Drawing Graphs for Incidence and Prevalence

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Drawing graphs showing the progression of individuals through sickness and death (or loss to follow-up), to help students estimate prevalence and incidence.

Basic idea, for each person, generate a probability of sickness, death, or loss. Draw a line graph appropriately

Functions for getting sick, dying, or getting lost to follow up:

```
sick = function(rate = 0.07) {
    rexp(1, rate = rate)
}
loss = function(rate = 0.02, lockout = 0.5) {
    lockout + rexp(1, rate = rate)
}
death = function(rate = 0.05) {
    rexp(1, rate = rate)
}
```

Put these together for one person, graphing out the result:

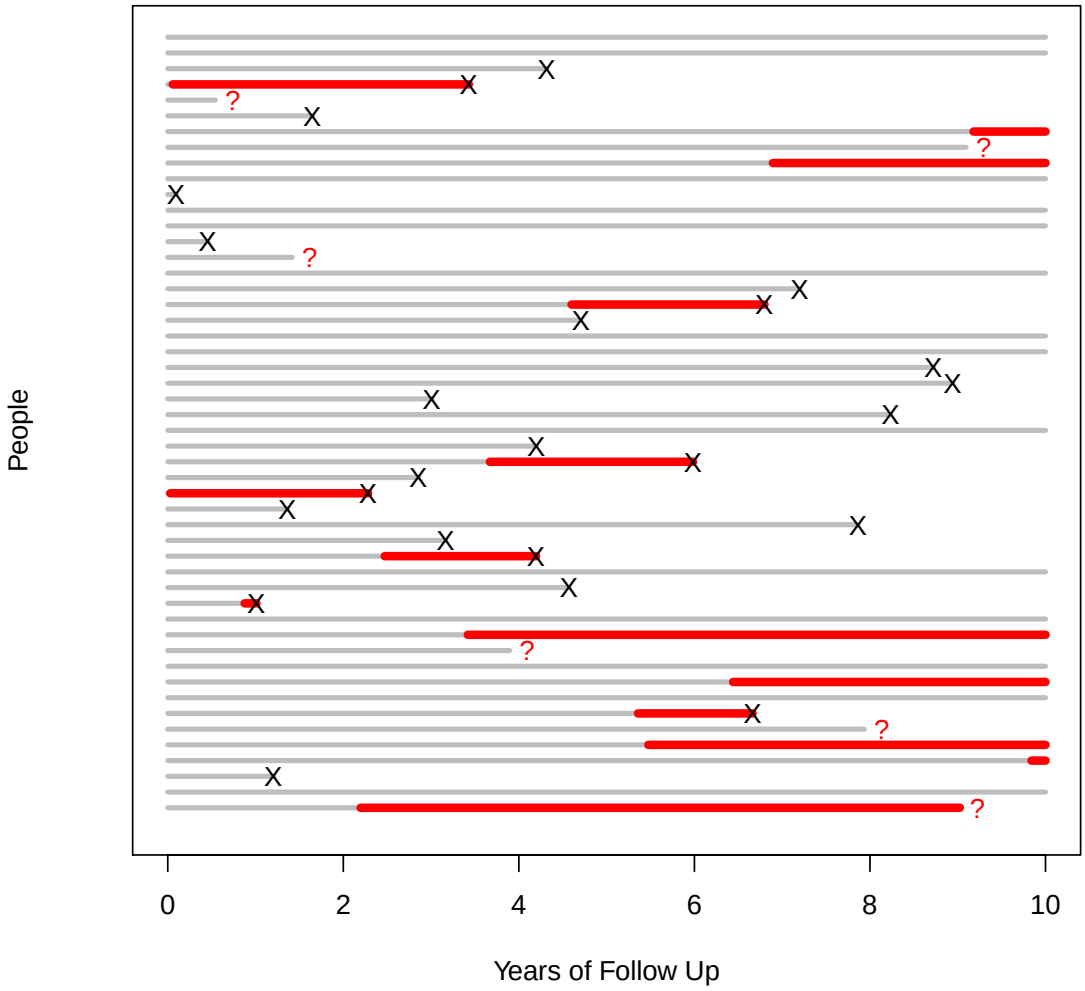
```
one.person = function(loc=1) {
  S=sick(); L=loss(); D=death()
  if( S <= L & S <= D ) {
    # they got sick first.
    lines( c(0,min(10,S)), c(loc,loc), col="gray", lwd=3 );
    # now figure out when they die or get lost.
    L = loss(); D=death(rate=.3); # a higher death rate
    if (S < 10 )
      lines( c(S,min(10,S+min(D,L))), c(loc,loc), col="red", lwd=5 );
  }
  else {
    S = 0; # they never got sick
    lines( c(0,min(10,min(D,L))), c(loc,loc), col="gray", lwd=3 );
  }
  if( L < D ) {
    text( S+L+.2, loc, "?", col='red');
  }
```

```
  else {
    text( S+D, loc, "X", col="black");
  }
}
```

