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**Connecting Numbers with Emotion: Review of *Numbers and Nerves: Information, Emotion, and Meaning in a World of Data* by Scott Slovic and Paul Slovic (2015)**

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## Connecting Numbers with Emotion: Review of *Numbers and Nerves: Information, Emotion, and Meaning in a World of Data* by Scott Slovic and Paul Slovic (2015)

### Abstract

Scott Slovic and Paul Slovic (Eds.). *Numbers and Nerves: Information, Emotion, and Meaning in a World of Data* (Corvallis, OR: Oregon State University Press, 2015). 272 pp. ISBN 978-0-87071-776-5.

It is common to view quantitative literacy as reasoning with respect to numbers. In *Numbers and Nerves*, the contributors to the volume make clear that we should attend not only to how students consciously reason with numbers, but also how our innate biases influence our actions when faced with numbers. Beginning with the concepts of psychic numbing, and then psuedoinefficacy, the contributors to the volume examine how our behaviors when faced with large numbers are often not mathematically rational. I consider the implications of these phenomena for the *Numeracy* community.

### Keywords

psychology, numeracy, numbers, emotion

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### Cover Page Footnote

Samuel Luke Tunstall is a graduate student in mathematics education and University Distinguished Fellow at Michigan State University. He has taught mathematics at multiple levels and is interested in the sociology of mathematics education, as well as curricula that promote quantitative literacy.

## Introduction

Like many authors of publications with a quantitative literacy focus (e.g., Steen 2001), Paul and Scott Slovic—a father and son team—begin *Numbers and Nerves: Information, Emotion, and Meaning in a World of Data* with the premise that our world is deluged with quantitative information. Notwithstanding this prelude, *Numbers and Nerves* is not about  $p$ -values, financial crises, or big data; rather, the edited volume's mathematical complexity is limited primarily to number sense and, in particular, problems and their order of magnitude. While such issues may seem straightforward, the authors of the volume demonstrate that our responses to large amounts of information are often not—they tend to be irrational. The examples that the various contributors bring to the fore include genocide, global warming, and vaccinations, among a host of other topics. Lives are at stake, and—per the book's message—we cannot always trust our intuition to make decisions.

*Numbers and Nerves* is not Paul Slovic's entrance into the realm of decision-making; the text represents a culmination of his and others' work completed over the past decades. As founder and president of *Decision Research*,<sup>1</sup> he has been a prolific author with publications in the fields of risk behavior (Slovic 2000, 2010), decision-making (Michel-Kerjan and Slovic 2010), and numeracy (Peters et al. 2007), among others. Building off of past research, the Slovics have assembled a series of chapters that address the quandaries reflected by our decision-making in the face of quantitative information. Though the topics from chapter to chapter are similar, the authors are diverse, with essays from philosophers, psychologists, journalists, and scientists. As I discuss below, the research presented is sobering and often dismal. The first part of the book focuses on research surrounding psychic numbing and pseudoinefficacy, two biases we learn skew our behavior. The second part builds on the first, giving various authors' strategies for infusing emotion into numbers as they relate to the biases. The final part consists of interviews with various individuals who do the type of work reported in Part Two.

*Numbers and Nerves* is inexorably tied to numeracy, or quantitative literacy. It is a must-read for those working with students on everyday mathematics, be it at the elementary or college level. The book is significant to us not only because we know that numbers inundate our world, but also because the research presented in it suggests that numeracy may *not* be a guarantee of rationality in the face of quantitative information. I pay particular attention to this paradox in my

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<sup>1</sup> See <http://www.decisionresearch.org> for more information.

review below. I begin with an overview on the phenomena introduced in the opening chapters, then weave the following chapters' proposed responses into my discussion of implications for the *Numeracy* community.

## Overview and Critique

The first chapter of *Numbers and Nerves* introduces research surrounding psychic numbing (a term coined by Robert Lifton, 1968, according to Slovic and Slovic 2015, 24), the notion that—as the chapter's title suggests—the more deaths we learn about, the less likely we are to care about additional lives lost. Driving this concern is that there have been 201 distinct mass atrocities (the intended killing of 1000 noncombatants or more) since 1900, resulting in a cumulative total of 84 million deaths. Despite such enormous numbers, intervention by the United States—even in cases of genocide—has arguably been scant. Other large numbers (discussed in the book) where psychic numbing might be at play include those related to global warming, nuclear weaponry, and deaths due to diseases such as AIDS and malaria. Psychic numbing sheds light on what may have been your reaction to the previous sentences: a lack of surprise. This non-linear mapping between lives lost and the value we put on saving lives is striking; it suggests that notwithstanding our potential rationality, our decisions are often irrational. Such a mismatch between judgment and decision-making arises because *affect*—the immediate, “gut” feeling of good or bad we have in response to information—is a key driver in our decision-making—not calculated judgment. Our affect is driven in large part by the binary categories of good or bad, so it makes sense that we cannot feel 1000 times as bad about hearing of 1000 deaths, as compared to one death. Given that most individuals would agree—at the very least—that there should be a one-to-one mapping between lives lost and value put on saving lives, the research the Slovics present provides sobering fodder for the *Numeracy* community.

