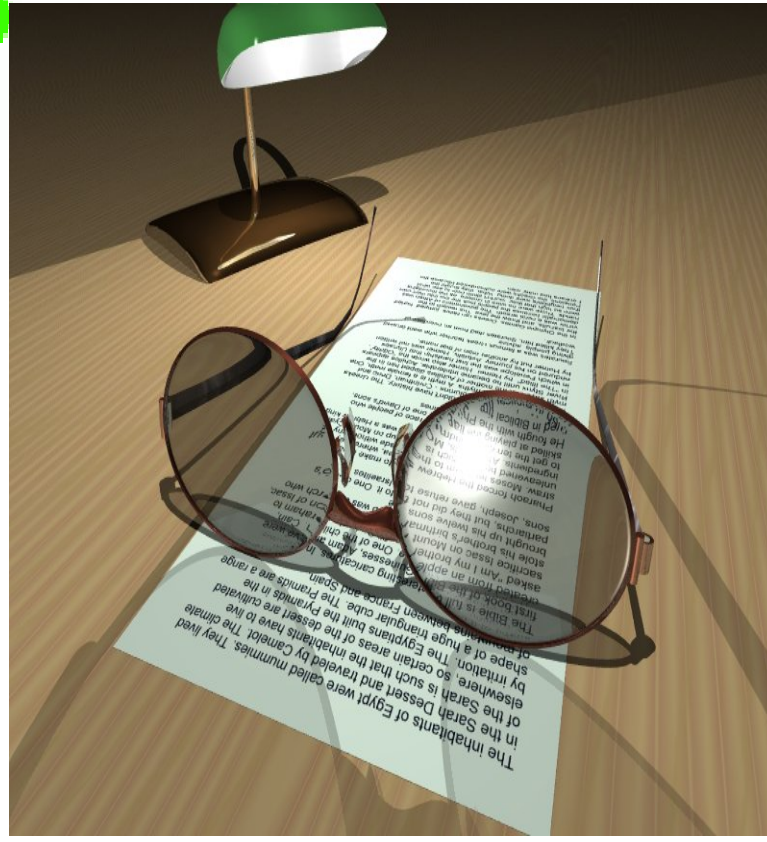
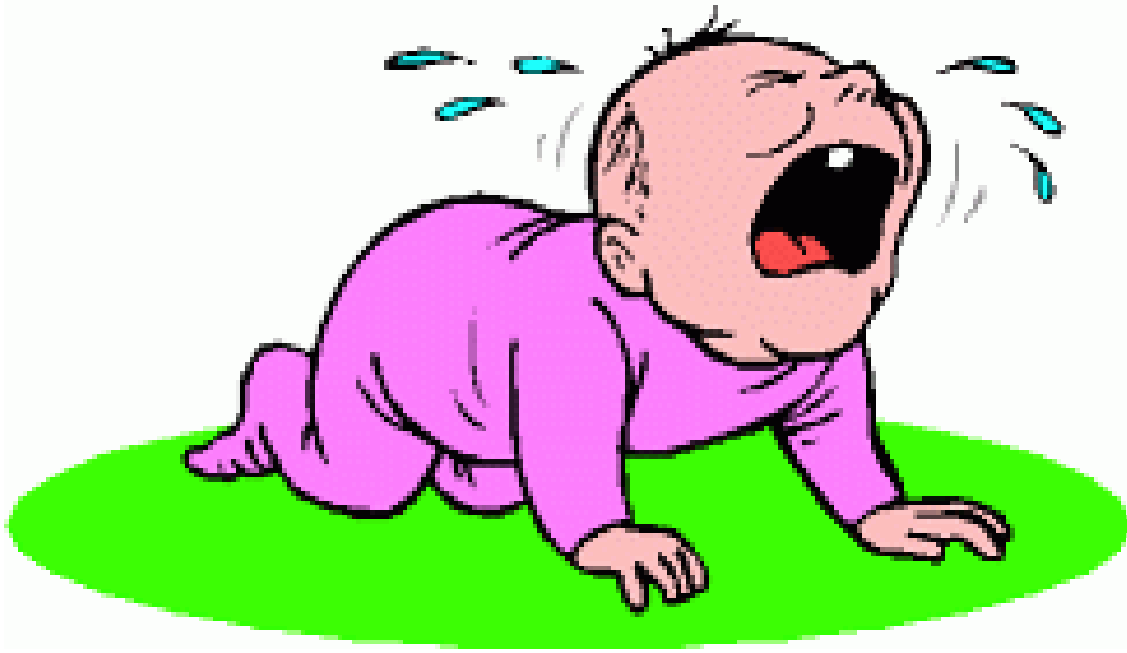


