



## Diagnosing students' writing problems

### 1. Readers construct a network of ideas from a sequence of words

#### a) Within a sentence, familiar information should usually introduce new information.

The material at the beginning of a sentence should include a familiar element that either connects easily to the reader's knowledge or to previous parts of the text (that have now become part of the reader's knowledge). For instance, here's an opening sentence:

Groundwater arsenic (As) contamination is a global problem affecting the health of millions of people through arsenicosis and increased risk for cancers and cardiovascular disease.

Which of these two following sentences is more likely to help the reader construct their network?

In South and Southeast Asia, geogenic arsenic contaminates large portions of the aquifers of the Brahmaputra/ Ganges, Mekong, Irrawaddy, and Red River Deltas.

or

In South and Southeast Asia, large portions of the aquifers of the Brahmaputra/Ganges, Mekong, Irrawaddy, and Red River Deltas are contaminated by geogenic arsenic.

#### b) Writers can establish and then meet expectations.

The most widely used instrument for doing this is the topic sentence. Examine the relation of the underlined elements in this example.

Drilling and well installation occurred in November 2011.

Nests of three wells <1 m apart were installed at 13 locations within the ~10 km<sup>2</sup> field area comprising 39 total monitoring wells. Each location included wells with a 1 m screen centered at 10, 25, and 50 m. Wells were drilled using either a Geoprobe 6620DT direct push drill rig or a rotary drill method. Sediment texture was logged for each well during drilling, and general lithology of the area is fine-grained silts and clays covering the top ~18 m and fine to coarse sand below this depth. Polyvinyl chloride (PVC) pipe with a 1 m sliced screen was inserted into the drill hole. The annulus was backfilled with clean coarse sand to cover the well screen and then topped with 1 m of bentonite to seal the well screen from surface water.

**c) Writers can use metatext to advertise the relation between elements in the sequence.**

This can be a simple at or near the beginning of a sentence:

However, Consequently, Conversely, Furthermore.

It can also signal an explicit and complex set of elements to come:

In the remainder of this section, we analyse five specific aspects of the studies: uncertainty categories, visualization techniques, application domains, participants, and tasks, organized in subsections.

## **2. Readers do this with limited cognitive resources**

**a) Keep sentences short, provide the verb early, and avoid beginning with *there is* or *it is*.**

What could be done to improve this sentence?

With crowdsourcing, selecting multiple options to obtain more information about the partial knowledge of these non-expert workers could be allowed.

**b) Put lists last in a sentence, and use parallel forms for information of parallel status.**

What could be done to improve this sentence?

Advancing our understanding of the underlying mechanisms, the development of more effective and reliable testing methods, and to contribute to therapeutic approaches to this increasingly common condition were among the aims of the project.

**c) Avoid redundancies.**

What could be done to improve this sentence?

In order to reduce the error rate, the already existing arrangement was adjusted, owing to the fact that improvements due to similar changes have been reported in the literature.

### 3. Exercise

Examine this opening paragraph. It was not published like this; it has been intentionally 'suboptimized' to provide more examples of some of the writing problems mentioned above. Identify the problems and suggest changes, then check the next page, where the paragraph appears exactly as it was published.

Also known as fused deposition modeling or molten polymer deposition, fused filament fabrication (FFF) is the additive manufacturing technology used in the majority of commercially available desktop 3D printers designed for the consumer market, which are rapidly gaining in popularity. A solid thermoplastic filament is forced through a heated extrusion nozzle, melted, and deposited in thin layers onto a moving bed in the FFF process, and a three-dimensional solid shape is formed layer-by-layer as the filament material cools and hardens. Acrylonitrile butadiene styrene (ABS), poly(lactic acid) (PLA), poly(vinyl alcohol) (PVA), polycarbonate (PC), high-density polyethylene (HDPE), high-impact polystyrene (HIPS), and nylon are among the wide variety of filament materials now being used in desktop FFF 3D printers, along with many other polymers, metals, ceramics, and other materials. Filaments are melted at a variety of extruder nozzle temperatures and different temperatures of bed, manufacturers typically recommend ranges of optimal temperatures for each filament material and thickness, and ABS and PLA are currently the most commonly used filaments, although others are also gaining popularity, in desktop 3D printers.

Desktop three-dimensional (3D) printers are rapidly increasing in popularity. The majority of commercially available desktop 3D printers designed for the consumer market utilize an additive manufacturing technology called fused filament fabrication (FFF), also known as fused deposition modeling or molten polymer deposition. In the FFF process, a solid thermoplastic filament is forced through a heated extrusion nozzle, melted, and deposited in thin layers onto a moving bed. A three-dimensional solid shape is formed layer-by-layer as the filament material cools and hardens. A wide variety of filament materials are now being used in desktop FFF 3D printers, including acrylonitrile butadiene styrene (ABS), poly(lactic acid) (PLA), poly(vinyl alcohol) (PVA), polycarbonate (PC), high-density polyethylene (HDPE), high-impact polystyrene (HIPS), nylon, and many other polymers, metals, ceramics, and other materials. Filaments are melted at a variety of extruder nozzle temperatures and bed temperatures, and manufacturers typically recommend ranges of optimal temperatures for each filament material and thickness. ABS and PLA are currently the most commonly used filaments in desktop 3D printers, although others are also gaining popularity.

from

Azimi, Parham, Dan Zhao, Claire Pouzet, Neil E. Crain, and Brent Stephens (2016) Emissions of Ultrafine Particles and Volatile Organic Compounds from Commercially Available Desktop Three-Dimensional Printers with Multiple Filaments *Environmental Science and Technology*, 50, 1260–1268 DOI: 10.1021/acs.est.5b04983.

Other sources from which examples have been adapted:

Kinkeldey, Christoph, Alan M. MacEachren & Jochen Schiewe (2014) How to Assess Visual Communication of Uncertainty? A Systematic Review of Geospatial Uncertainty Visualisation User Studies, *The Cartographic Journal*, 51:4, 372-386, DOI: 10.1179/1743277414Y.0000000099.

Schaefer, Michael V. Samantha C. Ying, Shawn G. Benner, Yanhua Duan, Yanxin Wang, and Scott Fendorf (2016) Aquifer Arsenic Cycling Induced by Seasonal Hydrologic Changes within the Yangtze River Basin *Environmental Science and Technology*, DOI: 10.1021/acs.est.5b04986.

Shah, Nihar B., Dengyong Zhou, and Yuval Peres (2015) Approval Voting and Incentives in Crowdsourcing Proceedings of the 32nd International Conference on Machine Learning, Lille, France, 2015. JMLR: *W&CP* volume 37.