



Metrication policies and technical communication

by Ron Stone (ron@enhanceability.com)

Introduction

This article is organized to concisely introduce topics related to metrication, and to provide information about metrication history and current developments related to applying best practices for using metric measures. To reach this goal, I have summarized key metrication policies from different periods of history to the present.

Metrication, which usually refers to the International System of Units (SI), also known as the modern metric system, can be defined as a process of learning about or practicing the use of metric measures (AAT 2007b). The *Système International d'Unités* (SI) was established by an international treaty, the *Convention du Mètre*, and is presently used throughout the world (BIPM 2006). Although measures are used everywhere in society, they have a particularly important role in science, engineering, commerce, medicine, and travel (Becker et al. 2007). Moreover, the development of an international system of measures supports international cooperation in areas of commerce and science by promoting consistent communication about weights and measures. Some of the topics in this review that may be particularly relevant to scientific and technical communicators include standards for style and usage, in addition to dimensions related to translation or localization. As many of the industries and sectors in which scientific and technical communicators work are metricated to a large extent, it is important that communicators become aware of the basic principles and usage conventions for writing about metric scales of measurement.

Early metrication

A history of metrication is complicated, and pre-dates the imperial, colonial, revolutionary, and constitutional political environments of North America and Europe in the 1700s and

Contents

Metrication policies and technical communication.....	1
Editorial: Everything has limits	2
STC's vision and mission.....	2
"What's in a word?" redux.....	8
Book review: A practical guide to graphics reporting	10
Book review: Cite right: a quick guide to citation styles	11
Discussion groups	14

1800s. Topics related to the ethics or morality of measurement, such that a smaller measure should not be presented as a larger measure in trade, appear in the early texts of both Christian and Islamic books (Naughtin 2008). One of the first English documents to declare constitutional or civil rights, the *Magna Carta* (established in England, AD 1215), contained guarantees for uniformity of weights and measures.

By the time of the *Magna Carta*, when Roman numerals were still widely used for writing numbers, at least some European mathematicians were writing about the use of decimal (Arabic) numerals for calculations (Naughtin 2008). By the Renaissance, a few centuries later, various practitioners had produced a number of cultural, scientific, and engineering developments in various regions of Europe, and some of the characteristics of a uniform system of measure were being formulated. In 1585, Simon Stevin of Belgium published both Flemish- and French-language editions of books on the use of decimal numbers and decimal fractions in mathematics (Naughtin 2008).

Subsequently (in 1668), the Royal Society in England published a philosophy text by John Wilkins that included a chapter on measurements, which covered many ideas that were later adopted into the metric system (Naughtin 2007). Wilkins proposed a universal standard measure

(continued on page 3)

Editorial: Everything has limits

by Geoff Hart (ghart@videotron.ca)

"Knowledge is as food, and needs no less / Her temperance over appetite, to know / In measure what the mind may well contain; / Oppresses else with surfeit, and soon turns / Wisdom to folly, as nourishment to wind."

—John Milton, *Paradise Lost*



One recurring lesson of science is how each discovery builds upon the previous discovery: the more we have learned, the more we discover that there remains to learn. Paradoxically, this lesson leads us to unconsciously absorb the belief that growth is without limits, for each new discovery reveals new horizons, each of which conceals new discoveries that will themselves lead to new horizons, and so *ad infinitum*.

Yet deep within even the most optimistic of us, a tiny voice whispers that it is not so, that there are limits to what we can know—and more specifically, that there are limits to what we should know and what we can do with what we know. As Milton noted, sometimes we need time to digest new knowledge rather than glutting ourselves with still more. It's not necessarily that any knowledge should be forbidden so much as Milton's wry notion that undigested knowledge often leads to <ahem> unpleasant emissions.

Such unpleasant emissions lead us, in my usual roundabout way, to the concept of greenhouse-effect gases and global warming, and to the consumption that underlies the problem. Whether or not you believe that "peak oil" has arrived (http://en.wikipedia.org/wiki/Peak_oil), and that we'll run out of the last economically accessible natural oil during the lifetimes of most readers of this newsletter, it's clear that peak oil is in sight—sooner for those with better vision, or later for those with various forms of intellectual myopia. The scientific optimism we've learned from the ongoing march of scientific discovery tells us we shouldn't worry, that there are always alternatives waiting to be discovered, and that we can, after all, synthesize oil. Whether

we're prepared to pay the higher cost of those alternatives is another story.

Somewhere in another world, Thomas Malthus (<http://en.wikipedia.org/wiki/Malthus>) is having the last laugh after a couple centuries of scorn. His proposal that there are natural limits to population growth fell into disrepute as new scientific advances made it possible to grow more food and cure more diseases. But Malthus turns

(continued on page 2)

the Exchange, Vol. 15 No. 3, September 2008.

The Exchange is published four times per year on behalf of the Scientific Communication community of the Society for Technical Communication (www.stcsig.org/sc/).

Copyright for material published in *the Exchange* belongs to the author. For permission to reprint an article, please contact the author. We welcome comments and letters to the editor.

Submissions: To submit an article, please contact the editor. By submitting an article, you grant a license to this newsletter to publish the article in print and online. In your cover letter, please indicate whether the article has been published elsewhere, and confirm that you hold copyright to the text.

Editor: Geoff Hart (ghart@videotron.ca)

Manager: Kathie Gorski (kgorski@execpc.com)

Webmaster: Matt Hunt (matt@likeable.org) and Scott Hughes (RaySHughes@Eaton.com)

© 2008 **Society for Technical Communication**

901 North Stuart St., Suite 904

Arlington, Virginia

22203-1822 U.S.A.

Tel.: 703-522-4114

Fax: 703-522-2075

Web: www.stc.org

STC's vision and mission

STC's vision: Technical communication is recognized as an essential part of every organization's competitive strategy.

