

Significant digits: Why happy numbers make sad policy

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Every one of us knows about significant digits, even if perhaps only one in ten thousand of us could define the term on a test. I realized this the other day while reading state documents reporting that a school district had spent \$8,834 per student one year, but the previous year had spent \$8,346.52498712296.

In a state of 11 million people, perhaps there are 100,000 computer programmers and another 100,000 people with sufficient spreadsheet experience who more or less know how that second figure came to be reported. More generally, almost every one of us, even if we cannot say why it happened, would even so respond properly to the bad figure. We'd ignore it. We'd think it doesn't make a lot of sense to talk about amounts less than a penny, and we'd write it down as \$8,346.52.

We often so simplify things, for example, when we leave a penny in the penny cup at the cash register, or we say gas costs \$2.52 per gallon when it costs \$2.529 (a nice little trick that works both for us and against us, since prices always end in ".99", not ".01").

For most of us, the problem isn't the significant digits themselves, or our knowledge or lack of knowledge of them, but that we're allowing ourselves to be defrauded, with significant digits as one of the tools for doing so. Significant digits are important, and failing to use them is doing great damage to us.

I don't mean the gas station's \$2.529, or a restaurant's selling a hamburger for \$4.99, causing some people to think they're paying only \$4 when they're paying \$5. That's not fraud. Someone who can't figure that one out should direct deposit their pay into someone else's account and ask for an allowance.

Rather, I mean a much more important fraud, a fraud that is more, in a word, significant. Our governments and, by both neglect and sometimes intent, our newspapers are using significant digits to hide important public policy from the public.

Needless to say, numeracy is an important presumed premise of education. One need only consider so-called "report cards" for our schools based on achievement tests in math, or any number of other over-reported efforts such as the vaunted STEM schools, so called for science, technology, engineering and math. The claimed importance of numeric competence is widespread among newspapers, elected office holders and the public.

In truth, however, our school systems, our newspapers, and especially our governor and General Assembly prefer that we be innumerate, lest we ask too many questions. Certainly they are innumerate themselves; they document their own ignorance repeatedly.

This is most obvious in budgeting. Any school district's five year forecast shows annual revenue and expense that looks like "\$53,211,039." A newspaper recently reported the city of Pataskala's water and sewer collections at \$1,623,541. Such figures are, literally, nonsense. They arise from legitimate

accounting needs and traditions, but the problem is, for the purpose used, they are not significant. They don't mean anything. Worse, they cause most of us to think they do mean something, that the person who reports \$1.6 million is, if not hiding something, then being careless and imprecise, while the person who reports \$1,623,541 is not. It's fully the opposite; the first is reporting facts, the second is reporting falsity, what is technically called "noise."

A small effort yields dozens of such examples. The widely reported state budget bill, for example, with its so-called education reform, has "challenge factors," which for one district is 1.078034. The next closest challenge factor is 1.078723. Try to imagine a scenario in which that last digit is important: Applied to a \$20 bill in a restaurant, not only does it not make a penny, it doesn't even make one-thousandth of a penny. Apply it to a \$50 million budget, and it represents \$50. Now, \$50 is \$50, and can be quite a nice meal, or a full tank of gas, or a generous present for a grandchild, but do we really need our elected representatives and bureaucratic machinery to spend their limited time on \$50 questions at the same time they are sorting \$50 million questions? If they have time, intelligence and principles enough to get only one question right (itself a doubtful proposition), it had better be the big one, not the small one.

The members of the General Assembly, the state's press corps, the reading public and ultimately voters all have only a fixed amount of time, and the time they do have is already used up. If we are plumbers, then we are busy plumbing; if we are lawyers we are busy lawyering. It is a rare and lucky day when any of us has 10 minutes to pay attention to the things that occupy others. In this busy milieu, what our legislators choose to address are ridiculously non-momentous dangers such as texting, sexting, and whether hand sanitizer will stop our wealth from being spread around.

Worse than a shame, it is a tragedy when our time, and their time, is wasted altogether by false impressions of feel-good precision on questions of feel-good importance. It prevents us from realizing, for example, that the United States government is bankrupt, that Ohio pensions are failing, and that any "reform," whether of Ohio school funding or national health care, is just more mindless headline chasing by politicians.

When we allow legislators and the press to either distract us, an act of malice, or to be uninformed themselves, an act of negligence, then we are wasting precious energy and attention on what does not matter. It is a useful trick to have everyone believe they are being careful and precise, when in fact they are being ignorant, if not downright stupid. We begin to miss the boat, to delve into pleasing but irrelevant minutia, which is even more emotionally satisfying if it is complex, instead of the hard, real and necessary choices, which are even worse if they are simple.