Evaluating the Literature

RHS 481

Lecture **3**

Dr. Einas Al-Eisa



Relevance of reviewing the literature

- Research should be conducted in light of existing relevant research results
- Clinicians must evaluate research articles before applying the results

Literature review

- Purpose: to discover what is known about a certain topic
- You should look for 4 things about the topic:
 - Theory
 - Facts
 - Opinions
 - Methods

Example

- A physiotherapist wanting to treat patients with continuous passive motion (CPM) needs to know:
 - Theories about how CPM works
 - Facts about protocols and results
 - Opinions of therapists on the future of clinical use of CPM
 - Methods that others used to assess effects of CPM

Types of literature

- **Primary sources:** original reports of research (journal articles, theses and dissertations, conference abstracts and proceedings)
- **Secondary sources:** in which authors summarize their own work and the work of others (book chapters, review articles)

Conducting a literature review

- Obtain a “relatively” **complete set** of articles on the topic
- Decide which articles are **relevant** to the your question
- Identify the **designs and variables** used previously to address the question
- Determine the **validity** of the studies
- Make **comparisons** across studies
- Specify **problems** that need further study

Evaluating the literature

1. Classify the **variables**
2. Compare **purposes and conclusions**
3. Describe **design and control** elements
4. Identify threats to **validity**
5. Compare the study with **other research**
(does it add new information?)
6. Evaluate the **utility** of the study

Basics of Data

- **A variable:**
 - measurable characteristic, trait, or property
 - some characteristic that takes different forms within a study
 - opposite to a ***constant*** which takes only one form

Example

- If differences between ROM values for men and women are studied, then gender is a **variable**
- If ROM values are measured for women only (or men only), then gender is a **constant**

Variables

```
graph TD; A[Variables] --> B[Independent variable = Presumed cause (factor)]; A --> C[Dependent variable = Presumed effect (outcome)];
```

Independent variable =
Presumed cause
(factor)

Dependent variable =
Presumed effect
(outcome)

Example

- Research **question**: “how effective is ultrasound in the treatment of knee pain?”
- **Independent** variables: ultrasound parameters
- **Dependent** variable: knee pain (visual analogue pain scale)

Elements of a research article

- **Title:**

- Identifies major **variables** studied

- Provides clues about the **purpose** of the research

Elements of a research article

- **Title:**

Examples: phrases such as

- ✓ “characteristics of” indicate **descriptive** research

- ✓ “association between” indicate **relationship** analysis

Elements of a research article

- **Abstract:**

- 150-300 words (depending on the journal)
- Briefly summarizes research purpose, methods, and results
- Does not include summary of related literature
- Does not include limitations & implications

Elements of a research article

- **Introduction:**

- Defines the broad **problem** that underlies the study
- States the **purpose** of the study
- Places the problem and purpose into the theoretical context of **previous work**
- Presents research **hypothesis**

Elements of a research article

- **Methods:**

- Subjects

- Instruments

- Procedures

- Data analysis

- Often refers to methods or procedures used by others as the basis for the current research

Elements of a research article

- **Results:**

- Presents the results without comment on their meaning
- Often subdivided into sections corresponding to the variables studied
- Much of the information is usually contained in **tables and figures**

Elements of a research article

- **Discussion:**
 - Presents the author's **interpretation** of the results
 - Refers to **previous work** that is related to the findings of the study
 - **Limitations** of study
 - **Directions** for future research

Elements of a research article

- **Conclusions:**

- Restates the important findings of the study concisely
- Presents a conclusion for each purpose outlined in the introduction

Elements of a research article

- **References:**

- Lists references cited in the text of the article

- **Appendix:**

- Presents survey instruments or detailed treatment protocols

Guidelines for writing about published research

- Discuss the study in the **past tense**
- Clearly **distinguish** between your own opinions and those of the authors
- Qualify **generalizations** so they are not erroneously attributed to anyone

Example

Inappropriate wording

- Patients with greater knee range of motion have better functional outcomes after surgery

(implies that the relationship between range of motion and functional outcome is well established)

