal, as before, to doctors, nurses, health visitors, physiotherapists, radiographers, dietitians, speech therapists, health educators and promoters, podiatrists, and all of those other allied professionals (and students in each of these disciplines) – and to all of those involved in health research.

David Bowers, Allan House, David Owens, Bridgette Bewick

*Leeds, 2013*
PART

I

Setting the Scene:
Who Did What, and Why
Some Preliminaries

Before you start reading a paper, you could usefully ask one or two questions which help set the work in context:

- Who wrote the paper?
- In what sort of journal does the paper appear?
- Who (and what) is acknowledged?

WHO WROTE THE PAPER?

Often, one person writes an article such as a review or an editorial. This is less common for papers describing the results of a research study. Because most research is a joint enterprise, papers describing research studies are usually published under the names of a number of people – the research team. From the list of authors, you can tell:

- The range of expertise of the research team. Professional backgrounds of the authors (and sometimes their level of seniority) are often included, with the address of each.
- The research centre or centres involved in the study. This is useful when you’ve been reading for a while and you know whose work to look out for – for whatever reason!
- The principal researcher. He or she is often named first, or sometimes identifiable as the only author whose full address and contact details are listed (called the corresponding author).

Figure 1.1 shows a typical example of a research project which required a collaborative effort.

The list of authors may be quite long. The more people involved with a study, the less likely it is that one of them has a pre-eminent position, so there may be no principal author. The authors may simply be listed in alphabetical order.

When a large study involving many sites is published, it may be that the work is written up by a small team, on behalf of the larger group. You may then find that there are no named authors, or only one or two, and the rest of the team is listed elsewhere – as in Figure 1.2. This type of multiple authorship is unavoidable if everybody is to get credit for participating in large studies.

An undesirable form of multiple authorship arises if members of an academic department attach their names to a paper when they had nothing to do with the study. This is sometimes called ‘gift authorship’, although it isn’t always given very freely. To try to stop this practice, many journals now expect each author to explain exactly what part he or she has played in the study. For this, and other useful information, you should turn to the Acknowledgements at the end of the paper.
Understanding factors influencing substance use in people with recent onset psychosis: A qualitative study

Fiona Lobbana a,*, Christine Barrowclough b, Sophia Jeffery b, Sandra Bucci b, Katherine Taylor a, Sara Mallinson c, Mike Fitzsimmons d, Max Marshall d

a Spectrum Centre, School of Health & Medicine, Lancaster University, Lancaster, UK
b School of Psychological Sciences, University of Manchester, Manchester, UK
c School of Health and Medicine, Lancaster University, Lancaster, UK
d Lancashirecare NHS Foundation Trust, Lancashire, UK

This project involved workers from different disciplines . . . working in two universities and the Health Service.

The corresponding author is marked * in the title, with contact details included as a footer.

*Corresponding author Tel: +44 (0) 1524 593756
Email address f.lobban@lancaster.ac.uk (F Lobbana)

Figure 1.1 Authors and research centres listed at the start of a research article. Reprinted from Lobbana F, Barrowclough C, Jeffery S, Bucci S, Taylor K, Mallinson S, et al. Understanding factors influencing substance use in people with recent onset psychosis: a qualitative study. Social Science & Medicine 2010, 70 (8): 1141–7, © 2010, with permission from Elsevier.

IN WHAT SORT OF JOURNAL DOES THE PAPER APPEAR?

Not all journals are the same. Some are mainly aimed at members of a particular professional group, and therefore include political news, commentaries, and personal opinions. Others publish only research articles which have not appeared elsewhere, while some aim to mix these functions.

In some journals, the letters pages are designed to allow readers to express their opinions about articles which have appeared in previous issues. In others, the letters pages contain only descriptions of original studies.

What appears in a journal is decided by the Editor, nearly always with the help and advice of an Editorial Committee. The best journals also seek opinions from external referees who comment on papers sent to them and advise on suitability for publication. Because these referees are usually experts in the same field as the authors of the paper, this process is called ‘peer reviewing’. It isn’t always easy to tell whether papers for a journal are peer-reviewed, which is unfortunate because the peer-reviewing process is the best means of establishing the quality of a journal’s contents. You shouldn’t trust the results of any data-containing study if it appears in a journal which does not use the peer-reviewing system.

