

Scientific Writing in a Nutshell Part II



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ROAR



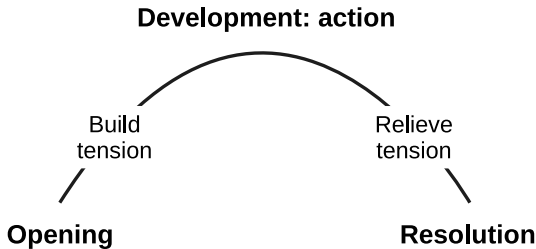
Inspiration

“clear thinking can emerge from clear writing” – Scott Montgomery



Internal Structure

- OCAR defines the overall structure
 - Opening - grabs attention with characters and setting
 - Challenge - creates uncertainty and curiosity
 - Action - provides info and develops story
 - Resolution - rewards the reader and relieves the tension
- This creates an overall story arc



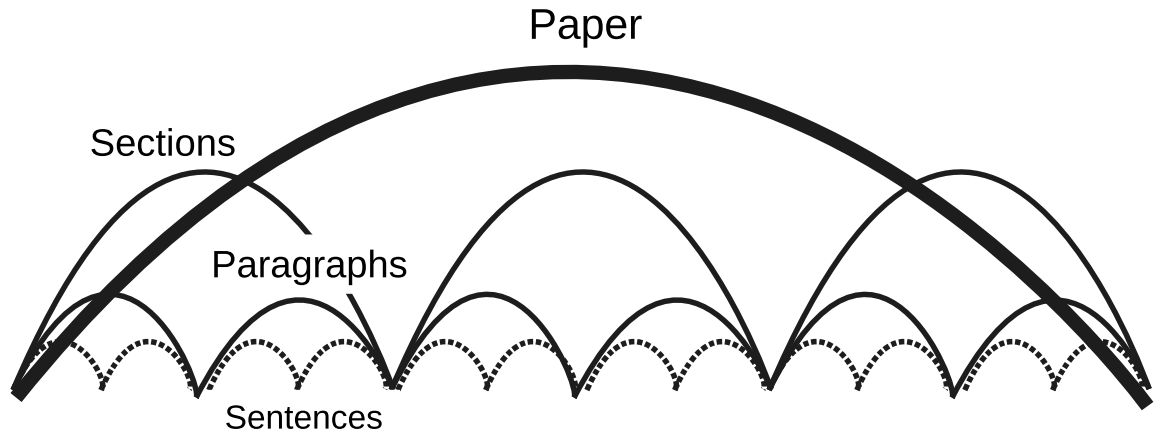


Internal Structure

- A story has a spiral structure
 - moving forward and returning to where it started at the end
- Successful writing creates that flow and that arc
- A paper's structure is:
 - sections, composed of
 - subsections, composed of ...
 - ... paragraphs, composed of
 - sentences



Internal Structure





Internal Structure

- Creating arcs compartmentalizes your thoughts and makes them manageable
- For each new point we build a structure and form a small story arc
- These arcs are then linked together

Complete, linked arcs



- This structure works on the premise that the beginning and endings are power positions
 - These positions help guide the reader
- Try to root out extraneous thoughts that break the serial nature



Effective Arcs

- The prior concepts told us how to build arcs
- We also can understand that these same principles apply at all levels of organization
- Evaluating Internal Structure
 - Does each unit make a single, clear point?
 - When several paragraphs together form a section, are the linkages among them clear?
 - Has every extraneous thought that breaks the serial arc structure been removed?
 - When you introduce a topic, do you resolve the discussion before introducing a new topic?
 - Is every major unit of the work defined by either a subhead or clear opening text
- A “No” to any question indicates you still need to work on the structure



Paragraphs

Paragraphs are the “unit of composition”

- Three forms:
 - TS-D - Topic Sentence-Development (point-first)
 - LD - Lead/Development (point-first)
 - LDR - Lead/Development (point-last)
- Bad Paragraphs
 - fail to tell stories
 - lack coherent structure
- Fixing Paragraphs
 - ① Determine the real story
 - ② Pick either a point-first or point-last structure
 - ③ Pull apart story threads to clarify relationships
- Shorter tends to be better than long



Sentences

- A sentence has components: Subject, Verb, Object
- These map to story units that carry out the OCAR functions:
 - O – Opening: who is the story about? = Subject
 - C/A – Challenge/Action: what happened = Verb
 - R – Resolution: what was its outcome? = Object



Topic and Stress

- **Topic:** critical opening position
- **Stress:** critical resolution position
- A sentence should focus on a single character, the topic.
 - Readers interpret the beginning of the sentence as the topic
- The last words of a sentence carry the greatest weight
 - put the stress of the sentence here
- If you change this ordering, you change the meaning.



Managing Sentences

- Connect the Subject and Verb
 - The verb should immediately follow the subject
 - Otherwise it is hard to follow
- Managing complex sentences, boils down to uncluttering the Topic, Action, Stress structure.
- **Unburying the Stress**
 - ① Fix the topic
 - should be short and clear
 - main verb should immediately follow
 - ② Fix the Stress
 - this is where the key message should be
 - ③ Finish
 - package everything else in the middle

Flow

2 Approaches for Creating Flow

- ① Write paragraphs where all sentences are on the same team
 - Coherent theme
 - Working together for a common goal
 - ② Write sentences so the team forms a relay
 - Each passes a baton at the transition
 - Allowing an idea to flow cleanly from start to finish
- Paragraph opening sets the theme
 - If all sentences have a topic that fits the theme they will hang together

