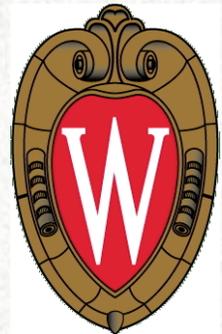# Achieving a Readable Style
Part 3: Sentences, continued

A writing workshop presented by BACTER
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Last time we looked at...

Sentence Structure

- Subject-verb agreement
- Maintaining linkage

This time we'll continue with sentence structure…

Sentence Structure

- More on maintaining linkage
- Noun clusters
- Passive voice

We already began discussing the lack of linkage in this example

Ruminants form the cotyledonary placenta at the feto-maternal interface. Two specific types of trophoblast cells, trophoblast giant binucleate cells (BNCs) and trophoblast mononucleate cells (TMCs), play a crucial role in ruminant placentation. The properties of BNC-specific genes...have been investigated, and TMC-expressed interferon-tau is the molecule for maternal recognition of pregnancy. **???** BNC and TMC individually produce numerous proteins of unknown function. **???** It is important to identify the genes that are specifically expressed in each cell type in order to systematically decipher the function of the trophoblast cells.

And some connecting words that help

Ruminants form the cotyledonary placenta at the feto-maternal interface. Two specific types of trophoblast cells, trophoblast giant binucleate cells (BNCs) and trophoblast mononucleate cells (TMCs), play a crucial role in ruminant placentation. The properties of BNC-specific genes...have been investigated, and TMC-expressed interferon-tau is the molecule for maternal recognition of pregnancy. **However,** BNC and TMC **also** individually produce numerous proteins of unknown function. **Thus, as a first step toward (?)** systematically deciphering the function of **these** trophoblast cells, we sought to identify the genes that are specifically expressed in each cell type.

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But linkage is also broken in another way

Ruminants form the cotyledonary placenta at the feto-maternal interface. Two specific types of trophoblast cells, trophoblast giant binucleate cells (BNCs) and trophoblast mononucleate cells (TMCs), play a crucial role in ruminant placentation. The properties of BNC-specific genes...have been investigated, and TMC-expressed interferon-tau is the molecule for maternal recognition of pregnancy.

First…the topic position

- The start of the sentence is called the **topic position**.
- "The information in the topic position prepares the reader for the upcoming material by connecting it backward to the previous discussion." (Gopen and Swan, 1990)
- I.e., the topic position should contain "old" information that links backward. The latter part of the sentence should then include new information to be emphasized.
- When the start of sentences consistently contain new information, the reader gets confused.

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Here's the problem in our current example

Ruminants form the **cotyledonary placenta** at the feto-maternal interface. Two specific types of **trophoblast cells**, trophoblast giant binucleate cells (BNCs) and trophoblast mononucleate cells (TMCs), play a crucial role in ruminant placentation.

**The topic position of the second sentence contains new information about trophoblast cells, rather than referring back to the ruminant placenta

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Here's the fix

Revised: Ruminants form the **cotyledonary placenta** at the feto-maternal interface. In **ruminant placentation**, two specific types of trophoblast cells play a crucial role: trophoblast giant binucleate cells (BNCs) and trophoblast mononucleate cells (TMCs).

Another example

Original: "DNA breaks arise spontaneously or in response to genotoxic events. Cells respond to **double-stranded break (DSB) formation** to prevent chromosomal abnormalities. **The conserved Mre11-Rad50-Xrs2 (MRX) complex** (MRN complex in mammals) is implicated in the DSB response. **It** binds and holds together the broken extremities, thus preventing chromosome fragmentation…"

Notice how this one change links all the sentences better

Revised: DNA breaks arise spontaneously or in response to genotoxic events. Cells respond to double-stranded break (DSB) formation to prevent chromosomal abnormalities. **Implicated in the DSB response** is the conserved Mre11-Rad50-Xrs2 (MRX) complex (MRN complex in mammals). **It** binds and holds together the broken extremities, thus preventing chromosome fragmentation...

Where is linkage broken here?

"The early bi-potential mammalian gonad requires the expression of a Y-linked gene, *Sry,* during a brief window of time to ensure proper testis development. WT1 and its direct target gene *Sf1* function during sex determination as well as in the specified testes and ovaries. We have previously shown that the transcription co-factor CITED2 interacts with WT1 to stimulate the expression of *Sf1* in the adrenogonadal primordium to ensure adrenal development. We now show through genetic interactions and expression analyses that *Cited2* acts in the gonad with *Wt1* and *Sf1* to increase the expression of *Sry* levels to attain a critical threshold to efficiently initiate testis development."

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The main problem

Original: "The early bi-potential mammalian gonad requires the expression of a **Y-linked gene, *Sry*,** during a brief window of time to ensure proper testis development. WT1 and its direct target gene *Sf1* function during sex determination as well as in the specified testes and ovaries. We have previously shown that the transcription co-factor CITED2 interacts with WT1 to stimulate the expression of *Sf1* in the adrenogonadal primordium to ensure adrenal development. We now show through genetic interactions and expression analyses that *Cited2* acts in the gonad with *Wt1* and *Sf1* to increase the expression of *Sry* levels to attain a critical threshold to efficiently initiate testis development."

