



Critical Reading of Medical Research Articles

Joyce Kling, PhD
November 10, 2016

UNIVERSITY OF COPENHAGEN



The Language Strategy: More Languages for More Students (2013-2018)

Motivation

- Students must be given easily available opportunities to acquire competence in another foreign language and another culture than the anglosaxon.

(Destination 2012)

Project scope: pan-university

Goals

- Implement the university language strategy
- Provide all students with relevant language skills (especially students outside foreign language degrees)
- Prepare students for the global market

Pilot Project Learning Outcomes

- To develop critical reading strategies in relation to domain specific argumentation
- To raise awareness of stylistic and rhetorical English language usage in empirical articles in scientific publications
- To identify linguistic characteristics used to build an argument in empirical articles in scientific publications

Pilot Project Course Plan

10/11 –

- The structure of an empirical paper
- Reading: Junge, A. & Dvořák, J. Football injuries during the 2014 FIFA World Cup. *Sports Med* 2015;49:599–602. doi:10.1136/bjsports-2014-94469

15/11 –

- Language usage for argumentation in empirical papers
- Reading: Altman AR & Davis, IS. Prospective comparison of running injuries between shod and barefoot runners. *Sports Med* 2015;0:1–6. doi:10.1136/bjsports-2014-094482

Reading challenges for medical students

- In pairs, discuss the challenges you have in relation to understanding/comprehending journal articles in English.
- Are these challenges related to **reading problems** or **language problems**?



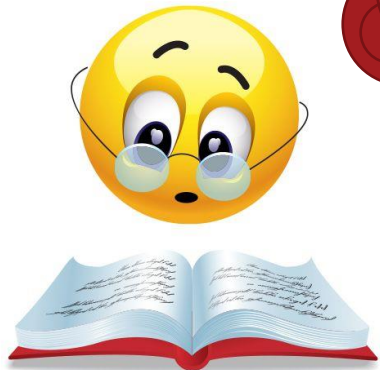
How do you read?

What is your approach to reading academic texts (i.e., course assignments, textbooks, articles, etc.)?

Critical reading: What is it?

- Don't read looking only or primarily for information
- Do read looking for ways of thinking about subject matter

- What information can I get out of this text?
- How does this text work? How is it argued?
- How is the evidence (the facts, examples, etc.) used and interpreted?
- How does the text reach its conclusions?



Metacognitive Awareness Reading Strategies Inventory - MARSI

30 statements about what people do when they read academic materials.

- Global reading strategies
 - Problem-solving reading strategies
 - Support reading strategies
-

Global Reading Strategies

- statements represent a set of reading strategies oriented toward a global analysis of text

Examples include “evaluating what to read or ignore, noting text characteristics, guessing what the material is about, etc.”

These strategies can be thought of as generalized, intentional reading strategies aimed at setting the stage for the reading act.

Problem-Solving Strategies

- -- strategies for solving problems when the text becomes difficult to read

Examples of these strategies include re-reading for better understanding, going back when losing concentration, pausing and thinking about reading etc.

These strategies provide readers with action plans that allow them to navigate through the text skillfully.

Such strategies are localized, focused problem-solving or repair strategies used when problems develop in understanding textual information.

Support Reading Strategies

- primarily involves use of outside reference materials, taking notes, underlining or circling information and other practical strategies that might be described as functional or support strategies

These strategies provide the support mechanisms aimed at sustaining responses to reading.



Study Skills and Personal Development

- Recognize skills and abilities you are developing for academic literacy
- Identify methods and plans to support development of these skills and abilities
- Identify areas you want and need to improve and develop

IMRaD	PURPOSE
I	The Introduction provides the rationale for the paper, moving from a general discussion of the topic to the particular question, issue, or hypothesis being investigated.
M	The Methods section describes, in various degrees of detail, methodology, materials, subjects, and procedures – and assert their credibility.
R	In the Results section, the findings are described, accompanied by commentary.
D	The Discussion section gives meaning to and interprets the results. Authors make a series of 'points', at least some of which refer to statements in the Introduction.

