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Styles d'apprentissage: Humpty Dumpty revisité

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Résumé de l'article

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LEARNING STYLES: HUMPTY DUMPTY REVISITED

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ABSTRACT. What is a learning style? No one seems to know for sure. The language used by learning style theorists is filled with ambiguities. Price (2004) maintains that "learning style is often used as a metaphor for considering the range of individual differences in learning" (p. 681). Is learning style merely a fanciful metaphor or is it the wave of the future? The research offers mixed results. "Effects on improved test scores with testing conditions matched to student style have been published, but," Curry (1990) adds, "there are also studies showing no discernible effect attributable to learning style variation" (p. 54). How many distinct learning style models are there? The Coffield (2004) team identified 71 different learning style models, which they subdivided into 13 major and 58 minor models. One of the most popular learning style models comes from Rita and Kenneth Dunn. They have developed an eclectic model featuring 21 (23) different variables that influence a person's learning style. These variables run all the way from light and temperature to whether the person is analytic or global in his or her thinking. Rita Dunn says about the movement: "I want to convert the world" (Kortland, 2007, p. 8). And well she may. The Dunns' model is used in the United States, Canada, Great Britain, Australia, and a number of other countries. Is learning style a panacea or a placebo? The jury is still out on that question.

STYLES D'APPRENTISSAGE: HUMPTY DUMPTY REVISITÉ

RÉSUMÉ. Qu'est-ce qu'un style d'apprentissage? Nul ne semble tout à fait certain de ce que cela signifie. Le vocabulaire utilisé par les théoriciens des styles d'apprentissages est truffé d'ambiguïtés. Price (2004) soutient que le terme « style d'apprentissage est fréquemment utilisé comme une métaphore pour refléter l'éventail des différences individuelles face à l'apprentissage.» (p. 681) En fait, les chercheurs présentent des résultats variés. Selon Curry (1990), « si des effets positifs sur les résultats de tests dont les conditions respectaient le style d'apprentissage de l'étudiant ont été publiés, il existe également des études démontrant qu'il n'existe pas d'effet significatif attribuable à la variation des styles d'apprentissage. » (p. 54) Combien de styles d'apprentissage distincts peut-on répertorier? L'équipe de Coffield (2004) a identifié 71 théories différentes sur les styles d'apprentissages, en admettant toutefois qu'il pourrait en exister jusqu'à 100. Un des styles d'apprentissages les plus connus est celui popularisé par Rita

et Kenneth Dunn. Ceux-ci ont développé un modèle éclectique montrant 21 (23) variables différentes qui influencent le style d'apprentissage d'un individu. Ces variables comportent autant la manière dont la lumière, la température ou encore la personnalité analytique ou globale d'un individu influence son mode de pensée. À propos de ce mouvement, Rita Dunn déclare : « Je désire convertir le monde » (Kortland, 2007, p. 8). Elle le fera peut-être. Le modèle Dunn est utilisé aux États-Unis, au Canada, en Grande-Bretagne, en Australie et dans un grand nombre d'autres pays. Le style d'apprentissage est-il une panacée ou un effet placébo? Le jury délibère encore sur la question.

> "When I use a word," Humpty Dumpty said, in rather a scornful tone, "it means just what I choose it to mean – neither more nor less." "The question is," said Alice, "whether you can make words mean so many different things." *Through the looking-glass*

Why is learning style a Humpty Dumpty model of education? Because those who have fostered it, including Rita and Kenneth Dunn, have played fast and loose with their use of language. Familiar words have been assigned new and novel meanings. The word "style" has undergone radical surgery. It no longer comes as the result of years of painstaking practice; rather, it is something every child is either born with or acquires very early in life. Indeed, according to Dunn (1990), "three-fifths of learning style is biologically imposed" (pp. 15-16). Consequently, "those who suggest that children should learn to adapt to the teachers' styles disregard the biological nature of style" (Dunn, Beaudry, & Klavas, 1989, p. 56). Style is not only rooted in human biology, but it is divided along bipolar lines. Coffield, Moseley, Hall, and Ecclestone (2004) identified 30 such pairs. "The field of learning styles," Coffield (2005) observes, "suffers from almost fatal flaws of theoretical incoherence and conceptual confusion; for example, you can read about left-brainers versus right-brainers, pragmatists versus theorists, and globalists versus analysts" (p. 28).

