Statistics for Empowerment and Social Engagement

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Editor

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Teaching Civic Statistics to Develop Informed Citizens

Springer

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Foreword

Democracy Needs Statistical Literacy

In his beautiful essay *What is Enlightenment?* Kant spoke of people's emergence from their self-imposed nonage. Nonage is the inability to use one's own mind without another's guidance. It is self-imposed when it originates not in a lack of understanding but in a lack of courage. Dare to know: That is the message of the Enlightenment.

That was in 1784. Since then, statistical data, once a state secret, have become public and statistical thinking has emerged as one of the most powerful weapons of the Enlightenment. One might therefore presume that, by the twenty-first century, with data as the lifeblood of our societies, every citizen would be interested and skilled in understanding it. Surprisingly, that is not so. Most doctors still do not understand health statistics, most judges still do not know how to evaluate DNA evidence, and most of the public is still not even sure what a 30% probability of rain means.

In 2016, Laura Martignon approached me to ask whether I would host a round table of the *International Association for Statistical Education* (IASE) at the Max Planck Institute for Human Development in Berlin on the topic of promoting understanding of statistics about society, in collaboration with the ProCivicStat project (which was then supported by the ERASMUS+ programme of the European Commission and described later in the book). Impressed by the effort to make Civic Statistics a part of school curricula, I enthusiastically agreed. My former Center for Adaptive Behavior and Cognition, known as the ABC Group, developed teaching tools (such as natural frequencies) to foster the intuitive understanding of statistics; as a member of this group, Laura had made important contributions to research on decision-making under uncertainty. The Max Planck Institute hosted two further meetings on Civic Statistics, in the course of which the idea was born to immortalise the results of the ProCivicStats project in the form of this book.

Why, in the age of big data, is the Enlightenment dream still largely science fiction? The traditional enemies of statistical literacy have been authoritarian governments and lack of public education. In most countries we have overcome these, and pioneers such as Otto Neurath and online tools such as those created by the Harding Centre[1] and the ProCivicStat group[2] have helped to make the public risk literate. Yet, a good education in statistical thinking remains the exception rather than the rule in the majority of countries, resulting in collective statistical illiteracy (Gigerenzer, 2014). The Enlightenment dream has also met new challenges and foes. One new rival emerged in the social sciences. In the 1970s, a program known as "heuristics and biases" asserted that people's statistical intuitions are plagued with systematic flaws and that attempts to educate people out of their biases are largely doomed to fail because these biases, like visual illusions, are hardwired. That was a surprising message given that the bulk of psychological research, from Jean Piaget to Ward Edwards, had previously shown that people's statistical intuitions are quite good, albeit not perfect. Many of the celebrated biases were later found not to be biases in the first place (Gigerenzer, 2018). Nevertheless, the message spread and has fuelled a new kind of soft paternalism. Governments around the world began to "nudge" their people into better behaviour instead of teaching them risk literacy.

Paternalism is older than statistical thinking, and secret data are older than open data. Before the 1830s, statistics about citizens were largely considered state secrets and deliberately kept sealed. They were the key to recruiting taxes and soldiers and to economic success. As the saying went, if you wanted something from Napoleon, then give him statistics. Today most data are open to the public; the current problem is how to teach everyone to distinguish reliable data from fake news. The ProCivicStat project has made an important contribution to enabling future generations to make better decisions.

This book is a remarkable achievement. It synthesises much of the work of the ProCivicStat project, along with valuable contributions from fellow travellers. Contributors bring experiences from different countries and academic backgrounds. The book maps out data creators and consumers in the turbulent sea of information in which we all swim. It describes the components of knowledge needed by enlightened citizens (many of these components are absent from current school and undergraduate curricula), illustrated via examples in contexts such as COVID-19 and global warming. It describes and links to resources relevant to teaching such as data visualisation tools, sources of open data, and tools for data analysis, and—most important of all—it describes material for teachers and students developed for use in classrooms at school and university level on Civic Statistics topics such as pollution, migration, social inequalities, and racial bias. It reports on classroom experiences in a wide range of teaching contexts that include social sciences, business education, and teacher education. It discusses data science and describes teaching and activities to support the uses of data science and statistics for social good. It also makes a call

[1] https://www.hardingcenter.de/en

[2] http://iase-web.org/islp/pcs/

for action that advocates appropriate actions by stakeholders in different locations in the educational system that are needed if we are to bring about urgently needed curriculum reform.

Kant's vision is one of the biggest dreams of humankind. In the age of big data and fake news, it is as pressing as ever before. We need to find the courage to speak out, defend the scientific method, and make as many people statistically literate as we can. *Sapere aude*—have the courage to know.

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Gerd Gigerenzer

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