STC's mission: STC advances the theory and practice of technical communication across all user abilities and media so that both businesses and customers benefit from safe, appropriate, and effective use of products, information, and services.

Metrication, continued from page 1

that could be expressed in terms of decimal multiples and sub-multiples. He also suggested that the system be established as an international standard that could be communicated regardless of local language (Naughtin 2007). The commentary by Pat Naughtin also highlights some points of particular interest to communicators. These include a recognition of needs for clear communication among different nations about methods of measurement. The goal of clear communication can serve as a guideline that communicators can use to add value. The use of common definitions of measure can reduce considerably the time and cost of doing business in other regions. One chapter also presents a proposal that the measurement for a line of longitude on the Earth's surface would be suitable as the basis for a world standard for length. A proposed value for this length standard based on astronomical methods of the time would have described a length standard that was 996.95 millimeters rather than the modern value of exactly 1000 millimeters (Naughtin 2007).

Calendars can also be regarded as a topic of metrication that for technical communicators can involve choices of style and formatting in the course of preparing information for translation or localization. The Gregorian calendar, which was first adopted in Italy in AD 1582 during the European Renaissance, was subsequently adopted by many other nations during transitions that occurred from the 1500s to the 1900s, depending on the nation (Tondering 2008). Although most regions have made the transition from the Julian calendar to the Gregorian, some communities still observe the Julian calendar for civil or religious use. A history of the development and use of the BC and AD era scales with regard to the Julian and Gregorian calendars is summarized in an AAT ICAS (Alliance for the Advancement of Technology, Integrated Chronological Applications System) document (AAT 2007b).

International metric system

International development of the metric system occurred amidst the revolutions in France and the United States. In 1787, the United States Congress adopted a national constitution, grant-

ing Congress a power to "coin money . . . and fix the standard of weights and measures" (Article 1, Section 8). The United States also introduced the first decimal currency, a dollar consisting of 100 cents: "fugio cent" coins were minted and entered circulation immediately following their design by Benjamin Franklin in 1787 (Naughtin 2008). A few years later, in 1795, the Republic of France adopted the French Academy of Sciences recommendation and legally created a *Système métrique décimal* that is very much like the metric system we use today (Naughtin 2008). French law included a provisional standard for the metre, and a prefix scheme for decimal multiples and submultiples. The United States, in addition to several other countries, received copies of the provisional standards.

Reviews of a survey by Delambre and Méchain to determine the distance along a line of longitude from the equator to the North Pole were conducted by an international committee of experts in the late 1790s (Naughtin 2008). France and Belgium quickly established the resulting metric system as their official standard. An international commission convened by France in 1872 took preparatory steps toward creating the Metre Treaty (Naughtin 2008) that was subsequently established with 17 signatories, including the United States, in 1875 (Brown 2005).

Metric modernization

Processes of metrication or measurement can, however, be subject to a variety of issues concerning the science, practice, or linguistic expressions involved in areas of metrication. Sources of "great difficulty" (in the words of Wilkins [Naughtin 2008]) about metrication have included the use of customary or pre-metric measures, differences in regional languages, trade protectionism, and processes of scientific development. These issues have sometimes slowed the adoption of a system of measurement that is otherwise more practicable for more types of measure than any customary pre-metric system of measure.

For purposes of brevity, I will try to highlight a few selected ideas about the modernization of metrication that may be most relevant to techni-

(continued on page 4)

"Processes of metrication or measurement can, however, be subject to a variety of issues concerning the science, practice, or linguistic expressions involved in areas of metrication."

Metrication, continued from page 3

cal communication. Readers who are interested in further details of metrication history are referred to the *Metrication Timeline* (Naughtin 2008). In the century following the initial establishment of the Metre Treaty, countries where uses of the inch-pound system of units remained customary (including Australia, Canada, the United Kingdom, and the United States) prepared initiatives for metrication, and increased the use of metric units for a variety of areas of practice. Canada and Australia metricated in the 1970s (Reid 2008a,b). However, the United States remains only partially metricated.

In 1960, the 11th *Conférence Générale des Poids et Mesures* (CGPM) of the Metre Convention adopted the name *Système International d'Unités*, with the international abbreviation "SI". The official English translation of the French name is "International System of Units (SI)", and the official short-form expression of the system, in any language, is "SI" (BIPM 2006).

Current state of metrication

The current state of metrication is subject to advances in science and technology that can improve the accuracy and practical realization of measurement. In 2005, the International Committee for Weights and Measures (CIPM) published a recommendation to begin the process of redefining the kilogram, ampere, kelvin, and mole in terms of exactly known values of physical constants that are "universal, permanent, and invariant in time" (Mills et al. 2006). An example of this was the redefinition in 1960 of the metric unit of length, the metre (meter), in terms of a path of light traveling in a vacuum, rather than in terms of a physical prototype that might be subject to change over time (BIPM 2006).

Various recent metrication policies that are relevant to technical communicators include the following:

European Community

The European Council directive 80/181/EEC of the European Economic Community (EEC 2000) designated SI for use by member states. As a 1999 allowance for the use of "supplemen-

tary indications" such as inches and ounces is scheduled to expire at the end of 2009, a current proposal to amend the directive to indefinitely permit the use of these supplementary indications may ease requirements for the exclusive use of metric units on product labeling in Europe. The proposed amendment is also intended to encourage the United States to approve legislation to permit the use of metric-only labeling on products subject to federal regulation, instead of requiring both customary and metric units on product labeling..."

"The proposed amendment is also intended to encourage the United States to approve legislation to permit the use of metric-only labeling on products subject to federal regulation, instead of requiring both customary and metric units on product labeling..."

United States

Current metrication policy for the United States is summarized in an announcement in the Federal Register, and in special publications of the National Institute of Standards and Technology (NIST 1998).

