

The Mythical Retention Chart and the Corruption of Dale's Cone of Experience

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In response to the wide-scale proliferation of “the cone of learning”—a fanciful retention chart confounded with Dale’s Cone of Experience—the authors make four major claims debunking this fantasy and provide documentary evidence to support these claims. The first claim is that the data in the mythical retention chart do not make sense: they clearly are not and cannot be construed as actual research findings, and, in addition, they are highly unreliable in that the percentages have been reported in dozens of permutations. Second, Edgar Dale’s Cone of Experience, even in its original form, has been misinterpreted and misused as a prescriptive guide, in ways not appropriate for a descriptive schema. Third, superimposing the mythical retention data on Dale’s Cone is completely unjustifiable. Fourth, both the mythical retention chart and the corrupted Dale’s Cone have murky provenances. Diverse versions of these concepts can be traced at least to the early 20th century (for the retention data) and to the 1970s (for the corrupted cone). Each of the sources proclaimed by others to be the correct one for the mythical retention data and the corrupted cone are examined and proven false.

The Problem: Myths Proliferating, Combining, and Metastasizing

Over the past century, the literature of education and training has been polluted by references to several constructs under the headings of “What We Remember” and “The Cone of Learning” that have been concocted, conflated, plagiarized, perverted, and misused in myriad

ways. The problem, although egregious, was somewhat more manageable in the pre-Internet age, when the publication of scholarly material was subjected to some measure of peer review or editorial discretion and the dissemination of trainers’ handouts was mostly hand-to-hand. With the blossoming of the World Wide Web, thousands of “authors” have been able to disseminate their misinformation without gatekeepers and without the constraint of physical proximity, and thus the problem has grown in scope, morphing into increasingly garbled fiction. Not only scholars are affected; learners—both face-to-face and distant—in classrooms, training centers, or homes are being subjected to lessons designed according to supposed principles that are both unreliable and invalid. In any profession this would be called malpractice.

Our objective here is to systematically deconstruct the various problematic concepts associated with the “cone of learning” and to cast light on the issues distorted by these meandering canards. We are not claiming to be the first to notice these problems or to address them directly in the scholarly literature. There have been several well stated critiques, beginning as far back as 1971 and emerging in force after 2002, as is discussed at length in this special issue (see “Previous Attempts to Debunk the Mythical Retention Chart and Corrupted Dale’s Cone”). However, we do claim to treat this problem more systematically, thoroughly, and comprehensively than previous efforts.

There are three main targets of our investigation. The first is the data table, shown in *Figure 5*,* which we refer to as the *retention chart*. The wording and numbers in the chart are those used in the version shown in DeForest G. Treichler’s article in *Film and Audio-Visual Communication* (Treichler, 1967), which some have cited as an early, credible source. We are treating this as the canonical version of the retention chart, the one to which others can be compared.

The second target is the visual classification schema devised by Edgar Dale, shown in *Figures 2 and 3*, which he called the Cone of Experience. *Figure 3* shows our abstraction of Dale’s Cone appearing in the second and third editions of his textbook (Dale, 1954, 1969); it is the earliest version of the Cone that contains all the elements created by Dale. We suggest that this be regarded as the canonical version of Dale’s Cone of Experience.

The third target is a visual that combines the data from the retention chart with the pyramidal arrangement of learning methods of Dale’s Cone. As we will demon-

* As explained in the *Introduction*, all of the 16 Figures referenced in the articles comprising this special issue are placed together in a separate, dedicated section of this issue rather than being dispersed across the issue.

strate, this is indisputably an illegitimate distortion of Dale's Cone; it is *not* Dale's Cone of Experience. We refer to it as the *corrupted cone*, since it inappropriately superimposes the mythical retention chart over the original Cone of Experience of Edgar Dale, badly distorting Dale's original idea. The version shown in *Figure 10* is typical of the hundreds of variants, the range of which is illustrated by *Figures 10 to 16*. There is no canonical version of the corrupted cone. As is discussed at greater length later, we have not been able to determine when or by whom Dale's Cone was first corrupted with the retention data, but it was probably sometime around 1970.

