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## **Profiles in Operations Research**

Eds. Arjang Assad and Saul Gass

### ***John D. C. Little Profile***

By Glen Urban and John Hauser

When the MIT Sloan School appointed a new Dean, one of the first things he said to the faculty was that he had once received the John D.C. Little Award for the best paper published in marketing science. When a new graduate student arrived at MIT, she was excited to meet the author of Little's Law. When a new faculty member arrived at MIT, he was proud to trace his heritage through many academic generations to John Little. The Institute for Operations Research and Management Science (INFORMS) owes its current structure, in part, to its founding president. All of this and much more describes a man who is known as a pioneering researcher, entrepreneur, administrator, and a leader in operations research and management science. But he also embraces his role as mentor, educator, and advisor. Indeed, on almost any day we observe John with a new generation of students excitedly exploring new ideas and problems.

Judging by his most recent research, John is best known for outstanding contributions to theory and practice in marketing science – indeed he is known as one of the founders of marketing science as a discipline. Let's explore how the person who proved Little's Law of queues ended up in marketing science. We'll start at the beginning and find out how his professional interests developed and led to both fundamental OR contributions and to rigorous and relevant marketing models.

### **From Physics to OR**

In June 2008, John attended his 60th MIT undergraduate reunion. He had received an SB degree in physics in 1948, which served him well as he explored the post-WWII landscape. After building his credentials for wanderlust by hitchhiking all over

the country, he returned to MIT as a graduate student in physics just as the cold war was dawning. Although he passed his general exams in physics on schedule, he still had intellectual wanderlust. This extended to a research assistantship (RA) on an unclassified air defense project with the psychologist J.C.R. Licklider and to taking the only course at MIT in the new field of operations research, taught by George Wadsworth of the mathematics department

By 1952 John had secured a research assistantship (RA) with Professor Philip Morse of the physics department to work on a Navy-sponsored project entitled “Machine Methods of Computation and Numerical Methods.” For “Machine Computation” read: “Whirlwind,” one of the earliest digital computers. John was asked to compute a book of tables for spheroidal wave functions – rather esoteric functions used for calculations in theoretical physics. (Today’s computers calculate such functions as needed.) John did not think the resulting book was going to be a big seller, but he said “an RA is an RA”. More importantly, John was among the few people in the world with access to a digital computer. He’s always thought that “computers are cool” and even today he can be caught playing with the latest technology.

It so happened that Morse, a well-known physicist, was also a WWII pioneer in operations research, known as the founder of OR in the US. (Oliver 2009) When John asked Morse about possible thesis topics he mentioned a few topics in physics and then asked, “Would you be interested in operations research?” Physics or OR? Looking back later, John recalled thinking “Physics is fine, but look at it this way. Bohr solved the hydrogen atom and it’s beautiful. Then somebody named Hyleraas solved the helium atom. It took him seven years on a hand-crank calculator and it’s ugly. Beyond helium there are another 100 or so elements with bad prognoses. I’m searching for a field with a lot of unsolved hydrogen atoms. OR looks good.” The die was cast.

John D. C. Little was the first person to be granted a Ph.D. in Operations Research – his advisor was Philip Morse. To be precise, John often describes his Ph.D. as being in “Physics and Operations Research,” since his general exams were in physics and his thesis in OR.

John’s thesis studied water-flow management in a hydroelectric reservoir/dam system (Little 1955). The problem was how best to use the water stored behind a big

dam. The system is dynamic. The rate at which water enters depends upon rain but, more-importantly, on the runoff from snow melting in the mountains during the spring in summer. In the fall and winter, this natural river flow drops drastically. Water leaves the reservoir from spill-over (wasted energy) and when the water is drawn down to generate electricity. The problem is interesting because the power is proportional to the “head,” the height of the water behind the dam relative to the water below the dam, and to the rate of water flow. A greater flow generates more electricity, but also reduces the head at a faster rate.