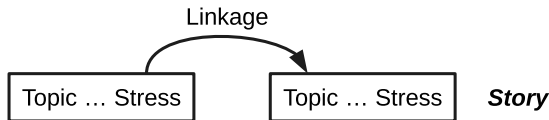
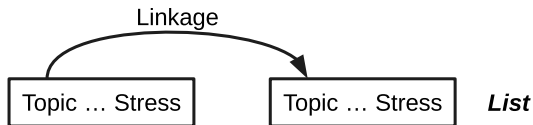
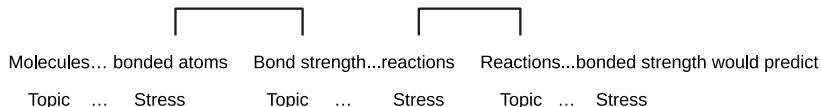
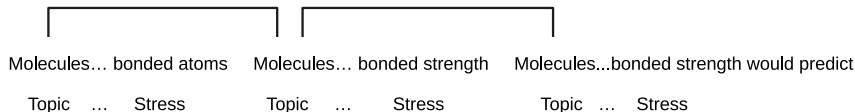
Flow

Challenge: Ensuring readers do not derail at the transition

- Help them follow you through your arguments and between story arcs
- Sentences need to link seamlessly to each other
- Each sentence must tell a coherent story, while functioning to advance the larger story
- You must tie together stress and top, weaving old and new information in an unbroken chain
- Paragraphs are linked similarly



Flow



- Avoid list structure if possible
- Short lists can be okay
- Long lists confuse readers



Energizing Writing

- Good stories are driven by action
 - “Show, don’t tell”
- Action is the job of verbs, use them well
 - Otherwise your writing is overburdened

Overburdening your Writing

- ❶ Passive Voice
- ❷ Fuzzy Verbs
- ❸ Nominalizations

Passive vs. Active Voice

Active Voice

John	called	Jane
Actor	Action	Acted-on
Subject	Verb	Object

Passive Voice

Jane	was called	by John
Acted-on	Action	Actor
Subject	Verb	Object

Example:

- Active: Soil porosity influences water retention.
- Passive: Water retention in soil is influenced by porosity.

Example:

- Active: A magnetospheric source produces variable electric fields.
- Passive: Variable electric fields are produced by a magnetospheric source.



Fuzzy Verbs

- **Fuzzy Verbs:** say that something happened but not what
 - Steal energy by telling and not showing
- **Action Verbs:** powerful, concrete storytelling tools.

Fuzzy Verbs (Weak)

Occur
Affect

Facilitate
Perform

Conduct

Implement

Action Verbs (Strong)

Modify
Accomplish
Create

Increase
Decrease
Invade

React
Inhibit
Disrupt

Accelerate
Migrate

Nominalizations

- You can kill the entire action by turning a verb into a noun.

Examples

Verb	Nominalization
Move	Movement
Differ	Difference
Suggest	Suggestion
Interact	Interaction
Analyze	Analysis
Develop	Development



Words

- Choosing words is not easy.
- English has amassed words from many sources
- Academics have a fondness for long, heavy words
 - but this is not necessary to be effective

Jargon vs. Technical Term

- **Jargon:** (A) a term that refers to a schema the reader does not hold. (B) A term for which there is an adequate plain language equivalent
- **Technical term:** (A) a term that refers to a schema the reader **does** hold. (B) A term for which either there is no plain language equivalent or where using it would be confusing.
- Remember to define terms before using them (and at the end of a sentence), and in the right place to ensure flow.



Condensing

- Condensing keeps your ideas from becoming
 - buried in words, cumbersome sentences, and extraneous info
- Prevents your readers from getting confused and frustrated
- There are two approaches
 - ① Tighten up your ideas and language (harder)
 - ② Formatting tricks (cheating)

Condensing Strategy

- Identify the following targets for the [Delete] key
 - Redundancies
 - Obvious
 - Modifiers: adjectives and adverbs
 - Metadiscourse
 - Verbosity

Condensing

Redundancies

- Sometimes we use several words where one is all that is needed:
 - Ex: “I will develop, test, and apply a new synthetic approach to produce photovoltaic plastics.”
 - Testing is part of developing
 - “synthetic” and “produce” both refer to making things
 - Revision: “I will develop a new approach to produce photovoltaic plastics.”

Obvious

- Remove ideas that are well known or implied and so don't need to be said
 - Ex: “There is evidence that X17-production can be associated with enzyme induction (Chu et al. 2008).”
 - If there wasn't evidence for this, you wouldn't have said it (and there wouldn't be a citation)
 - Revision: “X-17 production can be associated with enzyme induction (Chu et

Condensing

Modifiers: Adjectives and Adverbs

- These are not your friends
- Good words do not need modifiers
- Eliminate unnecessary modifiers to make your writing stronger and tighter

Good Modifiers

- These don't just reinforce but clarify or define their referent
- Some, rather than amplifying, alter the meaning. These are powerful.



Condensing

Metadiscourse

- Discussing the discussion:
 - We found that...
 - We argue that...
 - Our initial hypothesis was that...
 - These data may indicate...
 - To conclude...
- Avoid unnecessary metadiscourse

Verbosity

- the sum of multiple types of filler
- sentences that ramble on endlessly
- Indication of an author that is
 - insecure
 - afraid to make a definitive statement
 - can't separate their mental processes from the story



Editing

- Structure: get the structure of the story into shape
- Clarity: ensure that your ideas are clear and concrete
- Flow: make the ideas flow, linking one thought to the next
- Language: make it sound good

- These overlap, and require many iterations

- Final Technique: **Read it out loud**



Are there any questions?