Some journals produce supplements, which are published in addition to the usual regular issues of the main journal. They may be whole issues given over to a single theme or to describing presentations from a conference or symposium. Often they are produced (unlike the main journals) with the help of sponsorship from pharmaceutical companies. Papers in these supplements may not have been reviewed by the same process as papers in main journals and for that reason they tend not to be of as high quality.
One way to judge the quality of a journal is to check its impact factor – a measure of the frequency with which papers in the journal are quoted by other researchers. High-quality journals that cover very specialised topics will inevitably have lower ratings than journals with a wider readership.

WHO (AND WHAT) IS ACKNOWLEDGED?

It is tempting to treat the Acknowledgements at the end of a paper as being a bit like the credits after a film – only of interest to insiders. But they contain interesting information. For example, who is credited with work, but does not feature as an author? This is often the fate of medical statisticians and others who offer specialist skills for the completion of one task in the study. If the study required special expertise – such as advanced statistics, economic analysis, supervision of therapists – then the necessary ‘expert’ should be a member of the research team and acknowledged. If not, then either the expert was not a member of the team or somebody isn’t getting credit where it is due. To ensure that co-authorship is earned, and to guard against research fraud, the Acknowledgements in many journals now also contain a statement from each author about his or her individual contribution.

* You can check the impact factor of a journal at a number of websites, including (for example) the Thomson Reuters (formerly ISI) Journal Citation Reports. These are available through many Health Science libraries and websites (e.g. http://isiknowledge.com/jcr).
Gender differences in HIV-1 diversity at time of infection

E. Michelle Long, Harold L. Martin, Jr, Joan K. Kriess,
Stephanie M. J. Rainwater, Ludo Lavreys, Denis J. Jackson, Joel Rakwar,
Kishorchandra Mandaliya & Julie Overbaugh

Acknowledgements

We thank D.D. Panter-Cell, M. Poss, R. Anderson, J. Neilson, J. Gosink and B. Chohan for technical assistance; B. Richardson for assistance with statistical analysis and discussions; J. Carr for advice on computational analyses; and J. Bwabo, J. Ndinya-Achola and the Nairobi HIV/STD Research Project for the continued collaborations and interactions that make this research possible. We also thank C. Giachetti, S. Rodrug and M. Bott of Gen-probe for assistance with the HIV-1 RNA assay. This work was supported by the National Institutes of Health through grants A130518 and A133873 and through Family Health International subcontract No1-A135173-119. E.M.L. was supported in part by National Institutes of Health predoctoral fellowship T32 GM07270.

RECEIVED 7 SEPTEMBER; ACCEPTED 22 OCTOBER 1999

The Acknowledgements section from the first paper we looked at showed what additional help the research team received (Figure 1.3). It also contains an indication of the source of funding that supported the research. This is of interest because external funding may bring with it extra safeguards as to the rigour with which work was conducted. On the other hand, it may lead to a conflict of interest (for example if a pharmaceutical or other commercial company has funded research into one of its own products).

Declaring a conflict of interest is not the same as admitting to a guilty secret. Its aim is to ensure that readers, when they are making their judgements about the study, are informed that there may be non-scientific influences on the conduct or interpretation of a study.

CHAPTER 2

The Abstract and Introduction

At or near the beginning of most quantitative papers you will find an Abstract and an Introduction.

THE ABSTRACT

If the title of an article doesn’t give you a clear enough idea of what it’s about, then most papers reporting primary research data start with an Abstract – a brief summary of the whole paper that appears immediately below the title.

The purpose of this brief summary is to help the reader decide if they want to go on to read the paper in detail, by outlining the content of the research and its main findings. A good Abstract should help the reader decide – if this study has been well conducted, then is it one about which I would be interested enough to read further?