The tradeoff is interesting. Suppose the melting snow fills the reservoir in the spring and summer. In the winter the natural flow can become quite low. Therefore, you may wish to use some of the water stored in the reservoir to generate extra power, but drawing down the reservoir decreases the head. With a lower head in spring, the natural flow produces less energy. As a result you want to postpone drawing down the reservoir. But, if you wait too long, you will never use the available water because the next spring’s run-off arrives.

For a concrete example, John focused on Grand Coulee Dam on the Columbia River and the Franklin Delano Roosevelt reservoir behind it. He formulated the problem as a dynamic program, although at the time John did not yet know it was a dynamic program. John faced the dynamic-programming “curse of dimensionality,” the rapid increase in computing time with the number of state variables. The simplest credible formulation required two state variables: one for the amount of water in the reservoir (which determines the head) and the other for the current river flow (the river flow is strongly Markovian). Thanks to Whirlwind, John was able to finish his thesis before his RA ran out!

The thesis was very likely the first non-defense application of dynamic programming to a problem of practical importance. Real data were used for the historical stream flows. The models of Grand Coulee and its reservoir were simplified to save computing time but based closely on actual physical dimensions.

## **Laying Down the Law**

John continued to be influenced by his mentor Philip Morse modeling his research style as a physicist who is both an experimentalist and a theoretician. He was guided by the definition of OR popularized by Morse and Kimball in their 1951 book on the *Methods of Operations Research*: “Operations Research is a scientific method of providing executive departments with a quantitative basis for decisions regarding operations under their control.” In his review of Morse in the 50th Anniversary issue of *Operations Research*, Little (2002) says, “The definition leaves room for the tremendous development of methodology that we have witnessed in the past 50 years, but it keeps our feet on the ground with the requirement for data, models, and decisions. I like that, and I am sure it is what Morse intended.”

Being true to this paradigm, John first observe the “real world” and collect data before returning to his office where, often with students, he would attempt to model the observed phenomena, iterating between the observed and modeled worlds until he got it right. This style marked his professional behavior in such disparate subfields of OR as traffic signal synchronization, queues, the process of managing, and eventually marketing.

Little’s Law is a classic illustration of this style. John provided the first general proof of the now-famous queuing formula,  $L=\lambda W$  (Little 1961). See the side bar for an example. Assuming steady state operation, the formula says that the time-average number of customers in the queuing system ( $L$ ) equals the average arrival rate of customers into the system ( $\lambda$ ) multiplied by the average time that each customer spends waiting in the system ( $W$ ). A customer can be anything from a consumer waiting for a teller in a bank, to an aircraft waiting to land, to a packet of data waiting to be processed in a computer. Little’s Law allows an analyst to obtain all three of these fundamental performance measures of a queue by calculating (or measuring) only two of them. This is useful because the analytic methods used to calculate  $L$  and  $W$  are usually quite different and, often, one is easier to calculate than the other.

John was motivated to investigate the general truth of the relationship by observing many specific cases in real applications. For example, his advisor, Morse (1958), noted while writing the first text on queuing theory, *Queues, Inventory and Maintenance*, that this curious formula always seemed to apply to the queues whose operational behavior were solved the long, hard way. While the mathematics are

sophisticated, the formula comes with an intuitive insight from the way queues operate. John has often noted in later writings that the OR analyst is not finished until he or she can translate the mathematics back to intuitive insights.

Little's Law has entered OR folklore. At an OR national conference in New Orleans many years ago, T-shirts were being sold to raise money for ORSA: A best seller was the one that proclaimed: "It may be Little, but it's the Law".

