JOINT WORKSHOP ON SCIENTIFIC WRITING IN FIELD EPIDEMIOLOGY

Lecture 6: Writing for Flow
Wednesday afternoon - 2014-02-26

Pakse, Champasak Province, P.D.R. Lao
International Field Epidemiology Training Programme
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126

Writing for Flow
Principles of Gopen & Swan

■ George D. Gopen (Duke), Judith A. Swan (Princeton)
  □ Recognized the science of writing
  □ "Use Key Terms" and "Write for Flow"

The Science of Scientific Writing

If the reader is to grasp what the writer means,
the writer must understand what the reader needs

Writing with the Reader in Mind: Expectation and Context

Information is interpreted more easily and more uniformly if it is placed where most readers expect to find it.

Beginning with the exciting material and ending with a lack of luster often leaves us disappointed and destroys our sense of momentum.

http://www-stat.wharton.upenn.edu/~buja/sci.html

127

Writing for Flow
Identify key terms

■ "Key terms" are the "flesh" of content that are conveyed on the "bones" of grammatical structure

■ Importance of key terms
  □ Improve reader comprehension
  □ Used to form paper's title
  □ Used to name concepts and components
  □ Used to link sentences
    ▸ Help reader follow your order of ideas
    ▸ Help reader understand your writing

Acknowledgment : Robert M. Jacobson,
Mayo Clinic, "Writing a First Draft"   128

Writing for Flow
Identify key terms - 2

■ Example
  "Digitalis increases the contractility of the mammalian heart. This change in inotropic state is a result of changes in calcium flux through the muscle cell membrane."
  □ What is *inotropic state*? Ans.: Same as *contractility*

■ Revision for improved comprehension
  "Digitalis increases the contractility of the mammalian heart. This increased contractility is a result of changes in calcium flux through the muscle cell membrane."

Source: Mimi Zeiger, Essentials of Writing
Biomedical Research Papers, 2000   129

Writing for Flow
Identify key terms - 3

■ Repeat key terms nearly exactly
  □ Avoid synonyms
  □ Provides continuity between sentences and paragraphs
  □ Avoids mental manipulation
    ▸ Knowledgeable readers may understand synonym
    ▸ Unfamiliar readers may not know the synonym

Source: Mimi Zeiger, Essentials of Writing
Biomedical Research Papers, 2000   130

Writing for Flow
Identify key terms - 4

■ Abuses of key terms
  □ Conversion in mid-stream to new term
    ▸ "Viscerotropic adverse event" shows up later as "VAE" (without introducing the abbreviation)
    ▸ Replaced by shorter synonym (even if good writing)
      ▹ "Viscerotropic adverse event" later called "disease"
      ▹ "17D virus" later called "vaccine virus"
  □ Replacement with ambiguous pronouns
    ▸ Too many words or phrases intervene between noun and pronoun "it" to make ambiguous

Acknowledgment : Robert M. Jacobson,
Mayo Clinic, "Writing a First Draft"   131

Writing for Flow
"Topic" positions and "stress" positions

- At beginning of sentence = "topic position"
  - Places the person or thing whose "story" you are telling
  - Already known and familiar Old Information
  - Usually the grammatical "subject" of the sentence
  - Provides the important link to prior sentences

- At end of sentence = "stress position"
  - Place the New Information you want the reader to learn
  - This provides the important link to future sentences

Acknowledgment : Robert M. Jacobson,
Mayo Clinic, "Writing a First Draft"   132

Writing for Flow
Linking old information to new

- Sentence should begin (topic position) with *Old Information*
  - Usually introduced in a prior sentence
  - Readers already familiar with it
- Sentence provides *New Information* at its *stress position* at or near end of sentence
- Next/nearby sentence/paragraph:
  - The same *New Information* now becomes the *Old Information*

Old Info. ➔ New Info.
⫽
Old Info. ➔ New Info.
⫽
Old Info. ➔ New Info.

