Numeracy
Advancing Education in Quantitative Literacy

Volume 14 | Issue 1 Article 11

2021

Review of *Social Workers Count: Numbers and Social Issues* by Michael Anthony Lewis

Michael T. Catalano
Dakota Wesleyan University, micatala@dwu.edu

Recommended Citation

Catalano, Michael T.. "Review of *Social Workers Count: Numbers and Social Issues* by Michael Anthony Lewis." *Numeracy* 14, Iss. 1 (2021): Article 11. DOI: https://doi.org/10.5038/1936-4660.14.1.1387

Review of *Social Workers Count: Numbers and Social Issues* by Michael Anthony Lewis

Abstract

Lewis, Michael Anthony. 2017. *Social Workers Count: Numbers and Social Issues*. 2019. New York: Oxford University Press. 223 pp. ISBN 978-019046713-5

The numeracy movement, although largely birthed within the mathematics community, is an outside-the-box endeavor which has always sought to break down or at least transgress traditional disciplinary boundaries. Michael Anthony Lewis's book is a testament that this effort is succeeding. Lewis is a social worker and sociologist with an impressive resume, author of *Economics for Social Workers*, co-editor of *The Ethics and Economics of the Basic Income Guarantee,* and member of the faculty at the Silberman School of Social Work at Hunter College and the City University of New York Graduate Center. Although explicitly targeted to social work students and professionals, the nine chapters here provide a good quantitative literacy education accessible to the general public and include a great many of the topics one would find in a "standard" quantitative literacy text written by a mathematician. The examples, despite being rooted in social work, are interesting and relevant to those outside that discipline, and speak to Lewis's breadth of knowledge and the skill of being able to make connections between different types of knowledge and evidence that is inherent in being a numerate person.

Keywords

numeracy, quantitative literacy, social work, social science, fair division, statistics, measurement

Cover Page Footnote

Mike Catalano is the Book Review Editor for this journal. He is a professor of mathematics and chair of the mathematics department at Dakota Wesleyan University. He is a former member of the Board of Directors of NNN and has a particular interest in incorporating numeracy into college algebra through the use of examples related to social issues.

Introduction

The numeracy movement, although largely birthed within the mathematical community, is an outside-the-box endeavor which has always sought to break down or at least transgress traditional disciplinary boundaries. Michael Lewis's book *Social Workers Count: Numbers and Social Issues* is a testament that this effort is succeeding. Lewis is a social worker and sociologist with an impressive resume, author of *Economics for Social Workers*, co-editor of *The Ethics and Economics of the Basic Income Guarantee,* and member of the faculty at the Silberman School of Social Work at Hunter College and the City University of New York Graduate Center.

While focused on persuading social work students and professionals that mathematics is relevant to their work and providing quantitative techniques that this audience will find valuable, the book is worthy of use as a resource for anyone involved in teaching quantitative literacy (QL). Lewis argues that social workers have an obligation to be advocates and need to be able to make persuasive arguments including appropriate quantitative evidence in service of that advocacy. In this context, numeracy is part of critical thinking and the ability to engage in civic and political debate, even what William Briggs would call "civic virtue" (Briggs 2018).

The book is written in an engaging and informal style, focusing on examples and mathematical utility. It is certainly accessible to a general student at the university level. Key words are italicized and referenced in the rather thorough index. There are no exercises and Lewis (p. xii) recommends his book as a "supplementary text for required (or elective) courses in social policy." However, I would agree with Lewis (p. xii–xiii) that the book would be of benefit to any student wanting a "gentle overview of mathematics," as long as they are willing to "tolerate frequent references to social work." Lewis's use of the term "mathematics" does seem to me to be broad and encompass common notions of numeracy. Despite the lack of exercises, an instructor in a quantitative literacy course who was willing to include persuasive essays or short projects as part of the course would find the book an ideal model for the kinds of arguments a numerate person should be able to make.

It is worth noting the diversity among the 66 works included in the references; these speak to Lewis's breadth of knowledge and the skill of being able to make connections between different types of knowledge and evidence that is inherent in being a numerate person. The classic Bennett and Briggs (2008) quantitative literacy text is cited. There are a great many references to sources of data from the U.S. Census Bureau, Congress, the Department of Education, the U.S. Tax Center, WHO, Statistica, the National Center for Health Statistics, the Centers for Disease Control and Prevention, and the CIA World Fact Book. There are sources for data

on taxation, polling, demographics, measuring political power (e.g., gerrymandering, electoral votes, and efficiency gaps). There are works related to inequality, probability theory, advanced statistics, polling, and affirmative action. This is not really a narrowly focused book just for social workers.