Classification

The learning styles movement is an example of unfettered pluralism. Coffield et al. (2004) identified 71 different learning style models, which they subdivided into 13 major and 58 minor models. The major models were selected because of their theoretical importance, widespread use, and influence on other models. The minor models were considered to be extrapolations from the major models. The Coffield team developed a system for classifying different learning style models based on the criterion of how stable or flexible, biological or sociological, learning styles were regarded as being by their respective theorists. "Our continuum is based on the extent to which the developers of learning styles models and instruments appear to believe that learning styles are fixed" (p. 21). Based on their criterion, Coffield et al. divided the 71 theories into 5 different families, from which they culled out the 13 major models.

The descriptors for the 5 families and their 13 most significant members are as follows: (a) learning styles and preferences that are held to be largely biologically based, Dunn and Dunn, Gregorc; (b) learning styles reflecting deep-seated features of cognitive structure, Riding; (c) learning styles as a component of personality type, Apter, Jackson, Myers-Briggs; (d) learning styles as flexible learning preferences, Allinson and Hayes, Herrmann, Honey and Mumford, Kolb; and (e) learning styles as an aspect of learning approaches, strategies, orientations, and conceptions of learning, Entwistle, Sternberg, Vermunt (Coffield et al., 2004, pp. 19-22).

The Coffield (2004) team conducted an in-depth analysis of the 13 most significant models and their respective instruments. They looked at four measures of test construction: internal consistency, test-retest reliability, construct validity, and predictive validity. Given these four criteria, the Allison and Hayes' Cognitive Styles Index (CSI) received the highest rating. "Overall, the CSI has the best evidence of reliability and validity of the 13 models studied" (p. 23). The lowest ratings were given to Gregorc's Style Delineator, Kolb's Learning Style Inventory (LSI), and Sternberg's Thinking Styles Inventory (TSI). Coffield et al. called Gregorc's instrument "theoretically and psychometrically flawed" (p. 27). Kolb's inventory did not fare much better. "Problems about reliability, validity and the learning cycle continue to dog this model" (p. 31). The Coffield team seemed almost joyful in panning Sternberg's theory. They called it "an unnecessary addition to the proliferation of learning styles models" (p. 34).

What of the Dunn and Dunn model? In relationship to the other learning style models, the Dunn and Dunn model received no better than an average grade. Coffield et al. (2004) said about it: "Despite a large and evolving research programme, forceful claims made for impact are questionable because of limitations in many of the supporting studies and the lack of independent research on the model. Concerns raised in our review need to be addressed before further use is made of the model in the UK" (p. 25).

THE DUNN AND DUNN MODEL

Definition

Rita and Kenneth Dunn have put together one of the most popular learning style packages. Their names have become synonymous with the movement in the United States. The Dunns have designed a visual representation of their model, which metaphorically resembles a patchwork quilt. [See the Appendix.] They define a learning style as the way a person "concentrates on, processes, internalizes, and remembers new and difficult academic information or skills" (Shaughnessy, 1998, p. 141). The definition, however, does not end there. It is expanded into a multifaceted model, which further describes a learning style as the way an individual reacts to 21 (23) elements in 5 basic strands:

> (a) immediate environment (sound, light, temperature, and design); (b) emotionality (motivation, persistence, responsibility/conformity, and need for internal or external structure); (c) sociological (learning alone, in a pair, as part of a small group or team, with peers, or with an authoritative or collegial adult; also, in a variety of ways or in a consistent pattern); (d) physiological (auditory, visual, tactual, and/or kinesthetic perceptual preferences; food or liquid intake needs; time-of-day energy levels; mobility needs); and (e) indications of global or analytic processing inclinations (through correlation with sound, light, design, persistence, peer-orientation, and intake scores). (Shaughnessy, 1998, p. 142)

What is wrong with the Dunn and Dunn definition (model) of a learning style? In addition to being long, cumbersome, and ambiguous, the Dunns' model is rich in what Ryle (1949), *The Concept of Mind*, has called "category mistakes." Such mistakes occur when we use a term as though it belonged to some logical category of which it is not in fact a member. The Dunns' model is a patchwork of such mistakes. Behaviorist assumptions about *environmental* influences (sound, light, temperature, classroom design) are thrown together with constructivist assumptions about *psychological* processes (global vs. analytic, right-brained vs. left-brained, and impulsive vs. reflective) learners. How all of the categories and their related variables are pieced together into a single learning theory remains a source of wonderment to the Dunns' critics. Two such critics, Hyman and Rosoff (1984), call attention to an underlying flaw in the Dunn and Dunn model. "Intelligence, however defined, is not listed in Dunn's definition" (p. 36). All of the other factors influencing learning are pictured in the Dunns' schematic, but not intelligence. "It simply goes counter to commonsense and linguistic logic to exclude intelligence as an element of learning style since intelligence is related to the concepts of brain and learning" (p. 36).

