

# Effective Written Communication: Storyboarding a Technical Report



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The goal of oral presentations and written reports is to explain a technical finding . . .

**BUT . . .** they're not the same. . .

### Written Reports



### Oral Presentations

- ❑ Random reading (re-reference text)
- ❑ Reader controls pace
- ❑ Message is archival
- ❑ Reader must actively read
- ❑ Feedback not possible

- ❑ Linear (cannot “go back”)
- ❑ Speaker controls pace
- ❑ Message presented in the moment
- ❑ Audience can be passive
- ❑ Feedback possible (questions)



# The form of scientific communication follows its function

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- Forms of technical reports: conceptual, **empirical**, observational, methodological, review

convey the **values** of science

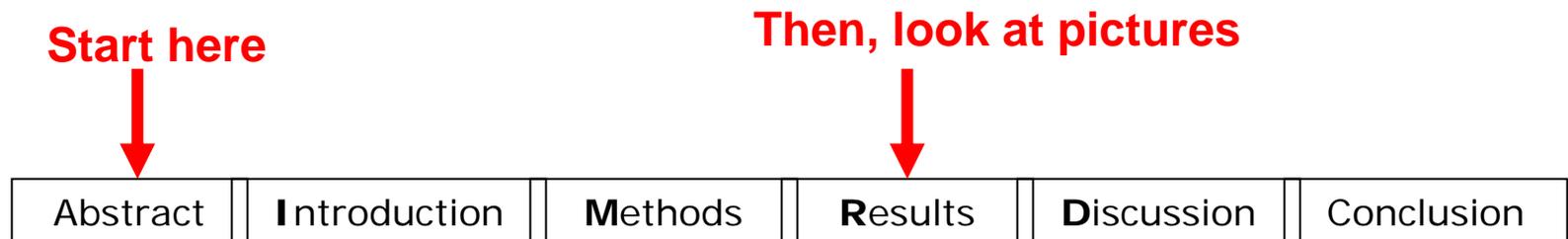
- Contextualizes research in the field
- Provides a repeatable methodology
- Forces writer to speak from the data
- Forces writer to separate results from opinions



# The form also conveys function needed by readership

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- Scientific readers maximize potential of the form when they read.
- Makes it is easy to locate data & compare experiments (methods, etc.)
- Easy to write? No
- Easy to read? Yes. Optimized for reading
- Document design and use of figures conveys ethos of scientist.



**Known as the IMRaD Format**

# The grammar of scientific communication also follows its function

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Because science readers do not read chronologically and skim, the grammar of science is:

- Prose that is not laden with jargon or vague expressions
- Simple sentence structure S – V – O
- Provides links between text and visuals  
e.g., “As shown in Figure 2 . . .”
- Provides time reference (e.g., Methods – past tense)
- Distances subjectivity of the researcher (e.g., passive voice)
- Unambiguous prose It = ??, This = ??

See “The Science of Scientific Writing” By Gopen and Swan

# Many writers start off using the outlining approach to writing

Title Page

Abstract

Table of Contents

Background

Acknowledgments

References

Appendices

Results (maybe)

Procedure

Discussion\*

Conclusion

\* Sometimes these sections are combined

End here

**Inefficient!**

# Try the storyboarding approach instead

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A “movie-making” approach to writing

Each section of report is a “scene”



# Try the storyboarding approach instead

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A “movie-making” approach to writing

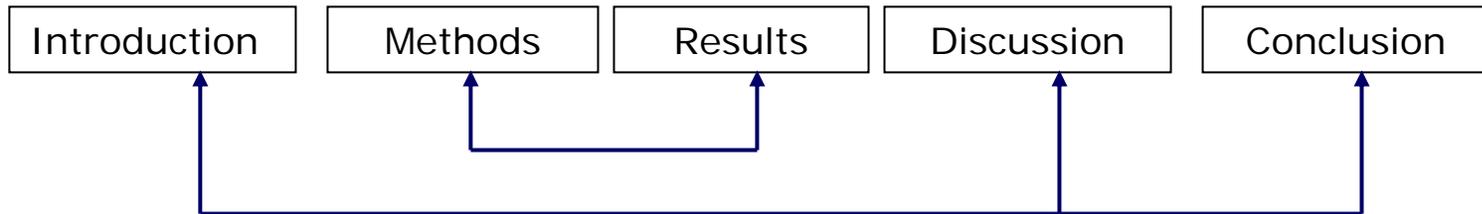


Movie  
design  
starts  
here

# Try the storyboarding approach instead

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A “movie-making” approach to writing



