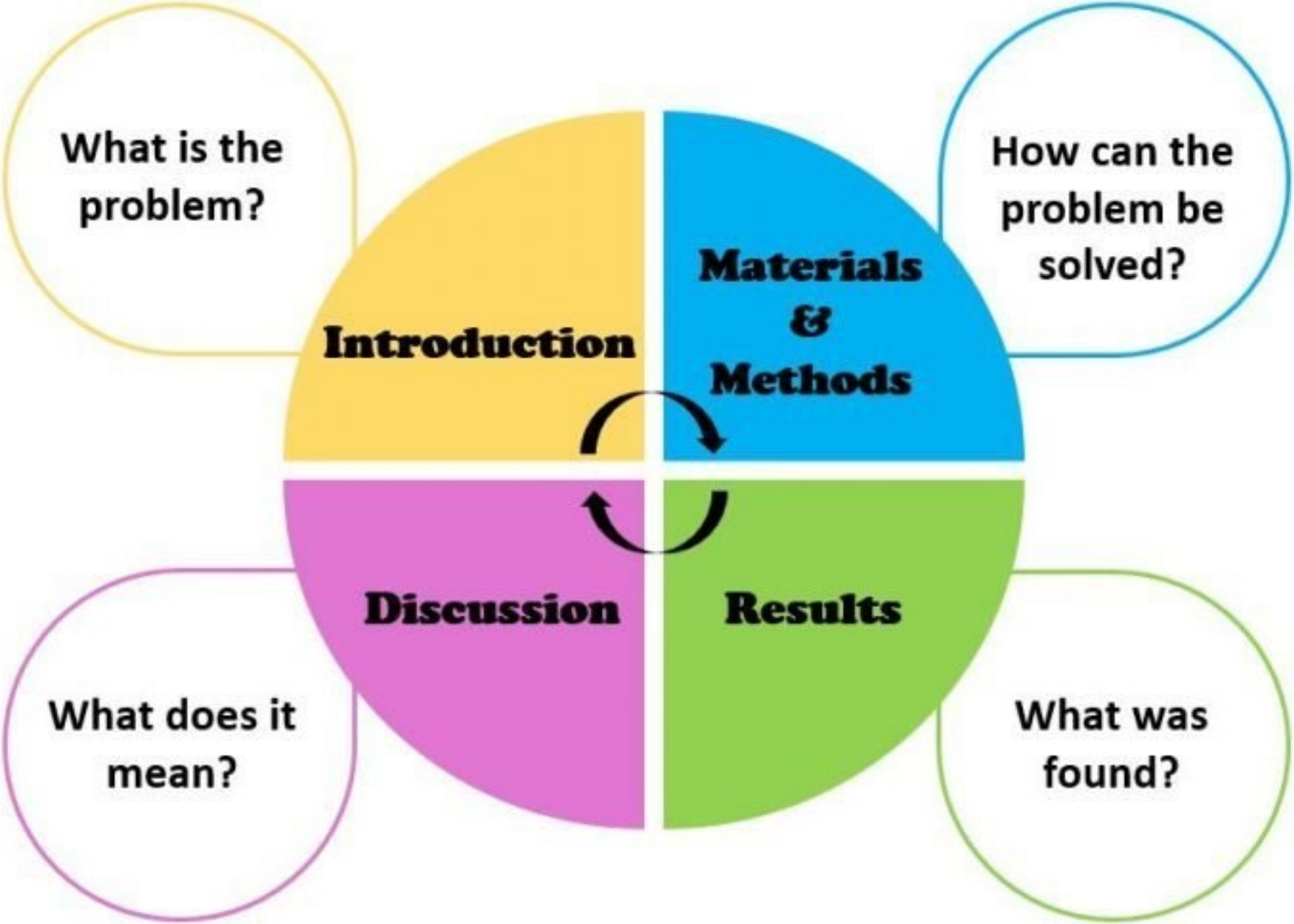
Scientific Writing Course
October 31- November 4, 2022