These constructs have been the subject of numerous misunderstandings and misuses, which we will explore in detail. *The four major claims we make are:*

1. The data shown in the retention chart cannot reasonably be construed as research findings; they are both invalid and unreliable.
 - a. None of the purported sources of research backing the retention data stands up to scrutiny; indeed, the retention data can be found in the public record prior to the existence of the purported research agencies.
 - b. The percentage numbers themselves (10, 20, 30, etc.) lack face validity as possible research findings.
 - c. The retention chart data hide or misrepresent the issues involved in evaluating the effectiveness of visuals for purposes of learning.
 - d. In addition, the actual numerical claims of the retention chart are highly unreliable; they have been altered many times to fit the purposes of various writers.
2. Dale's Cone of Experience even in its unadulterated form has been misused regularly in the literature of educational technology.
3. The retention chart has been overlaid illegitimately onto Dale's Cone of Experience; the two constructs have been fallaciously confounded, thus corrupting the original intent of Dale's Cone.
4. The retention chart and the corrupted cone each have a murky provenance.
 - a. The pursuit of the original source(s) of the retention chart and corrupted cone has been impeded by a plethora of erroneous citations.
 - b. Putting aside the false sourcing, the origins of neither the retention chart nor the corrupted cone can be firmly established by the evidence found up to this time.

Claim 1: Unreasonableness of the Retention Chart

The percentages shown in *Figure 5* purport to show the amount of something (facts? concepts? procedures? principles?) that people remember (how long?) as a

result of different teaching-learning treatments. These percentages have reverberated throughout the literature of training and in certain quarters have gained the aura of "accepted truth" or "conventional wisdom." Naïve designers looking at the retention chart might conclude that they could automatically enhance the achievement and retention of educational objectives by merely selecting one particular treatment or a certain combination of treatments associated with "90% retention." However, a closer look reveals that the data are virtually uninterpretable on their face as well as totally unsupported by actual empirical research.

Claim 1a: No Body of Research Supporting Retention Data

When the retention chart is trotted out it is often accompanied by a claim that it is a summary of some body of research—by the US Army, by Socony-Vacuum Oil Company, by the NTL Institute, by Forrester Research, by William Glasser, or by some combination of the above. A source sometimes cited as an early authority is Treichler (1967). In fact, Treichler only makes passing reference to "studies that indicate what people generally remember" (p. 29) with no hint as to who might have conducted such purported studies—as discussed elsewhere in this special issue in "The Good, the Bad, and the Ugly: A Bibliographic Essay on the Corrupted Cone." Treichler may have been one of many who saw the retention chart in a handout labeled TIM-151, associated with the University of Texas extension division. That version of the retention chart was created in Texas in 1947 by Paul John Phillips, coming from the US Army's Ordnance School, according to Cyrus (1963; see *Exhibit 13*).^{*} As discussed in "The Good, the Bad, and the Ugly: A Bibliographic Essay on the Corrupted Cone," the official history of the Ordnance School (US Army, 1943) makes no mention of research being conducted up to that time.

However, Cyrus (1963) says he recalls Phillips talking about research. That is the one scrap of evidence connecting the retention chart to any body of research. Balancing this claim of formal research is a statement made by Phillips himself, according to Curl (1971):

These percentages are clearly only approximations, but they do indicate where emphasis in training should be placed. We shall be much more certain of this, however, if we can find some practical proof. What, for example, did the Army find out about learning *in the vast laboratory of its experience* in training millions of men? [Emphasis added.] (p. 32)

^{*} As explained in the *Introduction*, all of the 13 Exhibits referenced in the articles comprising this special issue are placed together in a separate, dedicated section of this issue rather than being dispersed across the issue.

The phrase “vast laboratory of its experience” reportedly used by Phillips implies the accumulated wisdom gained through trial-and-error rather than through structured experiments. If Phillips had participated in or had other first-hand knowledge of US Army research on the learning effectiveness of different instructional treatments, would he not have mentioned it explicitly?

Further undercutting any claims of being based on research done by military services or oil companies is the simple fact that various versions of the retention chart data have been circulating since at least early in the 20th century, before the military services or oil companies had training research capabilities. Two examples:

- In 1914, R. D. Calkins, head of the geography department at the Central Michigan Normal School, made a presentation to the Michigan School Masters Club, which was subsequently published (Calkins, 1918). Speaking about the teaching of map-reading skills, he said “In addition they have the advantage of fixing in the mind the facts which they represent, for it is said we remember 10% of what we hear, 15% of what we read and 20% of what we see.” (pp. 22–23)
- In 1922, an Oklahoma newspaper story about county agricultural extension agents (County Agents, 1922) says “We know, as has been said before, that the average person retains only about ten percent of what he reads and about eighty-five percent of what he sees” (p. 8), after citing different figures earlier in the story.

Note that both these sources refer to the retention data as something already well known, not something newly discovered.

Other purported sources mentioned above—Forrester Research (*Exhibit 7*), the William Glasser Institute (*Exhibit 8*), and the NTL Institute (*Exhibit 10*)—each at some time was perceived to be the source of the research supporting the retention data, although none of these claims are found on their Websites in 2014. The claims and the evidence for each of these sources are discussed later in this article, but suffice it to say they are manifestly untrue, since the retention figures existed, at least in the form of folkloric maxims, before any of these organizations existed.