Lab report is built around **Results** data

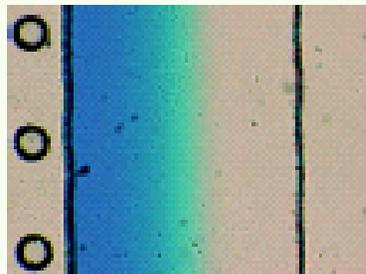
**How do you make a movie of your data?**

# Step 1: Organize your data

## Start with figures:

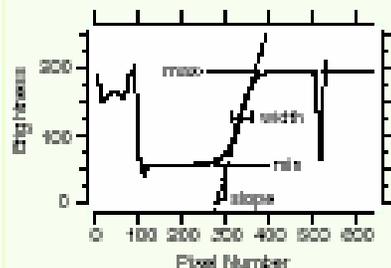
- Assemble hard copies of your figures in a “storyboard”
- Figure out the major technical theme of the report
- Assess how each figure contributes to the major theme
- REVISE figures to focus on the major theme (develop figures that summarize that major theme)

Sample Image



- circles are distance markers (separated by 250  $\mu\text{m}$ )
- blue dye in left channel, red dye in right channel
- blurring of dye in center results from diffusion

Characterizing Concentrations



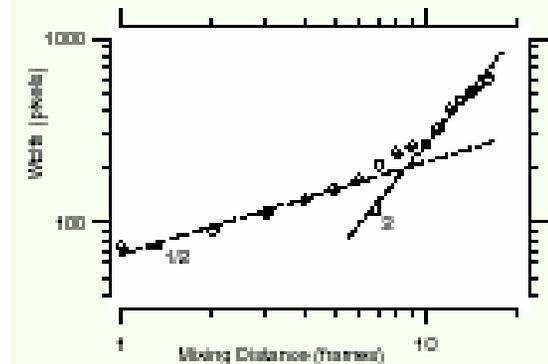
- brightness measured through center row of sample image
- brightness largest where no dye absorbs light
- characterize transition width by measuring minimum, maximum, and slope

Characterizing Changes With Mixing Distance

frame	min	max	slope	width
1	115.0	241.3	0.284	73.42
2	120.8	228.9	0.547	91.86
3	126.0	217.5	0.449	111.75
4	130.5	209.3	0.379	132.44
5	134.1	202.9	0.333	150.85
6	138.0	197.5	0.294	170.43
7	139.9	189.5	0.245	204.09
8	142.0	184.8	0.210	238.00
9	144.2	184.6	0.193	259.32
10	145.8	180.7	0.188	284.26
11	147.9	179.0	0.156	320.40
12	149.5	179.7	0.123	411.85
13	150.2	175.8	0.108	482.03
14	151.3	173.3	0.099	504.47
15	152.5	172.0	0.090	554.74
16	153.3	171.2	0.082	609.09

- tabulate blurring statistics as a function of mixing distance
- frames separated by 1 mm

Width Versus Mixing Distance



- log-log plot of mixing width versus mixing distance
- width increases with square root of distance for small distances  $\rightarrow$  consistent with theory from class
- width increases with square of distance for large distances  $\rightarrow$  inconsistent with theory from class  $\rightarrow$  perhaps due to “edge effects” from stickers

