

## 8<sup>th</sup> GESIS Summer School in Survey Methodology Cologne, August 2019

### Syllabus for Course 08: "Design and Implementation of Longitudinal Surveys"

Instructors:	Dr. Tarek Al Baghal	Dr. Alexandru Cernat
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Date: 12.-16. August 2019  
Time: 09:00-13:00, 14:00-16:00  
Course starts Monday morning at 09:00

#### About the Instructors:

*Dr. Tarek Al Baghal* is a Research Fellow at the Institute of Social and Economic Research, University of Essex, UK. He is the lead questionnaire designer for the Understanding Society Innovation Panel, involved in designing and implementing this longitudinal study, now on its eleventh wave. His PhD is in Survey Research and Methodology from the University of Nebraska, and he has a Master's in the same field from the University of Maryland.

*Dr. Alexandru Cernat* is a lecturer in Social Statistics at the University of Manchester. Previously he was a Research Associate at the Cathie Marsh Institute for Social Research and the National Centre for Research Methods, University of Manchester where he investigated non-response in longitudinal studies with a special focus on biomarker data. He has received a PhD in survey methodology from the University of Essex working on the topic of mixed mode designs in longitudinal studies.

#### Selected Publications:

- Cernat, A. (2015). Impact of mixed modes on measurement errors and estimates of change in panel data. *Survey Research Methods*, 9(2), 83-99. <http://doi.org/10.18148/srm/2015.v9i2.5851>
- Cernat, A. (2015). The Impact of Mixing Modes on Reliability in Longitudinal Studies. *Sociological Methods & Research*, 44(3), 427-457. <http://doi.org/10.1177/0049124114553802>
- Cernat, A., Couper, M. P., & Ofstedal, M. B. (2016). Estimation of Mode Effects in the Health and Retirement Study Using Measurement Models. *Journal of Survey Statistics and Methodology*, 4(4), 501-524.
- Al Baghal, T. (2017) The Effect of Online and Mixed-Mode Measurement of Cognitive Ability, *Social Science Computer Review*. <http://DOI.org/10.1177/0894439317746328>
- Al Baghal, T. (2017). "Last Year Your Answer Was ...": The Impact of Dependent Interviewing Question Wording on Measures of Change. *Field Methods*, 29: 61-78.
- Al Baghal, T. and Kelley, J. (2016). The Stability of Mode Preference: Implications for Longitudinal Survey Design. *Methods, Data, Analysis*, 10:143-166.

#### Short Course Description:

The course will provide an overview of those aspects of survey design, implementation, and analysis that are unique to longitudinal surveys or that have distinct features in the longitudinal context. The course will specifically cover:

- a review of the advantages and limitations of longitudinal surveys and an outline of some of the uses to which longitudinal surveys are put;
- key aspects of longitudinal survey design such as the sampling design, interval between waves, and data collection modes;
- important aspects of designing a questionnaire and measurement for a longitudinal study, particularly for capturing micro-level change;

- the impact of non-response and attrition in a panel, and adjustments, such as weighting and imputation given that missing data patterns differ between waves;
- an introduction to important analysis considerations and methods when using a longitudinal survey design;
- in addition, each morning time will be available in a computer lab for exercises for practical application of these methods and an opportunity for more interaction with the instructors.

## Keywords:

Longitudinal surveys, data collection, measurement, attrition, weighting, panel data analysis

## Course prerequisites:

Participants should have:

- basic knowledge of survey methodology from a cross-sectional perspective, in particular with respect to survey design, instrument development, and survey implementation;
- basic knowledge of statistics and statistical modeling (i.e., regression) and of a statistical software (Stata or R).

## Target group:

Participants will find the course useful if:

- they are interested in the uses and importance of longitudinal surveys;
- they are involved in planning or conducting a longitudinal survey;
- they are interested in aspects of longitudinal data collection;
- they are interested in the processes involved in measurement of phenomena over time;
- they want to use appropriate methods to analyze longitudinal data.