## **New Branches (and Bounds), the Army, and a Family Begins**

In 1953 John married Elizabeth (Betty) Alden, another physics graduate student who worked on ferroelectrics under Professor Arthur von Hippel. After their nuptials Betty and John moved to Marlborough Street in Boston's Back Bay. He said the rent was high "but not too bad and we could split it." Beginning a lifetime of exercise (John still jogs/bicycles daily at age 80), they had to walk up 5 flights to reach their tiny two room apartment on the top floor. It had sloping ceilings to conform to the roof, but they thought it was great. During this period John also developed his love of seafood (and a later interest in fisheries). Squid was particularly inexpensive and John discovered many great ways to prepare it. John and Betty remained happily married and eventually contributed four children, John, Sarah, Tom, and Ruel to the baby-boom. They, in turn, each had two children of their own, giving John a total of eight grandchildren

In 1955 John was drafted and spent two years in the army working on military OR. As an antidote to the army, Betty and he bought a sailboat and had a wonderful time getting in and out of trouble on Chesapeake Bay. After the army John began his academic career at Case Institute of Technology (now Case Western Reserve University) in 1957. A project with M&M Candies introduced him to advertising problems and a project with Cummins Engine, Inc. introduced him to the issues of channel coordination. With his accumulating experience he introduced a graduate course, "OR in Marketing," which may have been the first marketing science course ever. During this time he worked on the traveling salesman problem, a problem that is not quite a marketing problem, but which was rightly famous as a computationally challenging optimization task. In addressing the problem, he and his coauthors introduced and popularized the term "branch and bound" as a technique for solving combinatorial optimization problems

(Little, et. al. 1963). For a while, the authors held, according to John, “the indoor record for size of problem solved.” It is an interesting side note that this problem remains relevant to marketing today. With automatic tracking of shopping carts and automated checkout data, researchers are now using the traveling salesman paradigm to study how shoppers actually shop for goods in a supermarket.

## **Returning to MIT**

In 1962, John interviewed for a faculty position at MIT in “Course 15,” now known as the MIT Sloan School of Management. His interview seminar talk was about assigning priorities to queuing jobs, but, with a continued intellectual curiosity, he viewed the scope of OR broadly and was attracted back to MIT with the promise of new problems and new research directions. MIT was an excellent base of operations with good colleagues and great students. He’s never left.

Perhaps frustrated by Boston drivers or perhaps just interested in helping others, just continued to work on a problem he had begun at Case: traffic signal control. He used mathematical programming to synchronize fixed-timed traffic lights for streets with two-way traffic (Gartner, Kelso and Little 1981). He and his research colleagues defined a new state of the art in this field, ending with a set of algorithms and computer program called MAXBAND. John’s career would continue to intersect with transportation planning. For example, in the early 1980s his seminal paper on the analysis of UPC data drew insights and methods from models of transportation demand (the logit model, Guadagni and Little 1983).

## **The Beginnings of a Science of Marketing**

John was now in a business school and had the vision to perceive marketing as source of interesting, relevant, unexplored opportunities for management science and operations research. From the firm’s perspective, consumer response to marketing actions, such as advertising is inherently stochastic. Nonetheless, marketing actions were control variables that could be selected to maximize profit. John became the first scholar to apply probabilistic adaptive control to the field of advertising. He pioneered a methodology that enabled managers to design continuing advertising experiments in a

world where advertising response was changing (Little 1966). The experiments were optimal in the sense that all costs, including the opportunity cost due to experiments at levels that were not optimal, were considered. The math was sophisticated and the solution optimal, but John was particularly proud of an analogy to a simple system of thermostats. His system could be implemented easily and thus be applied. For John it was not enough to “solve the system.” He wanted somebody to use it.

During this period John became increasingly interested in advertising budgeting and media selection. Along with Leonard Lodish, one of his PhD students, he developed a media selection model called MEDIAC (Little and Lodish 1966). MEDIAC replaced heuristic reach-and-frequency analyses with the optimization of a measure more closely related to sales and profits. Once again application in the real business world was important.

