Storytelling as a Tool of Technical Explanation  
- Improvisation Risks and Benefits

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ABSTRACT

Kim Echlin, the IPCC 98 Keynote Speaker, presented at that conference some of her research on infrasonic communication between elephants. Echlin had published her main findings in the form of a novel, *Elephant Winter* (1997). Echlin had been invited to address the 1998 IPCC conference because of the "juxtaposition of both literary and extraordinarily effective technical writing evident in her book." (Malkinson, 1998)

Echlin reported in her address that, until the conference committee contacted her and invited her to address the IPCC, she had not known that she had created "technical writing," and still did not know how she’d done it. Echlin’s book exemplifies both benefits and risks of creative improvisation. The risk consists in not knowing how a new aesthetic or technical effect is created or how to reproduce it.

I will analyze Echlin's novel together with other novels constructed to help explain technical topics: Persig's *Zen and the Art of Motorcycle Maintenance* (1974), and Manning’s *Supposition Error* (1996). The analysis indicates principles governing the successful incorporation of storytelling in technical explanation. These principles relate to concepts of Minimalist documentation (Carroll, 1998), as well as rules of textual clarity developed by Riley and Parker (1998).

Most people will read or listen to stories willingly. Most people will not read or listen to raw technical instructions unless they are forced. We might prefer to communicate all technical information in the form of stories, to entertain as well as instruct. There are, however, obstacles preventing good technical writers from being good storytellers. Here I will discuss two such obstacles, among many. I will show how these obstacles have been overcome, at least in part, by talented storyteller/teachers, Robert Persig and Kim Echlin.
1. The disappearance problem. Science fiction author Robert Heinlein told of the time (in 1947 before computers and actual spaceflight examples), when he had to figure out how long it would take for a spacecraft launched from Earth to match orbit with a geosynchronous satellite:

Elapsed time is an unsmooth integral not to be found in Hudson’s Manual but it can be solved by the methods used on Siacci empiricals for atmospheric ballistics: numerical integration.

I’m married to a woman who knows more math, history, and languages than I do...we obtained yards of butcher paper, then each of us worked three days, independently, solved the problem and checked each other--then the answer [four hours] disappeared into one line of one paragraph [of the novel SPACE CADET].

(1980: 519-520)

The disappearance problem arises from the fact that we visualize technical information and the events of a story in radically different ways. In sum, technical information consists of generalized diagrams and formulaic relations, while stories emerge in particularized images and character actions. In his novel, Heinlein paints a particular scene wherein his space-cadet characters, particular young men climb aboard a particular spacecraft. A voice comes on the loudspeaker and tells them the flight will take four hours. Given the particulars of the story scene, there is simply no plausible space for the general information about orbital mechanics and the calculation showing the flight should take four hours, as opposed to four minutes or four days.

This is the disappearance problem: a storyteller often needs technical information to accurately craft the details of a story, but the generalized technical information itself does not appear (rather it dis-appears) in the particularized details of the story. To use a parallel example, a realistic image of a radio, a photograph or
painting will reveal very little about how the radio works. In contrast, a schematic diagram of radio circuitry applies to radios in general, but the schematic is nothing like the actual experience of looking at a particular radio, even with the case open and the actual circuits exposed. The primary purpose of a story is to generate images in readers minds. Realistic images tend to make schematic, or in other words, technical information disappear.

Story writers sometimes try to sneak technical information back into a story by having one character lecture other characters on a technical point. This would be like including a schematic of radio circuitry in a photographic image, side-by-side with a particular radio. This technique creates problems of plausibility. A real life, a 20th-century policeman never stops to explain to anybody how his pistol works. The corollary rule often repeated among science fiction authors is that a 23rd-century peace officer should not be explaining how his raygun works.

