Sociology 620: Aging and Cohort Analysis in Social and Epidemiologic Research: Models, Methods, and Innovations

Syllabus

Spring 2014:	TTH 2 – 3:15pm HM151
Instructor:	Professor Yang Claire Yang Department of Sociology Lineberger Comprehensive Cancer Center Carolina Population Center
Office:	Hamilton Hall, room 265
Phone:	966-5558
e-mail:	yangy@unc.edu
Office hours:	T 3:15 – 5pm.

Course Description. This seminar surveys the major methodological tools and empirical studies of aging and cohort analysis that are of enduring importance to the understanding of social change, epidemiologic trends, and related population and life course processes and dynamics. It aims to provide useful guidelines on how to conduct such analysis. It first introduces the theoretical background and principles of the aging and cohort analysis paradigm. This is followed by an introduction of key models and methods within the frameworks of three common research designs in empirical research. Discussion within each design emphasizes the substantive problems that result from the lack of adequate analytic strategies and the developments of new models and methods that address these problems. The objectives are for students to obtain an understanding of key concepts, theories, methods, and research findings so that they can begin contributing to current research in a broad range of areas in which time and change are of concerns such as cancer, chronic diseases, mortality, fertility, migration, marriage and family, quality of life, and longevity.

Course Materials.

1. Text book:
Yang, Yang and Kenneth Land. 2013. *Age-Period-Cohort Analysis: New Models, Methods, and Empirical Applications*. New York: Chapman & Hall/CRC Press.
2. Selected journal articles and book chapters. The PDFs of most readings are available at the course website. Others are accessible through the university library. Sample codes using Stata and SAS for data analysis will be provided. Students should be proficient in Excel and are free to use other statistical software packages such as R. More readings and sample codes using standard statistical software packages are available for public access at http://www.unc.edu/~yangy819/apc/index.html.

Course Requirements and Grading. Students are required to attend all class meetings. Students will be assigned the task of summarizing the readings each week and leading a discussion/study thereof. It is imperative that assigned chapters be read before class for class discussion to be productive. Graduate students will be required to replicate analyses introduced in each lecture and carry out new analyses and present findings following the lecture each week. Given the substantial quantitative background necessary to understand certain course materials, undergraduate students will have a reduced reading load. They will only be required to do readings marked by "*" below and two selected assignments which can be completed in Excel. Grades will be based on class participation and assignments during the semester (60%), the final research paper (35%), and the final exam (5%).

Schedule

Week 1: Jan. 9: Syllabus; introduction of class participants and identification of areas of interest and research questions

- *Book: Chapter 1

Week 2

I. An Overview of Early Literature: Concepts, measures, and methods

- **Jan. 14.1**: Why Age-period-cohort (APC) Analysis?
  - *Book: Chapter 2
  - *Ryder, N. B. 1965. The cohort as a concept in the study of social change. *American Sociological Review* 30: 843-861.
  - *Riley, Matilda White. 1987. "On the Significance of Age in Sociology." *American Sociological Review* 52(1): 1-14.
  - *Ben-Shlomo, Yoav and Diana Kuh. 2002. "A Life Course Approach to Chronic Disease Epidemiology: Conceptual Models, Empirical Challenges, and Interdisciplinary Perspectives." *International Journal of Epidemiology* 31: 285-293.
  - *Finch, C. E. and E. M. Crimmins. 2004. Inflammatory Exposure and Historical Change in Human Life-Spans. *Science* 305:1736-1739.
- **Jan. 14.2**: Distinguishing Age, Period, and Cohort
  - *MacMahon, B. 1957. Breast Cancer at Menopausal Ages: An Explanation of Observed Incidence Changes. *Cancer* 10:1037-1044.
  - Distribution of Assignment 1

- **Jan. 16.1**: Descriptive APC Analysis
  - *Book: Chapter 3.1 & 4.1
  - * (page 388-396) Yang, Y. 2008. Trends in U.S. adult chronic disease mortality: age, period, and cohort variations. *Demography* 45: 387-416.
- **Jan. 16.2**: What is the Model Identification Problem?
  - Book: Chapter 4.2
  - Mason, K.O., Mason, W.M., Winsborough, H.H., & Poole, W.K. 1973. Some methodological issues in cohort analysis of archival data. *American Sociological Review* 38: 242-258.

- (Page 75-80) Yang, Y., Fu, W.J., & Land, K.C. 2004. A methodological comparison of age-period-cohort models: intrinsic estimator and conventional generalized linear models. *Sociological Methodology* 34: 75-110.