## Course and learning objectives:

By the end of the course participants will:

- be familiar with the central design issues of longitudinal surveys;
- understand different strategies on how to collect longitudinal data;
- be able to design questions that meet research objectives for longitudinal surveys and minimize error;
- be able to identify and implement features that should help to prevent panel attrition;
- be able to study the nature of non-response and attrition in a longitudinal survey;
- generally understand the methods used in weighting and imputation in a panel survey.

## Organisational structure of the course:

The summer school courses are structured around four hours of classroom instruction and practical sessions. Course instructors shall be available for group and/or individual support for these two hours during the practical sessions. In these meetings, practical applications will be given for the students to work through, with the opportunity to ask instructors questions one-on-one about the course or their own projects. The practical application will relate to topics in longitudinal survey design covered in the lectures, including the impact of question wording on measurement, the identification of attrition, the development of weights, and how these can impact analytic findings.

## Software and hardware requirements:

None. This course takes place in a computer lab. GESIS will provide participants with access to the statistical software packages used in the course (i.e., Stata, R) and various other statistical software packages (e.g., SPSS, Mplus).

## Long Course Description:

Longitudinal surveys collect data from the same sample units over multiple time points, and are important in charting the changes that occur in a population. There are many benefits of longitudinal surveys compared to a cross-sectional study. One important benefit is the ability to measure change both at the macro- and micro-level. Other benefits include the possibility of identifying causality and efficiencies in data collection. As a longitudinal survey provides different benefits compared to a cross-sectional design, it also has unique design features that must be considered. This course aims at covering the main stages of designing and implementing longitudinal surveys, at revealing the main challenges faced when conducting longitudinal surveys and offering solutions for these. The lectures will be interactive, with students encouraged to provide questions and background on their relevant research. Practical examples will be used to illustrate how longitudinal surveys have been and are currently being conducted and used. The daily time for practical applications will specifically be focused on interaction between students and the instructors, focusing on the lecture material.

The course will start by defining a longitudinal survey, and outlining the types of such survey that are carried out currently. Subsequently, basic longitudinal designs will be introduced and their strengths and weaknesses in terms of data collection and analysis potential will be discussed. We will discuss the main stages and decisions involved in planning a longitudinal study. The focus will be on design features and implications that are specific to longitudinal surveys.

Second, the course will focus on measurement in longitudinal surveys. In longitudinal designs, decisions should take into account analysis objectives, which are typically distinct from those of cross-sectional survey. Discussion will focus on the strategy of designing questions for longitudinal surveys, with special attention given to autobiographic memory processes. In panel studies, measurement errors can affect both inter- and intra-wave change indicators, and questionnaire design that can reduce these will be covered, specifically dependent interviewing and calendar interviews. Another possible measurement problem that will be covered is panel conditioning and its potential detection.

Next, the course will discuss nonresponse in panel surveys. In particular, we will identify and discuss unique causes of non-response in the longitudinal survey context and we will outline unique opportunities for non-response prevention. The discussion will focus on panel attrition and we will describe methods to reduce this, dealing separately with locating sample members, making contact with them, and obtaining their co-operation. These methods include targeted field strategies, respondent incentives, targeted letters and other communications, providing a preferred mode to respond, and tailoring questions to engage respondents.

Fourth, in part relating to issues of nonresponse, we will introduce the importance of and methods for weighting longitudinal survey data and imputation of missing data. Given changes in nonresponse and missing data across waves, considerations should be taken for how these methods should be handled over time and how they can take advantage of longitudinal information. This session will provide a general understanding of why and how these methods are used, as well as specific detail to begin implementation in other surveys.

The last course session aims to link what we learned about longitudinal data collection with data analysis. We are going to talk about why traditional methods such as regression modeling are not appropriate for longitudinal data. We will then look at multilevel models of change with a focus on fixed and random effects and their use with real data.

In addition to the lectures, the instructors will be available in the practical application sessions. These sessions will be interactive in nature, fostering communication between the students and instructors using short applied exercises, designed to further the understanding of issues in survey design and collection of longitudinal data. During this time, participants will have the possibility to discuss challenges of their own longitudinal surveys during the course and individually with the instructors. The exercises will focus on application of materials, such as the writing of survey questions related to their research interests and the calculation and application of weights to longitudinal data. Some of these assignments will be based on data from Understanding Society: The United Kingdom Longitudinal Household Study (for more information, see [www.understandingsociety.ac.uk](http://www.understandingsociety.ac.uk)). For computer-based assignments we will make use of the statistical package Stata and of R.

