

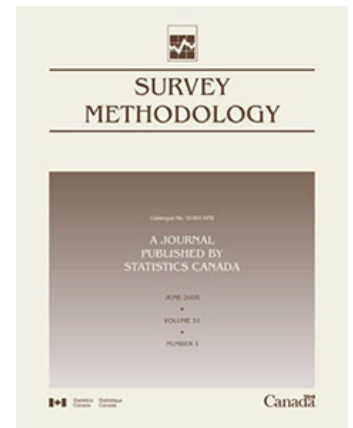
Catalogue no. 12-001-X
ISSN 1492-0921

Survey Methodology

Comments on “Progress in survey science and practice: yesterday-today-tomorrow”

by Robert E. Fay

Release date: June 30, 2025



Statistics
Canada

Statistique
Canada

Canada

How to obtain more information

For information about this product or the wide range of services and data available from Statistics Canada, visit our website, www.statcan.gc.ca.

You can also contact us by

Email at infostats@statcan.gc.ca

Telephone, from Monday to Friday, 8:30 a.m. to 4:30 p.m., at the following numbers:

- Statistical Information Service 1-800-263-1136
- National telecommunications device for the hearing impaired 1-800-363-7629
- Fax line 1-514-283-9350

Standards of service to the public

Statistics Canada is committed to serving its clients in a prompt, reliable and courteous manner. To this end, the Agency has developed standards of service which its employees observe in serving its clients. To obtain a copy of these service standards, please contact Statistics Canada toll-free at 1-800-263-1136. The service standards are also published on www.statcan.gc.ca under “Contact us” > “[Standards of service to the public](#).”

Note of appreciation

Canada owes the success of its statistical system to a long-standing partnership between Statistics Canada, the citizens of Canada, its businesses, governments and other institutions. Accurate and timely statistical information could not be produced without their continued co-operation and goodwill.

Published by authority of the Minister responsible for Statistics Canada

© His Majesty the King in Right of Canada, as represented by the Minister of Industry, 2025

Use of this publication is governed by the Statistics Canada [Open Licence Agreement](#).

An [HTML version](#) is also available.

Cette publication est aussi disponible en français.

Comments on “Progress in survey science and practice: yesterday-today-tomorrow”

Robert E. Fay¹

Abstract

The attempt to set the current concerns over the future of survey science in the context of the history and philosophy of science offers little specific guidance on the path forward. But the author is to be thanked for sharing his thoughts and encouraging new solutions.

Key Words: History of science; Paradigm; Thomas Kuhn.

The thoughts of a highly distinguished contributor to the survey research literature are naturally of great interest, especially concerning the future of the discipline. Although several commentaries about our discipline’s future have appeared, Särndal selects just two, Citro (2014) and Tillé (2022), as examples. Rather than focusing on specific near-term predictions, however, the author seeks to add a perspective drawn on the history and philosophy of science. To do so, he summarizes historical generalizations about science with their possible relationship to the current state of our discipline. In the process, he reminds us of important milestones in the development of survey science.

The author begins with well-known ideas from Kuhn (1962), including the notion that a scientific discipline may enjoy a productive period of normal science under a ruling paradigm until an accumulation of anomalies forces a crisis, which is then followed by paradigm change. This basic theme has been applied to characterize change to a much wider set of situations than originally envisioned by Kuhn (1962). As I recall, in the second edition Kuhn (1970) remarked on tendencies for others to extend his thesis in directions he did not originally intend.

Särndal summarizes the history of survey science by identifying a period up to 1940, which led to the initial acceptance of sampling to represent a population, followed by a period of seemingly steady progress. The author finds a parallel between the wide acceptance of sampling beginning around 1940 and normal science as characterized by Kuhn. But a crisis has been emerging, precipitated by declining response rates and rising costs.