Claim 1b: Lack of Face Validity

Face Validity

It is immediately suspicious that the canonical form of the retention data (*Figure 5*) shows the retention results advancing neatly in increments of 10. Obviously, legitimate research (if the hypothesis implied in the retention chart *could* be tested by legitimate research) would not yield results of such neatness. Yet it is the very neatness of the data that makes this canard attractive and memorable. Units of ten are ingrained in the Western mind—

Top Ten lists, Athlete of the Decade, the Ten Commandments. Because both Roman and Arabic numbering systems use the Base 10 system, it is ingrained in our culture, so seeing things in groups of ten feels natural.

Reasonableness of Methodology

The reasonableness of the data can be questioned simply by asking the most rudimentary questions about the sort of research that might address the issues of “learning from mediated instruction.” To begin with, any research psychologist would understand that the measurement situation affects the learning outcome. If students are studying foreign-language vocabulary by listening to an audio recording and vocalizing their responses, it makes no sense to test them by written questions and answers. Conversely, people who learn by reading printed words could hardly be tested by asking them to vocalize their responses. Thus, the learning goal dictates the testing method, and two completely different types of learning (listening vs. reading) could not reasonably be tested by the same instrument. The two different types of instruments would not yield percentage results that could be compared with each other; it would be apples to oranges. For example, would you say that a boxer who wins 70% of his bouts is a better athlete than a golfer who wins 60% of his matches? The metrics are simply incomparable.

As early as 1978, Dwyer (p. 10) posed these questions about the retention data: What research methods were used? What sorts of learners were involved? How was the instruction presented? What sorts of learning objectives were pursued, and how they were measured? Those who uphold the retention chart provide answers to none of these questions. Frank Dwyer’s own program of rigorous and systematic research on learning from visuals is described in “The Good, the Bad, and the Ugly: A Bibliographic Essay on the Corrupted Cone” in this special issue.

More recently, Dwyer (2010) repeated his earlier methodological challenge, reiterating his claim of failure on the part of those who support the mythical retention data and citing specific recent studies—his own and others—that refute the retention chart generalizations.

Claim 1c: Hiding or Misrepresenting the Issues in Evaluating Visual Effectiveness

Comparison with Actual Published Data

There is within educational psychology a voluminous literature on remembering and learning from various mediated experiences. Nowhere in this literature is there any summary of findings that remotely resembles the fictitious retention table. On the contrary, generalizations about media treatments are difficult to draw. Those that can be drawn tend not to support the

mythical retention table. We could fill many pages with findings of actual research but will offer just a few representative examples.

When Fleming (1987) summarized findings about learning from visual displays, he concluded that:

- “Realism per se is not necessarily a virtue in instruction” (p. 242).
- “Pictures and words can be reciprocally beneficial; words can delimit and interpret pictures and pictures help define, exemplify, and make memorable words” (p. 242). But as Gagné and Glaser (1987) added: “However, it is not clear that adding images to material that is otherwise semantically well organized is always of benefit to retention...” (p. 60)

When Barron (2004) summarized findings on learning from audio sources, she concluded that:

- In terms of short-term memory “audio information...is recalled better than the same information presented visually.” (p. 958)
- In terms of long-term memory, “studies have produced conflicting results.” (p. 958)
- “It seems evident that there are many variables that influence optimal combinations of audio and visual information, including the type and complexity of the information, the attributes of the target audience, and the level of redundancy.” (p. 962)

Research on context-dependent memory—such as is reviewed by Smith (1988) and Bjork & Richardson-Klavehn (1989)—shows that the people are aided in memory retrieval when they perceive contextual stimuli similar to the stimuli they perceived during learning. This robust characteristic of human learning makes comparisons between the different contexts reported in the retention chart (i.e., hearing, seeing, reading) impossible to assess fairly. For example, if people learn a word and its definition by writing down the definition after seeing the word on a page, they will likely be aided in retrieval by seeing the written word on the page in comparison to hearing the word read aloud. So the question then becomes: What is the retrieval context—the testing situation—for the comparison between hearing, seeing, reading, doing, etc., and does it favor one over the other?

Suffice it to say, in the realm of learning from mediated instruction, generalizations are difficult to draw and if drawn are accompanied by caveats about what the subject matter was, who was being treated, and what learning objectives were pursued and how they were tested.

Claim 1d: Unreliable Representation of the Data

Making sense of the retention chart is made nearly impossible by the varying presentations of the data, the numbers in the chart being a moving target, altered by

users to fit their individual biases about desirable training methods.