## Day-to-day schedule:

Day	Topic(s)
1	<p data-bbox="279 360 1348 389"><b>Introduction to Longitudinal Surveys; Research Questions; Sample Design; Survey Modes</b></p> <p data-bbox="279 398 890 427"><u>Compulsory reading (have to be read before the session):</u></p> <ul data-bbox="304 461 1332 651" style="list-style-type: none"> <li data-bbox="304 461 1332 524">▪ Lynn, P. (2009). Methods for longitudinal surveys. Pp. 1-19 in: P. Lynn (Ed.), <i>Methodology of Longitudinal Surveys</i>. Chichester: Wiley.</li> <li data-bbox="304 524 1332 586">▪ Groves, R. M., &amp; Lyberg, L. (2010). Total Survey Error: Past, Present, and Future. <i>Public Opinion Quarterly</i>, 74(5), 849-879. <a href="http://doi.org/10.1093/poq/nfq065">http://doi.org/10.1093/poq/nfq065</a></li> <li data-bbox="304 586 1332 651">▪ Smith, P., Lynn, P. &amp; Elliot, D. (2009). Sample design for longitudinal surveys. Pp. 21-33 in: P. Lynn (Ed.), <i>Methodology of Longitudinal Surveys</i>. Chichester: Wiley.</li> </ul> <p data-bbox="279 685 1109 714"><u>Suggested reading (suggested, yet do not have to be read before the session):</u></p> <ul data-bbox="304 748 1348 1122" style="list-style-type: none"> <li data-bbox="304 748 1348 837">▪ Sikkel, D. &amp; A. Hoogendorn (2008): Panel surveys. Pp. 479-499 in: E.D. de Leeuw, J.J. Hox &amp; D.A. Dillman (Eds.), <i>International Handbook of Survey Methodology</i>. New York, London: Lawrence Erlbaum Associates.</li> <li data-bbox="304 837 1348 965">▪ Lynn, P. (2011). Maintaining cross-sectional representativeness in a longitudinal general population survey. <i>Understanding Society Working Paper 2011-04</i>. <a href="https://www.iser.essex.ac.uk/research/publications/working-papers/understanding-society/2011-04">https://www.iser.essex.ac.uk/research/publications/working-papers/understanding-society/2011-04</a>.</li> <li data-bbox="304 965 1348 1055">▪ Buck, N.H., Ermisch, J.F. and Jenkins, S.P. (1995) Choosing a Longitudinal Survey Design: The Issues. <i>Occasional Paper 96-1</i>, Colchester: University of Essex. (Pages 1-20, 33-41) <a href="https://www.iser.essex.ac.uk/files/occasional_papers/pdf/op96-1.pdf">https://www.iser.essex.ac.uk/files/occasional_papers/pdf/op96-1.pdf</a></li> <li data-bbox="304 1055 1348 1122">▪ Rose, D. (1995) Household Panel Studies: An Overview. <i>Innovation: The European Journal of Social Sciences</i>, 8(1)7-24.</li> </ul>
2	<p data-bbox="279 1160 1348 1223"><b>Measurement in Longitudinal Surveys: What to measure, cognitive processes, problems, and questionnaire design</b></p> <p data-bbox="279 1229 502 1258"><u>Compulsory reading:</u></p> <ul data-bbox="304 1292 1332 1442" style="list-style-type: none"> <li data-bbox="304 1292 1332 1355">▪ Jäckle, A. (2009). Dependent Interviewing: A Framework and Application to Current Research. Pp. 93-112 in: P. Lynn (Ed.), <i>Methodology of Longitudinal Surveys</i>. Chichester: Wiley.</li> <li data-bbox="304 1355 1332 1442">▪ Belli, R. F., Smith, L., Andreski, P., &amp; Agrawal, S. (2007). Methodological comparisons between CATI event history calendar and conventional questionnaire instruments. <i>Public Opinion Quarterly</i>. 71, 603-622.</li> </ul> <p data-bbox="279 1476 486 1505"><u>Suggested reading:</u></p> <ul data-bbox="304 1538 1332 1951" style="list-style-type: none"> <li data-bbox="304 1538 1332 1568">▪ Hox, J. J. (1997). From theoretical concept to survey question. In Lyberg, Biemer,</li> <li data-bbox="304 1568 1332 1597">▪ Collins, de Leeuw, Dippo, Schwarz, &amp; Trewin (Eds.), <i>Survey measurement and</i></li> <li data-bbox="304 1597 1332 1626">▪ <i>process quality</i>.</li> <li data-bbox="304 1626 1332 1688">▪ Callegaro, M. (2008). Seam Effects in Longitudinal Studies. <i>Journal of Official Statistics</i>, 24: 387-409.</li> <li data-bbox="304 1688 1332 1751">▪ Chapter 4 in Tourangeau, R., Rips, L. &amp; Rasinski, K. (2000): <i>The Psychology of Survey Response</i> Cambridge, MA: Cambridge University Press.</li> <li data-bbox="304 1751 1332 1841">▪ Sturgis, P., Allum, and Brunton-Smith, I. (2009). Attitudes Over Time: The Psychology of Panel Conditioning. Pp. 113-126 in: P. Lynn (Ed.), <i>Methodology of Longitudinal Surveys</i>. Chichester: Wiley.</li> <li data-bbox="304 1841 1332 1951">▪ Uhrig, SC. N. (2012) Understanding panel conditioning: An examination of social desirability bias in self-reported height and weight in panel surveys using experimental data". <i>Journal of Longitudinal and Life Course Studies</i>, 3: 120-136.</li> </ul>