The Book

Chapters are entitled as follows:

1. Arguments and Social Issues
2. The Math You Need to Know
3. Measurement and Social Issues
4. Demography and Social Issues
5. The Mathematics of Personal Finance
6. The Mathematics of Budgets
7. Probability and Social Issues
8. Statistics and Social Issues
9. The Mathematics of Political and Social Decisions

These titles certainly emphasize the applied focus on social work, and only three mention particular aspects of mathematics or numeracy. I offer some comments and highlights on each chapter.

Chapter 1: Arguments and Social Issues. Social issues involve public policy and public policy involves debate and argumentation. Taxes, the minimum wage, welfare programs, poverty, foster care, social unrest, climate change, and child abuse are all mentioned in this chapter. Lewis begins his book with critical thinking and logic, not an uncommon topic for a quantitative literacy course, but Lewis's treatment (and this runs throughout the book) is conversational and based more on example and concept than traditional mathematical algorithms and rigor, although these are most definitely included as needed. There are premises and conclusions and syllogisms. There is discussion of conditional statements, conjunctions, and disjunctions. There are no truth tables. The ambiguity of argumentation (and of language in general) is amply acknowledged. The difference between logical validity and truth is made plain, as is the difference between evidence, good arguments, and proof. Because some associated factors are causal and some are not, arguments usually do not give a mathematically rigorous proof of the claims made. Lewis provides a sampling of common fallacies including personal attack, false cause, and hasty denial.

Chapter 2: The Math You Need to Know. This chapter starts with basics of set theory in lay person's language. Symbols for set operations like ∩, ∪, etc. do not appear, although sets are listed in the traditional curly-brackets notation. Different types of numbers (integers, rational numbers, irrationals, etc.) and a

discussion of decimal numbers and place values are included. Lewis does some easy calculations by hand but also discusses the use of calculators. Inequalities, ratios, proportions, and percentages are explained, and with these concepts, for the first time in this chapter, Lewis applies math to real world examples, which introduces the ideas of units and pure numbers (those without units). Lewis ends this chapter by acknowledging the likely existence of math phobia among his audience and provides some words of encouragement to keep going, having made it this far.

Chapter 3: Measurement and Social Issues. Here, Lewis gets a bit philosophical, describing British statistician David Hand's distinction between the representational and operational conceptions of measurement. He alludes to Einstein in describing the operational definition of speed as distance divided by time. In this conception, speed is not some underlying phenomenon that is being measured, it is defined by the "operation" used to come up with a number. Lewis then goes on to note the problems one can run into when applying the operational notion of measurement to a concept like poverty. Because poverty is often defined as having a personal income under a certain level and that level can be set arbitrarily, what poverty actually consists of is ambiguous under the operational framework. Lewis notes social scientists are not of one mind regarding whether to use the operational or representational framework, and indicates he plans to avoid the debate going forward, focusing instead on "a number of social scientific practices regarding measurement . . . the role mathematics plays in those practices, and show[ing] how they're related to social issues of concern to social workers" (p. 37). However, Lewis acknowledges that in the initial portions of the book he uses the representational conception and in what follows he seems to maintain that focus. Numbers as applied to social issues need to mean something; they need to have some attachment to the real world that social workers are observing every day, some attachment to concepts that have at least an intuitive meaning like "well-being." Certainly, the issue of meaning is one students should be wrestling with in a quantitative literacy course, whether it involves social issues or not.

Next comes a detailed discussion of units, with net wealth as the first example. Borrowing from Sanjay Mahajan's *Street Fighting Mathematics*, Lewis notes that Bill Gates has a higher net worth than the Dominican Republic (Mahajan 2010). Lewis goes on to note the importance of flows, quantities that are measured over a set period of time like the number of cases a social service agency handles per day.

As one might expect, this chapter includes a discussion of concepts like validity, reliability, and measurement error. It closes with a fairly lengthy section (8 pages) on index numbers and their uses in measuring social phenomena, including poverty and inflation. Lewis (p. 48) alludes to the classic text by Bennett and Briggs (2008), using their definition of an index number as "a comparison of

measurements made in two different areas or at two different times," with one of those times or places providing the reference value.

Chapter 4: Demography and Social Issues. The concept of rate is central to this chapter and the examples are plentiful: pregnancy, marriage, divorce, poverty (again), death, infant mortality, inflation (again), prevalence of disease and other health conditions, life expectancy, and social security. Lewis has a nice explanation of adjusting mortality rates for age. He also goes into detail on the dependency ratio, which gets at the issue of how many workers are needed to support the social security system as life expectancy increases. The chapter closes with a discussion of population growth and whether earth's resources will be sufficient into the future, including allusions to Malthus.

Chapter 5: The Mathematics of Personal Finance. Financial literacy is becoming both more important and harder to achieve as the terrain becomes more complicated and the decisions more numerous. Since social workers will be involved in helping some segments of the public—often those most at risk from poor decision making and with meager resources—make these decisions, financial numeracy is an important skill for them. Some larger social issues are also alluded to, such as privatizing social security.

