

On Writing, part 1

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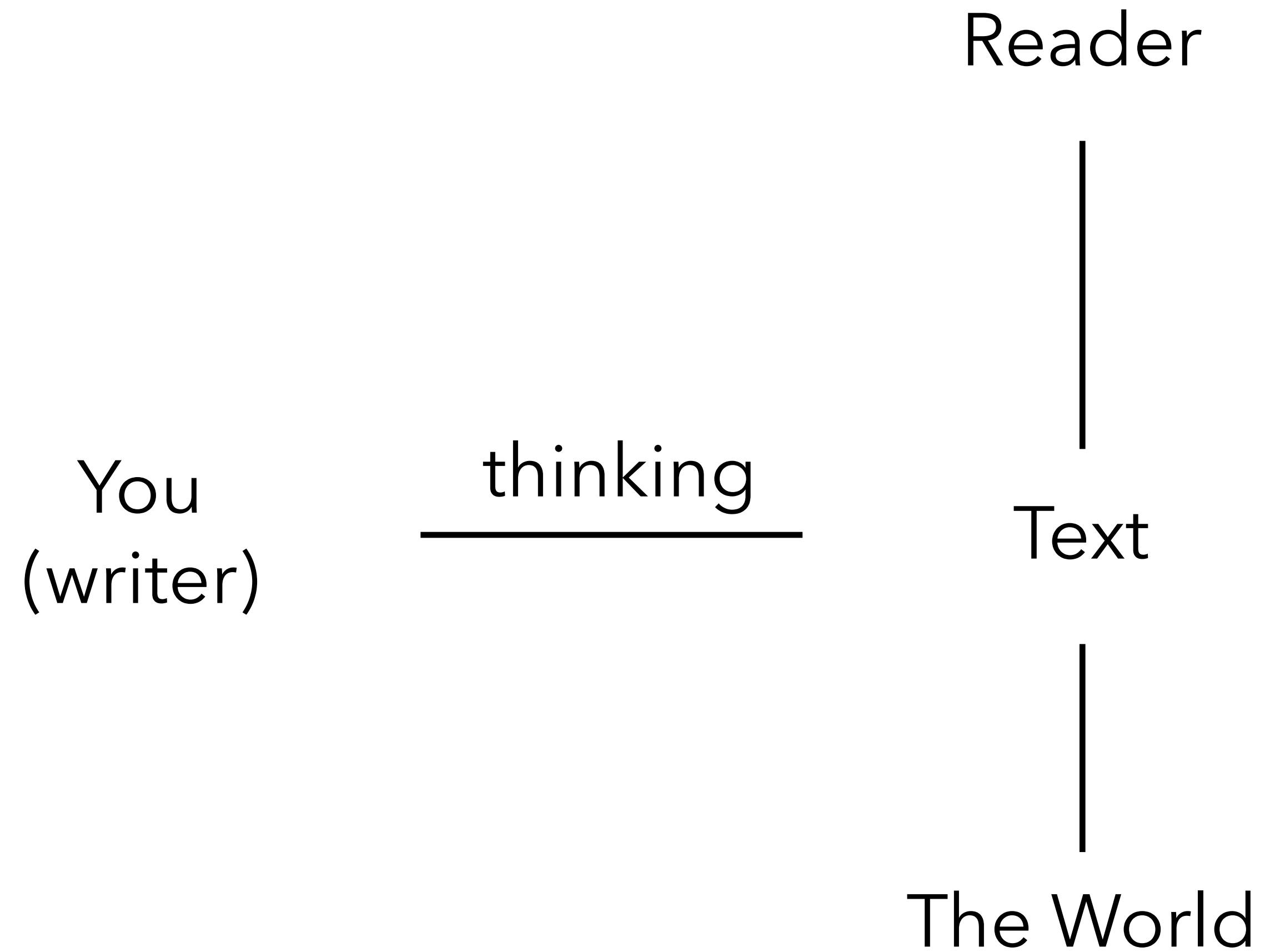
Johns Hopkins University