<p>3</p>	<p><b>Attrition in Longitudinal Surveys: Specific issues and methods to counter nonresponse</b></p> <p><u>Compulsory reading:</u></p> <ul style="list-style-type: none"> <li>▪ Watson, M. &amp; Wooden, M. (2009). Identifying factors affecting longitudinal survey response. Pp. 157-181 in P. Lynn (Ed.), <i>Methodology of Longitudinal Surveys</i>. Chichester: Wiley.</li> <li>▪ Lepkowski, J.M. &amp; Couper, M.P. (2002). Nonresponse in the second wave of longitudinal household surveys. Pp. 259-272 in R.M. Groves, D. Dillman, J.L. Eltinge &amp; R.J. Little (Ed.), <i>Survey Nonresponse</i>. New York: Wiley.</li> </ul> <p><u>Suggested reading:</u></p> <ul style="list-style-type: none"> <li>▪ Couper, M.P. &amp; Ofstedal, M.B. (2009). Keeping in contact with mobile sample members. Pp. 183-203 in P. Lynn (Ed.), <i>Methodology of Longitudinal Surveys</i>. Chichester: Wiley.</li> <li>▪ Laurie, H., Smith, R. &amp; Scott, L. (1999). Strategies for reducing nonresponse in a longitudinal panel survey. <i>Journal of Official Statistics</i>, 15: 269-282.</li> <li>▪ Lynn, P. (2014). Targeted response inducement strategies on longitudinal surveys. Pp. 322-338 in U. Engel et al (Ed.s), <i>Improving Survey Methods: Lessons from Recent Research</i>. New York: Routledge.</li> <li>▪ Laurie, H. &amp; Lynn, P. (2009). The use of respondent incentives on longitudinal surveys. Pp. 205-233 in P. Lynn (Ed.), <i>Methodology of Longitudinal Surveys</i>. Chichester: Wiley.</li> <li>▪ Banks, J., Muriel, A., &amp; Smith, J. P. (2011). Attrition and health in ageing studies: evidence from ELSA and HRS. <i>Longitudinal and Life Course Studies</i>, 2(2), 101-126.</li> <li>▪ Groves, R.M. (2006). Nonresponse Rates and Nonresponse Bias in Household Surveys. <i>Public Opinion Quarterly</i>, 70: 646-675.</li> <li>▪ Groves, R.M, Singer, E. &amp; Corning, A. (2000). Leverage-Saliency Theory of Survey Participation: Description and an Illustration. <i>Public Opinion Quarterly</i>, 64: 299-308.</li> </ul>
<p>4</p>	<p><b>Weighting and Imputation in a Longitudinal Survey</b></p> <p><u>Compulsory reading:</u></p> <ul style="list-style-type: none"> <li>• Lynn, P. (1996). Weighting for nonresponse. Pp 205-214 in R. Banks et al (Ed.s), <i>Survey and Statistical Computing</i>. Amersham: ASC. Chapter can be downloaded from <a href="https://www.google.com">https://www.google.com</a></li> <li>• Schafer, J. L., &amp; Graham, J. W. (2002). Missing data: Our view of the state of the art. <i>Psychological Methods</i>, 7(2), 147.</li> </ul> <p><u>Suggested reading:</u></p> <ul style="list-style-type: none"> <li>▪ Seaman, S. R., &amp; White, I. R. (2013). Review of inverse probability weighting for dealing with missing data. <i>Statistical Methods in Medical Research</i>, 22(3), 278-295. <a href="http://doi.org/10.1177/0962280210395740">http://doi.org/10.1177/0962280210395740</a></li> <li>▪ Peytchev, A. (2012). Multiple Imputation for Unit Nonresponse and Measurement Error. <i>Public Opinion Quarterly</i>. <a href="http://doi.org/10.1093/pog/nfr065">http://doi.org/10.1093/pog/nfr065</a></li> <li>▪ Enders, C. K. (2010). <i>Applied Missing Data Analysis</i> (1st ed.). New York: The Guilford Press.</li> </ul>
<p>5</p>	<p><b>Introduction of analysis issues in longitudinal surveys</b></p> <p><u>Compulsory reading:</u></p> <ul style="list-style-type: none"> <li>• Chapters 3, 4, 5 in Singer, J., &amp; Willett, J. (2003). <i>Applied longitudinal data analysis: modeling change and event occurrence</i>. Oxford University Press.</li> </ul> <p><u>Suggested reading:</u></p> <ul style="list-style-type: none"> <li>• Chapters 6, 7 and 8 in Singer, J., &amp; Willett, J. (2003). <i>Applied longitudinal data analysis: modeling change and event occurrence</i>. Oxford University Press.</li> </ul>

