

How to Critically Read a Research Article

YOU SHOULD KNOW THE FOLLOWING AFTER CRITICALLY READING A PAPER:

- WHAT *QUESTIONS* DOES THE PAPER ADDRESS?
- WHAT ARE THE MAIN *CONCLUSIONS* OF THE PAPER?
- WHAT *EVIDENCE* SUPPORTS THOSE CONCLUSIONS?
- DO THE DATA ACTUALLY *SUPPORT* THE CONCLUSIONS?
- WHAT IS THE *QUALITY* OF THE EVIDENCE?
- WHY ARE THE *CONCLUSIONS* IMPORTANT?

THE APPROACH:

- *DO NOT* TRY TO LEARN A LARGE NUMBER OF FACTS
- *DO* DETERMINE WHAT THE IMPORTANT PROBLEMS ARE
- *DO* GET A SENSE OF WHAT METHODS HAVE BEEN USED
- *DO* ANALYZE THE RESULTS YOURSELF
- *DO* EXAMINE THE CONTROLS
- *DO* ASK QUESTIONS
- *DO* LOOK UP THINGS YOU DON'T KNOW OR UNDERSTAND
- *DO* TAKE NOTES

BEFORE YOU BEGIN READING:

- *HAVE EXPECTATIONS* BEFORE YOU READ THE ARTICLE: WHAT AM I LOOKING FOR IN THIS ARTICLE?
- PASSIVE VS. ACTIVE READING
- WITH WHAT YOU KNOW:
 - WHAT GAPS NEED TO BE FILLED?
 - WHAT KNOWLEDGE NEEDS TO BE EXPANDED?
 - WHAT CONTROVERSIAL POINTS NEED TO BE CORROBORATED?

READ THE TITLE AND ABSTRACT FIRST:

- THE TITLE SHOULD SUMMARIZE THE WORK WELL
- CAREFULLY READ THE ABSTRACT – IT SHOULD GIVE A GOOD AND THOROUGH IDEA OF WHAT THE PAPER IS ABOUT
 - GENERAL AIM
 - HYPOTHESIS/SOLUTION OR ANSWER TO THE PROBLEM
 - SPECIFIC AIMS: RESULT 1, RESULT 2,etc
 - DISCUSSION: WHAT ARE THE IMPLICATIONS?
- DO YOU KNOW ENOUGH TO APPRECIATE THIS PAPER?
- WHERE WILL THIS NEW KNOWLEDGE INTEGRATE INTO YOUR PREVIOUS KNOWLEDGE?
- SET UP YOUR EXPECTATIONS
- AS YOU BECOME MORE FAMILIAR WITH A SUBJECT, YOU SHOULD BEGIN TO REALIZE THOSE (LABS) WITH WHOM YOU AGREE AND DISAGREE

NOW FLIP THROUGH THE ARTICLE:

- EXAMINE THE HEADINGS, STUDY THE FIGURES, ILLUSTRATIONS, TABLES, LEGENDS
- REVIEW THE METHODS – IS THERE A NEW APPROACH TO YOUR RESEARCH?

INTRODUCTION

- WHAT IS THE ACCEPTED STATE OF KNOWLEDGE IN THE FIELD (TAKE NOTES AND EVEN DRAW YOUR OWN FIGURES)? WHAT LARGER QUESTION IS THIS A PART OF?
- WHAT DATA LED DIRECTLY TO THIS WORK – WHAT'S PRIOR RESEARCH VS. WHAT IS BEING STUDIED HERE?
- IS THIS WORK...
 - *Descriptive* – early stages of understanding a system
 - *Comparative* – determine how general a finding is
 - *Analytical* – testing hypotheses about how a system works
 - something else
- IS THERE A CLEAR HYPOTHESIS? IF SO, WHAT IS IT? HOW WILL IT BE TESTED?
- WHAT ARE THE BASIC CONCLUSIONS? (SEE THE LAST PARAGRAPH OF THE INTRODUCTION)

MATERIALS & METHODS

- SHOULD BE DETAILED ENOUGH FOR ANOTHER SCIENTIST TO REPLICATE THE WORK (VOLUMES, TIMES, COMPANY MATERIAL WAS PURCHASED FROM ETC.) –*IN REALITY, METHODS ARE OFTEN COMPRESSED AND YOU MAY NEED TO LOOK UP ANOTHER PAPER THAT IS REFERENCED FOR MORE DETAIL.*
- WHAT WAS MEASURED?
- SAMPLE NUMBER? (WAS THE EXPERIMENT REPEATED?)
- CONDITIONS? (WHAT KIND OF PROTEIN GEL IS THIS?)
- DO I KNOW ENOUGH ABOUT THIS METHOD TO UNDERSTAND WHY AND HOW THEY USED IT?
- OUTLINE THE PROCEDURES

RESULTS

- YOU UNDERSTAND A FIGURE WHEN YOU CAN REDRAW IT AND EXPLAIN IT!! FOR EACH EXPERIMENT/FIGURE, YOU SHOULD BE ABLE TO EXPLAIN *QPRC*...
 - THE QUESTION IT SOUGHT TO ANSWER
 - THE BASIC PROCEDURE
 - THE RESULTS
 - THE CONCLUSION
- OTHER QUESTIONS TO ASK:
 - DO THE RESULTS MAKE SENSE TO YOU?
 - WHAT IS UNCLEAR?
 - WERE PROPER CONTROLS USED?
 - WHAT IS THE ONE MAJOR FINDING?

DISCUSSION

- *KNOW YOUR OWN CONCLUSIONS BEFORE YOU READ THE AUTHOR'S TO MAINTAIN YOUR OBJECTIVITY.*
- DESCRIBE FOR YOURSELF WHY THESE DATA ARE SIGNIFICANT. (DOES IT CONTRIBUTE TO KNOWLEDGE OR CORRECT ERRORS?)
- THEN, DECIDE WHAT CONCLUSIONS DO THE AUTHORS DRAW? *BE SURE TO SEPARATE FACT FROM THEIR OPINION/INTERPRETATION!*

CRITICAL REFLECTION

- WHAT QUESTIONS DOES THE PAPER ADDRESS?
- WHAT ARE THE MAIN CONCLUSIONS OF THE PAPER?
- WHAT EVIDENCE SUPPORTS THOSE CONCLUSIONS?
- WHAT IS THE QUALITY OF THE EVIDENCE?
- DO YOU AGREE WITH THE AUTHORS' INTERPRETATIONS? OR ARE THERE OTHERS?
- DID THEY PERFORM THE EXPERIMENTS APPROPRIATELY?