Week 3:

- **Jan. 21**: *Class discussion of Assignment 1
  - Find examples that confound age and period effects or period and cohort effects
  - Descriptive analysis of rates of 1) lung cancer mortality and 2) colorectal cancer mortality in the U.S. from SEER and NCHS.
  - Distribution of Assignment 2
- **Jan. 23.1**: *Linear constrained coefficients approach*: *CGLIM*
  - Book: Chapter 4.3
  - Mason, William M. and Herbert L. Smith. 1985. "Age-Period-Cohort Analysis and the Study of Deaths from Pulmonary Tuberculosis." Pp. 151-228 in *Cohort Analysis in Social Research*, edited by W. M. Mason and S. E. Fienberg. New York: Springer-Verlag.
- **Jan. 23.2**: *Proxy variables approach*
  - *Preston, S.H. & Wang, H. 2006. Smoking and sex mortality differences in the United States. *Demography*, 43, 631-646.
- *Nonlinear constraints approach* (optional)
  - Holford, T. R. 1991. Understanding the effects of age, period, and cohort on incidence and mortality rates. *Annual Review of Public Health* 12: 425-57.

II. New Developments: Generalized Linear Mixed Models (GLMM) Framework and Substantive Research

Research Design I: Age-by-Time Period Tables of Rates and the Intrinsic Estimator (IE)

Week 4:

- **Jan. 28: Class discussion of Assignment 2**
  - Model fitting comparison;
  - Estimation of the APC accounting models using the constrained coefficients (CGLM) approach
  - Distribution of Assignment 3
- **Jan. 30**: Definitions and Properties
  - Book: Chapter 5.1, 5.2
  - Yang, Y., Fu, W.J., & Land, K.C. 2004. A methodological comparison of age-period-cohort models: intrinsic estimator and conventional generalized linear models. *Sociological Methodology* 34: 75-110.
  - Yang, Y., Schulhofer-Wohl, S., Fu, W.J., & Land, K.C. 2008. The intrinsic estimator for age- period-cohort analysis: what it is and how to use it? *American Journal of Sociology* 113: 1697-1736.

Week 5:

- **Feb. 4: Empirical applications:**

- the evolution of adult mortality declines: Yang, Y. 2008. Trends in U.S. adult chronic disease mortality: age, period, and cohort variations. *Demography* 45: 387-416.
- Cancer incidence and mortality trends: Chapter 6.1

- **Feb. 6**: Class discussion of Assignment 3
  - A three-step analytic procedure: descriptive graphics – model fitting – the IE for APC models of cancer mortality data
  - Comparison of results from earlier methods
  - Distribution of Assignment 4

Week 6:

- **Feb. 11: APC model based demographic projection and forecasting**
  - Book: Chapter 6.2
  - Osmond, C. 1985. Using Age, Period and Cohort Models to Estimate Future Mortality Rates. *International Journal of Epidemiology* 14:124-129.
  - *Reither, Eric N., S. Jay Olshansky, and Yang Yang. 2011. New Forecasting Methodology Indicates More Disease and Earlier Mortality Ahead for Today's Younger Americans. *Health Affairs* 30:1562-1568.

Research Design II: Repeated Cross-sectional Surveys

The Basics of Hierarchical Age-Period-Cohort (HAPC) Models

- **Feb. 13**: CCREM Model Specification and Interpretation of Model Estimates
  - Background: Hierarchical Linear Models (HLM):
    - Raudenbush, Stephen W. and Anthony S. Bryk. 2002. *Hierarchical Linear Models: Applications and Data Analysis Methods*: Chapter 2 and Chapter 3 on Hypothesis Testing. Thousand Oaks: Sage.
  - Book: Chapter 7.1, 7.2
  - Yang, Y. & Land, K.C. 2006. A mixed models approach to age-period-cohort analysis of repeated cross-section surveys: trends in verbal test scores. *Sociological Methodology* 36: 75-97.

Week 7:

- **Feb. 18**: CCREM (cont.)
  - Book: Chapter 3.3, 7.3 – 7.6
  - Introducing prototypical datasets: GSS, NHIS, and NHANES
  - *Reither, E., Hauser, R., & Yang Y. 2009. Do birth cohorts matter? Age-period-cohort analyses of the obesity epidemic in the U.S. *Social Science & Medicine* 69:1439-1448.