## Preparatory reading:

General introduction to survey methodology and survey data collection (alternatively you could take a course such as "Introduction to Survey Design" in the first week):

- Groves, R. M., Fowler, F. J., Couper, M. P., Lepkowski, J. M., Singer, E. and Tourangeau, R. (2009). Survey Methodology. Hoboken: Wiley.

## Additional recommended literature:

General introduction to survey methodology and survey data collection:

- de Leeuw, E. D., Hox, J. J. and Dillman, D. A. (Eds.) (2008). International Handbook of Survey Methodology. New York: Lawrence Erlbaum Associates.
- Dillman, D. A., Smyth, J. D. and Christian, L. M. (2008). Internet, Mail, and Mixed-Mode Surveys. The Tailored Design Method. Hoboken: Wiley.

General longitudinal data collection:

- Lynn, P. (Ed.). (2009). Methodology of Longitudinal Surveys (1 edition). Chichester, UK: Wiley.

Mixed modes and longitudinal studies:

- Lynn, P., Uhrig, S.C.N. and Burton, J. (2010) Lessons from a Randomised Experiment with Mixed-Mode Designs for a Household Panel Survey. Understanding Society Working Paper 2010-03, Colchester: University of Essex. (Pages 1-6) <http://research.understandingsociety.org.uk/publications/working-paper/2010-03.pdf>

Online panels:

- Blom, A. G., Bosnjak, M., Cornilleau, A., Cousteaux, A.-S., Das, M., Douhou, S., & Krieger, U. (2016). A Comparison of Four Probability-Based Online and Mixed-Mode Panels in Europe. Social Science Computer Review, 34(1), 8–25. <http://doi.org/10.1177/0894439315574825>
- AAPOR Standards Committee. (2010). AAPOR Report on Online Panels (pp. 1–82). AAPOR Executive Council. <https://www.aapor.org/Education-Resources/Reports/Report-on-Online-Panels>