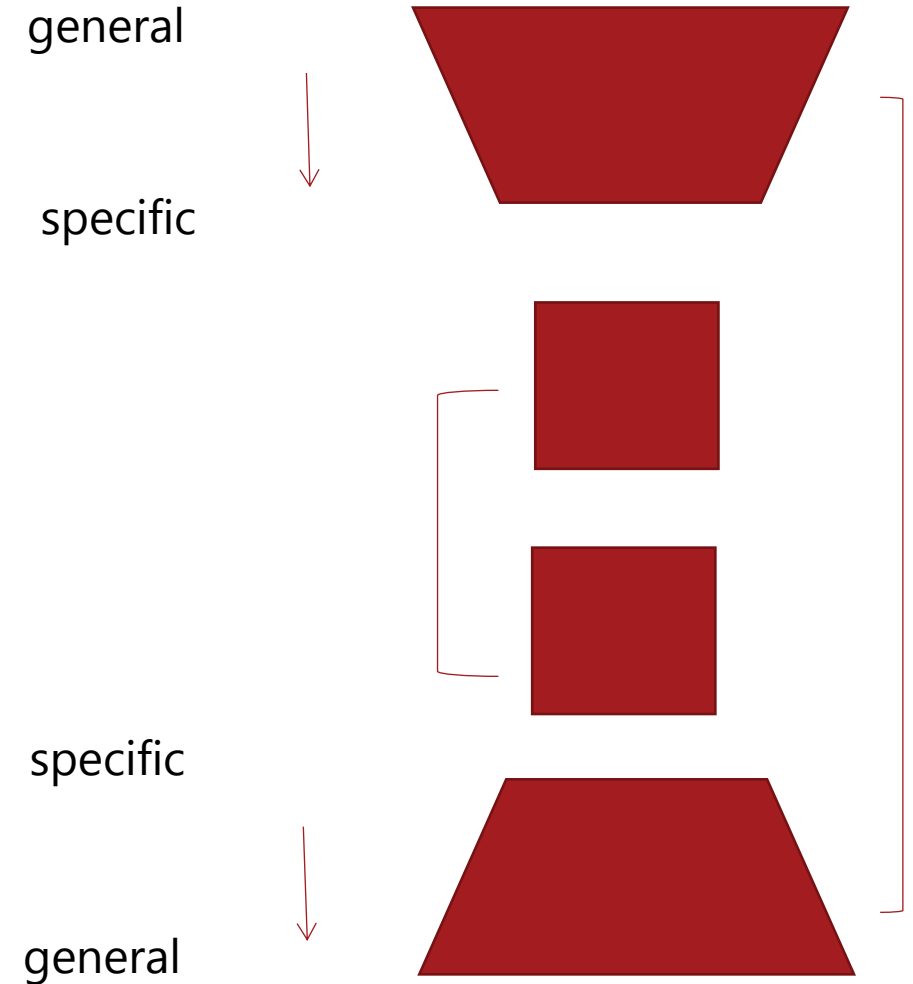
Move Structure Analysis

- Means of describing what may always be done rather than what always must be or is always done
- Assigns function to a stretch of text
- Identifies that function with one, or a set of, exponents which signal its presence, and seeks to establish whether or not the pattern identified is a general one

11 Moves & IMRaD

- **I**ntroduction -- 3 moves
- **M**ethod -- 3 moves
- **R**esults -- 2 moves
- **D**iscussion – 3 moves

(Nwogu, 1997; Skelton, 1994; Swales, 1990)



Introduction

Move 1 – Present background information/ Establish a research territory

- Reference to established knowledge in the field
- Reference to main research problem

Move 2 – Discussion of previous literature

- Reference to previous research
- Reference to limitations of previous research

Move 3 – Present new research (Identify research purpose)

- Reference to research purpose
- Reference to the main research procedure



Methods

Move 4 – Describe data-collection procedure

Identified the population to be studied - i.e.,

Indicate:

- Source of data
- Data size
- Criteria for data collection

Move 5 – Describe experimental procedures

- Identify main research apparatus
- Recount experimental process
- Indicate criteria for success

Move 6 – Describe data-analysis procedures

- Define terminology
 - Indicate process of data classification
 - Identify analytical instruments/procedure
 - Identify modification to instruments/procedure
-

Results

Move 7 – Report findings – Consistent observations

- Contains the overall observation made in the study
- Includes all other significant observations which impinge on the objectives
 - graphs, tables & pictorials
- Highlight overall observation
- Indicate specific observations
- Account for observations made

Move 8 – Report findings – Inconsistent observations

- Presents negative results – results which do not conform with expected outcomes

Discussion

Move 9 – Highlighting overall outcome

- Main function: confirm or refute attainment of research objective

Move 10 – Explaining specific outcomes

- Contains information which:
 - states specific outcome
 - interprets the outcome
 - indicates the significance of the outcome
 - contrasts present and previous outcomes
 - indicates limitations of the outcomes

Move 11 – Stating research conclusions

- Attempt to sum up writer's view on study's contribution to the field
 - Indicating research implications
 - Promoting further research

Moves in play

- Let's review:
- Calverley, P.M., Anderson, J.A., Celli, B., Ferguson, G.T., Jenkins, C., Jones, P.W., Yates, J.C., Vestbo, J., 2007. Salmeterol and fluticasone propionate and survival in chronic obstructive pulmonary disease. *N. Engl. J. Med.* 356, 775–789.

Chronic obstructive pulmonary disease (COPD) is a major cause of illness, death, and the use of health care resources globally.¹⁻³ The disease causes approximately 2.75 million deaths annually, and the number is projected to increase.² Treatment for COPD is focused on minimizing risk factors, improving symptoms, and preventing exacerbations.³ With the exception of smoking-cessation programs for patients with early disease,⁴ home oxygen treatment for persistent hypoxemia,^{5,6} and lung-reduction surgery for selected patients with emphysema,⁷ no treatment has been shown to reduce mortality.

Pulmonary inflammation is prominent in COPD.⁸ Antiinflammatory drugs such as inhaled corticosteroids have little or no effect on the rate of decline of lung function^{9,10} but may reduce the frequency of exacerbations.⁹ Especially when combined with an inhaled long-acting beta-agonist.¹¹ Retrospective analyses suggest that inhaled corticosteroids reduce the mortality rate among patients with COPD¹² and that adding a long-acting beta-agonist might increase this effect.¹³ We hypothesized that the combination of the long-acting beta-agonist salmeterol and the inhaled corticosteroid fluticasone propionate would reduce mortality among patients with COPD, as compared with usual care. To test this hypothesis, we undertook the Towards a Revolution in COPD Health (TORCH) trial, a double-blind, placebocontrolled, randomized, parallel-group study comparing salmeterol plus fluticasone propionate (the combination regimen) with each of the components alone and with placebo over a 3-year period.

- In Calverley, et al – these sections provides a breakdown with headings:

METHODS

- PATIENTS

“We recruited patients who were current or former smokers with at least a 10-pack-year history...”

- STUDY DESIGN

“This double-blind study was conducted at 444 centers in 42 countries; center and data auditing ensured the integrity of the data ... After a 2-week run-in period, eligible patients were randomly assigned...”

- OUTCOME MEASUREMENTS

“Vital status was assessed until 3 years after treatment had begun, regardless of ... The primary end point was ...”

“Secondary end points were the frequency of exacerbations, defined as...”

- SAFETY EVALUATION

“Adverse events and medications were reviewed at each study visit.”

- STATISTICAL ANALYSIS

“All reported data analyses were prespecified. Assuming a 17% mortality rate ... Two interim analyses of death from any cause were planned...”

RESULTS

- STUDY POPULATION

Of 8554 patients recruited, 6184 underwent randomization (Fig. 1). ...