2. The constancy problem. Still determined to include technical information in a story, a writer may try to be clever and invent a plausible scenario where one character really would stop and explain a technical point. My novel *Supposition Error* was a deliberate experiment, to see how far I could overcome the disappearance problem by bending the “raygun rule” (1996: 108-109). In the novel, a twentieth-century literature professor (the narrator) and his graduate student Dana are kidnapped by aliens and find themselves dumped in a parallel universe where a *StarTrek*-like television program has become reality. In the story, these characters can only survive if they help each other learn how things like rayguns and tricorders [“scanputers” in the novel] really work:

Dana set the scanputer on her lap and began fiddling with it. "I never have taken time to figure these out. They're a little more complicated than the studio props, aren't they?"
"Just don't accidentally erase my map recording!" I cautioned. "Turn that center switch to OBJECTSCAN…That's right. Now you can't hurt anything. The three main functions are selected by that center switch there; subfunctions you select off the screen like in the library…"
"Oh I see…IMAGESCAN, OBJECTSCAN… what about INTERPSCAN?"
"That's the most complicated function; I haven't learned how it works yet," I admitted. "But the on-line manual says it's for interpreting symbolic information systems, say, an alien computer's memory banks;
it'll also translate spoken languages, but not very well unless it's patched into a supercomputer like Voice."

"Hmmm…Felix would have loved it, another [purse-ian] triangle," she muttered to herself as she played with the scanputer.

"How's that again?" I asked. "Preston had a purse in… what triangle? Bermuda?"

"No, no," Dana corrected me. "One of Preston's favorite sources, a nineteenth-century scientist named C.S. Peirce, spelled P-E-I-R-C-E, but sounds like 'purse'; he analyzed the whole universe in metaphysical patterns of three."

"As in Father, Son, and Holy Ghost? Never heard of him," I said dismissively.

"No, silly, as in Shifting Image, Reacting Object, and Evolving Interpretation. Most people never heard of him back in our time. He had a wide reputation while he lived, but never got the grant he needed to write up his philosophical work in one coherent whole…"

(1996: 137-138)

*Supposition Error* was not a wildly successful novel, but as an experiment, its results are instructive. It reveals a second obstacle to communicating technical information with stories. With enough imagination, Heinlein’s disappearance problem can be dealt with. Technical information can be plausibly worked into the imagery of the story, plausible circumstances when a diagram of radio circuitry might be found on the table next to an actual radio.

The second problem, the constancy problem, is more challenging however. *Supposition Error* is crafted to be a page turner: the main characters are in more or less constant danger and readers want to rush along with them to the bitter end (or happy ending). The problem is, the story is also plotted in such a way that readers can’t really understand the story unless they stop short every few pages and absorb technical ideas like the Peircean categories mentioned above. One reader said the experience was like rolling down a very steep hill, covered with cactus. Another said reading the book was like solving a crossword puzzle, at gunpoint. It turns out that some people like this bumpy kind of reading experience, but this wasn’t quite the effect I was trying to achieve. This is another risk of improvisation: unexpected and sometimes unwanted results.

Like the disappearance problem, the constancy problem arises from the fact that the truth of an image is decided differently than the truth of a diagram. An image of a dragonfly can represent one particular bug by resemblance, but the diagram sketch of a dragonfly can represent all dragonflies together, not by resemblance but by general relationships (see Manning, 1998a).
Stories generate images, but if technical information is mixed into the story it also compels readers to visualize diagrams too, leading to a conflict in truth assessment. Riley and Parker (1998) argue that a text with truth-value conflicts violates the gestalt principle of perceptual constancy, as illustrated by “impossible” figures like the Penrose fork (182).

3a. The separation strategy. One apparent solution to the constancy problem would be to separate the technical aspects of a story from the main narrative.

Readers can then switch back and forth in truth modes. In the main chapters of *Elephant Winter*, Echlin tells her acclaimed story of how a young woman cares for her dying mother and falls in love with the elephant keeper and then with the elephants at a seedy tourist farm next to her mother’s house. These chapters alternate with five sections from an ELEPHANT-ENGLISH DICTIONARY. The dictionary material is laid out as a technical presentation. Readers come away with the impression that they have been instructed in the form and meaning of several different infrasonic elephant calls in a fairly effortless way.