The process

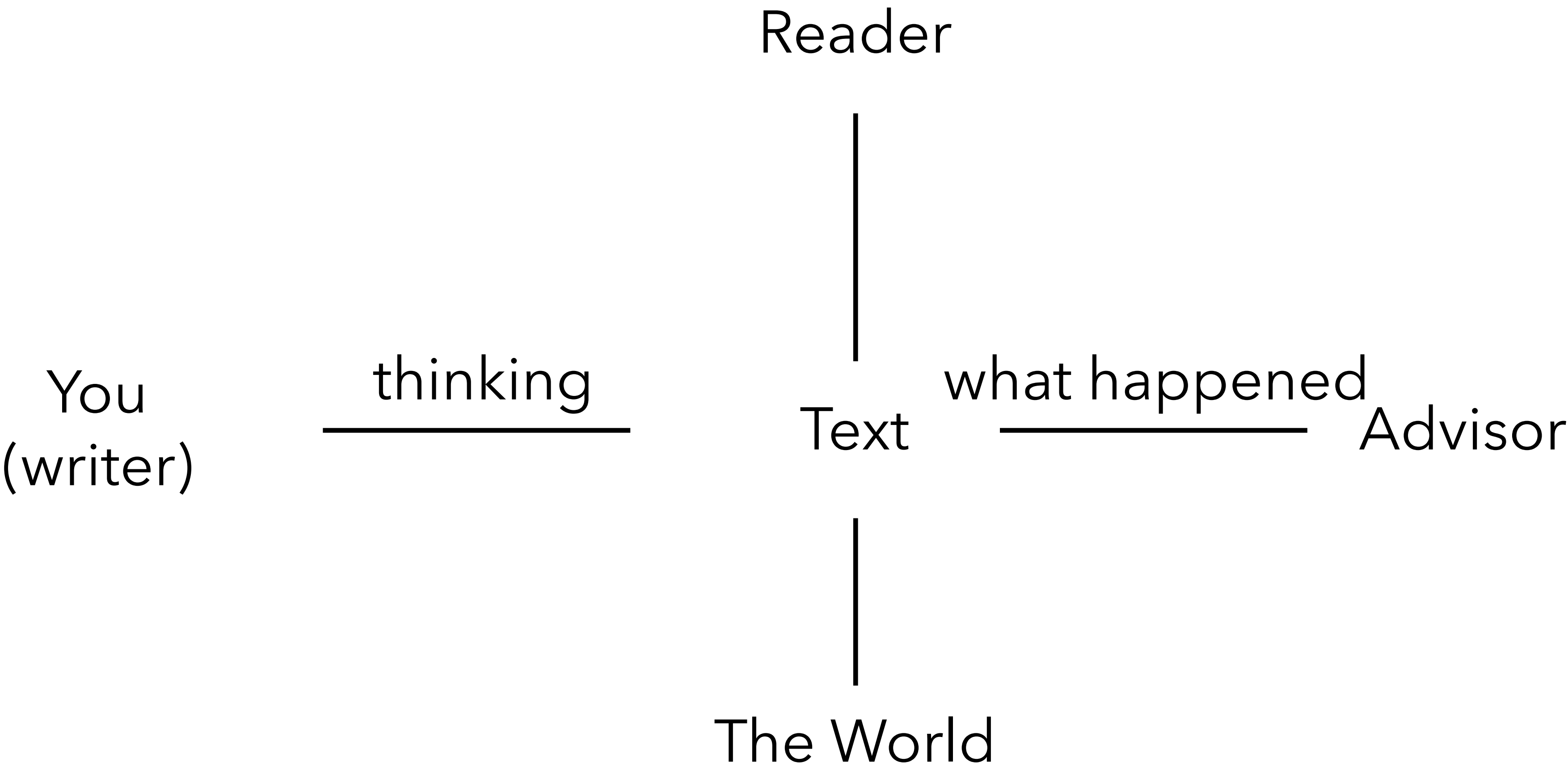


Transition from research, to organized research, to manuscript