133

Writing for Flow
Good and bad examples

- Sample sentence:
  - "When key regulatory pathways that control cell proliferation are subverted, genes with latent transforming potential (proto-oncogenes) can become oncogenes. … "
- Bad next sentence:
  - "… Several subfamilies of G-protein-coupled receptors, such as serotonin and muscarinic cholinergic receptors, can activate these proto-oncogenes"
- Why?

Acknowledgment : Robert M. Jacobson,
Mayo Clinic, "Writing a First Draft"   134

Writing for Flow
Good and bad examples - 2

- Sample sentence:
  - "When key regulatory pathways that control cell proliferation are subverted, genes with latent transforming potential (proto-oncogenes) can become oncogenes. … "
- Bad next sentence:
  - "… Several subfamilies of G-protein-coupled receptors, such as serotonin and muscarinic cholinergic receptors, can activate these proto-oncogenes"
- Why? Old and New information in wrong positions

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Writing for Flow
Good and bad examples - 3

- Sample sentence:
  - "When key regulatory pathways that control cell proliferation are subverted, genes with latent transforming potential (proto-oncogenes) can become oncogenes. … "
- Bad next sentence:
  - "… Several subfamilies of G-protein-coupled receptors, such as serotonin and muscarinic cholinergic receptors, can activate these proto-oncogenes"
- Good next sentence:
  - "… These proto-oncogenes are activated by subfamilies of G-protein-coupled receptors, such as serotonin and muscarinic cholinergic receptors."

136

Writing for Flow
Linking paragraphs

- Begin paragraphs with the topic sentence
  - Provides overview of what paragraph or next sentences will cover, e.g.:
    - "Prevention programs for AIDS involve a number of interacting components, including … ."
    - "A complex of proteins mediate transcriptional silencing at selected regions of the yeast genome."
  - Topic sentences provide linkages
    - To "old info" in preceding paragraph, if not the last sentence of that paragraph
    - To remaining sentences in paragraph, helping reader anticipate what is coming

137

Writing for Flow
Five paragraph progression structures

1. Progression around a constant topic
   - Key term appears in each sentence
2. Progression through sub-categorization
   - Subsequent sentences address each subcategory
3. Chain progression
   - Key terms daisy chain sentence to sentence
4. Progression through time or order
5. Progression through shrinking Venn diagram enclosures

Acknowledgment : Robert M. Jacobson, Mayo Clinic, "Writing a First Draft" 138

Paragraph Progression
1. Progression around constant topic

- old-**A** or **topic** ➔ new **B**
- old-**A** ➔ new **C**
- old-**A** ➔ new **D**
- old-**A** ➔ etc.

"During the last decades, safe and effective live-attenuated **varicella vaccines** have been developed. The **vaccines** are used in **childhood immunization programs in many countries** [1]. All of the currently available **varicella vaccines** derive from a Japanese varicella-zoster virus (VZV) **wild-type strain** isolated from a **child** with typical varicella **named Oka** (parental Oka, pOka)."

Sauerbrei A, et al. Immune response of varicella vaccinees to different varicella-zoster virus genotypes. Vaccine 2011;29:3873-3877.

Acknowledgment : Robert M. Jacobson, Mayo Clinic, "Writing a First Draft" 139

Paragraph Progression
2. Progression by sub-categorization

- old-**A** ➔ new **B**+**C**
- old-**B** ➔ new **D**+**E**
- old-**B** ➔ new **G**+**H**
- old-**C** ➔ new **I**+**J**

The **objective** was to determine the **immunogenicity** and **safety** of one or two injections of the XRX-001 vaccine at two dose levels. The coprimary **immunogenicity outcomes** were the **proportion of subjects with seroconversion** and the **geometric mean titer of neutralizing antibodies**. Secondary **outcomes** were the **distribution of titers** and **duration of antibody response**. **Safety** was assessed on the basis of **local and systemic reactions** and **clinical laboratory abnormalities**.