First, since there is no original authoritative source, people have felt free to recast the retention chart in ways that fit their own purposes. For example, comparing *Figure 5* to *Figure 6*, the claim has shifted from “remember” to “learn,” three new categories are added or substituted, and one of those new categories has a new percentage—95%—not previously seen.

For a second example, comparing *Figure 5* to *Figure 7*, the categories have been totally changed and two new percentages introduced—5% and 75%.

In *Figure 8* the percentages are converted to a bar graph and one category is dropped with two new ones substituted, with “reading, discussing & doing” now taking over the 90% place. The 90% place is the favorite subject of creative substitution. Whatever is the method being advocated by the writer, that method moves into the 90% slot; some of the 90% occupants include: “what we teach to someone else” (*Figure 6*), “reading, discussing & doing” (*Figure 8*), “what they say as they do an activity” (*Figure 10*), and “teach others/immediate use” (*Figure 11*).

Holbert and Karady’s (2008) criticism of the misuse of the retention chart in engineering education shows that the numbers in the chart are reported highly unreliably, with six authors presenting six different versions of the numbers! (p. 4) One of the very earliest published sources (County Agents, 1922) manages to top that: the authors actually cite two completely different sets of retention numbers in the same newspaper article! (See “Timeline of the Mythical Retention Chart and Corrupted Dale’s Cone” for details.)

To summarize Claim 1, we have shown that the validity of the data in the retention chart does not stand up to the slightest scrutiny, either in terms of being framed in a sensible fashion or in terms of congruence with actual research findings. From what we know about visual and auditory learning, the purported data simply do not make sense. In addition, we have shown that the retention chart data lack reliability as well as validity. Authors have blithely altered the retention chart data to fit whatever purpose they were pursuing.

Claim 2: Dale’s Cone Misused

Edgar Dale’s Schema

Introduced by Edgar B. Dale in his textbook on audio-visual methods in teaching (1946), the Cone of Experience is a visual schema intended to depict his classification scheme for the various types of learning experiences. The organizing principle of the Cone is a progression from most concrete learning experiences (bottom of the cone) to most abstract (top of the cone), shown in *Figure 2*. The cone shape was meant to convey the gradual loss of sensory information

at each step upward toward greater abstraction.

Dale made minor modifications of the Cone in the second edition (1954), adding "Educational Television" (see *Figure 3*). In the third edition (1969) he acknowledged the growing influence of Jerome Bruner's cognitive psychology concepts by comparing Bruner's classification system for modes of learning—enactive, iconic, and symbolic—to his own categories, suggesting that his Cone's 11 categories could be grouped into a "threefold arrangement of learning possibilities"... "direct, firsthand participation to pictorial representation and on to purely abstract symbolic expression" (p. 108). This reinterpretation of his own schema may have been portentous, perhaps giving implied license to others to later make other "creative" adaptations.

Dale's own claims for the cone were modest and qualified, at least in the first edition of his textbook. The categories were not "rigid, inflexible divisions" (1946, p. 37) and should not be viewed as any sort of "hierarchy or rank order" (1946, p. 47).

Misuses of Dale's Cone

Not a Prescriptive Guide

The root of all the perversions of the Cone is the assumption that the Cone is meant to be a prescriptive guide. Dale definitely intended the Cone to be descriptive—a classification system, not a road map for lesson planning. He came close to drawing this distinction explicitly when he stated in the Summary of his chapter on the Cone: "The cone, of course, is merely an aid to understanding this subject...something to help explain the relationship of the various types of sensory materials..." (1946, p. 52). The key words are *understand* and *explain*. These words indicate a descriptive purpose, not a prescriptive one.

On the other hand, Dale himself sometimes fell prey to the urge to extend the descriptive construct to prescriptions, as pointed out by Subramony (2003). References to "uses" or "implications" of the Cone are scattered throughout Dale's textbook, especially the later editions (1954, 1969). An example from the third edition (1969): "When properly understood and used, however, the Cone can be a helpful and practical guide" (p. 110). With this sort of ambiguity from the author, it is not surprising that some of his readers attempted to use the Cone as a prescriptive guide to lesson planning.

Audiovisual as Superior to Verbal

When the Cone is used as a prescriptive guide, it can be misused in support of any mediated experience that is "lower on the cone" than another, for example, advocating the use of a simulation rather than a video presentation. This bias toward the more concrete activities is multiplied many-fold when the mythical data are superimposed. Now, the "lower" activities are suppos-

edly both more concrete and better retained! Of course, in Edgar Dale's day many of those who referred to the Cone were advocates for audiovisual media, and they tended to selectively emphasize those aspects of the Cone that supported their claims—audiovisual media being superior to verbal symbols. Thus, by the time of his third edition (1969) Dale found it necessary to devote six pages of the chapter on the Cone to "Some Possible Misconceptions" (1969, pp. 128–134).