In 1968, while conducting an MIT summer session on “OR in Marketing,” Nabisco was intrigued by John’s work and asked him to develop a model to set advertising spending levels for Oreo cookies. John quickly realized that Nabisco had some hard data, but other data was in managers’ heads. Managers had been working in the category for many years and had implicit knowledge of how sales would respond to advertising. The challenge was how to unlock that information in a manner that could augment rather than replace hard data. From this challenge, John developed the concept of a “decision calculus.” His paper on “Models, Managers, and the Concept of a Decision Calculus” went on to become one of the ten most influential papers in the first 50 years of *Management Science* (Little 1970). This was a revolutionary paper that took the perspective of those who would apply management science models and set forth guidelines that were critical to implementation. John proposed that models, to be useful to managers, should be “simple, robust, easy to control, adaptive, complete, and easy to communicate with.” John’s insight was that for managers to use a model, they must understand the model well enough that they could control it. He had confidence that the manager would not abuse a model if it was way to learn how to set the best advertising levels. John illustrated the decision calculus with an advertising model called ADBUDG – a model that has been analyzed extensively in its own right.

John's Decision Calculus is clearly one of the most highly cited papers in marketing science, but it is often misunderstood. Decision Calculus draws on managers' knowledge to augment hard data – it is not a license to ignore data. John has always maintained that data are valuable and, when they are available and sufficiently accurate, they should be used. Throughout his career he has always sought new data, new ways to use that data, and new ways to present data so that managers could discern the truth in the data. He has embraced new computational and statistical methods to uncover that truth.

The best way to demonstrate the relevance and rigor of the decision calculus was to apply it to the complex problem of selecting the entire marketing mix – manufacturer advertising, retailer advertising, pricing, coupons, premiums, price-off, trade promotion, packaging, production capacity, retailer availability, product changes, seasonality, trend, and many other variables. The model was complete on important actions using submodels when feasible and judged indices when not. ADBUDG had grown to BRANDAID. In fact, the paper became so comprehensive that it was broken into two papers that were published simultaneously in the same issue of *Operations Research* – an extremely rare and laudable event (Little 1974). The BRANDAID papers remain one of the best illustrations of how one can combine data and judgment to effect the solution to an important managerial problem.

## **Data, Data, and more Data**

As we look back from today's data-rich world it's hard to image the data-poor world of the 1970s. The best data were from syndicated services, some of which measured warehouse withdrawals. There were little or no data at the level of the individual consumer and no data at the level of the purchase level. At the end of the decade, in a classic paper in *Operations Research* on aggregate data for marketing, John summarized the known advertising phenomena, set forth criteria for advertising models, and summarized the state of the art (Little 1979). It was to be his last paper on aggregate models – the data they were a'changing.

In the early 1980s John recognized a data revolution. Products were being labeled with computer readable Universal Product Codes (UPC), supermarket scanners were being installed that could read that code, and computer technology was being distributed

(no longer just mainframes) to collect, organized, and analyze those data. Suddenly, there were too many data, not too few.

It took insight to make use of these data. John, with one of his Master's students, developed a disaggregate model that predicted actions at the level of the individual consumer making individual purchases (Guadagni and Little 1983). When aggregated, the disaggregated analyses were more accurate and provided more insight. However, these models were still decision calculus models. John recognized the need for a "loyalty" variable to capture that which could not otherwise be modeled. A new field was born.

John's paper went on to become one of the most cited papers in *Marketing Science* and was recently republished as one of eight classic papers. The model has been improved, re-analyzed, expanded, kicked, and modified. New phenomena have been added and new data have been analyzed. But the basic structure (and the power of the loyalty variable) remain. An entire generation of marketing science academics have cut their teeth on John's UPC models.