Some journals require authors to provide structured Abstracts – using headings equivalent to those that appear in the main text. A typical example is shown in Figure 2.1, from a study of a day treatment programme for patients with eating disorders. Some Abstracts are unstructured and simply give a brief narrative account of the accompanying paper as in Figure 2.2, from a qualitative study on the attitudes of young male offenders to fatherhood. The decision about which style of Abstract to use is determined not by the author, but by the journal.

A list of Keywords may accompany the Abstract, if the journal requires it. Their purpose is to assist readers who are searching for articles on particular topics. For such a list the words may come from a standard source decided by the journal or they may be chosen by the authors themselves.

THE INTRODUCTION

After the abstract comes an introductory section. Its aim is to provide some background information that makes it clear why the study described in the paper has been undertaken. The general topic area of the paper may be very familiar, but even so (perhaps especially so) the authors will probably give some summary of its importance, possibly along the lines of:

- **Is it clinically important?** Is it about a symptom that affects quality of life or causes major treatment difficulties?
- **Is there a public health importance?** Is it about an illness that represents a big burden for the community – in terms of chronic handicap, or costs to health or social services?
- **Is the interest theoretical?** Will further study help us to understand the causes of a condition or its consequences?
Day treatment programme for patients with eating disorders: randomized controlled trial

Seongsook Kong

Aim This paper reports a randomized controlled trial to compare the effects of day treatment programmes for patients with eating disorders with those of traditional outpatient treatment.

Background Eating disorders are common, especially in adolescents, and their worldwide prevalence is increasing. Treatment interventions for patients with eating disorders have traditionally been offered on an outpatient or inpatient basis, but the recent introduction of day hospital programmes offers the possibility of greater cost-effectiveness and relapse-prevention for this population.

Methods Volunteers from an outpatient clinic for eating disorders were randomly assigned either to a treatment group (n = 21), participating in a modified day treatment programme based on the Toronto Day Hospital Program, or to a control group (n = 22) receiving a traditional outpatient programme of interpersonal psychotherapy, cognitive behaviour therapy and pharmacotherapy. Data were collected from January to December 2002 using the Eating Disorder Examination, Eating Disorder Inventory-2, Beck Depression Inventory, and Rosenberg Self-Esteem Scale.

Results Participants in the day treatment programme showed significantly greater improvements on most psychological symptoms of the Eating Disorder Inventory-2, frequency of binging and purging, body mass index, depression and self-esteem scores than the control group. They also showed significant improvement in perfectionism, but the group difference was not significant.

Conclusion Nurses in day treatment programmes can play various and important roles establishing a therapeutic alliance between patient and carer in the initial period of treatment. In addition, the cognitive and behavioural work that is vital to a patient’s recovery, that is, dealing with food issues, weight issues and self-esteem, is most effectively provided by a nurse therapist who maintains an empathic involvement with the patient.

Keywords Day treatment, depression, eating disorders, nursing, outcome, self-esteem

Figure 2.1  An example of a structured Abstract – this one from a trial of two treatment programmes for patients with eating disorders. Reproduced from Kong (2005) with permission from John Wiley & Sons.

Figure 2.3 shows the Introduction to a study which examined the effect of two ways of presenting information to women who were making decisions about antenatal testing.

These questions will normally be discussed by reference to existing evidence. The Introduction to a paper is not the place to look for a comprehensive literature review, and introductory sections in most papers are brief, but there are one or two pointers to help you decide if the evidence is being presented in a fair and unbiased way:
Experiences of, and attitudes towards, pregnancy and fatherhood amongst incarcerated young male offenders: Findings from a qualitative study

Katie Margaret Buston*
Medical Research Council Social and Public Health Sciences Unit,
4 Lilybank Gardens, Glasgow G12 8RZ, UK

ARTICLE INFO
Article history:
Available on line 21 October 2010

Keywords:
Teenage parenthood
Fatherhood
Pregnancy
Young offenders
Sex and relationships education
Parenting interventions
Scotland