- MORTALITY

“Vital status was known at 3 years for 6111 of the 6112 Patients included in the efficacy population. There were 875 deaths within 3 years after randomization... (Fig. 2B and Table2).”

“Prespecified secondary analyses for mortality were also performed: ... (see Table 2 in Supplementary Appendix 2).”

- EXACURBATIONS, HEALTH STATUS, AND LUNCH FUNCTION

“According to our statistical models, the annual rate of exacerbations was ... (Table 2) ... (Fig. 2E and Table 3).”

- ADVERSE EVENTS AND SAFETY

“Adverse events were reported by 90% of the patients in the study, and serious adverse events were reported by 41% of the patients (Table 4). ...”

MOVIE

9

In this trial, the reduction in mortality from any cause in the combination-therapy group, as compared with the placebo group, did not meet the predetermined level of statistical significance.
During the 3 years of the study, treatment with the combination regimen resulted in significantly fewer exacerbations and improved health status and lung function, as compared with placebo.

There are two possible reasons why the reduction in mortality in the combination-therapy group, as compared with the placebo group, did not achieve statistical significance. The first is that there ... In this scenario, the data would suggest... It could be that mortality is influenced mainly by ...

The second possible reason, which we believe is the more likely one, is that salmeterol plus fluticasone propionate does have an effect on mortality but that our study was underpowered to detect this effect. Our power calculations were based on ... In addition ... Furthermore ... More studies are needed to determine whether either of these explanations or another explanation accounts for the primary finding.

MOVIE

10

Our data on the secondary outcomes are consistent with and extend previous observations in studies ... Unlike previous studies in which reductions in exacerbations and improvements in health status have also been reported, ^{19,21} in our study there was no requirement of exacerbations during the year before entry into the trial. Furthermore, the greater number of patients withdrawing from the placebo group is likely to have resulted in an underestimation of the effect of the combination regimen on all the secondary outcomes. Nevertheless, the number needed to treat to prevent an exacerbation in 1 year was 4, and the number needed to treat to prevent a hospitalization was 32.

The TORCH study recruited patients with COPD from around the world, and we think that our findings can therefore be generalized. The particular strengths of the study are the virtually complete survival data to 3 years and the independent adjudication of causes of death, which eliminated between-country variation in death certification. Although the TORCH study is a large COPD trial, as compared with studies of mortality associated with other major chronic illnesses such as cardiovascular disease,²²⁻²⁴ its size is modest. The results of our mortality analysis should be viewed in this context. The potential for a reduction in the risk of death of 2.6 percentage points among patients treated with salmeterol plus fluticasone propionate, as compared with placebo, and the 17.5% reduction in the risk of death that was identified in the study clearly merit further investigation in future large, prospective trials. Until such trials are completed, our data support the use of salmeterol plus fluticasone propionate in the clinical management of COPD.

Scan

- Run your eye quickly over the text to locate specific words or phrases that are of interest.

You can scan

- headings and subheadings
 - images and graphics
 - the text for authors' names and affiliations
 - the abstract and conclusion
 - the index for specific words
- This will help you decide whether you should read further, and how useful the document might be for your study.

Skim

- Read quickly to get an overview prior to in-depth reading. Although you may still need to read the entire text, by scanning first you can decide where you want to concentrate your time.
- Skim the text quickly to
 - get an indication of the scope and content of the text
 - read the first and last paragraphs to get the main points
 - look at the first sentence of each paragraph to see where the content of the paragraph will lead
 - note the key points in the conclusion and discussion.