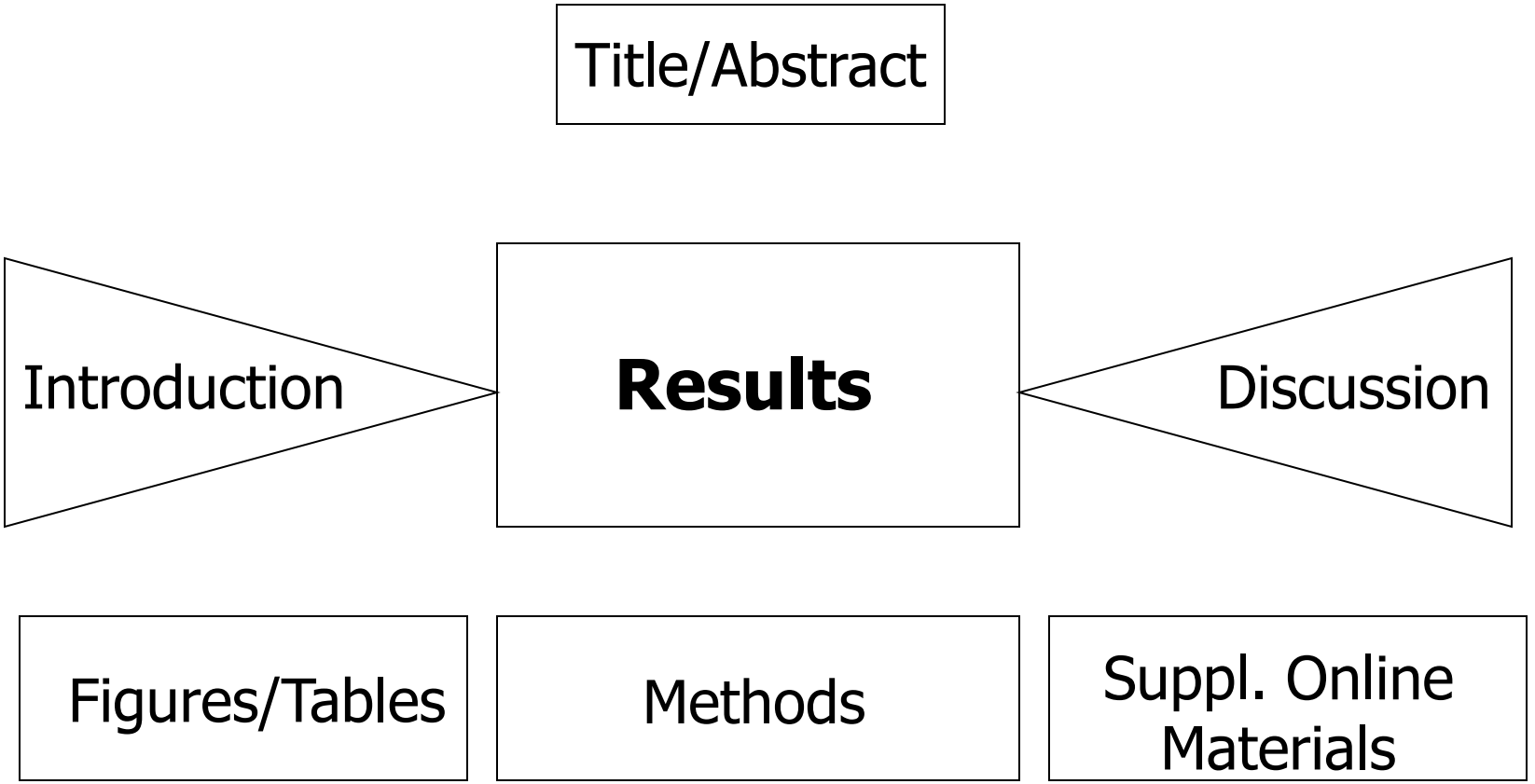
Results

Pam Murnane

Tuesday, 1 November 2022

UCSF
University of California
San Francisco
advancing health worldwide™


What is the problem?
Introduction
Materials & Methods
How can the problem be solved?
Discussion
Results
What does it mean?
What was found?