After beginning with Kuhn’s ideas, the author backs away a bit, particularly by declaring that the ruling research tradition in survey science was not a paradigm. The author cites Chalmers (1976) for the notion of *research structure*, which encompasses both *research tradition* as used by Laudan (1977) and *research program* from Lakatos (1970). He prefers to treat survey science as a research tradition. He identifies two core assumptions: the *population assumption* and the *sample assumption*. He states the sample assumption as: “Data are collected, or are otherwise available, on units in a comparatively small selected and designated

1. Robert E. Fay, 5113 Sangamore Rd., Bethesda, MD, 20816, U.S.A. E-mail: bobfay@hotmail.com.

subset, a sample: these data, together with other relevant data, are used to draw conclusions about the population.”

But is the population assumption particularly unique to survey science, representing a recent advance in human cognition? The taking of a census, including in ancient times, is an undertaking clearly based on the notion of a population. Although the role of Adolphe Quetelet in the 19th century to study the Belgian population is an interesting historical note, I do not see the notion of population as a recent conceptual insight for humanity.

The sample assumption has the more recent history and perhaps should be regarded as the single distinguishing feature of the discipline. Although probability-based sampling has been the primary choice of national statistical offices, Särndal offers a definition including “comparatively small selected and designated subset” that does not set sharp boundaries on what to include and what to exclude from the definition of a sample. Probability sampling is included and the term “probability sampling paradigm” appears often in practice, but he includes forms of non-probability sampling such as purposive sampling as well.

In Sections 10 and 11, the author usefully reviews progress in survey science, including a list of general theories of inference from finite populations. The author remarks:

Survey science is about methods. It proposes, examines and compares methods. There is no one “true theory”, one capable of ruling out alternatives as necessarily wrong or false, as might happen in an “exact” natural science.

Looking forward, the author comments on cumulative progress, returning to Laudan (1977), both in science generally and its manifestation in survey science. New theory can co-exist with previous findings within the research tradition. He divides cumulative progress in survey science into two periods, with the second incorporating auxiliary information and models.

Section 14 summarizes primarily points made during the article, but Särndal includes a passing remark “National Statistical Offices are not disposed to lend support and fund research to confine nonresponse to acceptable low levels; they indirectly encourage a paradigm shift.” My impression is that resources are allocated to this research question, so the intention of the remark is unclear. Does he believe additional support for research on nonresponse would yield important gains? If so, what evidence supports this?

Having begun by summarizing work on the history and philosophy of science which drew on physics as a prime example, the author acknowledges the difference between survey science and physics. Physics and neuroscience escape the external impact of social changes, whereas survey science must confront them. Nonresponse has rendered many once successful survey methods ineffective.

Särndal almost exclusively identifies the mathematical elements as the primary features of survey science. Different methods of estimation and inference each have mathematical bases that are generally not in dispute. Past debates originated from different perspectives on the merits of applying the theories to actual data collections. Although mathematics is broadly scientific, its underlying methods of deductive proof

separate it from the scientific method and related methods of empirical sciences, as reflected by their different positions in the acronym *STEM*, (Science, Technology, Engineering, and Mathematics). Even though from 1940 to recently, it may have seemed that the probability sampling paradigm provided assurance about the validity of survey results, in fact this was only a partial truth, whose limits were often insufficiently acknowledged.

There has been a developing empirical science side of survey science which the paper did not attempt to cover, except for nonresponse. Over decades researchers have identified multiple, sometimes quite significant, sources of errors in surveys, that can be classified according to different elaborations of the total error model. The research has also led to methods to reduce some of these sources of error. Some of the methods and findings from cognitive and social psychology have been incorporated. The empirical side of our discipline has often attempted to address the effects of social changes, such as the rise and fall of telephone interviewing as a consequence of the evolving public relationship with the telephone. Citro (2014) particularly attends to the challenges faced by the empirical science side of survey science. Any discussion of the future of survey science would benefit from considering both sides of our discipline.