Reading for detail

- To understand the text specifics
- Read closely and evaluate meaning of the text

- Determine **central claims** or **purpose** of the text
- Begin to make some judgements about the **context**
- Distinguish **kinds of reasoning** the text employs
- Examine the **evidence** the text employs
- If necessary, evaluate -- assess the strengths and weaknesses of an argument

Activity

Junge, A. & Dvořák, J. Football injuries during the 2014 FIFA World Cup. *Sports Med* 2015;49:599–602. doi:10.1136/bjsports-2014-94469

Read quickly to get the main idea

- Look at headings, subheadings and topic sentences
- Acknowledge repetition of key words

- Search for specific pieces of information or specific words in the text.
- Ignore information not relevant to your purpose

Read for detail:

Mark the moves and **identify the individual elements** the authors use to present their findings.

- **Abstract:**
- **Background** FIFA has surveyed match injuries in its tournaments since 1998.
- **Aim** To analyse the incidence and characteristics of match injuries incurred during the 2014 FIFA World Cup in comparison to previous FIFA World Cups.
- **Methods** The chief physicians of the participating teams reported all newly incurred injuries of their players after the match on a standardised report form. 124 (97%) forms were returned.
- **Results** A total of 104 injuries were reported, equivalent to an incidence of 1.68 injuries per match (95% CI 1.36 to 2.00). 64 (63.4%) injuries were caused by contact with another player. Thigh (26; 25%) and head (19; 18%) were the most frequently injured body parts. The most frequent diagnosis was thigh strain (n=18). Five concussions and three fractures to the head were reported. While most thigh strains (15/17; 88.2%) occurred without contact, almost all head injuries (18/19; 94.7%) were caused by contact. 0.97 injuries per match (95% CI 0.72 to 1.22) were expected to result in absence from training or match. Eight injuries were classified as severe. The incidence of match injuries in the 2014 FIFA World Cup was significantly lower than the average of the four preceding FIFA World Cups, both for all injuries (2.34; 95% CI 2.15 to 2.53) and timeloss injuries (1.51; 95% CI 1.37 to 1.65).