Origins of the Cone's Concepts

The concepts of Dale's Cone were not entirely original to him. Parallel ideas appeared in the literature of education prior to 1946. Saettler (1990) points to *Exposition and Illustration in Teaching*, published in 1910 by John Adams, "which included the following 'order of merit' concerning concreteness: '(1) the real object, for which anything else is a more or less inefficient substitute; (2) a model of the real object; (3) a diagram dealing with some of the aspects of the object; and (4) a mere verbal description of the object'" (Saettler, p. 140).

Closer to the time of Dale's writing, the new philosophical paradigm of General Semantics had been introduced by Alfred Korzybski (1933); it influenced a generation of scholars in linguistics, communication theory, education, psychology, and many other fields. The greatest popularizer of Korzybski's theories was S. I. Hayakawa (1941). Borrowing from Korzybski's visual construct of "the Structural Differential," Hayakawa offered "The Abstraction Ladder," a visual schema illustrating the consequences of using words to describe a living object or event as opposed to pointing to the thing itself (pp. 126–127). Hayakawa used the concept of a ladder to show how as our representations move up from the concrete level to more and more abstract levels, they are more prone to misinterpretation, which is the core idea of Korzybski's General Semantics. The General Semantics movement was sweeping through North American scholarly circles at the time Dale was writing, and he certainly would have been affected by these revolutionary concepts.

However, a more direct antecedent of the Cone is a diagram created by Charles F. Hoban, Charles F. Hoban, Jr., and Samuel Zisman (1937), shown in *Figure 1*. They made the conceptual breakthrough of constructing a chart in which visual media are arranged along the y axis, while the learner's level of development—from the concrete level of thinking to the abstract level of thinking—is arrayed along the x axis. In applying the graphic to a particular case, one would locate the learner's current level of conceptual development (concrete to abstract) then trace up to the slope line and then horizontally over to the instructional treatment that intersects at the same point. Hoban, Hoban, and Zisman's categories were: total situation, objects, models, films, stereographs, slides, flat pictures, maps,

diagrams, and words. Although Dale's schema appears to be quite derivative of Hoban, Hoban, and Zisman's graphic, he does not explicitly acknowledge this source, although he makes several references to their book elsewhere in his textbook.

To summarize our Claim 2, we have shown that even without the overlay of the specious retention chart, Edgar Dale's Cone of Experience has been prone to misuse, even by Dale himself, primarily in terms of representing it as a prescriptive guide. Dale originally intended it only as a descriptive schema. Even as such, the schema was not original to Dale nor was its validity ever backed by any theoretical or empirical support, especially not for prescriptive use.

Claim 3: Combining the Retention Chart with Dale's Cone

The mythical retention data and the concrete-to-abstract cone evolved separately throughout the 1900s, as illustrated in "Timeline of the Mythical Retention Chart and Corrupted Dale's Cone." At some point, probably around 1970, some errant soul—or perhaps more than one person—had the regrettable idea of overlaying the dubious retention data on top of Dale's Cone of Experience; we refer to this concoction as the *corrupted cone* (Figures 10–16).

We do not know the identity of the first fabricator(s) of the corrupted cone, but it surely was not Edgar Dale, who reigned as the intellectual leader of the audiovisual field from the 1940s through the 1960s. He retired in 1970 and died in 1985, so he was neither around to gin up variations of his Cone nor to defend himself from those who did. After his retirement, a special issue of the journal *Theory into Practice* (Wagner, 1970) was organized as a tribute to him and his work; none of the 11 articles mention any modifications of the Cone, which were yet to become visible.

The earliest report we have found for a sighting of the corrupted cone is by James E. Stice (personal communication, April 14, 2014), who has provided a visual similar to our Figure 15, claiming "I obtained these data as a handout at a 'Train the Trainer' workshop held at the University of Wisconsin-Eau Claire in 1970. The source was listed as 'Socony-Vacuum Oil Company.'" Note that Stice is referring to the *retention data*, not the combination of the data with the Cone. It is not clear whether the document he transmitted to us was the same one he remembered receiving in 1970. It is unlikely because the document he sent had a source note running along the right margin: "developed and revised by Bruce Nyland from material by Edgar Dale." In 1970 Bruce R. Nyland was still in the first years of his stint as an instructor of philosophy at the College of William and Mary. He did not become a substance abuse educator until after he joined the staff of Fort Eustis in 1972, as discussed in "The Good, the Bad, and the Ugly: A

Bibliographic Essay on the Corrupted Cone."