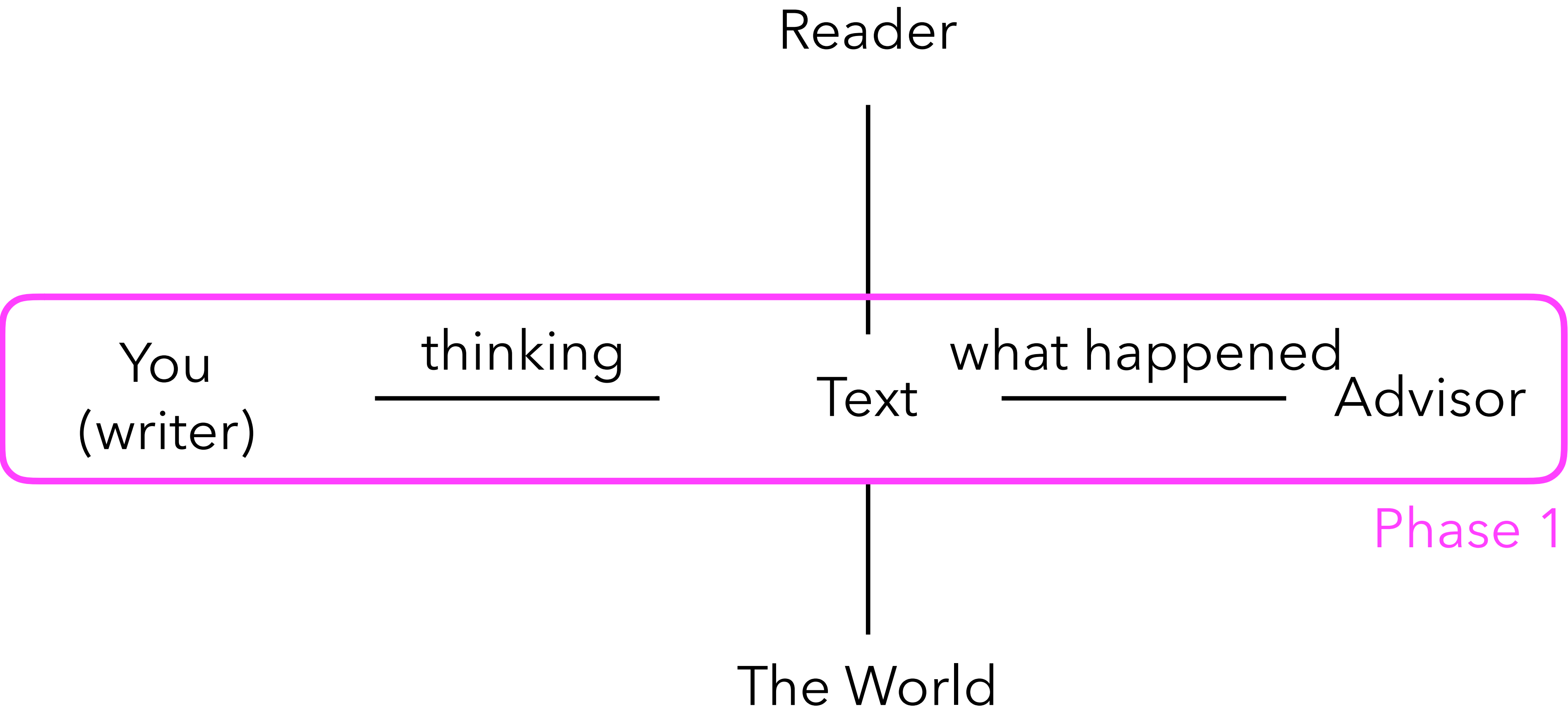
Goal: to create value for the reader / change their view of the world