NIST Special Publication 811 (NIST 2008b), *Guide for the Use of the International System of Units (SI)*, provides guidance about legal and stylistic matters for authors writing for NIST or other federal agencies. The usage and style material in Special Publication 811 includes an explanation of American spellings and usage that are used in NIST documents. For example, "meter" and "liter" are used instead of "metre" and "litre". A number of guidelines review the rules for properly writing SI units. Other guidelines concern avoiding usage that might be subject to different interpretations due to regional variation in terms like "million", "billion", and "trillion" (and thus to avoid terms like "ppm", "parts per million"). Advice that the term "weight" should only be used unambiguously, to avoid confusing the concepts of mass and force, is explained with the advice that the term *atomic weight* should henceforth be replaced by the term *atomic mass*.

NIST special publication 330 (NIST 2008a), *The International System of Units (SI)*, is a version of the BIPM (2006) SI brochure that has been localized for the United States by NIST. Differences between the two English versions are described in the foreword, which includes American spelling variations such as the ones used in Special Publication 811.

(continued on page 5)

BIPM

The Bureau International des Poids et Mesures (BIPM) is an intergovernmental organization that was established by the Metre Convention in 1875, and which is still in operation. The primary task of BIPM is to ensure worldwide coordination of measurement standards. This involves establishing fundamental standards and scales of measure, comparing national and international standards, and ensuring coordination of measurement techniques (BIPM 2006).

The BIPM Web site (www.bipm.org) provides access to many documents and resources, including the SI brochure *The International System of Units (SI)* and the journal *Metrologia*. The International Committee for Weights and Measures (CIPM), the group that oversees the work of BIPM, recently adopted a recommendation in preparation for redefining the kilogram, ampere, kelvin, and mole so that these units are linked to exactly known values of physically invariant values (Mills et al. 2006). A redefinition of the kilogram in terms of a fundamental physical constant that is “universal, permanent, and invariant in time” would mean that SI would not depend on the prototype kilogram, an actual physical object that may be subject to changes over time. Since 1960, the meter has been defined in terms of the length of a path of light traveling through a vacuum (BIPM 2006). The unit of time is also defined in terms of a natural atomic frequency, from which the SI second is scaled (Guinot 1997). A future kilogram defined in terms of a physically invariant value would make possible the definition of all SI units in terms of two fundamental units of time and length (Wignall 2007).

IEEE

The Institute of Electrical and Electronics Engineers (IEEE) has implemented a metrication policy (Policy 9.19; IEEE 2007) for the exclusive use of metric units in the normative (prescriptive) portions of new and revised standards. The implementation of this policy provides an allowance for parenthetical or supplemental use of inch–pound data “after the metric unit if

the sponsor believes that the audience for the document would benefit from the inclusion of inch–pound data, based on concerns for safety or clarity”.

The policy also provides for the evaluation of necessary exceptions that can be approved for a specific period of time. Such exceptions include the use of trade sizes or mechanical connectors that are specified in terms of an inch. Moreover, IEEE implementation of the policy does not require that products specified in terms of an inch be replaced by products specified in metric units.

The discipline of electrical engineering has been extensively metricated for more than a century. In 1881, the British Association for the Advancement of Science (BAAS) introduced practical electrical metric units—the ampere, coulomb, farad, ohm, and volt—to the First International Electrical Congress in Paris (Naughtin 2008). The ampere was eventually defined as an SI unit of electrical current in 1948 (BIPM 2006), and was subsequently defined as a base SI unit.

Alliance for the Advancement of Technology (AAT)

Conventional calendar and clock units are only mentioned briefly in the BIPM (2006) SI brochure, because the rotational and orbital movements of the Earth are not as invariant as a natural atomic frequency. Nevertheless, conventional calendar and clock units are widely used beyond applications of metrological comparison. Computer algorithms for the formatting of dates in the Gregorian calendar and clock times (per Coordinated Universal Time) are programmed into many computing platforms, including the Unix operating system and the Java programming language. Methods of formatting dates and times for information interchange are also described in the ISO 8601 standard (ISO 2004). However, there have been several initiatives to apply decimal or uniform schemes to calendaring or timekeeping. One of these initiatives is the Integrated Chronological Applications System (ICAS) framework of standards for the uniform formatting of calendar and clock information,
(continued on page 6)

“The policy also provides for the evaluation of necessary exceptions that can be approved for a specific period of time. Such exceptions include the use of trade sizes or mechanical connectors that are specified in terms of an inch.”

developed by the Alliance for the Advancement of Technology (AAT, www.aatideas.org). The development of ICAS standards is based on a cross-disciplinary approach that includes technical communication, computer science, usability analysis, applied linguistics, and metrology. Recent ICAS developments have built a framework for determining how calendar and clock units can be formatted or processed in terms of uniform or decimal schemes. Such a framework can provide advantages for users who process or work with a lot of calendar and clock information. And ICAS approaches can inform workflows that decimalize time scales for existing applications in metrology, computer science, astronomy, and information science.

AAT has also formulated a metrication policy (AAT 2007d) that tries to highlight a proactive, rather than remedial, and a voluntary, rather than mandatory, approach to promoting metrication. Style and usage guidelines for ICAS are described in the 2020 series of standards documents (AAT 2007a). Other policies related to the administration of AAT ICAS, such as the terms of use (AAT 2007c) for the standards documents, or the *ICAS in use* (AAT 2008) terminology for open-source software resources, contain many features that are similar to the policies of other standards development organizations and initiatives.

Metrication communication

Metrication is closely linked to progress in science, technology, and commerce. As science and technology advance, measurements can be realized more accurately. In commerce, the metrication benefits for producers and consumers can offer more value than would be possible with pre-metric systems of measure. Perhaps the methods by which uses of metric units can simplify matters of “great difficulty” in addressing problems of measurement is why frameworks of metrication policy have been widely established by governments, researchers, and industries.

