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                                Ex3Voc
options nodate nonumber ps=max linesize=75;
goptions reset=all hsize=5 vsize=4 ftext=simplex;
title;
libname BASUG "d:\my documents\presentations\BASUG_08";

proc print data=BASUG.Vocab (obs=20);
run;

proc freq data=BASUG.Vocab;
  table age*group / nocol norow nopercent;
run;

data Vocab; set BASUG.Vocab;
  *coding up offset term;
  if group = 0 then hours = 5;
  if group = 1 then hours = 3;
  lnhours = log(hours);
  *centering age at 12 months;
  agecent = age-12;
  *median split on momspeak -- for plots ONLY;
  if momspeak > 3103 then momspeakhi = 1;
  else momspeakhi=0;
run;

proc sort data=Vocab; by group age; run;

proc means data=Vocab noprint; by group age;
  var vocab;
  output out=means mean=mean;
run;

proc print data=means; run;

data means; set means;
  if group = 0 then hours = 5;
  if group = 1 then hours = 3;
  lnmean = log(mean);
  offset = log(hours);
  lnrate = lnmean-offset;
  drop _TYPE_ _FREQ_;
run;

symbol1 value=dot color=black i=rq;
symbol2 value=square color=black i=rq;
axis1 minor=none;
axis2 minor=none order=12 to 26 by 2;
proc gplot data=means;
  plot (mean lnmean lnrate)*age=group / vaxis=axis1 haxis=axis2;
run; quit;

proc sort data=vocab; by group female age; run;
proc means data=vocab noprint; by group female age;
  var vocab;
  output out=means2 mean=mean;
run;

data means2; set means2;
  if group = 0 then hours = 5;
  if group = 1 then hours = 3;
  lnmean = log(mean);
  offset = log(hours);
  lnrate = lnmean-offset;
  drop _TYPE_ _FREQ_;

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run;

symbol1 value=> color=black i=rq l=2 w=1.5 h=1.5;
symbol2 value=* color=black i=rq l=2 w=1.5 h=1.5;
axis1 minor=none;
axis2 minor=none order=12 to 26 by 2;
proc gplot data=means2;
  plot lnrate*age=female / vaxis=axis1 haxis=axis2;
run; quit;

proc sort data=vocab; by group momspeakhi age; run;
proc means data=vocab noprint; by group momspeakhi age;
  var vocab;
  output out=means3 mean=mean;
run;

data means3; set means3;
  if group = 0 then hours = 5;
  if group = 1 then hours = 3;
  lnmean = log(mean);
  offset = log(hours);
  lnrate = lnmean-offset;
  drop _TYPE_ _FREQ_;
run;

symbol1 value=x color=black i=rq l=2 w=1 h=1;
symbol2 value=circle color=black i=rq l=2 w=1 h=1;
axis1 minor=none;
axis2 minor=none order=12 to 26 by 2;
proc gplot data=means3;
  plot lnrate*age=momspeakhi / vaxis=axis1 haxis=axis2;
run; quit;

*Model 1, time trends;
proc glimmix data=Vocab;
  class id;
  model vocab = agecent agecent*agecent /
    solution offset=lnhours dist=poisson link=log ddfm=kr;
  random intercept agecent / subject=id type=un;
  random _residual_; *overdispersion;
  output out=predicted pred(blup ilink)=predcount;
run;

*comparing observed and predicted values;
symbol value=none color=black i=join l=1 repeat=22;
axis1 order=12 to 26 by 2 minor=none;
axis2 order=0 to 800 by 200 minor=none;
proc gplot data=predicted;
  plot (vocab predcount)*age=id/nolegend haxis=axis1 vaxis=axis2;
run; quit;

*Model 2, conditioning on predictors;
proc glimmix data=Vocab;
  class id;
  model vocab = agecent lnmonspeak female agecent*agecent /
    solution offset=lnhours dist=poisson link=log ddfm=kr;
  random intercept agecent / subject=id type=un;
  random _residual_;
  ods output parameterestimates=fixedeffects;
run;

proc transpose data=fixedeffects(keep=estimate effect) out=fixedT;
  var estimate;

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id effect;
run;

data fixedpred; set fixedT;
  do age = 12 to 26 by 2;
    agec = age-12;
    *male and female holding lnmomspeak at mean, 1 hour;
    linpredmale = intercept + agecent*agec + agecent_agecent*(agec**2);
    linpredfemale = linpredmale + female;
    *high and low lnmomspeak (SD=.54), balanced on gender;
    linpredmomhi = linpredmale + .5*female + lnmomspeak*.54;
    linpredmomlo = linpredmale + .5*female - lnmomspeak*.54;
    array linpred[4] linpredmale linpredfemale linpredmomhi linpredmomlo;
    array pred[4] predmale predfemale predmomhi predmomlo;
    do i = 1 to 4;
      pred[i] = exp(linpred[i]); *inverse link;
    end;
  output;
end;
drop i;
run;

symbol1 value=> color=black i=join l=2 w=1.5 h=1.5 repeat=1;
symbol2 value=* color=black i=join l=2 w=1.5 h=1.5 repeat=1;
axis1 minor=none order=12 to 26 by 2;
axis2 minor=none label=("log(rate)");
axis3 minor=none label=("word/hour");
proc gplot data=fixedpred;
  plot (linpredmale linpredfemale)*age / overlay haxis=axis1 vaxis=axis2;
run; quit;
proc gplot data=fixedpred;
  plot (predmale predfemale)*age / overlay haxis=axis1 vaxis=axis3;
run; quit;
symbol1 value=x color=black i=join l=2 w=1 h=1 repeat=1;
symbol2 value=circle color=black i=join l=2 w=1 h=1 repeat=1;
proc gplot data=fixedpred;
  plot (linpredmomlo linpredmomhi)*age / overlay haxis=axis1 vaxis=axis2;
run; quit;
proc gplot data=fixedpred;
  plot (predmomlo predmomhi)*age / overlay haxis=axis1 vaxis=axis3;
run; quit;

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