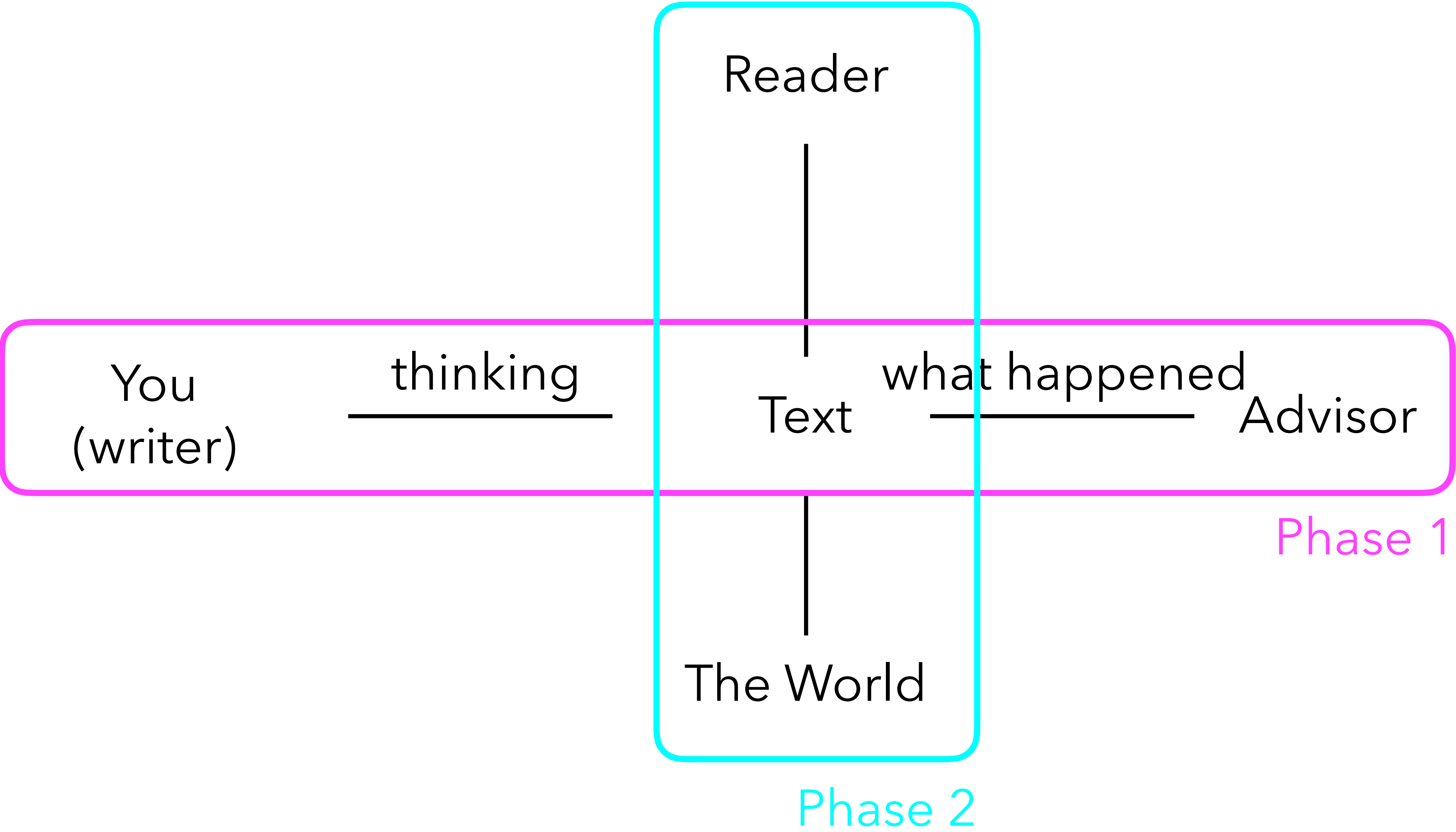
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Two writing models

Research

Paper



When to write

Model 1: "Think, then write"

Example: 1st author makes solid draft figures.