Acknowledgment : Robert M. Jacobson, Mayo Clinic, "Writing a First Draft" 140

Paragraph Progression
2. Progression by sub-categorization - 2

- old-**A** ➔ new **B**
- old-**A** ➔ new **C**+**D**
- old-**C** ➔ new **E**
- old-**D** ➔ new **F**+old-**A**

A live attenuated **vaccine (17D)** developed in 1936 is widely used, with approximately **20 million doses** distributed annually.

Although remarkably immunogenic, the **17D vaccine** may cause serious **viscerotropic** and **neurotropic** adverse events and anaphylaxis.

Viscerotropic disease is a fulminant 17D virus **infection of the liver and visceral organs** resembling naturally acquired yellow fever.

Neurotropic disease typically follows **invasion of the brain** by the replicating **vaccine virus**.

Acknowledgment : Robert M. Jacobson, Mayo Clinic, "Writing a First Draft" 141

Paragraph Progression
3. Progression by chaining

- new-**A** ➔ **B**
- old-**B** ➔ **C**
- old-**C** ➔ **D**
- old-**D** ➔ …

The **protein** when it is first made exists in an extraordinarily large variety of shapes, resembling those accessible to a **flexible strand** of spaghetti. The Brownian motion of the **protein strand** will carry it willy-nilly between various **shapes**, somehow finally getting it to settle down into a much less diverse family of **shapes**, which we will call the **native structure** of the **protein**. The average **native structures** …

Acknowledgment : Robert M. Jacobson, Mayo Clinic, "Writing a First Draft" 142

Paragraph Progression
4. Progression through time or order

- Ordered by chronological or logical steps
  - "First, …"
  - "Second, …"
  - "Third, …"
  - "Fourth, …"   "Fifth, …"

In **step one** of the survey, we listed all villages in the province. The **second step** required listing each of their estimated populations from the 2000 census.[23] Using a random-number generator, in **step three** we selected a total of 20 villages, for whom cluster sampling was performed in **step four** by trained field teams. **Step five** involved assay of specimens and analysis of the data.

143

Slide 144
Paragraph Progression
5. Progression by shrinking Venn diagrams

Background: Venn diagrams Illustrate overlaps and subsets of populations

A

B

In A, not B

In both A and B

In B, not A

Subset C of A

144

Slide 145
Paragraph Progression
5. Progression by Venn diagram - 2
- Shrinking subsets reflected in flow chart

Population of Thailand
Living in Chiang Mai
Married couples
HIV+/HIV- Partners
Invited into study
Recruited
Completed Follow-up with Results

145

Slide 146
Paragraph Progression
5. Progression by Venn diagrams - 3
- Population A ➜ shrinks into subset B
- Subset B ➜ shrinks into subset C
- Subset C ➜ shrinks into subset D
- Subset D ➜ shrinks into subset E
- Subset E ➜ shrinks into subset F

We invited all **127 married HIV-discordant couples attending the university's HIV clinic** to **view the explanatory video about the study, and 106 did so**. Of these, **101 were willing to listen to verbal explanation of the consent form**. Of these **57 volunteered** and after signing the consent form were **enrolled and vaccinated**. Of these, 6 couples (11%) withdrew their consent before followup serum could be collected. For another 3 (5%), insufficient serum was collected, leaving **48 specimens available for assay and analysis**.

146

Slide 147
Key Words and Logical Flow
- How Important is This?

"In the end your writing is not what you mean it to be, but what the reader interprets it to be.

"Meeting your readers' expectations facilitates their interpretation.

"When you fail to meet their expectations, they may insert interpretations to redress their expectations."*

* Gopen GD, Swan JA. The science of scientific writing. American Scientist (Nov-Dec) 1990;78:550-558.