However, the quantity of information on metrication can be overwhelming. There are numerous standards and style guides that provide advice that in some cases differs from the advice

provided by other guides. As no guide can cover all the style issues for every possible situation, it is important to determine a style strategy that includes a library of style resources appropriate to the context in which the guide will be used (Hart 2000). Particular areas of practice, or particular contexts of use, may also be subject to particular standards. A comprehensive review of existing style and standards resources can, however, help an editor to focus on issues that are most pertinent for a particular guide, such as one for the sciences (Hart 2008). As the standards for metric units are revised in light of advances in metrology, there will be a need for current information that has been updated to reflect the state of the art.

There are several methods by which technical communicators can deliver “best practices” for metrication communication. Rhetorical analyses such as determining the audience, purpose, and context of use for a particular document can guide a communicator to develop and produce information that is more useful (Hart 2000). A document prepared for a particular area of practice, or for a particular local audience, may call for some approaches that provide additional or specific guidance. At the same time, metrication and science are practiced globally, among several areas of practice. If metrication can add value to the producers and the users of communications, then there are incentives and opportunities (and in some cases also requirements) to provide metrication communication. Ω

References

- AAT. 2007a. AAT ICAS 2020: usage guidelines. Version 7.02 Basilicum. Alliance for the Advancement of Technology. <<http://www.aatideas.org/icas/2020.html>>
- AAT. 2007b. AAT ICAS 2040: guidelines for scale calculation. Version 7.02 Basilicum. Alliance for the Advancement of Technology. <<http://www.aatideas.org/icas/2040.html>>
- AAT. 2007c. AAT ICAS 9010: terms of use. Version 7.02 Basilicum. Alliance for the Advancement of Technology. <<http://www.aatideas.org/icas/9010.html>>

(continued on page 7)

Metrication, continued from page 6

- AAT. 2007d. AAT ICAS 9030: metrication policy. Version 7.02 Basilicum. Alliance for the Advancement of Technology. <<http://www.aatideas.org/icas/9030.html>>
- AAT. 2008. About ICAS in use. (updated 2008 April 03). Alliance for the Advancement of Technology. <<http://www.aatideas.org/iota/icas/icas.xht>>
- Becker, P.; De Bièvre, P.; Fujii, K.; Glaeser, M.; Inglis, B.; Luebbig, H.; Mana, G. 2007. Considerations on future redefinitions of the kilogram, the mole and of other units. *Metrologia* 44(1):1–14.
- BIPM. 2006. The International System of Units (SI): 8th edition. Bureau International des Poids et Mesures, Sèvres Cedex, France. <<http://www.bipm.org>>
- Brown, G. 2005. Metric convention of 1875. United States Metric Association, <<http://www.metric.org>> and <<http://lamar.colostate.edu/~hillger/laws/metric-convention.html>>
- EEC. 2000. Council Directive 80/181/EEC. CON-SLEG: 1980L0181—2000 February 09. Office for Official Publications of the European Communities. <<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31980L0181:EN:HTML>>
- EU. 2007. Explanatory memorandum on proposal for a directive of the European parliament and of the council amending Council Directive 80/181/EEC on the approximation of the laws of the Member States relating to units of measurement. European Union. <<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52007PC0510:EN:HTML>>
- Guinot, B. 1997. Application of general relativity to metrology. *Metrologia* 34(3):261–290.
- Hart, G.. 2000. The style guide is dead: long live the dynamic style guide. *Intercom* 47(3):12–17.
- Hart, G. 2008. Scientific style and format: the CSE manual for authors, editors, and publishers. *the Exchange* 15(2):9–11.
- IEEE. 2007. IEEE standards style manual. Institute of Electronics and Electrical Engineers, New York, NY. <<http://www.ieee.org>>
- ISO. 2004. ISO 8601:2004: Data elements and interchange formats—information interchange—representation of dates and times. 3rd ed. International Organization for Standardization, Geneva, Switzerland. <<http://www.iso.ch>>
- Mills, I.M.; Mohr, P.J.; Quinn, T.J.; Taylor, B.N.; Williams, E.R. 2006. Redefinition of the kilogram, ampere, kelvin and mole: a proposed approach to implementing CIPM recommendation 1 (CI-2005). *Metrologia* 43(3):227–246.
- Naughtin, P. 2007. Commentary on John Wilkins' *Of Measure*. <<http://www.metricationmatters.com/docs/CommentaryOnWilkinsOfMeasure.pdf>>
- Naughtin, P. 2008. Metrication timeline: a chronological history of the modern metric system. <<http://www.Metricationmatters.com/docs/MetricationTimeline.pdf>>
- NIST. 1998. Metric system of measurement: interpretation of the international system of units for the United States. United States Federal Register 63(144):40334–40340.
- NIST. 2008a. The international system of units (SI). Ed. by B.N. Taylor and A. Thompson. National Institute of Standards and Technology, Gaithersburg, MD. NIST Special Publication 330: 2008 edn.
- NIST. 2008b. Guide for the use of the international system of units (SI). Ed. by B.N. Taylor and A. Thompson. National Institute of Standards and Technology, Gaithersburg, MD. NIST Special Publication 811: 2008 edn.
- Reid, J.B. 2008a. Metrication of Australia. United States Metric Association, <<http://www.metric.org>> and <<http://lamar.colostate.edu/~hillger/internat.htm#australia>>
- Reid, J.B. 2008b. Canadian Metrication. United States Metric Association, <<http://www.metric.org>> and <<http://lamar.colostate.edu/~hillger/internat.htm#canada>>
- Tondering, C. 2008. Frequently asked questions about calendars. <<http://www.tondering.dk/clus/cal/calendar29.txt>>
- Wignall, J.W.G. 2007. Some comments on the definition of mass. *Metrologia* 44(3):L19–L22.