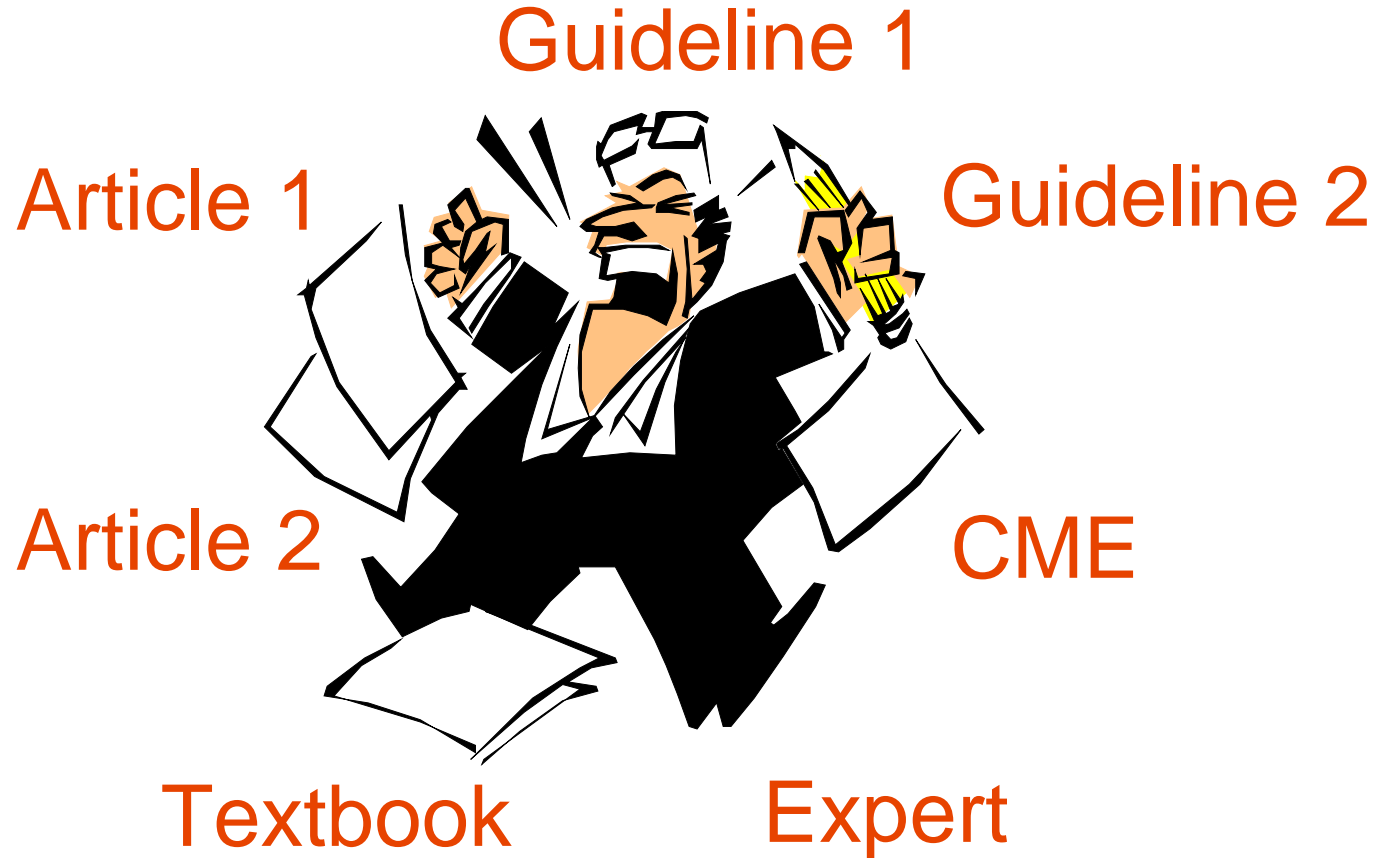
Example

Appropriate wording

- Therapists and surgeons often assume that patients with greater knee range of motion have better functional outcomes after surgery

(makes it clear that the relationship between range of motion and functional outcomes is an assumption not verified)