Another version of the corrupted cone appeared in a book, a train-the-trainer manual prepared by Ann R. Bauman (1977, reprinted 1979), distributed by the National Institute on Drug Abuse. The version found in that manual looks like our Figure 14, including question marks in the top and bottom categories, with the note "***Question marks refer to the unknown." There is no clue in the narrative text as to why the mysterious question marks are inserted. The footnote says "See Wiman & Mierhenry's [*sic*] *Educational Media*, Charles Merrill, 1969, for references to Edgar Dale's 'Cone of Experience.'" (See Exhibit 12 for other examples of this bogus citation.) The entire narrative text accompanying the Cone says:

An important principle, supported by extensive research, is that persons learn best when they are actively involved in the learning process. The "Learning Cone," in the Resource Manual on page __, shows various learning activities grouped by levels of abstraction. The left column indicates their relative effectiveness as training techniques. (p. 1–39)

The fact that Bauman refers (inaccurately) only to a book that does not contain an image of Dale's Cone nor any version of the retention data suggests strongly that she borrowed the corrupted cone and the reference from some other source. We can be confident that Bauman is not the originator of the conflation, and she does not claim to be.

Another 1977 publication (Nutting) presents a quite different version of the corrupted cone, similar to our Figure 16, with the learning methods and retention percentages rounded into just three categories. The caption to Nutting's visual says: Adapted from Mildred Arnold, "How Children Learn" (unpublished) and Edgar Dale, *Audio-Visual Methods in Teaching* (New York: Dryden Press, 1946), p. 38.

This is yet another vain attempt to ground the corrupted cone in some respectable source. Of course, Arnold's "unpublished" document is nowhere to be found, and we know Dale's works do not include the retention data. Again, it is clear that the "cone of learning" shown in Nutting's book existed prior to Nutting's writing, but where and by whom we have not yet been able to determine.

Identifying the original culprit who thought of overlaying the mythical retention data on Dale's Cone is not critically important. Indeed, this inappropriate juxtaposition might have been dreamed up by several different people at different times. What we do know is that over the succeeding years the corrupted cone spread widely from one source to another, not in scholarly publications—where someone might have asked hard questions about sources—but in ephemeral materials, such as handouts and slides used in teaching

or manuals used in military or corporate training.

With the growth of the Internet, then World Wide Web, after 1993 this attractive nuisance spread rapidly, even virally. Imagine the retention data as a rapidly mutating virus and Dale's Cone as a host; then imagine the World Wide Web as a bathhouse. Imagine the variety of mutations and their resistance to antiviral treatment. A Google search in 2014 revealed 11,000 hits for "Dale's Cone," 14,500 for "Cone of Learning," and 176,000 for "Cone of Experience." And virtually all of them are corrupted or fallacious representations of the original Dale's cone. It just might be the most widespread pedagogical myth in the history of Western civilization!

Dale's Cone when combined with the fallacious retention chart may take many forms, making it difficult to talk about a single "corrupted cone." There are many, many corrupted cones, bearing a number of different names, but usually including some combination of the words Dale, Cone, Pyramid, Learning, and Experience. We have taken the dozens, if not hundreds, of variations and compressed them into seven stereotypes that capture the range of variations, *Figures 10 to 16*. These abstractions leave out the colorful and artistic embellishments that have been draped upon the corrupted Cone...and they are a wonder to behold. But most of the variations out in the marketplace of ideas are within "one degree of separation" of one of these stereotypes in terms of their critical attributes, if not in terms of their imaginative embellishment:

- *Figure 10*—Dale's categories are condensed into six categories to match the number of percentages available, and the content of the categories is substantially altered to more closely resemble the methods employed in contemporary classrooms.
- *Figure 11*—Treichler's percentages are expanded (adding 5% and 75%) and matched with learning activities considerably altered from Dale's original list. The 90% category focuses on teaching others, which is not mentioned anywhere in Dale's or Treichler's discussions.
- *Figure 12* creatively combines "remembering" outcomes and "learning" outcomes; the condensed categories are aligned with a set of learning outcomes, implying that methods lower on the cone, such as "saying as they do a thing" are more appropriate for higher-order objectives, just as they are better for retention.
- *Figure 13* supposedly addresses "Web Delivery Methods" (keeping in mind that the Web did not exist in Dale's lifetime) and proposes that Dale's categories could be aligned not only with retention rates but also with different learning styles.
- *Figure 14* expands Dale's categories, rather mysteriously adding question marks which "refer to the unknown," perhaps anticipating that other sorts of learning activities may be invented in the future.

In addition, the learning activity categories are clustered into groups based on "nature of involvement."