Ron Stone (ron@enhanceability.com) is a communications consultant in Northern California who is also actively involved in developing AAT ICAS standards and programs for the nonprofit Alliance for the Advancement of Technology (AAT).

“What’s in a word?” redux

By Katherine Haramundanis
(kathy.haramundanis@hp.com)

In response to an earlier editorial (*the Exchange* 15(1), January 2008) I thought it might be amusing to pick apart some of the thoughts on that particular compost heap, to prompt discussion of two things: the paucity of words we decide to use and the baggage that some words bring along with them that can alter the fundamental meaning of the concept the author is trying to convey. Sometimes words have antique meanings that, for reasons that are unclear, are kept and therefore those words, instead of clarifying meaning, obscure it.

In taxonomy, as the earlier editorial describes, we are faced with the “nested boxes” of domains, kingdoms, phyla, classes, orders, families, genera, and species. It’s not clear that these are always truly boxes, as it is sometimes quite difficult to be sure where a specific individual specimen goes at the genera and species levels. In the genus *Rosa*, for example, how different is the species *Rosa caroliniana* from its near neighbor, *Rosa virginiana*? How different is different? And is the species definition (that a species comprises organisms that can interbreed successfully) really complete? (And why is this *interbreed* and not merely *breed*?) There does not seem to be a contradiction that if a horse and a donkey can breed, they are of the same species, even if their offspring cannot. There is nothing in the definition that says the attribute must apply to all successive generations. We believe that, by convention, but the definition does not say this explicitly. Perhaps the mule is simply a sterile offspring rather than a different species. Do we know why they are sterile? Another example is the liger, an offspring of a lion and a tiger that also appears to be sterile. There are many examples of human individuals who are sterile, usually as a result of disease or some unknown problem, but these do not seem to be considered in the definition. Of course, individual cases do not define the norm, but the definition does ignore these variations. It’s been conjectured that *Homo neanderthalis* and *Homo sapiens*, considered separate species, may have interbred, but in some varieties, produced sterile offspring.

Sometimes words have antique meanings that, for reasons that are unclear, are kept and therefore those words, instead of clarifying meaning, obscure it.

And what about the words *variety* and *race*? Variety appears to be used for horticultural subspecies, for example, *Rosa californica* var. *plena*, a variety of the species *Rosa californica* bred in 1894. Why is this called a variety and not a race? Alternatively, why could we not follow the same

scheme and have subspecies or variety names for the different origins of those in the species *Homo sapiens*? A start could be made to embargo the old word *race* and replace it with *variety*. And we could replace the old words like “Caucasian” or “white” or “black” or “red” with geographical, clan, or linguistic terms. We could, for example, have names such as *Homo sapiens Amazoniensis* (people from the watershed of the Amazon), or *Homo sapiens Mississippianensis* (from the watershed of the Mississippi), or *Homo sapiens Gangeian* (from the watershed of the Ganges) that would clarify the geographical origins of particular, identifiable groups rather than using a term such as *race* that is ambiguous, ill-defined, vague and that, in today’s world, carries large negative baggage.

But using a watershed origin would not satisfy the individual groups that live along these large watersheds. Many native American (Amerindian) tribes lived in the watershed of the Mississippi River system, such as the Choctaw, Chickasaw, Creek, and Natchez, the first three being members of the Muskogean family, but all of these groups were considered part of the Hokan–Siouan stock or southeastern tribes by anthropologists (Wissler 1966). So the anthropologists had already taken a cut at defining individual groups primarily by language, a method that would still work today. It would remove the political identities that have become important since the 19th century, such as being American, French, or Brazilian, and that are solemnized by the issuing of birth certificates and passports by governing bodies, but note that these identities are also changing as new countries come into being and people in those new nations re-identify themselves with the new country. Africa, once the home for hundreds of separate tribes, remains a changing landscape of nationalities as linguistic and ethnic groups strive for recognition of their unique identities.

(continued on page 9)

So perhaps linguistic distinctions would be an even more appropriate method than geographical origins. Then we could have *Homo sapiens Hispanica*, those whose native language is Spanish, or *Homo sapiens Hungarica*, with Hungarian as a native language, or *Homo sapiens Gujaratica*, with Gujarati as a native tongue. Note, however, that languages are always changing and therefore new varieties would constantly become current. Multilingual people could also be accommodated in this scheme; for example, a person bilingual in English and Russian could be of the variety *Homo sapiens Anglica-Russika*. Linguistic definition gets to the heart of how people communicate and removes the explicit concept of race, though of course race can surface through the equation of language with race. For example, this would be implied through the varieties *Homo sapiens Hebraica* and *Homo sapiens Mandarinica*.

Using language as a variety name would accentuate these differences, make them more obvious, and possibly expose efforts to repress individual groups. Of course we don't need to have any of these distinctions at all, assuming everyone agrees to eliminate all such classifications. But few will be putting this to a vote any time soon. The closest we may get to such an event is the formation of a country that in fact incorporates linguistically diverse people who agree to be together. Most of the divisions that have occurred recently can be described along linguistic grounds, which are also sometimes religious. For example the breakup of the former Yugoslavia was largely on linguistic grounds; the Serbs, who speak Serbian, separated from the Croats, who speak Croatian, and the Kosovars, who speak Albanian, in the main. The current troubles in the country of Georgia also represent a breakup along linguistic grounds, as the Georgians, the Ossetians, and the Abkhazis all speak different languages; a similar event, the remarkably peaceful separation of Slovakia from the Czech Republic, earlier joined as Czechoslovakia, separated a Czech-speaking territory from a Slovak-speaking one. Of course many languages have dialects that further subdivide the language itself, and languages are typically grouped into language families by linguists.