Courtesy of Stephen Ordway

Results

- Narrates the findings
- Directs reader to figures/tables
- Interprets statistical analyses

- Only reports results pertinent to the question raised in the **Introduction**
- Any findings mentioned in **Discussion** should be in results

General organization of results

General recommendations

- Organize logically
  - chronologically (clinical and epi studies)
  - most to least important (basic science)

- Don’t repeat introductory material
- Minimize reiteration of methods

General recommendations

- Follow the sequence of the Methods
- Follow the sequence of Tables and Figures
- Use sub-headings if complex or many secondary analyses
- Think ~five paragraphs
  - 1000 to 1250 words, 4 – 5 pages double spaced

~5 paragraphs – one way

- Study population
  - Who's in, who's out
  - Baseline characteristics
- ? Follow-up, if prospective
- ? Primary outcome frequency
- Bivariate analysis
- Multivariate analysis
- Subgroups, biases

~5 paragraphs – another way

- Study population
  - Who's in, who's out
  - Baseline characteristics
- ? Follow-up, if prospective
- ? Primary outcome frequency
- Primary exposure-outcome of interest
  - Bivariate followed by multivariate
- Secondary exposure-outcomes of interest
  - Bivariate followed by multivariate
- Subgroups, biases

Paragraph 1: Study population

- Number of persons approached
  - Where
  - When
- Number of persons eligible
  - Why any excluded
- Number of persons enrolled
  - Reasons for refusal
- Differences between cases and controls
- Differences between intervention and control arms

Paragraph 1
Study population

Example:

"A total of 246,715 clients age 15-49 years of age had their first HIV test performed between January 1992 and December 2000.

We excluded 44,974 who reported illness as a reason for testing to avoid selection bias due to higher prevalence of HIV infection (61% in those reporting illness vs. 14% in those not reporting illness).

Results paragraph 1a : Follow-up if prospective study

- Number of persons lost to follow-up
- Reasons for loss to follow-up
- Difference between lost to follow-up vs. retained

Results paragraph 1a: Follow-up

Example:

"A total of 137 persons (50%) completed the follow-up interview. Overall follow-up did not differ by study arm assignment (p=0.22).

Moreover, persons lost to follow-up in the intervention arm did not differ from persons lost to follow-up in the control arm with respect to gender, age, education, employment, marital status, and types of partners (all p values >0.05).

However, persons who completed follow-up were more likely to be women than men (58% vs. 42%, p=0.008) and less likely to have regular partners (43% vs. 55%, p=0.048)..."

Results paragraph: primary outcome frequency

Example:

"Overall, HIV prevalence was 23% at baseline.

If the outcome was measured repeatedly, or in multiple ways, this outcome summary may warrant its own paragraph.

Results paragraph 3: Associations with outcome

- Bivariate associations with main outcome (Table 2)
- Focus written text on clinically significant findings

Example:

"Overall, adjusted prevalence of HIV infection declined from 23% to 13%, with a decreasse from 17% to 9% among men (P < 0.001) and from 31% to 17% among women (P < 0.001) (Table 2)..."

Results paragraph 4: Multivariate analysis

- Independent associations with main outcome (Table 3)
- Main hypothesis, single most important finding
- Focus written text on ruling out confounders

Results paragraph 4: Multivariate analysis

Example:

"In multivariate analysis controlling for potential confounding by partner types, gender, age, and employment status, subjects exposed to intervention counseling were four times as likely to notify any partner compared to those without counselling (95% CI 1.3 – 13.2; Table 2)."

Results paragraph 5: Sub-analyses

- Special sub-populations
- Effect modification (interactions)
- Temporal trends (Figure 1)
  - Focus written text on significant increases or decreases
- Ruling out biases
- Secondary aims

Tips on the narrative

Help the reader understand what is most important

Results: Seeing the forest for the trees

Are data different from results?

Results vs Data

Data:

facts obtained from experiments and observations

can be raw, summarized or transformed

Results:

statements that interpret data

Data but no result

- “In the 20 control subjects, the mean testing blood pressure was 85±5 (SD) mmHg. In comparison, in the 30 tennis players, the mean resting blood pressure was 94±3 mmHg.”