- **Feb. 20**: Class discussion of Assignment 4:
  - The HAPC analysis of the NHIS Self-rated health data
  - Distribution of Assignment 5

Week 8:

The Advanced Hierarchical Age-Period-Cohort (HAPC) Analyses

- **Feb. 25**: CCREM with level-two covariates across research designs
    - Book: Chapter 8.1
    - *Yang, Y. 2008. Social inequalities in happiness in the U.S. 1972-2004: An age-period-cohort analysis. *American Sociological Review* 73: 204-226.
    - Cancer incidence and mortality revisited: Book Chapter 8.2

- **Feb. 27**: HAPC Analysis of Aggregate Rates Data
    - Class discussion of Assignment 5:
        - HAPC analysis of SEER-NCHS data on lung cancer and breast cancer
        - Model validation: Comparison with results from Assignment 3
        - Period and cohort mechanisms
    - Distribution of Assignment 6

Week 9:

March 4: Extensions to the HAPC Models
- Book: Chapter 8.3, 8.4
- Small sample sizes
    - Yang, Y. 2006. Bayesian inference for hierarchical age-period-cohort models of repeated cross-section survey data. *Sociological Methodology* 36: 39-74.
- Between-group and within-group inequality
    - Zheng, Hui, Y. Yang, and Kenneth Land. 2011. Heteroscedastic Regression in Hierarchical Age-Period-Cohort Models, with Applications to the Study of Self-Reported Health. *American Sociological Review* 76: 955-983.

Research Design III: Accelerated Longitudinal Panels

Growth Curve Models of Aging and Cohort Effects

- **March 6**: Basic Model Specification: Intercohort Variations in Age Trajectories
    - Book: Chapter 3.4, 9.1
    - Miyazaki, Y., & Raudenbush, S. W. 2000. Tests for linkage of multiple cohorts in an accelerated longitudinal design. *Psychological Methods* 5: 44-63.
    - *Yang, Y. 2007. Is old age depressing? Growth trajectories and cohort variations in late life depression. *Journal of Health and Social Behavior* 48: 16-32.

Week 10: Spring Break

Week 11:

- **March 18**: Intracohort Heterogeneity in Age Trajectories
    - Book: Chapter 9.2
    - Cumulative Advantage/Disadvantage Theory
        - House, James S., et al. 1994. The Social Stratification of Aging and Health. *Journal of Health and Social Behavior* 35:213-234.

        - Ferraro, Kenneth F. and Jessica A. Kelley-Moore. 2003. "Cumulative Disadvantage and Health: Long-Term Consequences of Obesity?" *American Sociological Review* 68: 707-729.
    - Yang, Y. and L. C. Lee. 2010. "Dynamics and Heterogeneity in the Process of Human Frailty and Aging: Evidence from the U.S. Older Adult Population."

- **March 20**: Class discussion of Assignment 6
    - Growth curve analysis of the Americans' Changing Lives study: Aging and Cohort Effects on Health
    - Distribution of Assignment 7

Week 12:

- **March 25**: Intercohort Variations in Intracohort Heterogeneity Patterns
    - Book: Chapter 9.3
    - *House, J. S., P. M. Lantz, et al. 2005.Continuity and Change in the Social Stratification of Aging and Health over the Life Course: Evidence from a Nationally Representative Longitudinal Study from 1986 to 2001/2002 (Americans' Changing Lives Study). *Journal of Gerontology: SERIES B* 60B:15-26.
    - Yang, Y. & Lee, L.C. 2009. Sex and race disparities in health: cohort variations in life course patterns. *Social Forces* 87: 2093-2124.
    - Chen, F., Yang Y., & Liu, G. 2010. Social change and socioeconomic disparity in health over the life course in China: A cohort analysis. *American Sociological Review* 75:126-150.

- **March 27**: Class discussion of Assignment 7
    - Growth curve analysis of the Americans' Changing Lives study: Cohort Differences in Social Disparities in Aging

III. The Future of APC Analysis

Week 13

- **April 1**: Directions for future research
    - Book: Chapter 10
    - Other cohort models: Hobcraft, J., J. Menken, et al. 1982. Age, Period, and Cohort Effects in Demography: A Review. *Population Index* 48:4-43.
    - Brain-storming new ideas

- **April 3**: No class (Travel to the Southern Sociological Association Annual Meetings)

Week 14

- **April 8**: Presentation of final paper: Group 1

- **April 10**: Presentation of final paper: Group 2

Week 15

- **April 15**: Presentation of final paper**:** Group 3
- **April 17:** Individual meetings on final papers

Week 16: April 22 – 25 Reading period

April 25: Final paper due

April 27: Final in-class exam