## Step 2: Plan the report

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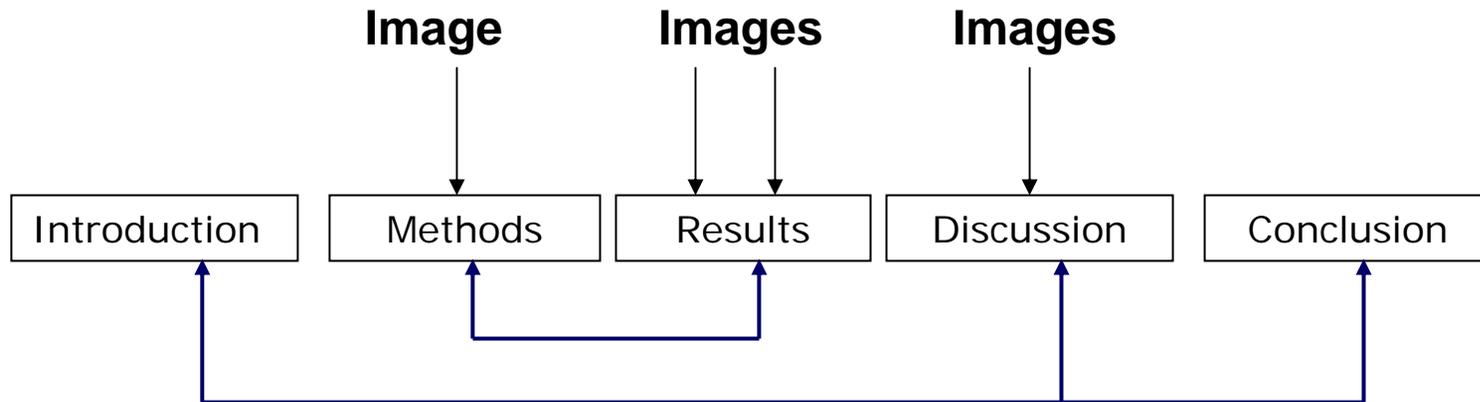
After you've got your data, consider if it's appropriate "screenplay" for your audience and venue:

- Who is the audience?
  - technical expertise
  - level of interest
  - personal familiarity
- How much space do you have?
  - 2-3 pages? 10 pages?
  - Can Results be combined with Discussion?
  - Do I need a Theory section?
  - How much background information to motivate study?

# Step 3: Write in non-linear sequence

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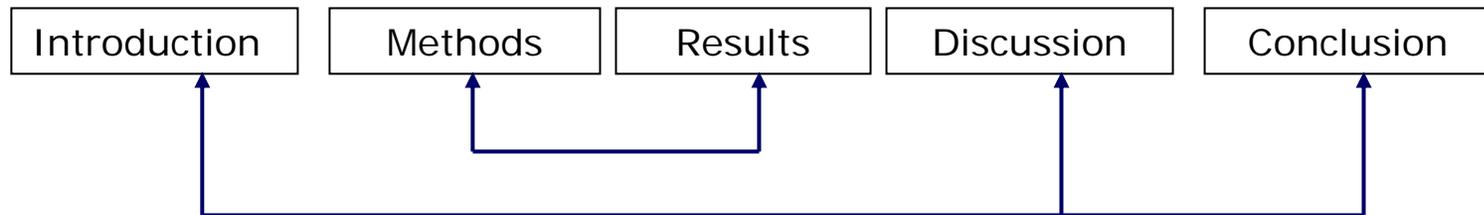
- ❑ What was the purpose of the project? What were the Results?
- ❑ Readers read Results first, so start there.
- ❑ “plug and play” other sections.
- ❑ Make sure you have accurate lab notebook



**Use storyboard as the “backbone” of your report/presentation**

# Step 4: Continue building the report

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Add Discussion, Introduction, & Conclusion around the Methods and Results

Check for coherence between and across sections

# Step 5: Add End/Front Matter

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Title  
Abstract  
Table of Contents

Acknowledgements  
References  
Appendices



# Step 6: All the Good Stuff: Edit, Peer Review, Bake, Edit, & Proofread

## and . . . Submit!

**Check the  
figures!**

1. Edit for **completeness**  
Is all relevant information included?  
Where might readers have questions?
2. Edit for **organization and document design**  
Is each section divided logically using subheadings?  
Does the information link clearly across sections?  
Do the figures support the text?
3. Edit for **prose style**  
Are there irrelevant sentences, sections, plots?  
Can you read the report aloud without verbally stumbling?