Conflicting Results--

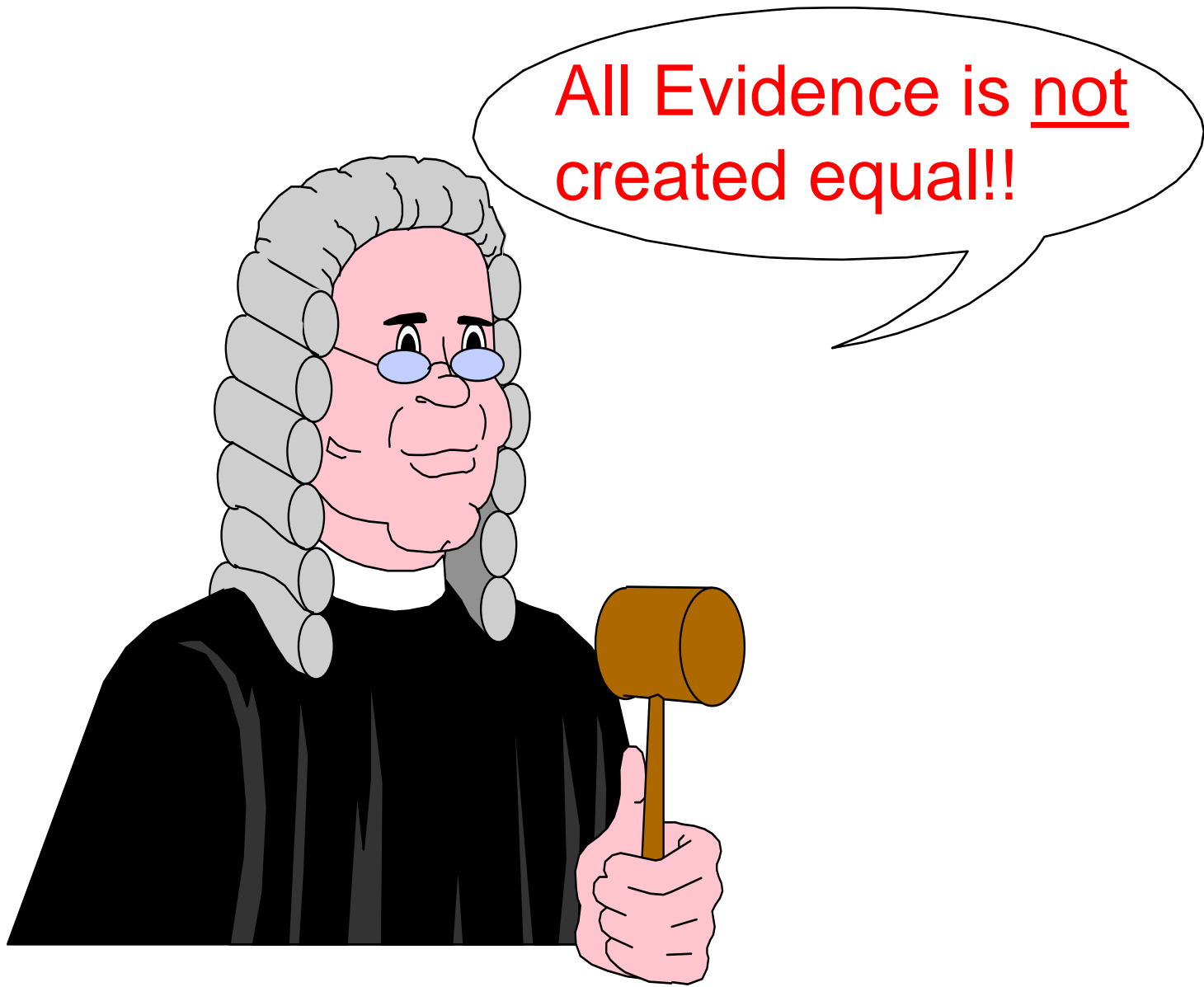


What's the truth?

Evaluations of studies

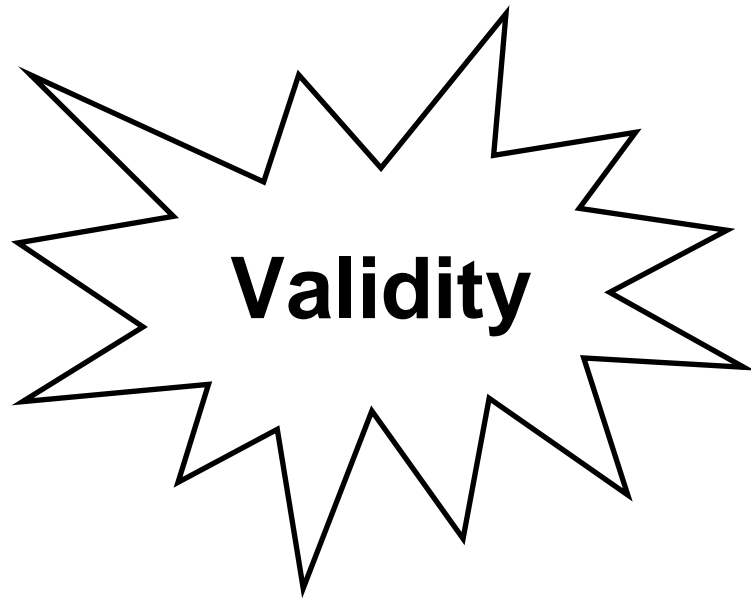
Trustworthiness:

1. Whether sources of *invalidity* have been controlled
2. Whether authors acknowledge *limitations* of the study
3. Whether the *conclusions* drawn are defensible in light of the methods used in the study



All Evidence is not created equal!!

Fundamental concepts



Research validity

- The extent to which the conclusions of the research are believable and useful

Types of validity

Internal validity:

- The extent to which the results demonstrate that a **causal relationship** exists between the independent and dependent variables
- Is the research designed so that there are only few alternative explanations for changes in the dependent variable other than the effect of the independent variable?

Types of validity

Internal validity:

- To increase internal validity —————> maximize the control over all aspects of the study
- Example: eliminating ***confounding*** (extraneous) variables through *control* of the experimental setting to eliminate their effects on the dependent variable
- Should be planned as early as the proposal

Types of validity

Construct validity:

- Concerned with the **meaning of variables** within the study
- Are the research constructs defined so that the research can be placed in the framework of other research within the field?

Types of validity

Construct validity:

- ***Labeled*** versus ***implemented*** construct
- Example: using active range of motion as a dependent measure of shoulder function:
 - Labeled construct is “function”
 - Implemented construct is “range of motion”

External Validity

Population



```
graph LR; C[Conclusion] --> P((Population));
```

Conclusion

Types of validity

External validity:

- To whom, in what settings, and at what times can the results be ***generalized?***
- To whom can the results of this research be ***applied?***

Types of validity

External validity:

- Requires thoughtful consideration of the population to whom the results of the study can be applied

Types of validity

Statistical conclusion validity:

- Are statistical tests used correctly to analyze the data?

Validity Example

- To achieve a high level of *internal validity*, researchers standardize the experimental treatment to control confounding variables.
- Such standardization compromises *external validity* because the results can be applied only to settings in which the treatment can be controlled.



Evaluations of studies

Utility:

- The usefulness of the study results
- May vary among readers

- Example: the results of a well controlled study of a narrowly defined patient population may be highly ***trustworthy***, but of low ***utility*** to a clinician who sees a different patient population

Sequence for evaluating the literature

1. **Classify the research and variables**

- Example: In a retrospective study, Richardson (1999) examined the effects of continuous passive motion (CPM) on the rehabilitation after total knee replacement. Subjects were classified in two groups according to treatment received: usual postoperative therapy, and postoperative therapy with CPM. Dependent variables were knee flexion & extension ROM at discharge. All data were collected through retrospective chart review.

Sequence for evaluating the literature

2. Compare purposes and conclusions

- Example: the purpose of this study was clearly stated: to compare the effect of adding CPM to postoperative total knee replacement rehabilitation program. The conclusions were consistent with the purpose.....

Sequence for evaluating the literature

3. Describe design and control elements

- Example: The author did not indicate the proportion of patients who received all of the planned CPM sessions. Also, assignment of subjects to groups were based on the surgeons choice of treatment. Therefore, the effects of the type of rehabilitation will be confounded by the surgeon.

Sequence for evaluating the literature

4. Identify threats to validity

- Example: The major *internal* validity concern in this study was assignment to groups. Very little information was given about why a patient received either traditional therapy or therapy with CPM.

Sequence for evaluating the literature

- Example: The major *construct* validity threat in this study relates to the use of ROM as a functional outcome after knee replacement. It would have been useful to include functional measures such as ambulation or stair-climbing.