As mentioned in the previous editorial, DNA work is making some of the human (i.e., *Homo sapiens*) variety distinctions more clear and explicitly finding geographical origins for some groups or varieties, so we are already on the road to finding better definitions for these concepts. The work of Cavalli-Sforza and his colleagues (1994) both demolished the idea that race had any biological meaning and showed that intermarriage among people of the same language stock was the most common (i.e., *propinquity*, the social or physical proximity among groups, is a real factor), though diasporas do occur. And movement of individuals is becoming increasingly widespread as the global population continues to expand.

So there's more than one useful way to approach the task of creating classifications. It is an entirely other question whether we can come up with new words that would eliminate the old baggage we carry along when we keep reusing words for new meanings. Perhaps we need a sort of Aladdin's lamp for "new words for old!" Perhaps this might be a topic for another article. Any takers? Ω

References

- Cavalli-Sforza, L.L.; Menozzi, P.; Piazza, A. 1994. *The History and Geography of Human Genes*. Princeton University Press, Princeton, N.J.
- Wissler, C. 1966. *Indians of the United States*. Doubleday Anchor, New York, N.Y.

Katherine Haramundanis (kathy.haramundanis@hp.com), a Senior Member of STC, is an Information Engineer for Hewlett-Packard. Previously, she worked for Wang Laboratories, Digital Equipment Corporation, and Compaq. She is the author of The Art of Technical Documentation (Digital Press), the only book about technical writing written by an industry practitioner, has contributed articles to the Grolier Science annual encyclopedias, and edited her mother's memoir (Cecilia Payne-Gaposchkin, An Autobiography and Other Recollections). An Election Officer in her town, she belongs to societies that focus on the history of science, history of technology, and technical writing, and formerly chaired ACM SIGDOC.

Book review: A practical guide to graphics reporting: information graphics for print, Web & broadcast

[Jennifer George-Palilonis. 2006. Burlington, MA: Focal Press. ISBN 978-0-240-80707-2. 186 p., including index and CD. \$44.95 USD (softcover).]

by Beth Lisberg Najberg (bbegin@aol.com)

Previously published in *Technical*

Communication 54(3):376, August 2007

Can a book about information graphics for journalists help technical communicators? Yes! Especially when it's done as well as *A practical guide to graphics reporting: information graphics for print, Web & broadcast*, by Jennifer George-Palilonis.

This useful handbook focuses on identifying the visual elements of a news story that are appropriate for displaying graphically and the best means to show the information in print, on the Web, and by broadcast. She uses the term *convergence* to describe the partnership "between and among various types of media organizations, such as newspapers, Web sites and broadcast news stations" (p. 176). The term resonated with me, as technical communicators grapple with the same thing—how to create and use graphic elements both in print and online.

The opening chapters introduce information graphics and the news. George-Palilonis gives a brief history of visual storytelling and the newspaper staff involved in getting the news out visually. She highlights pioneers: Edward Tufte, Nigel Holmes, and George Rorick and J. Ford Huffman (both at *USA Today*, which originated the use of innovative graphics in newspapers).

George-Palilonis suggests ways to identify parts of a story that can be clarified with a graphic. A chapter on ethics deals with interviewing sources, dealing with privileged source material, visual plagiarism, copyright, citing Internet sources, and verifying numbers.

Chapter 5, "Designing information graphics", introduces the seven basic design principles for any graphic: balance, proportion, contrast, harmony, rhythm, focus, and unity, shown in many excellent examples. This chapter also describes relevant design tools: a grid and color and type palettes.

The next four chapters discuss and present color examples of the types of graphics that are most often used in news media: maps, charts and tables, statistical data displays, and diagrams and illustrations. You will refer frequently to these five chapters as you learn to find graphic elements in stories as well as in processes and procedures. George-Palilonis includes steps for constructing the graphics.

Each chapter is designed for use on several levels. Sidebars give excellent tips on such matters as common mathematical equations and inflation, as well as short biographies of leaders in the field. Chapters end with an interview, called "In the eyes of an expert", followed by an exercise. A disc accompanies the book so you can complete the exercises in the book.

The color, grid layout, and distinct sections of the page are clear and rich and help you use the book. Unfortunately, the binding and the very thick, slippery paper make it awkward to open the book flat while reading it.

Overall, this book is useful for a journalism classroom as well as for the technical communicator who needs to communicate visually as well as with words. Ω

Beth Lisberg Najberg (bbegin@aol.com) develops online and paper-based user-support materials. She makes information easy to find and easy to use by incorporating graphics into the procedures and explaining processes and concepts. She has been making information useful and graphical professionally for over 30 years. She owns BEGINNINGS (www.beginningsdesign.com), an information design consulting firm.

Parting thoughts

"Nothing is more humbling than to look with a strong magnifying glass at an insect so tiny that the naked eye sees only the barest speck and to discover that nevertheless it is sculpted and articulated and striped with the same care and imagination as a zebra. Apparently it does not occur to nature whether or not a creature is within our range of vision, and the suspicion arises that even the zebra was not designed for our benefit."

—Rudolf Arnheim, psychologist and author (1904–2007)

—
"The study of error is not only in the highest degree prophylactic, but it serves as a stimulating introduction to the study of truth."—Walter Lippmann, journalist (1889–1974)

Book review: Cite right: a quick guide to citation styles—MLA, APA, Chicago, the sciences, professions, and more

[Charles Lipson. 2006. Chicago: University of Chicago Press. ISBN: 978-0-226-48475-4. 197 p. including index. \$10.00 USD (softcover).]

by Thomas Warren (*thomas.warren@okstate.edu*)

Previously published in *Technical Communication* 54(3):372–373, August 2007

The requirement to cite the work of others that you use in your own work derives from two main sources. First, there are moral and ethical reasons for indicating that you have used the ideas, images, and words of others in your own work. This approach is the one normally presented to students as they progress through the educational system. Second, there are legal issues that are frequently associated with using the work of others.