The term *paradigm* plays a key role in Kuhn (1962), Särndal's article, and Citro (2014). Särndal asserts "Paradigm is a strictly defined term in the philosophy of science, Kuhn (1962)." Kuhn described dominant paradigms ruling a discipline for a time, and Särndal goes further to remark "It is a norm; it can be a constraint, almost a straightjacket." (This statement may go beyond Kuhn's intent.) He also acknowledges that the term has become generally popular. Originally the term had a meaning as an exemplar. But *paradigm* also had a more specific meaning in some scientific disciplines well before Kuhn (1962). As one example, Bruner and Postman (1949) entitled their research report "On the perception of incongruity: A paradigm." Here, a *paradigm* is an experimental method that measures an underlying psychological phenomenon. Using Google Scholar to search articles with "paradigm" in the title in journals such as *Psychological Science* returns several recent examples with this meaning, and a few in *Survey Methodology* as well. In most cases, paradigms are not mutually exclusive within a discipline, unlike Kuhn's adaptation of the term. Although Kuhn's description may fit the examples he selected for *The Structure of Scientific Revolutions*, I think discussions of the future of survey science should allow the less restrictive interpretation of *paradigm* as an exemplar.

It is not clear that Särndal is contesting views held by others in our profession, although there are a few hints of that. The abstract hints that "in the opinion of some" that alternative data sources must be incorporated into surveys. Section 3 extrapolates from a sentence in the beginning of Citro (2014) a possible interpretation by a hypothetical reader that probability sampling is obsolete, although recognizing that "this is certainly not intended in the cited words". It is not clear that he actually intends to take exception to recommendations espoused by Citro (2014). In Section 9, he discusses probability-based sampling and estimation as a dominant paradigm in official statistics but allows for high quality non-probability samples.

Although Särndal's critique is interesting, I remain skeptical that a review of the history and philosophy of science contributes specific insights into our understanding of the current situation of survey science. For

readers interested in pursuing the topic further, I suggest starting with Wikipedia as a jumping off point after consulting articles on the authors mentioned by Särndal, as well as Karl Popper and the extended discussion of the scientific method. *The Structure of Scientific Revolutions*, in its three editions during Kuhn's (1962, 1970, 1996) lifetime, is likely to remain part of scientific culture but not necessarily a rigid blueprint for progress. It may continue to encourage creativity and openness to new ideas.

Although Särndal seems to set Kuhn's ideas to the side, he concludes:

A new paradigm seems far away; it must be rooted in a powerful new statistical notion, one with appeal and convincing power, comparable to that which probability sampling was able to confer, in convincing and solid support of the more than century old discovery that "a small sample will suffice".

I believe instead that the future will be much more the outgrowth of avenues of research that are already being pursued. Alternative sources of data will require continued diligence to assess and monitor quality, the work of empirical science, and statistical frameworks to incorporate the information.

Acknowledgements

The discussant thanks Jean-François Beaumont for the invitation to comment. The discussant is affiliated with Westat, Inc., but independently prepared these remarks outside this affiliation.

References

Bruner, J.S., and Postman, L. (1949). On the perception of incongruity: A paradigm. *Journal of Personality*, 18, 2, 206-223.

Chalmers, A.F. (1976). *What is this Thing Called Science?* University of Queensland Press.

Citro, C.F. (2014). [From multiple modes for surveys to multiple data sources for estimates](https://www150.statcan.gc.ca/n1/en/pub/12-001-x/2014002/article/14128-eng.pdf). *Survey Methodology*, 40(2), 137-161. Paper available at <https://www150.statcan.gc.ca/n1/en/pub/12-001-x/2014002/article/14128-eng.pdf>.

Kuhn, T.S. (1962). *The Structure of Scientific Revolutions*. University of Chicago Press.

Kuhn, T.S. (1970). *The Structure of Scientific Revolutions, 2nd enl. ed.* University of Chicago Press.

Kuhn, T.S. (1996). *The Structure of Scientific Revolutions, 3rd ed.* University of Chicago Press.

Lakatos, I. (1970). Falsification and the methodology of scientific research programmes. In *Criticism and the Growth of Knowledge*, (Eds., I. Lakatos and A. Mugrave), Cambridge University Press.

Laudan, L. (1977). *Progress and its Problems; Towards a Theory of Scientific Growth*. Univ. of California Press.

Tillé, Y. (2022). Some thoughts on official statistics and its future (with discussion). *Journal of Official Statistics*, 38, 2, 557-598.