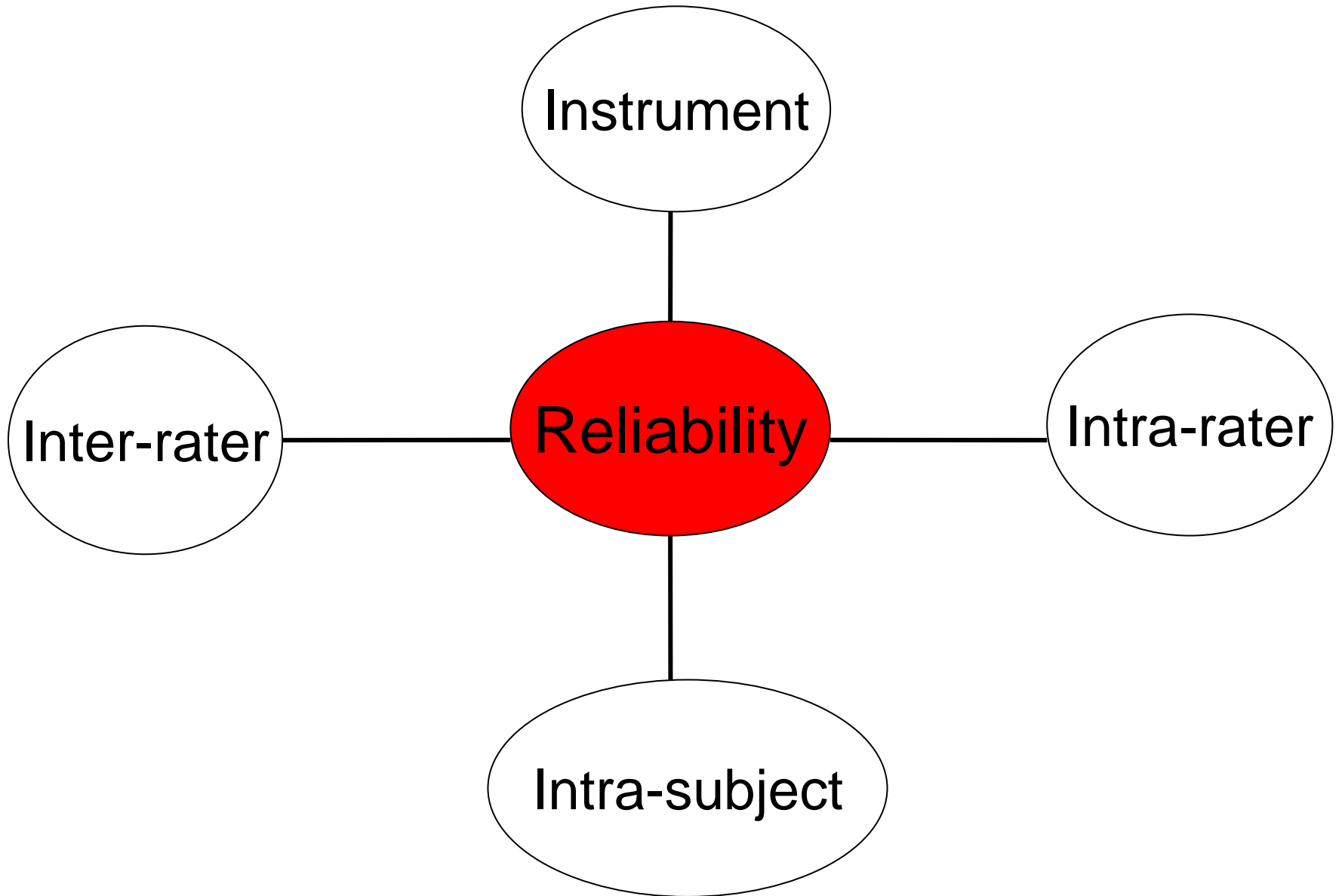
Sequence for evaluating the literature

- Example: The external validity of the study is strong in some areas and weak in others. The subjects seem representative of typical patients who receive total knee replacement: elderly women with osteoarthritis.
- The results, however, may not be applicable to patients with rheumatoid arthritis.

Sequence for evaluating the literature

5. Place the study in the context of other research

- Example: In contrast to Richardson's study, Megan et al. (2001) found that implementing CPM in the postoperative protocol following knee replacement does not influence knee ROM



Reliability

- **Reliability** (consistency) = the degree to which test scores are free from error
 - ***Instrument reliability*** = measurement error
 - ***Intra-rater reliability*** = consistency with which one rater assigns scores to the same thing on two occasions

Reliability

- ***Inter-rater reliability*** = consistency among different raters in assigning scores to the same thing
- ***Intra-subject reliability*** = related to change in subject performance from time to time

Sample size

- Researchers must make decisions about sample size, and these decisions have a great deal of impact on the validity of the statistical conclusions of the research.

Sample size

- Larger samples tend to be more representative of their populations than smaller samples
- There is less variability from sample to sample with larger sample sizes