Accommodation

Individuals differ in a wide variety of ways. One of these ways is how they go about learning. Everyone has his or her distinctive learning style. "Much of learning style," DeBello (1990) informs us, "is biologically imposed on humans. We can no sooner change our styles than permanently change the color of our eyes, hair, or skin" (p. 11). Identifying a student's learning style, however, is not as simple as it might seem. "Although teachers may identify certain learning style characteristics through observation, they often misinterpret many others" (p. 11). Consequently, the Dunns' (2008) Learning Style Inventory was created into order to assist teachers in identifying students' learning styles. "Three decades of research suggest that teaching strategies and resources should complement individuals' perceptual strengths when introducing new and difficult academic content" (p. 2). By building instruction around students' learning styles, schools can become truly effective.

Learning style theorists strongly favor accommodation. Schools should make students comfortable in their classrooms. Joyce and Weil (1996), however, advocate a course of action that runs in the opposite direction. They believe schools should create an environment where students are uncomfortable. Non-accommodation provides the conditions necessary for change and growth. If the environment merely accommodates students' learning styles, they may become too comfortable and complacent to change. "Significant growth requires discomfort. If the environment and the student are too much in harmony, the student is permitted to operate at a level of comfort that does not require the challenge of growth" (pp. 389-90). Teachers should strive to create a dynamic disequilibrium in the classroom. "Rather than match teaching approaches to students in such a way as to minimize discomfort, our task is to expose the students to new teaching modalities that will, for some time, be uncomfortable to them" (p. 390). Growth necessitates change. In order to facilitate growth, teachers must alter students' "comfortable ways of thinking and survive the buffeting involved in taking on unfamiliar ideas, skills, and values" (p. 397).

Tactual

Rita Dunn (1995), like Froebel, Montessori, and Piaget, believes in hands-on learning. A few children who are auditory or visual learners can acquire information easily from hearing and seeing. "Most young children," however, "learn tactually (through manipulatives, with their hands) or kinesthetically (by experiencing or being engaged in whole-body activities)" (p. 13). This is equally true, Dunn insists, of gifted students, who "prefer kinesthetic (experiential/active) and tactual (hands-on) instruction" (Shaughnessy, 1998, p. 144). Low-achieving students can only master difficult information through kinesthetic or tactual learning. "Low achievers have only one perceptual strength, or none, in contrast to the multiperceptual strengths of the gifted" (Shaughnessy, 1998, p. 144). Male students, according to Dunn, Thies, & Honigsfeld (2001), tend to be kinesthetic or tactual learners. They require mobility and informal design when concentrating and "if they have a third modality strength, it often is visual. As a group, many males tend to be relatively low auditory and more nonconforming and peer-motivated than females" (p. 7). Females, on the other hand, "tend to be auditory, conforming, authority-orientated, and better able to sit passively in conventional classroom desks and chairs" (p. 7).

The human hand is a marvelous tool. Of that there is no doubt. But is it the key to cognitive development? DeLoache (2005) presents an opposing point of view. "What most distinguishes humans from other creatures is our ability to create and manipulate a wide variety of symbolic representations" (p. 73). No aspect is more important for human development. Symbolization holds great meaning for the practice of education. Teachers in elementary classrooms use manipulatives to teach mathematical concepts. Concrete objects, or so it is commonly believed, assist students in learning abstract numerical concepts.

However, "if children do not understand the relation between the objects and what they represent, the use of manipulatives could be counterproductive" (p. 77). DeLoache conducted an experiment teaching mathematics to two groups of six and seven-year-old children. One group used manipulatives and the other group used paper and pencils. "Both groups learned to solve problems equally well – but the group using the blocks took three times as long to do so" (p. 77). A little girl, who had used the blocks during the experiment, asked DeLoache a pointed question: "'Have you ever thought of teaching kids to do these with paper and pencil'?" (p. 77).