- *Figure 15* is similar to *Figure 14*, but omits the question marks and modifies the wording of the categories to more nearly match the intent of Dale's original categories; it also makes the groupings more explicit and adds yet another dimension, Active-Passive.
- *Figure 16* differs most dramatically from the canonical version, condensing Dale's 11 categories into three and condensing the usual half-dozen percentages into three also.

To summarize our third claim, the overlay of the retention chart onto Dale's Cone is totally fallacious. We cannot determine who was the first to fabricate the combination, but Dale certainly did not intend or approve of it, and no subsequent purveyor of the formulation ever provided logical or empirical justification for it. It is simply bogus—both invalid and unreliable, and the proliferation of variations demonstrates the instability of the corrupted cone construct; it can be shamelessly adapted to support any pet theory of instruction.

Claim 4: Murky Provenance

Although many of those who make reference to the retention chart imply that they know the source of the data and consider it to be trustworthy, in reality it is exceedingly difficult to trace the provenance of the data. We know that various versions of the retention data existed in folklore at least since early in the 20th century, and probably before. In the context of training and education in the US, the most popular early published reference is Treichler (1967), who presents the data in his 'Figure 5,' but cites no source for the data. He dodged any challenge to credibility by saying of his Figure 4 and Figure 5, both of which contained percentages, "If the latter two percentage figures are as valid as experience and research have shown them to be..." (p. 29). He treats the data as some sort of summary of conventional wisdom which is consistent with some unnamed research. Later he says "These figures, of course, are only approximate and subject to exceptions" (p. 29). The problem is that subsequent users of these data seem to accept them as valid results of actual empirical research.

Incidentally, Treichler was affiliated with the Mobil Oil Corporation. This company was known as Socony-Vacuum Oil Company prior to 1955, the Socony Mobil Oil Company between 1955 and 1966, and Mobil Oil Corporation after 1966; hence some users have referred to Socony-Vacuum or Mobil Oil Corp. as the sources of the percentages.

Where did Treichler encounter this so-called accepted wisdom? Prof. Frank Dwyer, when writing his book, *Strategies for Improving Visual Learning* (1978), contacted the Mobil Oil Corporation to follow up on

Treichler's article, since Mobil, Treichler's employer, appeared to be the source of the retention data. As Dwyer reported in a personal communication (February 9, 2007):

As I recall when I read the original article the percentage data depicted in the 4 tables was being distributed by the Socony-Vacuum Oil Company. I believe that I contacted the HR dept. at their headquarters in RI or NJ at the time and as a response I received a copy of the letter that I have provided a copy to you. Apparently, they had a number of inquiries before mine and had taken the time to draft the "limp" response.

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Still, Phillips could possibly be the major source for the version of the retention data (*Figure 5*) that has proliferated in the American community of corporate training and thereafter in American educational circles more generally. We know that Phillips (who died in 1950) prepared training materials for the University of Texas extension division and that a major audience of this training was oil industry workers. People, such as D. G. Treichler, who later became trainers at American oil companies, could very well have encountered the retention chart through the handout to which Cyrus refers, since the handout was in circulation between 1947 and 1963, at least. From whatever the original source(s), the retention data most likely passed from person to person through handouts and slides used in various training centers. It is unclear whether Treichler's article was the source used by others that came after 1967. It is rarely cited directly, although Treichler's version of the retention chart and the "Socony-Vacuum" label recur frequently.

To summarize this claim, we have shown that the canonical American version of the retention chart data may be attributed, very tentatively, to Paul J. Phillips, but it cannot be demonstrated that Phillips based these generalizations on any body of scientifically conducted research. Further, there is no conceivable sort of scientifically conducted research that could yield the neatly rounded increments found in charts such as *Figures 5, 6, and 7*. The references to the chart by those who have used it over the past century suggest a serious scholarly deficiency in terms of applying even the minimal standards of critical analysis.

Claim 4a: Erroneous Representation of Sources

Tracking the sources of the retention chart is made all more difficult because previous writers have muddled the supposed sources, including by claiming they discovered the percentages themselves, and by knowingly concocting false citations as well as by unwittingly providing incorrect citations.

False Citations

In addition to cases in which writers play fast and loose with the retention data, there are many more cases in which writers attribute the mythical retention chart to erroneous sources. Januszewski and Betrus (2002) have identified 14 erroneous sources, but here we will discuss the eight most common mistaken attributions, including one that appears to be intentionally fudged.