In addition, just as psychic numbing purportedly diminishes the slope of our level-that-we-care-vs.-the-numbers-that-die curve,<sup>2</sup> so too does pseudoinefficacy as we become alert to context and alternatives. This phenomenon is the substance of Chapter Two. Pseudoinefficacy is the notion that—in the context of helping others (or even ourselves)—we are less likely to take action if we know that there are other issues our actions are not helping solve. The Slovics are intentional in their use of “pseudo” here, as this inefficacy is only perceived—we are still in a position to help. A simple but powerful example of this condition is that we are

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<sup>2</sup> See online public lecture (2011) by Paul Slovic at Institute of Hazard, Risk and Resilience Blog, Durham University: <http://ihrrblog.org/2011/07/08/paul-slovic-the-more-who-die-the-less-we-care-confronting-apaty-toward-mass-atrocities/> (accessed Dec. 19, 2016)

less likely to donate money to a starving individual if we are told, at the same time, that the individual is one of many who are starving. Similarly, we are less likely to donate money to a U.S.-based environmental organization if we are told that there are other environmental concerns abroad that our dollar would *not* go to help. The authors expand upon these notions throughout the text, explaining the nuances and details of previous research.

The concepts themselves—likely new to many *Numeracy* readers—engender several questions for exploration, including: to what extent does the development of the notion of number within children affect their sensitivity to increases in number magnitude? As educators, what measures can we take to ameliorate this phenomenon? Is it our role to intertwine mathematics with moral education? And perhaps most importantly, might numeracy—which includes understanding order of magnitude—help us make “better” decisions? The list goes on.

Rather than continuing the onslaught of sobering research, the latter two parts of *Numbers and Nerves* suggest a variety of means of combatting the irrational decision-making reported earlier, beginning with essays on various strategies, then ending with interviews of those involved in implementing action. The resulting suggestions are numerous, ranging from Nicholas Kristof’s suggestion to find a puppy that the media can attach to (Kristof 2015, 85), to Kenneth Helphand’s use of physical experience such as seeing individual flags for each live lost (Helphand 2015, 89). Each of the strategies used or discussed involves framing a message in a specific way; in the previous sentence, these included image and visual experience, respectively. As an example, with Kenneth Helphand’s focus on physical objects, he notes how individuals are able to frame a tragedy by providing a physical and visual means of connecting to it. In each strategy, this framing imbues the underlying statistic with a specific hue or message—that which the creator wants. For example, the U.S. Holocaust Memorial Museum includes an exhibit with several thousands of shoes of Holocaust victims; in this case, the hue of the statistic—that millions were murdered—is grounded in the reality of the immediate physical presence and smell of the shoes.

I am internally divided by the solutions posed by the authors. As I read the book, I reflected on the fact that—as numeracy educators—our goal is to empower students to deal effectively with numbers however they manifest in daily life. This power means making appropriate decisions among numbers, where by “appropriate” we often mean rational—a presumption rarely explicitly written or addressed. For students, the learning includes recognizing that authors (or artists, speakers, etc.) have a specific purpose in conveying information to you. Thus—among other things—students need to examine numerical claims carefully, considering evidence with a careful eye. I must admit that, in the context of confronting the types of information produced by the authors of this

text, we would encourage students to see *past* the rhetoric and presentation—to evaluate the information critically. This process might mean disbelieving the author’s message, or—at the very least—not reacting to it as strongly as one might otherwise. As a concrete example, in Rick Bass’s chapter entitled “The Blood Root of Art,” he lays out a procession of statistics about the environment, each aiming to sway the reader to care more about the repercussions of such large numbers. None, however, are swaddled in the context, background, or qualification they merit. For instance, “Georgia Pacific...had a 1000 percent increase in profit,” comes with no discussion of the underlying base profit, or whether there were other causes—aside from increased logging—to potentially account for the increase in profit (Bass 2015, 160). As numeracy educators, we strongly encourage students to interrogate statistics for their meaning—not to accept messages as is. As a result, I am torn on how our community might cope with the concepts presented in *Numbers and Nerves*.

## Parting Thoughts

I have little doubt that readers of *Numbers and Nerves* will care about the issues the book presents. Indeed, death and destruction are serious, no matter what the scale. The book is likely to give pause to many as one sees just how complex our reactions to numbers can be. As mathematicians and mathematics educators, it is rare for us to consider the development of number and meaning; at the elementary level, after teaching students to count and reify numbers as objects, we move on to other abstractions. Notwithstanding occasional trips into real-world problems and issues, very few courses—save for some with a quantitative literacy focus—spend nontrivial chunks of time considering issues and their magnitude. In some respects, one might say that we assume courses in other disciplines (e.g., history) will do the job, if any. This land of the real world is where *Numbers and Nerves* shines. The book fosters legitimate reflection on the precise relationship we have between number and emotion, posing myriad questions for teaching practice and for further research. It also engenders legitimate discussion on the complex practice of information framing. I look forward to seeing where future research in this realm goes. Indeed, as the authors suggest, lives are at stake—these issues (including our innate biases) are leaving us no time soon.

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