Dualisms

Freud once remarked there was room inside the human head for everything. He might have said the same about the Dunn and Dunn model. The whole model is an elaborate web of disjointed ideas. Nothing, however, is more confusing than the treatment of analytic and global learners. Rita Dunn (1995) informs us that "some students learn more easily when information is presented step-by-step in a sequential pattern that builds toward a conceptual understanding" (p. 18). These are analytic learners, and they prefer inductive logic. "Others learn more easily . . . when they understand the concept first and then concentrate on the details" (pp. 18-19). These are global learners, and they favor deductive logic. The difference between analytic and global learners does not end with logic. Analytics are left-brained people. Global learners, on the other hand, are right-brained. Analytic learners are reflective; global learners are impulsive. "Reflective thinkers require more time than impulsive thinkers because they process the questions sequentially, evaluatively, and comparatively. Impulsives, on the other hand, process intuitively and quickly" (p. 20).

The Dunn and Dunn model represents a clear illustration of what Dewey called "either-or" thinking. "Mankind," Dewey (1938/1959) writes in *Experience and Education,* "is given to formulating its beliefs in terms of *Either-Ors,* between which it recognizes no intermediate possibilities" (p. 1). Dewey rejected all forms of dualism. In *Democracy and Education,* Dewey (1916/1960) argued that dualistic thinking creates a world filled with false dichotomies. These dichotomies, in turn, create habits of mind that trip up our thinking and trick us into believing that sharp distinction exist where in reality there is merely a continuum of experience.

The notion that learners are either left-brained or right-brained is a false dichotomy. The two hemispheres work in tandem with one another. If they did not, classroom instruction would be impossible. "The harder the task," says Gazzaniga (1998), "the more one half of the brain must call on the subcortex or the other hemisphere for help" (p. 52). Bruer (1999) makes a similar point: "What modern brain science is telling us . . . is that it makes no scientific sense to map gross, unanalyzed behaviors and skills – reading, arithmetic, spatial reasoning – onto one brain hemisphere or another" (p. 653). Much of the

literature claiming to promote "brain-based" education is simply ill-informed. How can educators capitalize on the discoveries coming from neuroscience? Brandt (1999) proposes fusing brain research with the findings of cognitive psychology. Such a fusion, he believes, can help educators to develop a working theory of instruction. Brandt offers the following instructional insight coming from Stanislaus Dehaene, a French mathematician and neuroscientist, as an example: "'A good teacher is an alchemist who gives a fundamentally modular human brain the semblance of an interactive network'" (p. 238).

Labeling

Rita Dunn has provided us with a glimpse into how the learning styles system works with children. First, a storybook is read to the children, explaining that everyone has a distinctive learning style. Second, the children fill out the Dunn and Dunn Learning Style Inventory (LSI). Third, teachers explain the results of the LSI and assist "each student in recording his or her LS preferences" (Braio et al., 1997, p. 20). Fourth, a large learning styles chart is placed in the classroom. "This chart [is] displayed in each classroom to remind students of their LS strengths" (Braio et al., 1977, p. 6). Students are cautioned to remember that: "Your test grades must be better than ever before – or this experiment is not working and there is no reason to continue" (Dunn, 1995, p. 13).

Do students accept such labels? Braio et al. (1997) report one student telling another: "Don't forget you're auditory" (p. 23). A third student said about himself: "My best style is kinesthetic" (p. 9).

Coffield (2005) advises teachers to guard against the practice of pigeonholing students into narrowly defined categories. "Our research suggests labeling a pupil as, say, a 'visual' learner may do more harm than good" (p. 28). Also, because the instruments used to place pupils into different categories "are so unreliable, most such labels seem to be of dubious value" (p. 28). There is an inherent danger in coming to view a student as a certain type of learner who is incapable of learning in other ways, not only will the teachers limit the instruction but the student may come to accept the same mistaken assumptions about his or her own abilities. "All learners need a wide repertoire of learning strategies and need to know when to use each" (p. 28).

Modalities

The Dunns actively support modality-based instruction. All children learn better when instruction is matched to their favored modality. Dunn et al. (2001) tell us that, "less than 12 percent of elementary-school children are auditory learners" (p. 8). In addition, "less than 40 percent of the student body is comprised of visual learners" (p. 8). As children mature, they tend to become increasingly auditory and visual. "However, many adult males are neither auditory nor visual learners; some remain essentially tactual and kinesthetic all their lives" (p. 8). If educators are to address the learning problems of students who are neither

auditory nor verbal, they must utilize the tactual and kinesthetic instructional techniques. Research has shown, according to Dunn et al. (1989), that students who were "taught with instructional resources that both matched and mismatched their preferred modalities achieved statistically higher test scores in modality-matched, rather than mismatched, treatments" (p. 52).