John continued to focus on implementation. The logit models underlying his analyses of UPC data were powerful, but could be intimidating. Managers wanted answers in a form they could digest. More importantly, computer technology had gotten to the point where the logit models could work behind the scenes to create automated reports in the form that managers could use. This research led to COVER STORY which gave a brand manager a single page of charts and English language bullets for their customized situation their brand, in their markets vis-a-vis competitors (Schmitz, Armstrong and Little 1990). COVER STORY summarized a large amount of analytic computation that used models and data. The amazing thing at the time was that the report was generated by the computer in minutes untouched by human analysts. The number of brands and SKUs and regions would make it economically infeasible to do the analysis manually. John had come a long way from Whirlwind to the powerful computers and artificial intelligence embodied in COVER STORY, but he had remained true to his beliefs that he would use the latest computer technology, statistical methods, and theory to construct models that have impact on practice and improve managerial efficiency and effectiveness.

Besides having the most prestigious annual award in marketing science named for him, John has been recognized for his innovative and influential research by the prestigious Paul D. Converse Award, a lifetime achievement award given by the American Marketing Association (AMA) the AMA Charles Parlin Award for contributions on the practice of marketing research, the George E. Kimball Medal for recognition of distinguished service to INFORMS and to the profession of operations research and the management sciences, the Distinguished Service Medal from TIMS, and, most recently, by the Buck Weaver Award at MIT. He was elected to the National Academy of Engineering, was an inaugural Fellow of INFORMS, is an inaugural Fellow of the INFORMS Society of Marketing Science, has been elected to the IFORS' Operational Research Hall of Fame, and was named an Institute Professor by MIT. John has also been honored by other universities (Honorary degrees from University of London, University of Liege, Belgium, and Facultes Universitaires Catholiques de Mons, Belgium).

### **An Innovative Educator**

John is an innovative and devoted educator. He has always believed that new generations of management scientists and operations researchers. This devotion to students comes at all levels of the university – undergraduate, MBA, Ph.D., and faculty mentoring.

**Undergraduate.** John was particularly devoted to the Sloan undergraduate program and chaired the undergraduate program in management science from 1990 to now. During this time MIT's undergraduate management science degree has been ranked nationally as one of the very best business school programs. John particularly enjoys his role as an undergraduate advisor helping students navigate MIT, deal with personal and professional problems, and simply learn to love learning. He knows each student's story and helps those students find the right program and career to match their interests and skills.

**MBA.** From the time he developed a course on "OR in Marketing" at Case, John has been interested in teaching Master's students how to solve management science problems. At MIT he developed MIT's first "Marketing Models" course – a course that

was a long fixture in the marketing group until marketing models ultimately invaded almost all marketing courses. In the 1970s he pioneered a new specialty program at the MIT Sloan School called “Fast Track.” John would read all the files for admitted students and invite them to join the Fast Track program if they had very strong quantitative skills. He found they thrived in the challenging advanced courses in math programming, information technology and statistics. The students were in a cohort that shared a pro-seminar that featured actual business managers talking about “what they do for a living.” Graduates of this program went on to make significant contributions forming the basis for the diffusion of marketing science ideas to industry.

**Ph.D.** John has had many students who are now academics themselves and who have produced students who have, in turn, produced students – John’s academic great-grandchildren. These legacies have included two editors of *Marketing Science*, an editor of *Journal of Product Innovation Management*, and literally hundreds of marketing science publications. They have received tenure at schools such as Chicago, Florida, Illinois, Maryland, Michigan, MIT, Northwestern, Stanford, Tokyo, Utah, and others. John often invited students to his house for social functions (often tasting squid). A special feature was Thanksgiving, when John would invite foreign students and their families to his home in Lincoln for dinner. These interactions are an enduring memory for many students.

John also made it a practice to invite young faculty to Nantucket during the summer to enjoy the island. They were incidentally exposed to New England culture. Memories of staying in John’s little cabin and catching bluefish off Miacomet rip are particularly vivid. John loved seafood and felt that “anything from the sea must be good.” Sea urchin roe pizza was a specialty.

Today John’s legacies carry on the tradition of marketing science with its focus on both rigor and relevance, with its respect for data and theory, but with its goal of providing practical insights that have impact.