For students, citing the work of others is more of an exercise in avoiding a charge of plagiarism than it is in giving credit to those whose ideas, visuals, and words they may use. From middle school through university, and even professional school, students are exhorted to produce original work. Should they use ideas, visuals, and words from others, they are taught to cite those ideas using a specific form and format that depends on the class they are taking. If it is an English class, for example, they normally use the citation system developed by the Modern Language Association (MLA). If they are taking a social science class, they use the American Psychological Association (APA) system. If they are taking a biological sciences class, they use the Council of Science Editors (CSE) system. The marked differences in these three systems can lead to confusion. Lipson's book allows a student to move easily from one system to another in response to class requirements.

In addition to MLA, APA, and CSE, Lipson covers Chicago. These four constitute the major systems that students are taught. But Lipson presents citation systems for other disciplines as well: those used for anthropology and ethnography, biomedical sciences, chemistry, physics,

and mathematics, including computer science. He also covers two legal citation systems: Bluebook and Association of Legal Writing Directors (ALWD). In all, he covers 11 systems.

Lipson starts each main chapter by explaining each system's standard parts, and he shows how these relate to the examples. One useful feature in each of these chapters is a brief table of contents for the examples. This device allows you to find the example that best matches your reference.

In the chapter on CSE, he shows the three varieties of systems approved for use: citation-sequence, using numbers in the text and a listing of the items according to the order of their appearance in the text; citation-name, also using a numbered sequence in the text plus an alphabetical listing by author surname; and name-year, using the last name of author plus year and an alphabetical listing by author surname.

What makes this book especially useful for technical communicators as well as for students is that Lipson provides lots of examples for each system. Also, because students are frequently bedeviled by an unusual citation, his examples are wide-ranging. How, for example, do you cite the location within a Web site of a specific paragraph when there are no pages as such? If the student is using the MLA citation format, the answer is to cite the title of the article, indicate that it is a Web page, and provide the date, the data accessed, and the URL. For APA, the student cites the article title, the date retrieved, and the URL. Lipson's examples cover just about any work in any form that you might wish to cite.

The book opens with two chapters answering such matters as "Why cite?" and "The basics of citation". Eleven chapters then follow, one each for the different citation styles. Chapter 14 presents frequently asked questions about all reference styles.

I was a little disappointed in Lipson's book for two omissions. The first is the Columbia guide to online style, which tells you how to cite digital documents, an important concern for technical communicators. The second is the Vancouver citation agreement. Over 40 science journal editors met in Vancouver and agreed on a particular documentation style for their journals that cross all lines in science publishing. For technical

(continued on page 12)

Cite right, continued from page 11

communicators working in science, this system is too important to omit.

Overall, however, this \$10 book is a real bargain and an excellent addition to the libraries of editors, proofreaders, and technical communicators, as well as students. Ω

Tom Warren (thomas.warren@okstate.edu) is an STC fellow, a winner of the Jay R. Gould Award for Teaching Excellence, and professor of English (technical writing) at Oklahoma State University, where he established the technical writing programs. He is also past president of INTECOM and guest professor at the University of Paderborn, Germany.

Parting thoughts

"Perhaps some physicist will point out that it may be new and better equipment rather than new dangers that detects 100 parts per trillion of something in the well when there were zero parts per billion before."

—George W. Thomson, *The Brocken Specter, Acceptable Compromise, and Other Illusions*

"Though many scientists talk easily and well about the particular individual hypotheses that underlie a concrete piece of current research, they are little better than laymen at characterizing the established bases of their field, its legitimate problems and methods. If they have learned such abstractions at all, they show it mainly through their ability to do successful research."

—Thomas Kuhn, *The Structure of Scientific Revolutions*

"No sensible decision can be made any longer without taking into account not only the world as it is, but the world as it will be."—Isaac Asimov, scientist and writer (1920–1992)

"Knowing what / Thou knowest not / Is in a sense / Omniscience."—Piet Hein, poet and scientist (1905–1996)

"The Enlightenment may well have outlived its usefulness, but it is only through Reason's protocols that one can make a coherent case for Reason's limitations."

—James Morrow, *The Last Witchfinder*

"Human beings are perhaps never more frightening than when they are convinced beyond doubt that they are right."

—Laurens van der Post, explorer and writer (1906–1996)

"We tend to overestimate the effect of a technology in the short run and underestimate the effect in the long run."

—Roy Amara, engineer, futurist

"What is wanted is not the will to believe, but the will to find out, which is the exact opposite."—Bertrand Russell, philosopher, mathematician, author, Nobel laureate (1872–1970)

Editorial, continued from page 2

out to have been astonishingly prescient about an unpleasant reality we are gradually coming to recognize: that there *are* limits to growth. Recently, it's become apparent that we're running out of many chemical elements that are essential to our prosperity; see the January 2006 issue of *Scientific American* for one example (<http://www.sciam.com/article.cfm?id=measure-of-metal-supply-f>). These kinds of problems are particularly unpleasant if we're accustomed to gazing over the horizon in search of solutions; when we forget to occasionally cast our gaze downwards to the muck at our feet, we risk tripping over something unseen and finding ourselves face down in that muck.

As scientific communicators, we find ourselves embedded in a culture of relentless optimism and excitement about new discoveries and new implementations for old discoveries. This makes our work more than just lucrative: it makes it *fun*. It's why so many of us love working with scientists, because they're always turning over stones and finding something *cool*, or at least finding the kinds of fascinating, if faintly revolting, things that live under rocks. But we have a small advantage our scientist colleagues lack: we work at one remove from the science, and thus, can more easily achieve a modicum of critical distance. And that distance is necessary for us to grasp something the scientists may have missed, and hold fast to what we grasp—the scientists may be too busy holding up a rock with both hands.