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The main problem

**The authors introduce Sry at the top of the paragraph, but don't discuss it again until the end. There is also no connection between the first and second sentences.*

Some edits that improve linkage

<u>Revised</u>: **The (definition)** WT1 and its direct target gene *Sf1* function during sex determination as well as in the specified testes and ovaries. We have previously shown that **WT1 interacts with** the transcription co-factor CITED2 to stimulate the expression of *Sf1* in the adrenogonadal primordium to ensure adrenal development. We now show through genetic interactions and expression analyses that *Cited2* acts in the gonad with *Wt1* and *Sf1* to increase the expression of **the Y-linked gene** *Sry,* to attain a critical threshold that initiates testis development **in the early bi-potential mammalian gonad.**

**Note: I moved all information about of Sry to the end

Noun clusters

In English, using one noun to modify another is permitted.

Mouse cell **OK**

Mouse liver cell **OK**

Noun clusters

**However, meaning can be obscured when nouns begin to pile up, especially when jargon is involved.*

Normal mouse mammary gland development **X**

Cultured sheep pulmonary artery endothelial cells **X**

Robust spindle microtubule plus-end attachment **X**

For example

**Which interpretation of "robust spindle microtubule plus-end attachment" is correct?*

Robust plus-end attachments in spindle microtubules **??**

Plus-end attachments in spindles made of robust microtubules **??**

Plus-end attachments in microtubules from robust spindles **??**

Active and passive voice

**Active voice: The subject of the sentence performs the action expressed by the verb.

"**We conducted** the experiment…"

"**Researchers believe** that scaffolds have profound effects…"

"Other **studies have found** reduced levels of pro-inflammatory cytokines…"

"**Normal mammary gland development requires** Wnt co-receptor Lrp6…"

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Active and passive voice

Passive voice: The subject is acted upon.

"**The experiment was conducted**…"

"**Scaffolds are believed** to have profound effects…"

"**Reduced levels** of pro-inflammatory cytokines **have been found**…"

"**Wnt co-receptor Lrp6 is required** for normal mammary gland development…"

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When to use passive voice

**To take the emphasis off the actor and place it on the thing being acted upon:

"**The cells** were harvested" <u>versus</u> "**We** harvested the cells"

"Stationary-phase **promastigotes were washed** three times in phosphate-buffered saline..." <u>versus</u> "**Phosphate-buffered saline washed** the stationary-phase promastigotes..."

"**Lrp5** is required for ductal stem cell activity..." <u>versus</u> "**Stem cell activity** requires Lrp5..."

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When to use passive voice

When the subject doing the action isn't important to the meaning of the sentence:

"Between the extremes of network models and atomistic simulation a spectrum of models **has been developed** that..."

"**It is estimated** that 33.2 million people were infected with HIV-1 at the end of 2007..."

**If you wanted readers to know that the World Health Organization was making the estimate in the second example, you would use active voice instead.*

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When NOT to use passive voice

***When switching back and forth between discussing your results and those of others. For example, who did what below? (Sentence 5 is the most troublesome. Others did the work, but that's not at all clear.)*

(1) In the present study, we identified another specific feature of SOLD1. **(2)** Secreted SOLD1 protein was detected under the basement membrane, but only trophoblasts expressed the SOLD1 gene. **(3)** There is some evidence that trophoblast cells have bilateral secretion ability... **(4)** In contrast, the basolateral secretion of matrix metalloproteinase-2 and -9 (MMP2 and MMP9) has been confirmed in human syncytiotrophoblasts. **(5)** The secretion of leptin was confirmed at both the apical and basolateral surfaces of the human trophoblast cell line BeWo.

Bottom line: Use active voice unless there's a good reason not to

**Can you fix these instances of unnecessary passive voice?*

"In this paper, we describe two strategies, namely two-layer SVM and reasonable negative data design, which **are used** for the purpose of reducing the number of false positives and improve the applicability of our method for comprehensive prediction. In two-layer SVM, outputs produced by the first-layer SVM model **are utilized** as inputs to the second-layer SVM…By using these two strategies, the number of predicted candidates **was reduced** to around 100 in experiments in which the potential ligands for three druggable proteins (androgen receptor, muscarinic acetylcholine receptor M1 and histamine H1 receptor) **were predicted**…"

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Here are some options

Revised: In this paper, we describe two strategies, namely two-layer SVM and reasonable negative data design, which **aim to** reduce the number of false positives and improve the applicability of our method for comprehensive prediction. In two-layer SVM, the outputs produced by the first-layer SVM model **serve** as inputs to the second-layer SVM...Using these two strategies **reduced** the number of predicted candidates to around 100 in experiments **designed to predict** the potential ligands for three druggable proteins (androgen receptor, muscarinic acetylcholine receptor M1 and histamine H1 receptor)..."

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Final thought: Make revising a habit

**Issues such as word choice and sentence structure are best addressed when revising (as opposed to composing). So, make sure to revise.*

"A well-known scientist and journal editor was asked, 'Do you revise your work?' He answered: 'If I'm lucky, only about 10 times.'" (from *How to Write and Publish a Scientific Paper*)

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