Abstract
Teenage parenthood is problematised in the UK. Attention is increasingly falling on the potential or actual father yet we still know relatively little about young men's experiences and attitudes in this area. This paper focuses on the experiences of, and attitudes towards, pregnancy and fatherhood amongst a sample of men incarcerated in a Scottish Young Offenders Institute. In-depth interviews were conducted with 40 inmates, aged 16-20, purposively sampled using answers from a questionnaire administered to 67 inmates. Twelve men reported eighteen pregnancies for which they were, definitely or possibly, responsible. All but one of the pregnancies were unplanned. Five of the men were fathers: two were still in a relationship with the mother of their child and were in close contact with her and the child while incarcerated, three, all of whom had separated from their partner before the birth, had patchy contact with the mother and child before and/or during their sentence. All five of the men expressed a strong desire to be 'a good father'. Amongst the interview sample as a whole, most said they did not feel ready to become fathers. The main reason given was being unable to fulfil what they regarded as the key role of financial provider. Most of the men had given little or no thought to the possibility of a sexual partner becoming pregnant. Contraceptive use was high, however, amongst the minority who reported thinking about this possibility. The paper concludes by considering the cultural context of the men's attitudes and the potential for intervention development for incarcerated male young offenders in the areas of Sex and Relationships Education and parenting.

FIGURE 2.2 An unstructured Abstract accompanied by a list of Keywords indicating the article’s content. Reprinted from Buston, 2010. Experiences of, and attitudes towards, pregnancy and fatherhood amongst incarcerated young male offenders: findings from a qualitative study. Social Science & Medicine 2010, 71 (12): 2212–8, © 2010, with permission from Elsevier.

• Is there reference to a systematic review (see Chapter 33)? Or if not, to a search strategy which the authors used to identify relevant evidence? For an example, see Figure 2.4, taken from a study of the association between birthweight and adult blood pressure.
• Is the evidence mainly from the authors’ own group or do the authors quote a range of evidence, even if it is not in support of their own views?
Many clinical studies are carried out because the evidence is ambiguous or contradictory. Is there a dilemma which is posed by the evidence and is it clearly spelled out in the Introduction?

Generally speaking, the justification for a new study is that the existing evidence is unsatisfactory and a typical Introduction summarizes why, as in Figure 2.4. The commonest justifications for new research are that:

- Different studies have come to different conclusions about the topic and it isn’t possible to come to an answer without new work.
- The evidence cannot be applied in the setting being considered by the authors. For example, good evidence may cease to be of value simply because it is old – trials showing the benefit of treatment may no longer be useful if a disorder changes so that its sensitivity to treatment changes. Similarly, evidence from one part of the world cannot always be applied freely elsewhere.
The evidence may be incomplete. For example, we may know that rates of smoking are increasing among young women but we don’t know why.

The evidence may be of poor quality, so that no conclusion can be drawn from it. See, for example, Figure 2.5 from a study on the detection of depression in primary care.

If these elements of the Introduction are well presented, then it should be clear what the paper is about and why the authors have chosen to conduct the work that they have. Armed with this background briefing, you can now move on to check the specific objectives of the authors’ work.

**ETHICAL CONSIDERATIONS**

Nearly all studies in health-care that involve contact with people will require ethical approval. What that means is that the researchers will have had to submit their proposals to a panel of experts, such as a local research ethics committee, who decide whether the project is ethical or not. For example, the risks of any research should be outweighed by its benefits and participants should have been given the opportunity to participate or not as they wished, without their decision influencing their medical care.

Most authors will indicate that their study has been approved by the appropriate body governing research ethics – usually either in the Methods section or the Acknowledgements. Increasingly, authors
Effects of a clinical-practice guideline and practice-based education on detection and outcome of depression in primary care: Hampshire Depression Project randomised controlled trial

C Thompson, A L Kinmonth, L Stevens, R C Peveler, A Stevens, K J Ostler, R M Pickering, N G Baker, A Henson, J Preece, D Cooper, M J Campbell

Figure 2.5 Some reasons why previous research may be inadequate for current needs. Reprinted from The Lancet 355: Thompson C, Kinmonth AL, Stevens L, Peveler RC, Stevens A, Ostler KJ, et al. Effects of a clinical-practice guideline and practice-based education on detection and outcome of depression in primary care: Hampshire Depression Project randomised controlled trial. 2000; 185–9, © 2000, with permission from Elsevier.