Why is the idea of modality-based instruction so widely accepted by classroom teachers? "Modality," says Willingham (2005), "gives us an easily understood way of thinking about the differences among children" (p. 5). Though children differ in their visual and auditory memories, such memories make little difference in the classroom. "Most of what we want children to learn is based on meaning, so their superior memory in a specific modality doesn't give them an advantage just because material is presented in their preferred modality" (p. 3). Most educational content is stored in terms of meaning, which does not rely on visual, auditory, or kinesthetic memory. The different senses cannot be used as "stand-ins" for one another. Information should be presented in the modality that best conveys the subject matter. "The teacher's goal should be to find the content's best modality, not to search (in vain) for the student's best modality" (p. 4).

Educators err when they label students as visual, auditory, tactual, and kinesthetic learners. "Our different senses," Kayser (2007) informs us, "do not function as discretely as was previously thought" (pp. 24-29). Information coming from different sensory organs is integrated into "an overall unitary image of our surroundings" (pp. 24-29). This integration takes place early in the process of neuronal stimuli. "Even brain centers that specialize in a given sense use information from other sensory channels" (pp. 24-29). The five senses team up in the brain and "actually seem to fuse with one another" (pp. 24-29). The brain is constantly combining information from the senses in order to produce an integrated image of the world. This image, in turn, becomes the basis for our actions.

Instruments

Identifying a student's learning style is not as simple as it may at first appear. A person's learning style can only be properly identified by the use of an appropriate instrument. "Only a reliable and valid instrument," Dunn cautions, "can provide reliable and valid information, and only a comprehensive instrument can diagnose the many learning-style traits that influence individuals" (Shaughnessy, 1998, p. 142). The Learning Style Inventory (LSI), DeBello (1990) asserts, is "critical to the Dunns' approach" (p. 3). The LSI is comprised of 100 items, and it requires approximately 30 minutes for a student to take. Is the LSI a reliable and valid instrument? The Learning Style Inventory, according to DeBello (1990), is the product of award-winning research conducted by more than 50 universities. It has received "one of the highest reliability and validity ratings" (p. 3).

The Dunns claim the Learning Style Inventory conforms to the highest psychometric standards. Many critics, however, do not accept the Dunns' appraisal of their instrument. Hughes (1992), writing a review for *The Eleventh Mental Measurement Yearbook,* contends that "the LSI has no redeeming values" (pp. 460-461). Knapp (1998), writing a similar review for *The Thirteenth Mental Measurement Yearbook,* agrees with Hughes and does her one better, saying that "this instrument is a psychometric disaster" (p. 2). Why such harsh words from the LSI's critics? The critics believe the instrument is hopelessly flawed. Indeed, according to Hughes (1992), "the lack of test-retest data is appalling" (pp. 460-461). Shwery (1998), who published a review in the same yearbook as Knapp, points out that "the LSI possesses a number of psychometric limitations that may derive from the lack of a clear and concise theoretical paradigm" (p. 4).

The Learning Style Inventory appears to be a test that was assembled in a catch-as-catch-can fashion. It fails, says Hughes (1992), to provide sufficient "information on the normative group on which the standard scores are derived, other than to state that the norms are based on 'more than 500,000 students'" (pp. 460-461). Simply stating that the test was based on "more than 500,000 students" does not automatically make it a standardized instrument. "In light of the paucity of information," Hughes (1992) continues, "the provided norms are meaningless" (pp. 460-461).

The Dunns argue that the Learning Style Inventory has good validity. Hughes (1992), Knapp (1998), and Shwery (1998) all beg to differ. The validity of the LSI was established by content and factor analysis. Hughes (1992) contends that the Dunns have misused this statistic. "The factor analysis represents a confused use of a sophisticated statistical tool, and the reported results obfuscate rather than clarify the constructs underlying the LSI" (pp. 460-461). Not only have the Dunns misapplied factor analysis, but "an inspection of the factor loadings provides no support for the authors' conceptualization of learning styles" (pp. 460-461). Though the LSI has undergone several revisions, very little of substance has changed. "The instrument," Shwery (1998) asserts, "is still plagued by issues related to its construct validity and the lack of an a priori theoretical paradigm for its development" (p. 3).

Research conducted by the Dunns in 1988 showed that the LSI possessed an internal consistency estimate of .60 or greater for students in grades 5 through 12. "The actual range," according to Shwery (1998), "is .55 to .88. Internal consistency across areas in the third to fourth grade group ranged from .42 to .91" (p. 3). The internal consistency on a number of areas of the LSI was low for third and fourth grade students. Consequently, "the link between the areas and justifiable making decisions about instruction in these areas is questionable" (p. 3).

