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Data Stories

Data Story Rationale

Can the Scientific Research Process Be Communicated and Demystified By Use Of Narrative Structure? Integrating Research with Education, Outreach and Communications Through Data Stories

"What I am proposing is that our instruction in science from the start to the finish should be mindful of the lively processes of science making, rather than being an account only of 'finished science' as represented in the textbook, in the handbook, and in the standard and often deadly 'demonstration experiment.' ...We live in a sea of stories, and like the fish who (according to the proverb) will be the last to discover water, we have our own difficulties grasping what it is like to swim in stories." (Bruner 1996)

The current International Polar Year (IPY) is already swimming with stories, and with the use of the [Data Stories framework](#), the essential "who, what, where, when, how, and why" elements of research can be captured and conveyed to non-technical audiences who lack the background to comprehend and appreciate the process of data collection, analyses, review and publication. Designed primarily to make scientific research more accessible and meaningful to non-technical audiences (McCaffrey 2005), the "digital storytelling" approach of Data Stories serves to link data to existing and emerging content, including blogs, articles and other digital artifacts, as well as relevant curriculum. Data Stories will add value, promote access and provide context to the research and activities.

Narrative has long been used to describe the human dimension to scientific investigations, whether in the Galapagos with Charles Darwin or in polar regions with explorer/scientists such as the visionary of IPY, Karl Weyprecht (1875). Their stories provide a crucial human context that are often read for their adventures but can offer important and often compelling insights into the process of scientific observation and logic.

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During the International Geophysical Year (IGY), science education went mainstream, with the National Academy of Sciences developing a series of [films](#) and [posters and accompanying booklet](#). Following the success of Sputnik, which was one of several satellite launches of the Soviets and US as a part of IGY, the National Defense Education Act supported robust math and science initiatives in the schools, and the IGY films were used in many classrooms to convey the state of science at the time. Watching these films, viewing the posters and reading the booklet today, one thing that is striking is that these important scientific artifacts from half a century ago do use storytelling to describe

research projects, but all the scientists depicted are anonymous. There are no interviews with talking heads, no profiles of individual leaders. This likely reflects the culture within science that prevails in many circles today. In an effort to be objective and not indulge the egos and subjective views of individual scientists, the “who” is stripped away, leaving an often dry, technical recitation of the “what, where, when, how, and why”.

Based on what we now know about effective storytelling, we have learned that without the “who”, the story lacks a voice, a primary character, and vivid human context. Storyteller Kendal Haven who has researched the “best practices” in storytelling, particularly in communicating science, stresses the importance of the “who” in effective storytelling (2006), and Freeman Dyson notes that “science is a human activity, and the best way to understand it is to understand the individual human beings who practice it.” (1996) The “who” of the IGY stories are nameless scientists heroically measuring and recording the geophysical world. But the depth of human experience is not fully



Science Education during the IGY emphasized the science, but avoided the individual scientist.

Emphasizing the individual experience of the scientist and the mystery they are investigating can help bring the science alive

fleshed out because we never really know who the scientists are.

Emphasizing the “who” in science is, as the IGY science educators were aware, tricky. Milne (1998) identifies four types of science stories: (a) heroic, (b) discovery, (c) declarative, and (d) politically correct. The IGY “stories” deliberately avoided fostering the individual hero, and steered clear of the political and declarative, which one could argue is clearly appropriate in science education circles. But the spirit and essence of science is discovery, and thus it is important if not imperative for effective science stories to convey the sense of discovery first hand, from the perspective of the individual human beings who practice it.

As important as the “who” element is, there is one even more crucial element in capturing the interest of an audience. What is it? The question, the mystery, the riddle being investigated. For Data Stories or any other science narrative to be engaging, the inherent mystery being explored must be placed front and center, specifically in the title. Why? Because as a species we are naturally curious and, when a cognitive gap is presented to us (even something as mundane as how a bad movie is going to end) we often stick with it to see the outcome and thereby satisfy our curiosity. As Chip and Dan Heath note in their book “Made to Stick,” “We can engage people’s curiosity over a long period of time by systematically “opening gaps” in their knowledge — and then filling those gaps.” (2007)

Once developed, Data Stories can be attached or linked to metadata of datasets, helping to frame the context of collection and analysis process, potentially assisting in the access and discovery of the data and resources, particularly by non-technical audiences. They can also be augmented with blogs, articles, Google Earth tours, maps, images and figures, podcasts and more.

Ultimately, one of the goals of Data Stories is to make data more accessible for use in education settings. As Manduca and Mogk note:

“As the role of data in our world grows, it is increasingly important that students be empowered to use data and to overcome any sense of intimidation in the face of data. Students on their way to becoming informed voters, consumers, citizens, and scientists must develop a strong understanding and facility for using data. ”

While many non-scientists balk at the word “data” due to its association with everything dry and boring, and some scientists may consider “stories” to be primarily the realm of fiction and myth, Data Stories are meant to serve as a go-between, a “mashup,” a “middleware” between the minds of those not trained in a particular, often deliberately narrowly focused discipline of science, and the observations or data that serve as the “reality check” for scientific understanding.

A suite of IPY Data Stories would contribute to the legacy of this international year and potentially help teachers, students, journalists, and the the general public better understand the research process, and

this approach also holds potential for use in other arenas of science and technology. For students in particular, Data Stories will allow them to access the data, appreciate the human experience of the research, and conduct their own "virtual" expeditions in the form of presentations or "mashups" that tell the story and explain the data.

It may also be possible for students to go back and create new Data Stories from old research. For example, the recent reconstruction of sea air temperature by Wood and Overland (2006) from the [first IPY](#). Although the resources pulled together by Wood and Overland do not include personal diaries that would add the important personal touch, students could use the [data and visualizations](#), [images](#), and [history](#) resources to develop their own presentations.

Can the Scientific Research Process Be Communicated and Demystified By Use Of Narrative Structure? Time will tell, and we'll need more examples and research data to find out. Stay tuned.

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International Polar Year Data and Information Service (IPYDIS)
IPYDIS is a collaborative international effort; the Web site is hosted by the National Snow and Ice Data Center ([NSIDC](#)).

ipydis@ipydis.org
phone: +1 303-492-6199
fax: +1 303.492.2468