Getting your degree and beyond: Insights from a recent graduate

Sandrah P. Eckel
eckel@usc.edu

USC PM Graduate Student Seminar
January 19, 2010
Your ‘duties’ as a graduate student

• Coursework
• Qualifying exams
• Thesis research
• RA
• Tutoring
• Consulting
• Teaching
• Attending conferences
• Getting a job
Selecting a thesis advisor

- Personal decision
- Advisor must choose you too
- Interact with your potential advisor
  - Take his/her course, do an independent study
- Talk to other students
- Find out who has been your potential advisor’s advisees
  - What was their topic?
  - How long did it take them?
  - Where are they now?
  - Mathematical resource: http://www.genealogy.ams.org/
- Familiarize yourself with your potential advisor’s research
  - Look at his/her recent grant proposals
Selecting a thesis advisor, continued

• Choose a more senior or a more junior faculty member?
  ▪ Publication priorities
  ▪ Availability
    • Sabbaticals
  ▪ Connections in your field
  ▪ Experience in mentoring

• Consider co-advisors
  ▪ Could benefit you and a junior faculty member
How I selected my thesis advisor

• Worked with him before starting my thesis research
  ▪ Good interpersonal rapport
• Talked with classmates
• Senior faculty member
Selecting a thesis topic

- Whatever you choose, it may change over time and take longer than you expected
- Needs to interest you
  - Something you know
- Needs to interest your advisor
- Takes advantage of unique available resources
  - Expertise of your advisor, others in division/department
  - Datasets
- Corresponds to your career goals
- Needs to be ‘doable’
How I selected my thesis topic:

Quantifying individual and city level modification of the health effects of air pollution in older adults

1. Identifying effect modifiers in air pollution time-series studies using a two-stage analysis
   - Extension of standard models for time-series data to search for effect modification

2. Surrogate screening models for the low physical activity frailty criterion
   - Surrogate models as complement to multiple imputation
   - Possibly advance science while filling in missing data

3. Modification by frailty status of the association between air pollution and lung function
   - Innovative application of gerontological insight
   - Cumulative exposure summaries
Selecting my second thesis topic (Thesis II)

Surrogate screening models for the low physical activity frailty criterion
Thesis II: (Gerontologic) Frailty

• NOT a random effects survival model
• Gerontologic measure of health status (‘susceptibility’)
  ▪ State of reduced reserves and increased vulnerability
• 5 Validated criteria – Fried et al. (2001), Bandeen-Roche et al. (2006)
  1. Slow walking speed
  2. Poor grip strength
  3. Exhaustion
  4. Unintended weight loss
  5. Low physical activity
• Predictive of negative health outcomes
• Dynamic process, with transitions between categorical frailty status – Gill et al. (2006)
**Thesis II: Datasets**

**Cardiovascular Health Study (CHS)**

- Two cohorts of community-dwelling older adults
  - 5,021 at baseline (1989) in 4 US communities
  - 867 additional African Americans (1992)
- Long follow-up (up to 9 annual clinical exams)
- Used to operationalize phenotype of frailty

**Environmental Factors Ancillary Study**

- Ambient levels of PM$_{10}$, NO$_2$, O$_3$, SO$_2$ and CO
  - 3 CHS communities
  - Recruitment through June 2000
- Participant-level, monthly average “exposure”
  - Inverse distance weighted average of up to 3 nearby air quality monitors
Thesis II: Challenge 1: Infrequent assessment in CHS
Calculate frailty status at each year of follow-up in CHS

<table>
<thead>
<tr>
<th>Frailty criteria (M = not assessed):</th>
<th>Observation Year</th>
<th>2 - baseline 1</th>
<th>3</th>
<th>4</th>
<th>5 - baseline 2</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walk time</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Grip strength</td>
<td>•</td>
<td>M</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Exhaustion</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Weight loss</td>
<td>•</td>
<td>•</td>
<td>M</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Physical activity</td>
<td>•</td>
<td>M</td>
<td>M</td>
<td>•</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>•</td>
<td>M</td>
<td>M</td>
</tr>
</tbody>
</table>

- **Problem**: assessment of physical activity
- **Solution**: fill in missing data
  - Multiple imputation
  - Or…find a *surrogate measure* of physical activity
Thesis II: Challenge 2: Lengthy assessment

- Minnesota Leisure Time Activities Questionnaire
  - walking for exercise, moderately strenuous household chores, mowing the lawn, raking the lawn, gardening, hiking, jogging, biking, exercise cycle, dancing, aerobics/aerobic dance, bowling, golf, calisthenics/general exercise, swimming
  - singles tennis, doubles tennis, racquetball *(Cohort 1 baseline only)*
  - up to 2 free responses

20 activities

Kcal/week expenditure is calculated for each activity and then summed over all activities to obtain **total kcal/week expenditures**

**Low physical activity**

= gender-specific lowest 20% of total kcal/week expenditures at baseline
Thesis II: Discussion

Candidate Set 1:
We can create effective streamlined surrogate models
• Different predictive accuracy criteria produce similar conclusions
• Level of ‘effectiveness’ (i.e., threshold on AUC) required depends on expert opinion
  ▪ Formal cost-benefit analysis could clarify tradeoffs
  ▪ Dichotomizing predicted probabilities aids in decision-making
• Women require fewer activities than men

Candidate Set 2:
Surrogate models to fill in missing data not competitive
• Multiple imputation can be used to fill in the missing data
• Original low physical activity definition potentially not best measure
While you are working on your thesis...
Teaching

You never really understand something until you teach it
- Important for those planning to go into academia
- Also important for those planning to go into industry, etc…
  - Good preparation for
    - Job interviews
    - Consulting/working with colleagues in other fields
- Try to TA several courses and give at least a few lectures
- Meet many interesting people
  - Networking, collaborations, job offers, etc…
Conferences

• Attend as many as you can
  ▪ Biostatistics
    • ENAR
      March 21-24, 2010 in New Orleans
      (registration deadline in November)
    • WNAR
      June 20-23, 2010 in Seattle
    • JSM
      July 31-August 5, 2010 in Vancouver, B.C.
      (registration deadline February 1, 2010!)
  ▪ Substantive subject area conferences
    • Give a talk/poster
    • Apply for student travel awards!
    • Job hunting: informal and formal (job fairs)
Prepare yourself for the job market

• Know what’s available
  ▪ RSS feeds of relevant job listing websites
    • Biostatistics: http://jobs.amstat.org/search/results/

• Prepare your CV now
  ▪ Update whenever you accomplish something

• Create a personal website (simple is ok!)
  ▪ USC will host your website
    http://www.usc.edu/its/web/getting_started/ppages.html
  ▪ Include
    • Photo, contact info, CV

• Practice giving talks

• Rough timeline for job applications
  ▪ Academia: Nov-Jan before summer graduation
  ▪ Industry: Mid-late spring before summer graduation
Your ‘duties’ as a graduate student

- Coursework
- Qualifying exams
- Thesis research
- RA
- Tutoring
- Consulting
- Teaching
- Attending conferences
- Getting a job
Resources

• Advisors/Faculty
• Colleagues
• Alumni
• Books:

• Lots of websites