Acknowledgment : Robert M. Jacobson, Mayo Clinic, "Writing a First Draft"   147

Slide 148
Key Terms and Flow - Example *

There are several potentially curative or palliative approaches to the treatment of hepatocellular carcinoma.[36] The choice of treatment is driven by the cancer stage, the resources available, and the level of practitioner expertise. Since only a few randomized, controlled trials have compared these approaches, most recommendations for staging-guided treatment rely on the findings of observational studies or expert opinion. Numerous staging systems for hepatocellular carcinoma have been developed, and they have been validated to varying degrees. Barcelona Clinic Liver Cancer (BCLC) staging has been proposed as the standard means of assessing the prognosis for patients with hepatocellular carcinoma. The BCLC staging system is a useful assessment tool that incorporates data on the patient's performance status, number and size of nodules, cancer symptoms, and liver function as determined by the Child–Pugh classification system.[37] The Child–Pugh scoring system uses five clinical measures of liver disease. Each measure is assigned a score of 1 to 3 points, with 3 points indicating the most severe derangement. Scores on the five measures are then summed to determine the overall severity of disease, with a sum of 5 or 6 points indicating class A disease, 7 to 9 points class B, and 10 to 15 points class C, or the most severe disease.

* El-Serag. N Engl J Med 2011;365:1118-27   148

Slide 149
Key Terms and Flow - Example 2 *

There are several potentially curative or palliative Ⓐ **approaches to the treatment** of hepatocellular carcinoma.[36] The choice of **treatment** is driven by the cancer stage, the resources available, and the level of practitioner expertise. Since only a few randomized, controlled trials have compared these **approaches**, most recommendations for staging-guided **treatment** rely on the findings of observational studies or expert opinion. Numerous staging systems for hepatocellular carcinoma have been developed, and they have been validated to varying degrees. Barcelona Clinic Liver Cancer (BCLC) staging has been proposed as the standard means of assessing the prognosis for patients with hepatocellular carcinoma. The BCLC staging system is a useful assessment tool that incorporates data on the patient's performance status, number and size of nodules, cancer symptoms, and liver function as determined by the Child–Pugh classification system.[37] The Child–Pugh scoring system uses five clinical measures of liver disease. Each measure is assigned a score of 1 to 3 points, with 3 points indicating the most severe derangement. Scores on the five measures are then summed to determine the overall severity of disease, with a sum of 5 or 6 points indicating class A disease, 7 to 9 points class B, and 10 to 15 points class C, or the most severe disease.

* El-Serag. N Engl J Med 2011;365:1118-27   149

Key Terms and Flow - Example 3 *

There are several potentially curative or palliative **approaches to the treatment** of **hepatocellular carcinoma**.[36] The choice of **treatment** is driven by the cancer stage, the resources available, and the level of practitioner expertise. Since only a few randomized, controlled trials have compared these **approaches**, most recommendations for staging-guided **treatment** rely on the findings of observational studies or expert opinion. Numerous staging systems for **hepatocellular carcinoma** have been developed, and they have been validated to varying degrees. Barcelona Clinic Liver Cancer (BCLC) staging has been proposed as the standard means of assessing the prognosis for patients with **hepatocellular carcinoma**. The BCLC staging system is a useful assessment tool that incorporates data on the patient's performance status, number and size of nodules, cancer symptoms, and liver function as determined by the Child–Pugh classification system.[37] The Child–Pugh scoring system uses five clinical measures of liver disease. Each measure is assigned a score of 1 to 3 points, with 3 points indicating the most severe derangement. Scores on the five measures are then summed to determine the overall severity of disease, with a sum of 5 or 6 points indicating class A disease, 7 to 9 points class B, and 10 to 15 points class C, or the most severe disease.

* El-Serag. N Engl J Med 2011;365:1118-27   150

Key Terms and Flow - Example 4 *

There are several potentially curative or palliative **approaches to the treatment** of **hepatocellular carcinoma**.[36] The choice of **treatment** is driven by the **cancer stage**, the resources available, and the level of practitioner expertise. Since only a few randomized, controlled trials have compared these **approaches**, most recommendations for **staging-guided treatment** rely on the findings of observational studies or expert opinion. Numerous **staging systems** for **hepatocellular carcinoma** have been developed, and they have been validated to varying degrees. Barcelona Clinic Liver Cancer (BCLC) staging has been proposed as the standard means of assessing the prognosis for patients with **hepatocellular carcinoma**. The BCLC staging system is a useful assessment tool that incorporates data on the patient's performance status, number and size of nodules, cancer symptoms, and liver function as determined by the Child–Pugh classification system.[37] The Child–Pugh scoring system uses five clinical measures of liver disease. Each measure is assigned a score of 1 to 3 points, with 3 points indicating the most severe derangement. Scores on the five measures are then summed to determine the overall severity of disease, with a sum of 5 or 6 points indicating class A disease, 7 to 9 points class B, and 10 to 15 points class C, or the most severe disease.