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hapless authors reaching for authority decided to attribute the retention chart to William Glasser (see *Exhibit 8*). They are presumably referring to Dr. William Glasser, a psychiatrist best known as the author of *Reality Therapy* (1965) and *Schools Without Failure* (1969). However, he had no demonstrable connection with the retention chart, and its content did not lie within his area of expertise. In the early 2000s the William Glasser Institute Website acknowledged receiving many inquiries about the retention data. They denied ownership of the retention data and helpfully referred inquirers to "Dale's Cone of Experience which can be found in *Education Media [sic]* by Wiman and Mierhenry [sic], Charles Merrill Publishers, 1969; *Experience and Learning—Developed and revised by Bruce Ryland [sic]* from material by Edgar Dale" (see *Exhibit 5*). Unfortunately, this dog's breakfast of a citation would not lead the reader to any relevant sources.

It is possible that some of the people who clasp onto the "Glasser" source are actually thinking of Robert Glaser, an educational psychology researcher who wrote extensively about the psychological principles underlying educational technology, placing these principles under a "systems" umbrella (Glaser 1962, 1965, 1968). Occasionally the name "Glaser" is used instead of "Glasser." But, like Glasser, Robert Glaser did not invent or comment upon the fallacious retention chart or corrupted cone.

British Audio-Visual Society

A popular false attribution outside the United States is the British Audio-Visual Society (see *Exhibit 1*), found in sources from the UK and Australia. As with Glasser, this choice seems to be totally fabricated, with no plausible connection to the retention chart or corrupted cone. Indeed, there is no British Audio-Visual Society, nor has there ever been one. This one lies on the outer reaches of sheer fantasy.

Chi et al.

One of the more enterprising misattributions is intentionally misleading (see *Exhibit 2*). Thalheimer (2003) discovered a bar graph illustrating the retention chart data (see *Figure 9*), attributed to "Chi, M. T. H., Bassok, M., Lewis, M. W., Reimann, P., & Glaser, R. (1989)." There is a journal article by those authors, but the graph does not actually appear anywhere in that article. The lead author of that journal article (Chi) confirmed to Thalheimer that she had never seen it before. So the person who concocted this misbegotten representation of the retention chart actually searched the literature to find a plausible title and author to cite. Because of the conscious effort required to concoct it, this version could only be labeled as fraudulent.

Claiming Discovery of the Data

Although the majority of retention chart purveyors refer

to some outside source, some lead the reader to believe that they actually discovered the percentages through their research. For example, a slide from a Forrester Research Webinar shows the retention data in bar graph form (*Exhibit 7*), with figures virtually identical to those published by Treichler in 1967 (*Figure 5*). The slide says: "Source: Forrester Research." Forrester may be the "source" of this layout of the data, but it is not the source of the data. This Webinar has been deleted from Forrester's Website since Thalheimer's 2006 critique.

To summarize this claim: the purported information is widely and wildly attributed to a variety of sources, all erroneous and some intentionally so. As a partial remedy, we offer further analysis of these claims and claimants in the companion article "The Good, the Bad, and the Ugly: A Bibliographic Essay on the Corrupted Cone."

Conclusions

The retention chart and the Cone of Experience were created separately, the former by an unknown source probably around the middle of the 20th century, based on folkloric formulations of the retention data going back to the early 20th century or before. The retention chart cannot be supported in terms of scientific validity or logical interpretability. The Cone of Experience, created by Edgar Dale in 1946, makes no claim of scientific grounding, and its utility as a prescriptive theory is thoroughly unjustified.

Some person or persons, so far unidentified, overlaid the two constructs to form the corrupted cone, which possesses the deficiencies of both of the flawed constructs—scientifically unfounded and logically indefensible. In addition, the corrupted cone has no reliable form or content; it has been represented in hundreds of variations of structure and informational content. No qualified scholar would endorse the use of this *mish-mash* as a guide to either research or design of learning environments. Nevertheless, it obviously has an allure that surpasses logical considerations. Clearly, it says something that many people want to hear. It reduces the complexity of media and method selection to a simple and easy to remember formula. It can thus be used to support a bias toward whatever learning methodology might be in vogue. Users seem to employ it as pseudo-scientific justification for their own preferences about media and methods.

These mythical constructs seem to be popular mostly among education and training practitioners who have limited awareness of the research literature on visual and auditory learning, not among researchers or serious educational technology scholars. They seem to be yearning for a simple answer to the questions about how humans learn and how we can best teach. And so a myth emerges and evolves into different forms to suit the needs of different audiences. Unfortunately, reality does not

match up well with the myth. Practitioners who pass along this advice deceive both themselves and their gullible audiences and they perpetuate a significant embarrassment to the profession. Further, they do a disservice to the very people the profession has dedicated itself to serve—learners, whether they be school children, college students, military or business trainees, or adult citizens. □

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