Finally, the manual accompanying the LSI, Hughes (1992) maintains, was "written to sell rather than to inform. The heavy use of statistical jargon and

the exaggerated claims of the test's construct and predictive validity will impress the psychometrically naïve reader" (pp. 460-461). Such claims, however, do not carry much weight with persons familiar with psychometrics. Knapp (1998) also finds fault with the manual. It contains what he calls an "incredible sentence" written by the Dunns: "'Some of the questions are repeated to help make the inventory results more reliable.'" Why repeat the questions? "If," says Knapp (1998), "that is the only way the authors could think of to improve the reliability of the inventory they are in real trouble!" (p. 2).

Reading

The Dunns and their associates have actively promoted diagnostic and prescriptive reading. "Before we begin to teach a student to read," says Price, Dunn, and Sanders (1981), "we should diagnose his/her academic achievement and learning style, and then prescribe on the basis of those two essentials" (p. 226). Good readers and poor readers exhibit distinctly different learning styles. Good readers prefer dimly lit rooms and formal environments. They are self-motivating and require little adult supervision. Good readers are persistent, responsible, and do not require food while learning. It is not necessary to teach them by using their tactile and kinesthetic senses. Poor readers, on the other hand, prefer a brightly lit room, an informal setting, food while learning, and close adult supervision. They prefer "learning through their tactile and kinesthetic senses" (p. 224).

The classic debate between advocates of phonics and sight based reading has been joined by those favoring learning styles. "The key to literacy," Carbo (1997) asserts, "lies in reading styles. That key can unlock the strengths, interests, and abilities of each student" (p. 42). Reading methods and materials must be matched to a student's learning style. "If, however, there is a mismatch between the student and the approach," says Carbo (1996), "the instruction itself will hinder that youngster's learning to read" (p. 9). Learning styles researchers report phenomenal gains for students who have received their instruction using learning styles. For example, Horace Mann Middle School in Amarillo, Texas, was on the brink of being taken over by the state because of low test scores before becoming involved with Carbo's (1997) reading program. After participating in the learning styles reading program, reading scores "climbed an average of 33 percentage points" (p. 39). How is such progress possible? "Students learn to read more easily and enjoy it more when instructional techniques match their learning styles" (p. 38).

Stahl (2004) has raised serious questions about the test results reported by the Dunns and Carbo's reading research. "The reason researchers roll their eyes at learning styles is the utter failure to find that assessing children's learning styles and matching to instructional methods has any effect on their learning" (p. 99). Though the names given to the various styles have changed over the past 30 years – from "visual" to "global" and from "auditory" to "analytic" – the test

results have remained the same. Most of the supporting research cited by the Dunns comes from their own in-house studies or from faculty who finished their doctoral work at St. John's University. Few of these studies meet the standard of having been published in peer-reviewed journals. No amount of statistical analysis is any better than the quality of the data fed into the computer. "If the test is not reliable," Stahl (2004) asserts, "then the information it gives is not trustworthy" (p. 105). The reliabilities cited for the Dunn and Dunn Learning Styles Inventories are only moderate, .60s to .70s. Such reliabilities are lower than those desired for diagnostic instruments. There is, however, a bigger fly in the ointment. Many of the items on the inventory contain only one reasonable answer, thus boosting the test's reliability.

First meta-analysis

What evidence does Rita Dunn offer to support her claim that learning styles improve students' achievement and attitude scores? Dunn, Griggs, Gorman, Olson, and Beasley (1995) conducted a meta-analysis on 36 experimental studies involving 3,181 students who used the Dunn and Dunn model and method of instruction. The statistics revealed that students whose learning styles were accommodated achieved "75 percent of a standard deviation higher than students who have not had their learning styles accommodated" (p. 353). Given the data generated by the meta-analysis, Dunn et al. arrived at a number of interesting conclusions: (a) students with clear learning preferences showed greater gains than students who had mixed preferences; (b) college learners showed greater gains than elementary and secondary school learners; (c) middle-class students were more responsive than lower-class students; (d) average students were more responsive than low or high achieving students; (e) "the content area most responsive to learning-style accommodation was mathematics" (p. 358). In sum, learning styles appealed to a selective population of adult learners who were middle-class, had average academic ability, and who were studying mathematics.