will mention any particular ethical dilemmas raised by their research either in the Introduction or the Discussion of their paper. Where there are particular questions raised by a study, the authors may expand upon them (including, for example, details of the information given to participants and the way in which consent was obtained).
Does HIV status influence the outcome of patients admitted to a surgical intensive care Unit? A prospective double blind study

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Introduction

Limited resources and the high cost of intensive care have compelled clinicians to rationalise the allocation of resources. For example, in our unit it is policy not to admit patients with incurable malignant disease, and end-stage liver disease, and patients with multiple organ failure who are deemed non-salvageable. The lack of objective data made it unclear whether patients with HIV infection should be treated similarly. To allow rationalisation of the admissions policy with respect to these patients we conducted a prospective study to determine the prevalence of HIV infection among patients admitted to the unit and assess the impact of HIV status (HIV positive, HIV negative, AIDS) on outcome. The study embraced a major ethical dilemma. On the one hand, the clinician has an obligation of non-maleficence – that is, patients must not be harmed by the actions of the doctor. On the other hand, the doctor has an obligation to society to ensure that available resources are appropriated fairly, based on objective evidence. Though the basic ethical tenets of patient autonomy, justice, beneficence, and non-maleficence are useful, they are only the starting points for ethical decision making.

Subjects and methods The study was conducted in the 16 bed surgical intensive care unit at King Edward VIII Hospital, a large teaching hospital in Durban. All patients admitted to the unit over six months (September 1993 to February 1994) were included. There were no exclusions. Informed consent was not sought. The study protocol was approved by the ethics committee of the University of Natal.

Certain types of research cause particular ethical concerns. For example, young children, or those with cognitive impairment or learning disability, or patients who are unconscious, cannot give consent to participate in research that nonetheless asks extremely important questions about clinical care. In these situations, researchers may undertake research with ethical approval, provided certain criteria are met (see Figure 2.6 from a study of HIV status and surgical outcomes).
The Aims and Objectives

Following the Introduction, you should look for a clear statement of the purposes of the current work. This statement can come in two forms: the aims of the study and the objectives.

- **Aims** are general statements about purpose. For example, the authors might wish to examine the attitudes of hospital nurses to colleagues with mental health problems.
- **Objectives** are specific questions, suggested by previous research or theory. For example, ‘Does taking the oral contraceptive pill increase the risk of stroke among women of childbearing age?’ One particular sort of objective is to *test an hypothesis*.

Because the terminology of hypothesis testing is so widely used, we will start there.

**HYPOTHESES**

Often, studies will ask more than one question, so they will have several hypotheses. In these circumstances, you should look for a *main hypothesis* (Figures 3.1 and 3.2) and the other questions will form *subsidiary or secondary hypotheses*.

There are important reasons why a study should have only one main question:

- If a study tests many hypotheses, then just by chance it is likely to produce positive results for some of them. (See Chapter 27 on hypothesis testing and the possibility of false-positive results from *multiple testing*.)
- We can trust a negative result only if we know that a study was large enough; otherwise, there is a possibility of false-negative results. Many researchers therefore make an *estimate of sample size* to help them decide how big to make their study so that they can avoid this sort of error (see Chapter 10). To do that calculation they need to know what the main outcome of interest is, and the *main outcome* will be chosen to test the main hypothesis.

There used to be a conventional way of stating a study’s hypothesis, which involved the use of a *null hypothesis* and the description of a study set up to *disprove or refute an hypothesis*. Although this approach is still sometimes taught, you will almost never come across examples in papers. The null hypothesis was a way of stating a question in the form ‘situation A is no different from situation B’. It arose because certain statistical tests operate by testing whether an assumption of similarity is likely to be true.

The need to refute rather than prove an hypothesis is similarly based on a technical point – about the nature of scientific evidence. In fact, nearly everybody now states their hypotheses in a straightforward way. The English doesn’t have to be difficult to follow for the science to be right!