* El-Serag. N Engl J Med 2011;365:1118-27   151

Key Terms and Flow - Example 5 *

There are several potentially curative or palliative **approaches to the treatment** of **hepatocellular carcinoma**.[36] The choice of **treatment** is driven by the **cancer stage**, the resources available, and the level of practitioner expertise. Since only a few randomized, controlled trials have compared these **approaches**, most recommendations for **staging-guided treatment** rely on the findings of observational studies or expert opinion. Numerous **staging systems** for **hepatocellular carcinoma** have been developed, and they have been validated to varying degrees. **Barcelona Clinic Liver Cancer (BCLC) staging** has been proposed as the standard means of assessing the prognosis for patients with **hepatocellular carcinoma**. The **BCLC staging system** is a useful assessment tool that incorporates data on the patient's performance status, number and size of nodules, cancer symptoms, and liver function as determined by the Child–Pugh classification system.[37] The Child–Pugh scoring system uses five clinical measures of liver disease. Each measure is assigned a score of 1 to 3 points, with 3 points indicating the most severe derangement. Scores on the five measures are then summed to determine the overall severity of disease, with a sum of 5 or 6 points indicating class A disease, 7 to 9 points class B, and 10 to 15 points class C, or the most severe disease.

* El-Serag. N Engl J Med 2011;365:1118-27   152

Key Terms and Flow - Example 6 *

There are several potentially curative or palliative **approaches to the treatment** of **hepatocellular carcinoma**.[36] The choice of **treatment** is driven by the **cancer stage**, the resources available, and the level of practitioner expertise. Since only a few randomized, controlled trials have compared these **approaches**, most recommendations for **staging-guided treatment** rely on the findings of observational studies or expert opinion. Numerous **staging systems** for **hepatocellular carcinoma** have been developed, and they have been validated to varying degrees. **Barcelona Clinic Liver Cancer (BCLC) staging** has been proposed as the standard means of assessing the prognosis for patients with **hepatocellular carcinoma**. The **BCLC staging system** is a useful assessment tool that incorporates data on the patient's performance status, number and size of nodules, cancer symptoms, and liver function as determined by the **Child–Pugh classification system**.[37] The **Child–Pugh scoring system** uses five clinical measures of liver disease. Each measure is assigned a score of 1 to 3 points, with 3 points indicating the most severe derangement. Scores on the five measures are then summed to determine the overall severity of disease, with a sum of 5 or 6 points indicating class A disease, 7 to 9 points class B, and 10 to 15 points class C, or the most severe disease.

* El-Serag. N Engl J Med 2011;365:1118-27   153

Key Terms and Flow - Example 7 *

There are several potentially curative or palliative **approaches to the treatment** of **hepatocellular carcinoma**.[36] The choice of **treatment** is driven by the **cancer stage**, the resources available, and the level of practitioner expertise. Since only a few randomized, controlled trials have compared these **approaches**, most recommendations for **staging-guided treatment** rely on the findings of observational studies or expert opinion. Numerous **staging systems** for **hepatocellular carcinoma** have been developed, and they have been validated to varying degrees. **Barcelona Clinic Liver Cancer (BCLC) staging** has been proposed as the standard means of assessing the prognosis for patients with **hepatocellular carcinoma**. The **BCLC staging system** is a useful assessment tool that incorporates data on the patient's performance status, number and size of nodules, cancer symptoms, and liver function as determined by the **Child–Pugh classification system**.[37] The **Child–Pugh scoring system** uses **five clinical measures of liver disease**. Each **measure** is assigned a score of 1 to 3 points, with 3 points indicating the most severe derangement. Scores on the **five measures** are then summed to determine the overall severity of disease, with a sum of 5 or 6 points indicating class A disease, 7 to 9 points class B, and 10 to 15 points class C, or the most severe disease.