The results of Dunn et al.'s (1995) meta-analysis have not been universally endorsed. Kavale, Hirshoren, and Forness (1998) have raised serious questions about its validity. In addition to having weak rationale, curious procedures, significant omissions, and circumscribed interpretations, "the Dunn et al. (1995) meta-analysis has all the hallmarks of a desperate attempt to rescue a failed model of learning" (p. 79). Other interventions such as reinforcement (1.57), direct instruction (0.84), and the use of mnemonic strategies (1.62) have produced greater effect sizes. Yet, despite the lack of empirical evidence to support their theory, the Dunns have pushed forward in promoting their model of learning styles. Passion, however, is not a substitute for reality. "The Dunn et al. (1995) meta-analysis does not offer that reality and should not be regarded as the final word with respect to validation of the Dunn and Dunn model" (p. 79).

Second meta-analysis

Lovelace (2005) conducted a meta-analysis of 76 original research studies (between 1980 and 2000) using the Dunn and Dunn Learning Styles Model. The meta-analysis provided evidence that accommodating students' learning styles had increased their achievement and improved their attitude scores. "The Dunn and Dunn model had a robust moderate to large effect that was practically and educationally significant" (p. 181). Lovelace concluded her meta-analysis by stating:

> The mean effect-size values (r) were all approximately .40. According to Rosenthal and Rubin's (1982) Binomial Effect Size Display, that finding translates to a 40% difference in expected success rates. Therefore, students exposed to learning-style responsive instruction have an expected success rate of 70%. Students taught with traditional instructional methods have only a 30% expected success rate and, therefore, a 70% expected failure rate. That finding is true for academic achievement and attitude toward learning. (p. 181)

What to do when statistical results seem to stand at odds with common sense? The author elected to consult with Sterling Hilton (2008), who is Associate Professor of Statistics at Brigham Young University. Prior to the December 16 meeting, the author provided Professor Hilton with two articles, one containing Lovelace's (2005) meta-analysis and the second showing Rosenthal and Rubin's (1982) Binomial Effect Size Display. The meeting took place in Professor Hilton's office, where both articles were carefully reread and discussed in detail. The substance of that conversation is as follows.

No one would use a yardstick to weigh an elephant. Tools, yardsticks and scales, are designed to report very different data. To use Rosenthal and Rubin's (1982) Binomial Effect Size Display to evaluate student achievement is like trying to weigh an elephant with a yardstick. Lovelace's error, according to Hilton (2008), was one of picking the wrong tool for the job. "The meaning of any statistic is determined by its context." There is no universal yardstick that is appropriate for all cases. "Rosenthal and Rubin's display was based on the use of binomial data. It is not clear from Lovelace's meta-analysis what kind of data she was using." There are other, if somewhat lesser, problems in her article; for example, "of the 76 studies that were included in the meta-analysis, how many where published articles and how many were dissertation?" Lovelace seems to have "cherry picked" among the studies she decided to include. All of the studies she used showed positive results favoring learning styles. This is rarely the case in the vast majority of empirical studies. Also, what is meant by success? Is it passing a test or graduating from high school? "There are many ambiguities in Lovelace's meta-analysis that remain unresolved."

CONCLUSION

Remember Humpty Dumpty? He was the fellow who enunciated the principle that a word "means just what I choose it to mean – neither more nor