## **Leader and Entrepreneur**

We who know John well have often had the experience of the late night call in which John explored ideas on how to find a creative solution to a particularly thorny

administrative issue. John listens to all sides, understands their perspective, and tries to find a compromise that works. John is the ultimate practicing political scientist. With these skills he has served well both professional societies and MIT.

John served as President of both the Operations Research Society of America (ORSA, 1979-80) and The Institute of Management Sciences (TIMS, 1984-85). During this latter term he was instrumental in the founding of the journal, *Marketing Science*. He spearheaded the effort to merge ORSA and TIMS, which took place in 1995. He became the founding president of the merged society, now named The Institute for Operations Research and the Management Sciences (INFORMS).

John has served MIT in many capacities. At MIT he was director of the Operations Research Center from 1969-75. At the MIT Sloan School he was head of the marketing group and eventually the Management Science Area (MSA) from 1972-82. During this period MSA became cohesive and interdisciplinary. In 1982 John was asked to work his magic again. The Behavioral and Policy Science Area (BSP) at MIT Sloan was formed after a major reorganization. It was not cohesive and, interestingly, contained no one who might be labeled either an operations researcher or management scientist. It was primarily a collection of faculty from the less quantitative fields of organizational studies, R&D management, human relations, and strategy. John led the group for 6 years and developed a sound foundation of the potent BPS faculty that exists today. Today John is an MIT Institute Professor – a special rank and honor reserved for a very few faculty at the university. John reports to no school, but rather directly to the Provost. In this capacity John has undertaken some sensitive and important MIT-wide projects.

John's interest in modeling real world problems and influencing led him to co-found a company called Management Decision Systems, Inc. (MDS) to create and commercialize marketing models such as BRANDAID. MDS also developed marketing decision-support software, called EXPRESS, that enabled managers to use data for marketing decisions. MDS grew to over 200 employees. In 1985, MDS merged with Information Resources, Inc. (IRI) and John joined the IRI board. John's entrepreneurial activity did not end here. He invested in and served on the board of a new start-up, InSite Marketing Technology, which in 2000 merged with the Kana Corporation.

## **Eighty years and Going Strong**

John is a premier scholar, educator, leader, and entrepreneur, but also a devoted father and grandfather. He accomplished all this at the highest level of integrity and modesty. He is a man with the highest standards for research, ethics, and an incredible work ethic. (Students and colleagues ask if he ever sleeps.) His New England background is reflected in the highest standards of professionalism and human interaction. He is a true role model for students, faculty (including the authors), and managers.

In February 2008, John passed age 80, but he remains a full-time Institute Professor at MIT. He is going strong and, although he has mentioned the “R” word (“Retire”), we doubt it that it will happen soon. In any case retire or not, we predict he will have continuing major impact on field of OR/MS and marketing science for years to come.

### ***INSERT***

#### **Sidebar 1: Little’s Law**

#### **Sidebar 2: Personal Remembrances**

#### **Figures to be provided by John D. C. Little**

##### **Figure 1: Brandaid Flow Chart**

##### **Figure 2: Cover Story**

##### **Figure 3: Students Class – Sun Glasses**

##### **Figure 4: Nantucket Photo**

##### **Figure 5: Picture John Now**

*Authors’ note – We have adopted and adapted considerable material from “IFORS’ Operational Research hall of Fame – John D.C. Little” by Richard Larson (2004), International Transactions in Operations Research, 11, pp. 1-4 and from a presentation by John at his 80<sup>th</sup> birthday celebration.*

## **Sidebar 1: Little's Law**

(Adapted with permission from Graves, Stephen C. and John D. C. Little (2008), "Little's Law," in: Dilip Chheda and Timothy J. Lowe, eds. *Building Intuition: Insights from Basic Operations Management Models and Principles*, Springer Science+Business Media, LLC, New York.)