Most scientists focus so intently on their research that they grow blind to other issues of equal or greater importance. If you've ever seen a scientist interviewed by someone hostile to their research, you've seen this phenomenon: the scientist, enthused, elaborates on the wonders of what they've found, and when the interviewer starts pointing out inconvenient truths, the scientist deflates and flops around like a wilted balloon in a strong breeze. Each new attempt to invoke logic provokes yet another seemingly irrational jab. Eventually, the painful interview ends, with neither side quite understanding why the other is being so unpleasant.

What is really going on is that scientists and the rest of humanity have different preoccupa-

(continued on page 13)

Editorial, continued from page 12

tions, and different concerns. Particularly today, more than 40 years after Rachel Carson's publication of *Silent Spring* (http://en.wikipedia.org/wiki/Silent_Spring), a seemingly unending stream of technological disasters (from Bhopal, Chernobyl, and the Exxon Valdez oil spill in the 1980s to ozone depletion and global warming today) has made the public increasingly skeptical about the unalloyed benefits of science and increasingly fearful about its side-effects. That's a paradigm shift that most scientists and technologists have failed to notice, possibly because the public itself has internalized this unease rather than making it explicit.

The scientist floundering during a hostile interview shows how the problem can trip us up when we least expect it: Scientists are very good at persuading each other using the language and rhetorical approach of science, but that language and approach can both fail dramatically when scientists must discuss their work with someone who lacks skill with the language and distrusts the rhetorical approach—the general public and governments, for instance. Serious problems may result from this failure to understand their new audience: when scientists don't understand the context of their audience (distrust) and the audience's preferred rhetorical approach (often appeals to emotion rather than pure logic), the communication fails.

The consequences of that failure can be dramatic and severe. In China, for example, the Grain for Green Project represents the largest conservation set-aside program in history. Under this project and associated conservation efforts, the Chinese government is attempting to reforest or revegetate (with grassland species) on the order of 1 billion acres (yes, *billion*) of degraded land. It sounds great on paper, but it's also a textbook example of how science can go wrong when scientists focus on the science and ignore the surrounding reality. The problems began with a failure to consider both of the scientist's audiences. For the government audience, which is certain that reforestation is a laudable goal, the scientists failed to communicate the message that trees are not an appropriate solution everywhere, particu-

larly in the most arid areas of China. As a result, some researchers have estimated that more than 50% of the tree planting (possibly as much as 85% in some areas) will fail, and that the affor-

estation may even exacerbate environmental problems through depletion of the deep soil water that is required to sustain life in arid regions. For the general public, both the scientists and the government they advised through their research failed to clearly consider the needs of the people affected by the project. For example, farmers who abandon unsustainable agriculture in areas covered by the project receive annual grain

subsidies and financial compensation for up to 8 years if they plant trees and other vegetation. Unfortunately, the government policy makes no effort to retrain the displaced farmers before the program ends so that they will have alternatives to farming as a way to earn a living. When the program ends, many of the farmers will be forced to return to their old way of life.

That's an overly simplistic and unnuanced description of Grain for Green, but it illustrates the key problems. The scientists failed to communicate the limitations of their research in such a way that the government would understand that trees are not the best solution everywhere, and they failed to clearly communicate the impacts on the general public of implementing the policy. If this sounds familiar, it's because the problem is by no means limited to China. We face similar problems in the developed world, possibly exacerbated by how the modern economy focuses on short-term profit rather than long-term sustainability. Economic growth has become such a government priority that few in government think about the consequences of that growth.

It's unrealistic to assume that communicators alone can change things, since we usually lack the power and credibility of our scientist colleagues. Moreover, those colleagues often lack the power to shape policy—witness the reckless government disregard of warnings from key science advisors on a wide range of issues. But we can nonetheless invoke the ghost of Malthus and ask ourselves what the limits are to any new discovery or technology. That's particularly important

(continued on page 14)

“... when scientists don't understand the context of their audience (distrust) and the audience's preferred rhetorical approach (often appeals to emotion rather than pure logic), the communication fails.”

Editorial, continued from page 13

if we're the only ones asking that question. This is where our communication skills might save the day: by understanding the language, rhetorical and other needs, and communication styles of those we are attempting to persuade, we can craft our words in such a way that they convey the right message, and convey it clearly enough to be understood and to persuade the listener. Moreover, we also understand how to learn about audience needs and how those needs might differ from scientist and government perceptions of those needs. This critical distance gives us an opportunity to advocate for policies that will better meet those needs.

If you've ever doubted that the work you do is important, I urge you to think about the limitations of what your scientists colleagues are researching, about the consequences of their discoveries outside the field of science, and about the barriers to making key decisionmakers understand those limitations. This is where we can truly make a difference. **Ω**

Discussion groups

Scientific Communication community

STC and our community run an e-mail discussion group that provides a quiet, friendly place to turn for help if you've got any questions concerning scientific communication. To join, point your Web browser to:
<http://lists.stc.org/cgi-bin/lyris.pl?enter=stcscsig-L>

There's no cost to join, and you can expect a very low volume of mail. Of course, the more people who join, the more traffic there'll be, so please join. It's a great way to make the community work for you.

Editing

If your work involves lots of editing, consider joining the **Copyediting-L** e-mail discussion group, which focuses on editing in all its various forms. The group is not affiliated with STC, but you'll find many STC members there. To join, point your Web browser to:
www.copyediting-L.info/

Technical writing

If you do a lot of technical writing, join us on **Techwr-L** to discuss the tools and travails of the technical writer. The group is not affiliated with STC, but you'll find many STC members there. To join, point your Web browser to:
<http://lists.techwr-L.com/mailman/listinfo/techwr-l>