* El-Serag. N Engl J Med 2011;365:1118-27   154

Key Terms and Flow - Example 8 *

There are several potentially curative or palliative **approaches to the treatment** of **hepatocellular carcinoma**.[36] The choice of **treatment** is driven by the **cancer stage**, the resources available, and the level of practitioner expertise. Since only a few randomized, controlled trials have compared these **approaches**, most recommendations for **staging-guided treatment** rely on the findings of observational studies or expert opinion. Numerous **staging systems** for **hepatocellular carcinoma** have been developed, and they have been validated to varying degrees. **Barcelona Clinic Liver Cancer (BCLC) staging** has been proposed as the standard means of assessing the prognosis for patients with **hepatocellular carcinoma**. The **BCLC staging system** is a useful assessment tool that incorporates data on the patient's performance status, number and size of nodules, cancer symptoms, and liver function as determined by the **Child–Pugh classification system**.[37] The **Child–Pugh scoring system** uses **five clinical measures of liver disease**. Each **measure** is assigned a **score of 1 to 3 points**, with 3 points indicating the most severe derangement. **Scores** on the **five measures** are then summed to determine the overall severity of disease, with a sum of 5 or 6 points indicating class A disease, 7 to 9 points class B, and 10 to 15 points class C, or the most severe disease.

* El-Serag. N Engl J Med 2011;365:1118-27   155

Key Terms and Flow - Example 9 *

There are several potentially curative or palliative **approaches to the treatment** of **hepatocellular carcinoma**.[36] The choice of **treatment** is driven by the **cancer stage**, the resources available, and the level of practitioner expertise. Since only a few randomized, controlled trials have compared these **approaches**, most recommendations for **staging-guided treatment** rely on the findings of observational studies or expert opinion. Numerous **staging systems** for **hepatocellular carcinoma** have been developed, and they have been validated to varying degrees. **Barcelona Clinic Liver Cancer (BCLC) staging** has been proposed as the standard means of assessing the prognosis for patients with **hepatocellular carcinoma**. The **BCLC staging system** is a useful assessment tool that incorporates data on the patient's performance status, number and size of nodules, cancer symptoms, and liver function as determined by the **Child–Pugh classification system**.[37] The **Child–Pugh scoring system** uses **five clinical measures of liver disease**. Each **measure** is assigned a **score of 1 to 3 points**, with 3 points indicating the most **severe derangement**. **Scores** on the **five measures** are then summed to determine the overall **severity of disease**, with a sum of 5 or 6 points indicating class A disease, 7 to 9 points class B, and 10 to 15 points class C, or the most **severe disease**.

* El-Serag. N Engl J Med 2011;365:1118-27   156

Exercise 5 –   Identify Key Terms and Progression Type - 1

- Circle key terms in <u>Introduction</u> section
  - From Kulpeng W, *et al*. Cost-utility analysis of 10- and 13-valent pneumococcal conjugate vaccines: Protection at what price in the Thai context? Vaccine 2013;31:2839–2847 (http://dx.doi.org/10.1016/j.vaccine.2013.03.047).
  - Same section: *All workshop groups A, B, C, D*
  - Work individually

- *Identify progression type for logical flow*

CONTINUED

157

Exercise 5 –   Identify Key Terms and Progression Type - 2

- Circle and label *__key terms__* with Ⓐ, Ⓑ, Ⓒ, Ⓓ, etc.
- Identify flow pattern:
  - By **constant** topic progression?
  - By **sub-cat**egorization?
  - By **chain**ing?
  - By **order** or time?
  - By **Venn**-diagram subset?
- Lecturer to do demonstration first
  - ▸ Appel *et al*. [weight-loss interventions] N Engl J Med 2011;365:1959-68

158

End of Exercise 5

159