A "queuing system" consists of discrete objects called "items" that "arrive" at some rate to the "system." Within the system the items may form one or more queues and eventually receive "service" and exit.

While items are in the system, they may be in queues or may be in service or some in queue and some in service. The interpretation depends on the application and the goals of the modeler. For example in the case of the wine cellar, we say that a bottle (an "item") arrives to the system when it is first placed into the wine cellar. Each bottle remains in the system until it is removed from the cellar for consumption. If we view the wine rack as a single channel server, the service time is the time between successive removals. It is interesting to note, however, that we do not know which bottle the server picks and there is no particular reason to believe that the wine cellar will pick according to a first-in, first-out (FIFO) rule. To deal with the average number of bottles in the cellar or average time spent by a bottle in the cellar, we need to consider the complete system consisting of queue plus service.

Little's Law says that, under steady state conditions, the average number of items in a queuing system equals the average rate at which items arrive multiplied by the average time that an item spends in the system. Letting

$L$  = average number of items in the queuing system,

$W$  = average waiting time in the system for an item, and

$\lambda$  = average number of items arriving per unit time,

the law is  $L = \lambda W$ .

This relationship is remarkably simple and general. It requires stationarity assumptions about the underlying stochastic processes, but it is quite surprising what it

does *not* require. We have not mentioned how many servers there are, whether each server has its own queue or a single queue feeds all servers, what the service time distributions are, or what the distribution of inter-arrival times is, or what is the order of service of items, etc.

In good part because of its simplicity and generality, Little's Law is extremely useful. It is especially handy for "back of the envelope" calculations. The reason is that two of the terms in the equation may be easy to estimate and not the third. Then Little's Law quickly provides the missing value.

## ***Sidebar 2. Personal Remembrances***

John D. C. Little was born in Boston, MA on February 1, 1928, son of John D. and Margaret J. Little of Andover, MA. His mother was born in Gloucester, MA, the only child of Gilbert N. Jones, MD, and Margaret A. Jones. The family subsequently moved to Wellesley Hills, MA. John's mother grew up there and eventually became a school principal in Andover. John's father was born in Malden, MA, the only child of John W. Little and Cora D. Little. His father had various jobs in his career: driver of an ambulance in France in WWI, reporter for the Boston Herald, bond salesman for a Boston firm, writer for the Office of War Information in Washington during WWII, and a credit manager in Buffalo. He considered his best skill to be writing and, while holding other jobs, published two trade books and two children's adventure stories. He retired in Boulder, CO, where he took up fly-fishing and became newsletter editor for the Boulder Fly-casters, an early catch and release fly-fishing club.

Many people have asked John what D.C. stands for. In fact, an OR teacher in Oklahoma City made a class project out of it a few years ago, offering a reward to the individual who could find out the exact middle names of the person after whom Little's Law is named. The result was that John started receiving email from Oklahoma City. Always ready for a challenge, John went on the web and looked for it himself. He was surprised to find how difficult the task was. He was able to do it, once he figured out how, but admits he was aided by knowing that the names are in two places on the MIT website.

Although many people have guessed “direct current” from John’s early work on hydroelectricity, which, by the way would be alternating current. Other people have guessed District of Columbia from John’s contributions to OR in the US. It is not DC Comics, although many people consider John a superhero, nor DC Shoes – John jogs rather than skateboards. It is not Dominican College or the Dublin Core, nor is it D. C. United, the Department of Corrections, desert combat, digital cameras, or Dreamcast.

The answer is Dutton Conant. John says his parents wanted to please all the relatives, but, when pushed, he says that his father, who was John Dutton Little, did not want to call him “Jr.” and so added another middle name. His father’s grandmother, who was particularly nice to him growing up, had the maiden name Conant. So John became John D.C. Little. He says that, although there are many people named John Little, he has never found another who was John D.C. Little. He finds this helpful in searching for himself in web documents.

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