Active Reading and Learning Processes

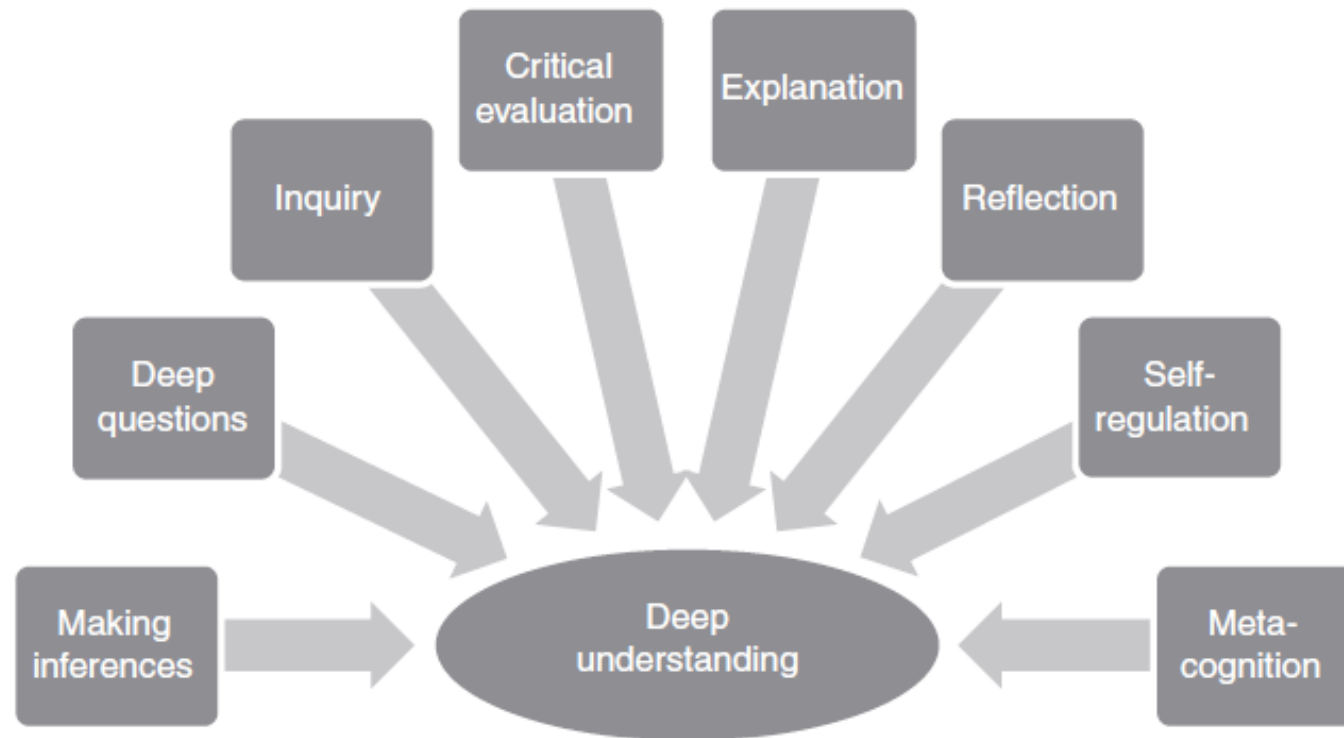


Figure 1 Active reading and learning processes produce deeper understanding of challenging material

4 premises of behind successful reading

- The reader constructs meaning from a text
- Prior knowledge plays an important role in learning
- Reading comprehension depends heavily on metacognition
- Reading and writing are integrally related

(adapted from Urquhart & Frazee, 2012)

1. You construct meaning from a text

i cdnuolt blveiee taht I cluod aulacly uesdnatnrd waht I was rdanieg. The phaonmneal pweor of the hmuan mnid, aoccdrnig to a rscheearch at Cmabrigde Uinervtisy, it dseno't mtaetr in waht oerdr the ltteres in a wrod are, the olny iproamtnt tihng is taht the frsit and lsat ltteer be in the rghi t pclae. The rset can be a taotl mse and you can sitll raed it whotuit a pboerlm. Tihs is bcuseae the huamn mnid deos not raed ervey lteter by istlef, but the wrod as a wlohe. Azanmig huh?

2. Prior knowledge plays an important role in learning

- “the single most important variable in learning with texts is the reader’s prior knowledge.”

--Vacca & Vacca, 1993, p. 13

- “Each academic discipline or content area presupposes specific kinds of background knowledge about how to read texts in that area, and often requires a particular type of reading.”

-- Lee & Spratley, 2010, p.2

Schema theory and reading in a foreign language

- Immanuel Kant (1781):
 - “new information, new ideas, new concepts can have meaning only when they can be related to something the individual only knows.”
- Anderson (1977):

demonstrated the truth of Kant’s original observation with schema theory.
“Every act of comprehension involves one’s knowledge of the world as well.”



3. Reading comprehension depends heavily on metacognition

Depending on the type of written material, the medium (electronic or print), and their reasons for reading, students will decide to skip, skim, flip or to read carefully.

(Urquhart & Frazee, 2012, p. 4)

4. Reading and writing are integrally related

“... the interdependence of reading and writing. The more critical and active a reader you become, the more persuasive will be your prose.”

(Daley, 1995, p. 99)

As you begin to read critically, consider:

- Who wrote this text, when and why?
- Do(es) the author(s) have any biases or make any assumptions?
- Are you prepared to accept this position? If so, why? If not, why not?
- What evidence is the author using – and how reliable is it?
- What is the basis for the author's argument? Is it logical and why?



For the next meeting (15/11)

- Read: Altman AR & Davis, IS. Prospective comparison of running injuries between shod and barefoot runners. *Sports Med* 2015;0:1–6. doi:10.1136/bjsports-2014-094482
- Skim the article
- Spend a few minutes previewing the text before you start to read.
- Think about:
 1. What does the title tell you?
 2. What do you know about the subject matter?
 3. Who wrote this text? What do you know about the author(s)?
 4. Where is this published? Who is the expected audience?
 5. Read through the headings – consider the moves. What do you expect to find?

Questions ...

joyce@hum.ku.dk