Result Stated

Revision A

The mean resting pressure was higher in the 30 tennis players than in the 20 control subjects [94±3 (SD) vs. 85±5 mmHg, $P < 0.02$]

- Point of the comparison is clear… "pressure was higher in one group".
- **Sentence now states a result**—and *the data* are given in parentheses AFTER the result

Result and General Idea of Magnitude

Revision B

The mean resting blood pressure was 10% higher in the 30 tennis players than in the 20 control subjects [94±3 (SD) vs. 85±5 mmHg, $P < 0.02$].

- Stating the result this way gives a simpler and therefore clearer idea of the magnitude of the difference than do the data alone.

Emphasize Results

- *To emphasize the results*, you can use a "signal" at the beginning of the sentence…like "**We found**," or "**We observed**" or "**We detected**".

- Or, the question, approach, rationale, etc., get put into 1 paragraph and the results get put into a second paragraph (see handout).

Emphasize Results

Brief data can be presented in the text (in parentheses, after the result)

Description:

Mean and Standard Deviation: 48.7 ± 1.3 (SD) ml

Confidence Intervals:

Blood flow was redistributed more toward the right ventricle than toward the left ventricle [26.3 ± 2.9 (SD) vs. 19.5 ± 1.5, 95% CI 3.8-9.8%, $P = 0.049$].

Emphasize Results

Some times you want to remind the reader of a method, very briefly, e.g.:

Examples

"PLD1 overexpression also increased ADRP mRNA levels by 30% (±5), as determined by real-time PCR."

"In multivariate regression analysis, individuals with mental illness had twice the rate of unintentional injury requiring admission (95% CI XX-XX)

Emphasize Results

Begin each paragraph by stating a result.

Don’t start off with a figure legend.

Example

A summary of renal function data is presented in Fig.2. Continuous positive airway pressure (7.5 cm H20) in newborns decreased urine flow, sodium excretion, and the glomerular filtration rate.

How would you make this a more powerful topic sentence that emphasizes the result?

Emphasize Results

Revision

Continuous positive airway pressure (7.5 cm H20) in newborns decreased urine flow, sodium excretion, and the glomerular filtration rate (Fig. 2).

- Omit the figure legend and state the results.
- Cite the figure in parentheses at the end of the sentence….
- In other words, subordinate Figure Legends and Table Titles and make the result the topic of the sentence.

Emphasize Results

Another Example

We administered propanolol during normal ventilation. This beta-blocker decreased phospholipids (fig. 1).

The topic sentences for paragraphs in the Results section should state results, but is the topic sentence here a result?

How would you revise?

Emphasize Results

Revisions

A. Propanolol given during normal ventilation **decreased** phospholipids (Fig. 1).

B. After propanolol was given during normal ventilation, phospholipids **decreased** (Fig. 1).

C. When propanolol was given during normal ventilation, phospholipids **decreased** (Fig. 1).

In all of these revisions, the method is *subordinated* because in the Results section, the main verbs (in bold) should describe results, not methods.

Emphasize Results

Use Subheadings to Convey the Message

Example:

CCR2 Deficiency and Atherogenesis

Revision:

CCR2 Deficiency Reduces Atherogenesis

Summary of How to Emphasize Important Results

1. Omit data from the text *(put it in the Figures and Tables).*

2. Condense the results *(in the text highlight only key information from tables).*

3. Put results at the beginning of a paragraph (strong "power" position).

4. Subordinate less important information (figure legend, title, methods).

5. Use subheadings to convey the message.

Additional tips for results

Additional tips for results

- **Don't mix Methods into Results** *unless* you are submitting a type II basic science paper!
  - Otherwise, if you conduct a new analysis or sub-analysis, describe it in Methods
- **Don't mix Discussion into Results**
  - No interpretation beyond self-evident
  - (Also, don't introduce Results for the first time in Discussion; go back and put them in Results)

Additional tips for results

- **Double check numbers, do they add up & did you avoid overlap?**
  - all data referred to in tables, figures, text, and abstract correspond to one another; all totals are correct
  - there is minimal redundancy in data and information presented among the figures and legends, tables, and text

Results “in a nutshell”

- Stick to what is relevant
- The text should tell the story
- The tables give the evidence
- The figures illustrate the highlights
- Don’t include just percentages or p values – *check articles in the journal to see what is expected*
- Include confidence intervals

Today's homework

- **Draft (revise):**
  - Results section
  - Revise other sections as needed