Struck by Echlin’s approach, I went back and reread Robert Persig’s now-classic *Zen and the Art of Motorcycle Maintenance*, and saw that he also used a separation strategy. Like Echlin, Persig alternates a story with instructional material. His story about a
cross-country motorcycle trip with his son alternates with meditations on the historical and philosophical split between rational analysis and romantic experience. Unlike Echlin, Persig does not use formal chapter boundaries to accomplish the separation. Instead his narrative voice announces the lectures as “natural” interruptions in the story of the motorcycle tour:

Unless you’re fond of hollering you don’t make great conversations on a running cycle. Instead you spend your time being aware of things and meditating on them.....

What I would like to do is use them time that is coming now to talk about some things that have come to mind.....

What is in mind is a sort of Chautauqua--that’s the only name I can think of for it--like the traveling ten-show Chautauquas that used to move across America, this America, the one we are now in, an old-time series of popular talks intended to edify and entertain, improve the mind and bring culture and enlightenment to the ears and thoughts of the hearer. (1974: 7)

The separation strategy is important, but it turns out to be insufficient by itself. If technical information is cleanly separated from the main story, readers still naturally tend to skip it or ignore it. [NOTE: I owe special thanks to Nicole Ervin from the University of Alabama, for her feedback on my own experiments with this kind of writing.] On a third, close reading of Echlin and Persig, I discovered another feature, present in both novels that, with the separation strategy, finally solves the constancy problem.

3b. The particularization solution. It turns out that very little generalized technical information is overtly presented in either Echlin’s or Persig’s novels, which is how they avoid the constancy problem. They give technical headings (following the separating strategy) but under those headings they mainly give flashback anecdotes, i.e. more story! These anecdotes are particularized examples of general technical points, as shown in this entry from Echlin’s elephant dictionary:

onr: (35+ Hz.) Comfort.

This utterance is different from *onrrarr [mourning] because it is uttered [in the human range of hearing]. It was one of the first empathics I discovered. Kezia chanted it to me when I was feeling defeated by my mother’s illness. It may be an utterance she created for me... (1997: 93)

Persig’s Chautauqua lectures are likewise mainly anecdotes from the half-forgotten life of a character named Phaedrus, full of dark
secrets and narrative conflict. In both books these “technical” entries are separate from the main story, but they are still image-generating narrative about particular characters and particular events. For the most part, readers discover for themselves the generalized diagrams of technical information as they draw general connections between the particular narratives.

Small seeds of generalization are given as technical headings in the text, but readers primarily grow their own connections in the space between the particularized anecdotes and the main story. What is particularly striking in this is that the reader comes away with the impression that the technical information they discover was given to them by the author. In a sense it was, but only in the sense that a farmer puts corn in a field.

4. Conclusion. There is a school of technical-communication theory, called Minimalism, which explains these results. Minimalism argues that technical communicators should not bulk up their software manuals with general specifications about each function in a program. They should instead focus on describing particular tasks that a user might perform using a program. Thus a typical entry in a manual would not be “The Group Function” but instead, “How you can alter several objects simultaneously” (Manning 1998b: 201). Users are left to discover for themselves most of the general properties of a program.

In focusing on particular tasks that a user might perform, the minimalist manual writer is moving in the same direction as Echlin and Persig. They all focus on particularized imagery, characters or software users doing particular things. In doing this, none of these writers has really abandoned their readers to wander in empty spaces between particularized events. Rather, the effective writer
with careful and literate examples leads readers to discover the larger technical picture for themselves.

References


Manning (b. 1960) received his Ph.D (linguistics with a minor in technical writing) from Louisiana State University in 1988. He has taught linguistics, literature, and writing courses at LSU, Stephen F. Austin University, and Idaho State University before joining the BYU linguistics faculty as an associate professor in 1994. He serves as an associate editor for IEEE Transactions on Professional Communication, and is currently working on a second novel, Love Story Logic.