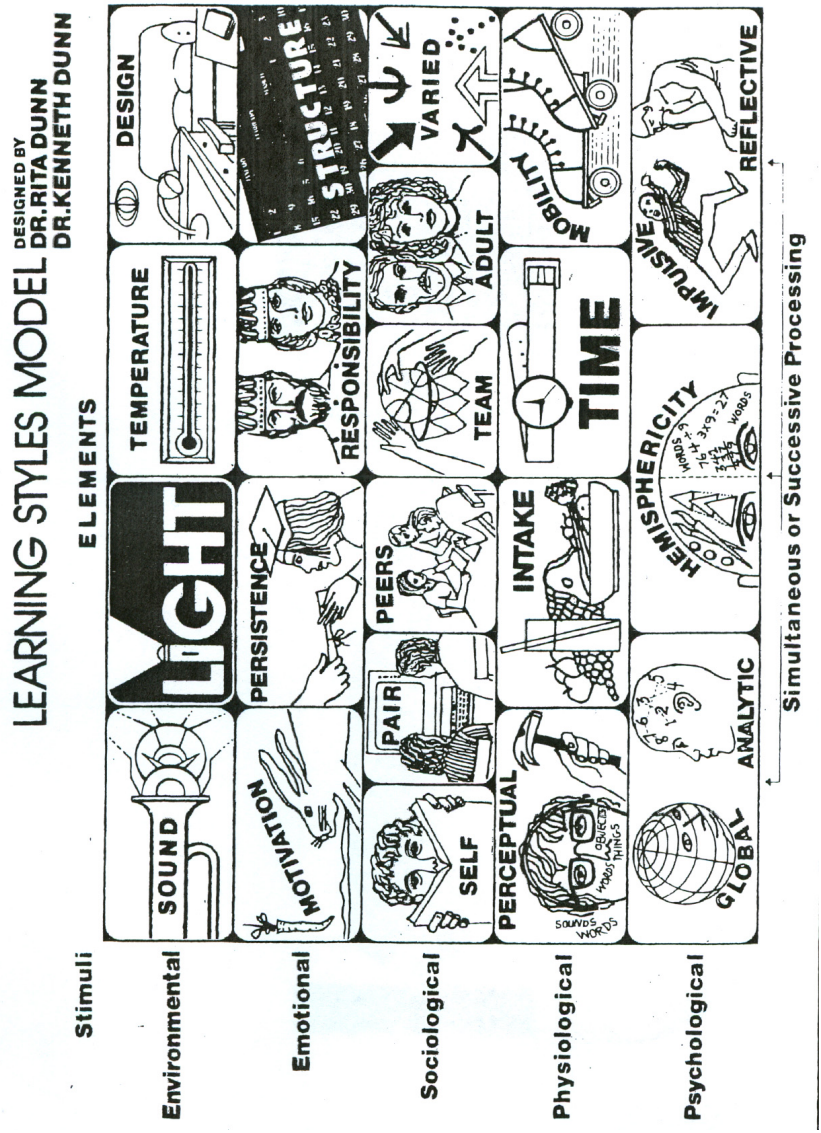
less." The Dunns have made ready use of this principle in their voluminous writings. Consider the following quotation from the Dunn et al. (2001) *Synthesis*: "The learning-style elements of Hemisphericity and Global/analytic are parallel. Whereas the former refers to a preference for simultaneous versus sequential mental processing by the student, the latter refers to the character of the instruction, global versus analytic" (p. 33). Humpty Dumpty could not have said it better. The Dunns earlier publications always identified "global" and "analytic" with different types of learners, not instructional processes. Why such rampant confusion? The problem stems from not having a clear denotation, tangible reality, lying behind the connotation, descriptive verbiage. Though everyone can describe a unicorn, no one has ever captured one of the mythical beasts.

The Dunn and Dunn model is an elaborate tautology whose logic runs in a circle. Students, the Dunns inform us, do not natively know their own learning styles. The only way they can really know their learning styles is by taking the Dunn and Dunn Learning Style Inventory (LSI). Once the answers to the 100 questions have been evaluated, students are presented with a printout of their learning styles. They are then taught in a fashion that accommodates those styles. From beginning to end, the whole process runs in a self-confirming circle. The Dunns' model illustrates a logical truism: Whoever formulates the definitions underlying a topic of debate gains control over the line of reasoning leading to the conclusions. This is certainly the case when it comes to the Dunn and Dunn model. If we buy into their definitions of different types of learners – analytic and global, left-brained and right-brained, sequential and simultaneous – we are at one and the same time committing ourselves to their conclusions.

Learning style theorists have made a fetish out of individual differences. Of course individuals differ. That fact is obvious to everyone. Children learn in a variety of different ways. Educators have known that since the days of Quintilian. Which factor – our individual differences or our common humanity – is more important for the purposes of education? All humans belong to a single species – one that stands erect, has an opposing thumb, possesses binocular vision, and is gifted with a big brain. The cerebral cortex makes abstract thought possible. Given human intelligence, language, culture, and civilization have all evolved. The need to preserve and transmit mankind's cultural heritage has likewise given rise to schools. Though children may differ in how they acquire our cultural heritage, and though teachers may utilize individual differences in their teaching, schools were not created in order to artificially inflate such differences. Humanity is bound together by its common nature and its fund of cultural experiences. The principal purpose of education is what it has always been – to cultivate individual talents by building upon and enhancing humanity's collective inheritance from the countless generations who have gone before us.

APPENDIX

Learning Styles Model



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NOTE

Some of the links in the references have closed since the article was accepted for publication.

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