Then writes results "around" the figures

Model 2: "Write, then think"

Example: Start draft early. Draft figures. Move around

Add new analysis sections. Rinse and repeat.

Two writing models

Research

Paper



When to write

Model 1: "Think, then write"

Example: 1st author makes solid draft figures.

Then writes results "around" the figures

+ "solid" slide deck

Model 2: "Write, then think"

Example: Start draft early. Draft figures. Move around

Add new analysis sections. Rinse and repeat.

Why start early

1. To think / organize

It is much easier to notice holes when things are written down

2. To finalize approach w/advisor

3. To actually write your text

Why write well

Well-written papers have greater impact.

What does it mean to be well-written?

- provide value to the reader
- make this value easy to get (easy to read)

This is IMO not about writing great prose, but about effective communication.

All effective communication requires you to think about the reader

- the "methods" / stats person
- the "user" / biologist

Types of papers

Methods papers

Biology papers

Software / workflow papers

Benchmark papers

1. Title
2. Abstract. Has to contain all main findings.
3. Figures / Results
4. Introduction / Discussion / Methods

Of course, not all readers are created equal.

Most readers only reads part of the paper.
So it is ok to "repeat yourself" (within reason)

How to construct a *Nature* summary paragraph

Annotated example taken from *Nature* 435, 114–118 (5 May 2005).

| | |
|---|--|
| One or two sentences providing a basic introduction to the field, comprehensible to a scientist in any discipline. | During cell division, mitotic spindles are assembled by microtubule-based motor proteins ^{1,2} . The bipolar organization of spindles is essential for proper segregation of chromosomes, and requires plus-end-directed homotetrameric motor proteins of the widely conserved kinesin-5 (BimC) family ³ . Hypotheses for bipolar spindle formation include the 'push-pull mitotic muscle' model, in which kinesin-5 and opposing motor proteins act between overlapping microtubules ^{2,4,5} . |
| Two to three sentences of more detailed background, comprehensible to scientists in related disciplines. | However, the precise roles of kinesin-5 during this process are unknown. Here we show that the vertebrate kinesin-5 Eg5 drives the sliding of microtubules depending on their relative orientation. We found in controlled <i>in vitro</i> assays that Eg5 has the remarkable capability of simultaneously moving at $\sim 20 \text{ nm s}^{-1}$ towards the plus-ends of each of the two microtubules it crosslinks. For anti-parallel microtubules, this results in relative sliding at $\sim 40 \text{ nm s}^{-1}$, comparable to spindle pole separation rates <i>in vivo</i> ⁶ . Furthermore, we found that Eg5 can tether microtubule plus-ends, suggesting an additional microtubule-binding mode for Eg5. Our results demonstrate how members of the kinesin-5 family are likely to function in mitosis, pushing apart interpolar microtubules as well as recruiting microtubules into bundles that are subsequently polarized by relative sliding. We anticipate our assay to be a starting point for more sophisticated <i>in vitro</i> models of mitotic spindles. For example, the individual and combined action of multiple mitotic motors could be tested, including minus-end-directed motors opposing Eg5 motility. Furthermore, Eg5 inhibition is a major target of anti-cancer drug development, and a well-defined and quantitative assay for motor function will be relevant for such developments. |
| One sentence clearly stating the general problem being addressed by this particular study. | |
| One sentence summarizing the main result (with the words "here we show" or their equivalent). | |
| Two or three sentences explaining what the main result reveals in direct comparison to what was thought to be the case previously, or how the main result adds to previous knowledge. | |
| One or two sentences to put the results into a more general context. | |
| Two or three sentences to provide a broader perspective, readily comprehensible to a scientist in any discipline, may be included in the first paragraph if the editor considers that the accessibility of the paper is significantly enhanced by their inclusion. Under these circumstances, the length of the paragraph can be up to 300 words. (This example is 190 words without the final section, and 250 words with it). | |

The craft of effective writing (video): <https://youtu.be/vtlzMaLkCaM>