In addition to the expected discussion of savings and investments, mortgages and debt in general, insurance, and taxes (including detailed examples of how marginal tax rates and income brackets work), Lewis defines some basic measures of household financial health like net worth, the liquidity ratio, and the asset-to-debt ratio. Balance sheets and cash flow statements are described. Lewis discusses the details of how mortgage payments are calculated and how exorbitant interest rates on payday loans can be.

As I read this chapter, the importance of understanding terminology and accurately using it struck me. What is a basic liquidity ratio and why is it important? In fact, what is liquidity? And why is the benchmark liquidity ratio three? Risk and return are emphasized as important decision criteria. Taking on debt for a car is different than the same amount of debt for an education because of the return side of the equation. Economists will be pleased to see mention of the idea of moral hazards.

Chapter 6: The Mathematics of Budgets. This takes the discussion of household budgets to the level of larger organizations including non-profits and the Federal Government. Lewis is very clear, though, on how and why budgets for these entities are different than those for households. Households have neither all of the types of responsibilities nor the powers (like "printing" money) that the Federal Government has. Taxes are now both an expense and a source of income, depending on the entity involved. Capital gains taxes are discussed, and, as in the last chapter, the importance of understanding terminology comes into play. What

is a realized versus an unrealized capital gain and why does this difference matter? How is a sole proprietorship different from a limited liability corporation?

There is a nice section on federal spending, focusing both on absolute numbers as well as percentages of the overall budget. A thorough discussion of the difference between deficits and debt and how federal debt accumulates is included. In an effort to portray scale, Lewis notes that if each dollar of federal debt was a mile, the dollars tied end to end would wrap around the earth over 800 million times. The downside of printing money to handle the debt leads to a discussion of inflation.

The next section is on NPO (non-profit organization) budgeting, a particular focus for Lewis as so many social workers do work for non-profits. Much of this section is not at all mathematical, focusing simply on how NPOs work, their funding sources, and their expenses.

Chapter 7: Probability and Social Issues. The opening example discusses how a case worker for a child welfare agency might have to use a variety of observations from a home visit to estimate the likelihood that child abuse was occurring in the home. This would be what some quantitative literacy authors refer to as a subjective probability, although Lewis does not use that term.

Lewis does discuss a probability model and a model in general as "an idealized representation of some real object or situation" (p. 123). Before getting into probability models, he uses Freud's model of the human mind as an example (id, ego, superego). This use of a model likely to be familiar to his audience seemed to me to be effective. He notes how Freud's model is simplified, capturing some aspects of reality and missing others.

Having described modeling as a general concept, Lewis then discusses probability models including fundamental notions like sample space, event, subset, and a reprise of set operations, getting to the additivity rule for probabilities of disjoint outcomes.

Lewis includes a discussion of the Bayesian versus the frequentist understandings of probability. After discussing both sides of the issue, Lewis indicates he will follow the frequentist approach as that viewpoint is the one social workers are most likely to encounter.

Lewis's coverage of conditional probabilities and dependent versus independent events is very down-to-earth and makes clear the distinction between true positives, true negatives, false positives, and false negatives. The chapter closes with sections on random variables and probability distributions.

Chapter 8: Statistics and Social Issues. This chapter opens with a "statistics is hard and I hate it" set of stories meant to acknowledge this dynamic among the target audience but also noting how unfortunate this attitude is given the usefulness of statistics. The chapter covers basic concepts of statistics: levels of measurement, discrete versus continuous variables, descriptive versus inferential statistics, probability sampling, and hypothesis testing. This last topic does get detailed with

Lewis following an 8-step hypothesis testing process. Lewis distinguishes between a "population random sampling approach" and a "data-generating process-sample approach," each being discussed in turn. Out of everything in the book, this particular discussion would seem to me to present the biggest challenge in understanding for the less numerate reader.

However, the chapter is in general example based and the reader not familiar with statistics can certainly get a general idea for how hypothesis testing works. Lewis is clear about the difference between statistical significance and substantial significance, the latter defined as a statistical result being "sizable enough to guide clinical, policy, or some other kind of intervention" (p. 151). The discussion is conceptual with the mathematics of test-statistics and *p*-value calculations omitted. There are no graphs of normal curves or other probability distributions here.

Chapter 9: The Mathematics of Political and Social Decisions. This chapter opens by alluding to the recent (at the time of writing) 2016 election, where Hillary Clinton won the popular vote but lost the election. The Electoral College, redistricting and apportionment, gerrymandering, types of voting systems, voting power, and game theory are all included in this chapter. These topics can generally be found in many more "traditional" QL texts (if traditional is a word that we can now appropriately use within the QL discipline).

