Data 22700

Data Visualization and Communication

Trimble

Ashley Hitchings

**Project 1: Black Hat White Hat Visualizations**

*Chart, line chart

Description automatically generated1. Deceptive Visualization*

*Caption: In the two decades between 1999 and 2019, expenditures by the U.S. Drug Enforcement Administration (DEA) increased by 2.15x even as the agency’s net efficacy plummeted by 64,726 over the period. Despite ramping budget allocations, drug overdose deaths began to dramatically eclipse the number of drug arrests by the DEA beginning in 2007 during the financial crisis, signaling declining public health and societal welfare, and thus lower DEA efficacy, with additional dollars spent over time. As displayed by the data, conservative presidential administrations and macroeconomic crises have been associated with both hikes in DEA expenditures and plunges in the net efficacy of federal drug enforcement activities. Data sources: United States Drug Enforcement Administration, “Staffing and Budget,” 1972-2021; Centers for Disease Control and Prevention, “Drug Overdose Deaths,” 1999-2019.*

*2. Truthful Visualization*

Chart, line chart

Description automatically generated

*Caption: Between 1999 and 2019, the DEA budget steadily rose, increasing by a total of $1.69 billion. Over the same period, drug arrests dropped in the early 2000’s before stabilizing around 30,000 per year with a slight decline after 2014. Drug-related deaths have simultaneously increased across every category, though benzodiazepine, prescription opioid, and heroin deaths have declined since the mid-2010s whereas methamphetamine and cocaine deaths have risen over the last few years at higher rates. Taken together, the DEA budget has increased alongside rising drug-related deaths and drug arrests have declined over the past two decades. Whether the data illuminates declining DEA efficacy or endogeneity between the pervasiveness of drug abuse and federal investment in mitigating drug crime remains to be explored by future research. Data sources: United States Drug Enforcement Administration, “Staffing and Budget,” 1972-2021; Centers for Disease Control and Prevention, “Drug Overdose Deaths,” 1999-2019.*

For my deceptive visualization, I created a dual axis scale chart with net efficacy as the left y-axis, the DEA annual budget as the right y-axis, and time as the x-axis. I scaled the right y-axis ($) to begin at $1.4B instead of zero to maximally exaggerate the change in DEA expenditures over time. On the left y-axis of the graph, I plotted the “net efficacy” of the DEA over a time, which I calculated by subtracting total annual overdose deaths from annual DEA drug arrests. Net efficacy is a rather bogus metric in that it takes the difference between two different types of units (deaths vs. arrests), which is empirically nonsensical. However, a strong negative trend emerges when I plot net efficacy over time that manipulates categories to overemphasize a clear but misleading pattern. Additionally, the misleading aggregation obscures the nuances displayed in the non-deceptive graph when arrests and overdose deaths by type of drug are plotted in a separated format. While the graph includes a description of how net efficacy was calculated, I deemphasized it using lower-salience channels and put it in small, light grey font at the bottom corner of the visualization. I also selected intuitive colors that would emphasize the message I tried to convey about rising costs and falling efficacy by coloring the budget line in green (relation to money), and the efficacy line in red. Using an overlaid area graph, I highlighted the crossing of the net efficacy from positive to negative, and signified an adverse pattern by shading the area with red. Additionally, the data is obscured by smooth lines that create an aesthetic visualization but make it more difficult to gauge precise magnitudes and year-over-year changes. I heavy-handedly labeled certain years with historical events (conservative presidential elections and the financial crisis) in Photoshop to invite readers to draw false conclusions about causality, and included labels showing the relative change in budget over time (2019 budget/1999 budget), as well as the decrease in net efficacy over time (2019 net efficacy – 1999 net efficacy), but in using two different metrics also sought to obscure comparability and the truth. Finally, I created a “click-bait” title that uses strong verbs like “soaring,” “plunged,” and “plummets” to complement my chart-level deception with message-level deception and guide readers to drawing exaggerated conclusions. Taken together, my deceptive tactics seek to deceive the reader in *somewhat* subtle ways, drawing on visual cues and biased messaging that guide them to draw simplified conclusions without raising any glaringly obvious red flags (e.g. omitting years, nonlinear axes, etc.).

My truthful visualization also uses a dual axis scale chart, but the budget scale begins at zero to more accurately represent the data. Likewise, I expanded the scope of the data to provide more detailed comparisons between the changes in DEA budget, drug arrests, and the six most common types of drug overdose deaths. The color-coordinated labels on the graph make it easy to tell what different lines signify, and there are no misleading metrics to misguide readers. Unfortunately, the data doesn’t break down how the DEA prioritizes different goals and divisions within its budget expenditures; however, the graph provides a truthful, salient depiction of the information obscured by the deceptive visualization.