Lewis focuses perhaps more on how the mathematics plays into the idea of social fairness than might be true in other texts. He opens the concluding section of this chapter (and of the book) entitled Mathematics and Fairness with a quote from the National Association of Social Workers Code of Ethics: "social workers 'should promote social, economic, political, and cultural values and institutions that are compatible with the realization of social justice'" (p. 185). The section returns to the idea of allocation of resources implicit in discussions of apportionment where the resource is legislative seats but with an explicit focus on indivisible resources. The first example of such a resource is a child being fought over in a custody battle. (Lewis acknowledges the "yuckiness" of this viewpoint but as a matter of fact, he is correct.) Of course, joint custody arrangements would suggest the child as a resource is not indivisible, at least with respect to time.

The next example is affirmative action, and Lewis begins this discussion with a reasonable appraisal of both sides of the argument, in a sense returning to the centrality of argument and debate from the opening chapter. He notes that mathematics can assist in making policy decisions in this area but "mathematics can't settle it" (p. 187). Lewis discusses both the "traditional" models of affirmative action, e.g., setting quotas for certain groups and then creating different criteria to apply to each group to reach the quota, with a proposal put forth by Norman Matloff. This method is based on creating one minimum set of criteria (as simple as a single SAT cut off score) that applies to all applicants and then randomly admitting students who meet this minimum until slots are allocated. Lewis notes

that, while this could be considered fair in the sense that it gives a member of any group who meets the criteria an equal chance to get in, it could have the perverse effect of significantly lowering the success rate (the ratio of students admitted as a fraction of the applicants) within minority groups.

Lewis acknowledges that determining what is fair is in some sense impossible, either in affirmative action or any other resource division problem. What measures should be used (SAT, GPA, something else?) and how valid and reliable are those measures? If multiple measures are used to create a weighted average or index, what is the best (fairest) way to do that? What does equal access or equal opportunity really mean? These questions in some sense get back to the operational versus representational viewpoints discussed in Chapter 3. This observation gets Lewis to his final point: that fairness, something social workers and the whole social work enterprise have as a central goal, cannot be divorced from the mathematics of measurement.

Concluding Comments

Lewis's book is useful for those of us who are in the numeracy field, for the general public, and (as advertised) for the target audience of (future) social workers. For the former, this book provides a plethora of useful examples one could bring into a quantitative literacy classroom as well as a model from another discipline for how to talk about mathematics and mathematical problems and ideas. We are likely to see students in social work and the social sciences in our classrooms, and even students not in these disciplines can benefit from the ideas and examples in Lewis's book.

Lewis's tone is matter of fact and informal. Occasionally he expresses opinions on matters of public policy, but generally provides a fair description of all sides of the argument in discussing issues that can be controversial. It seems to me he is careful to avoid or at least minimize editorializing, even in discussing hot button issues like the estate tax and affirmative action.

Those in the mathematical community may find some of the style, including the somewhat rudimentary typesetting of equations, as odd. For example, here is my best reproduction of the formula for monthly mortgage payments as it appears in Lewis.

$$\text{Monthly mortgage payment} = \begin{bmatrix}\text{Amount borrowed} * \text{Monthly Rate} * \\ (1 + \text{Monthly rate})^{t}\end{bmatrix} / [(1 + \text{Monthly rate})^{t} - 1]$$

Not what you would get using LaTeX, but for the target audience and the general public this works. Generally, the style reminded me a bit of John Allen Paulos work and is certainly closer to that than to a standard QL text written by mathematicians.

Although the book does not have exercises, it could be used to provide examples for instructor-designed exercises or projects. It might be used in conjunction with a more standard QL text as a supplement. At under 200 pages and $40 for either the kindle or paperback versions, one could incorporate the book without feeling it was an undue burden on students. Even if one does not put the book in students' hands, I would highly recommend making space for it as a resource for instructors and on the bookshelf of others generally interested in QL and social issues.

References

Bennett, J.O., and Briggs, W.L. 2008. *Using and Understanding Mathematics A Quantitative Approach*. Boston, MA: Addison Wesley Publishing.

Briggs, William. 2018. "Quantitative Literacy and Civic Virtue." Numeracy 11(2): Article 7. https://doi.org/10.5038/1936-4600.11.2.7

Lewis, Michael Anthony. 2002. *Economics for Social Workers*. New York: Columbia University Press.

Lewis, Michael Anthony. 2019. *Social Workers Count: Numbers and Social Issues*. New York: Oxford University Press.

Mahajan, Sanjay. 2010. *Street Fighting Mathematics*: *The Art of Educated Guessing and Opportunistic Problem Solving*. Cambridge, MA: MIT Press.

Widerquist, Karl; Lewis, Michael Anthony; Pressman, Steven, editors. 2005. *The Ethics and Economics of the Basic Income Guarantee*. Aldershot, UK: Ashgate Publishing.