Plot out a lot of them.

```
show.population = function(n) {
    plot(1:10, xlim = c(0, 10), ylim = c(0, n), type = "n", yaxt = "n", ylab = "People",
        xlab = "Years of Follow Up")
    for (k in 1:n) one.person(k)
}
```

1 For the Groups to Work On


People
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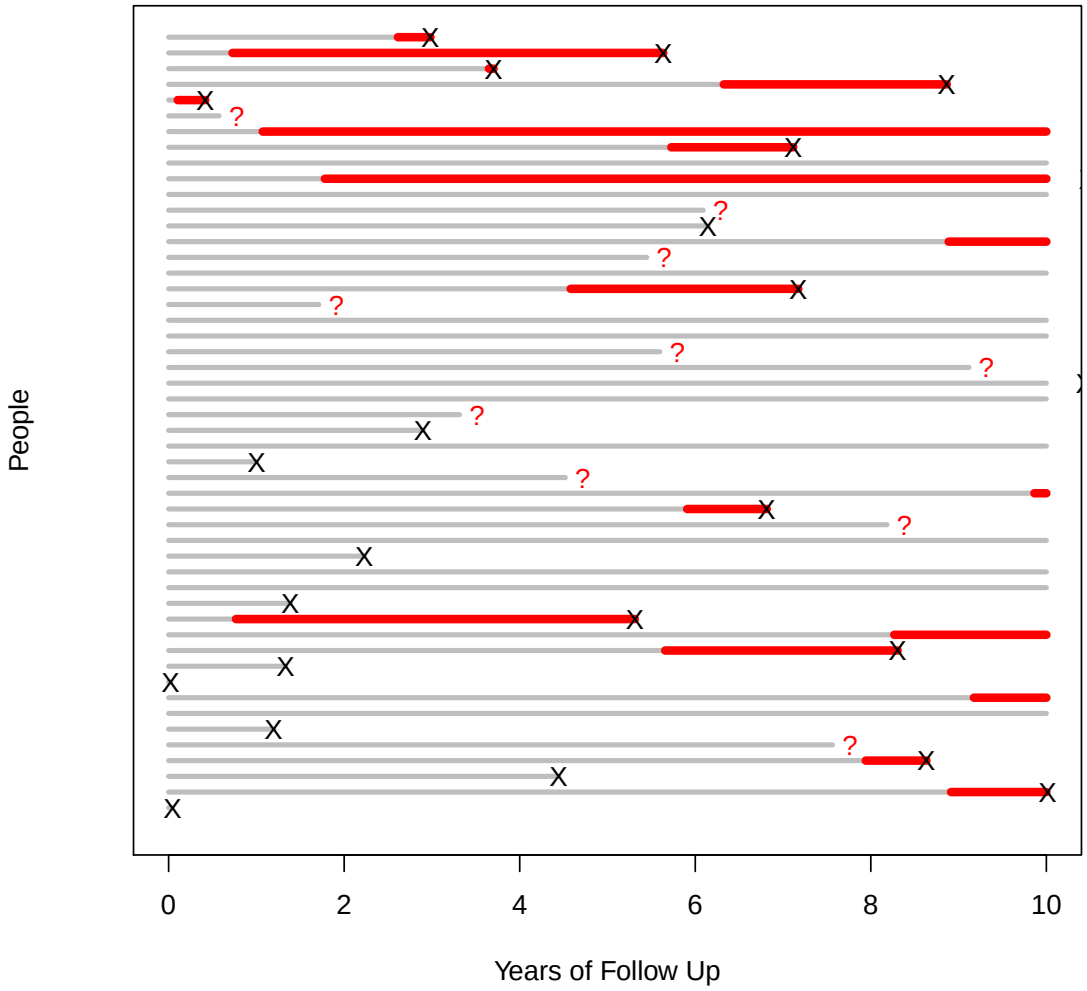
Years of Follow Up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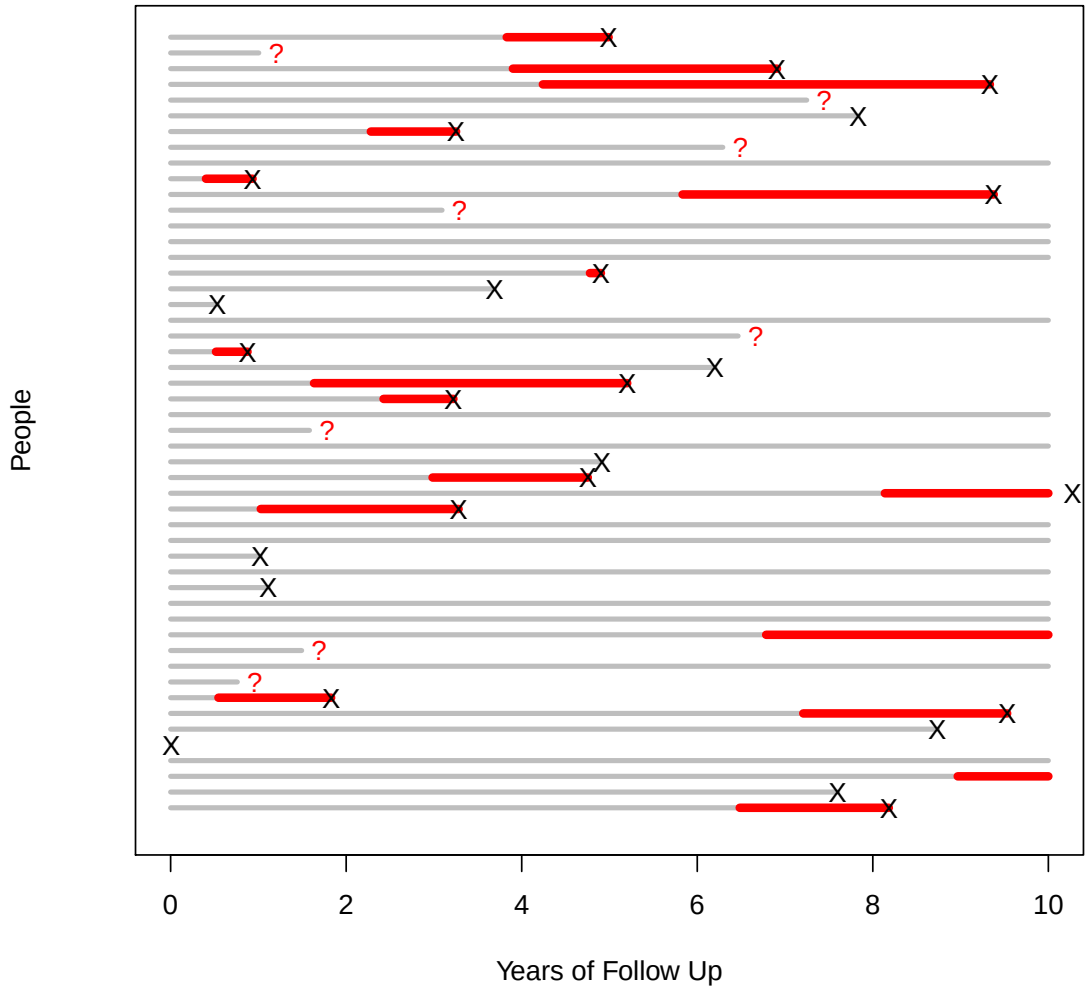
Years of Follow Up


People
Years of Follow Up
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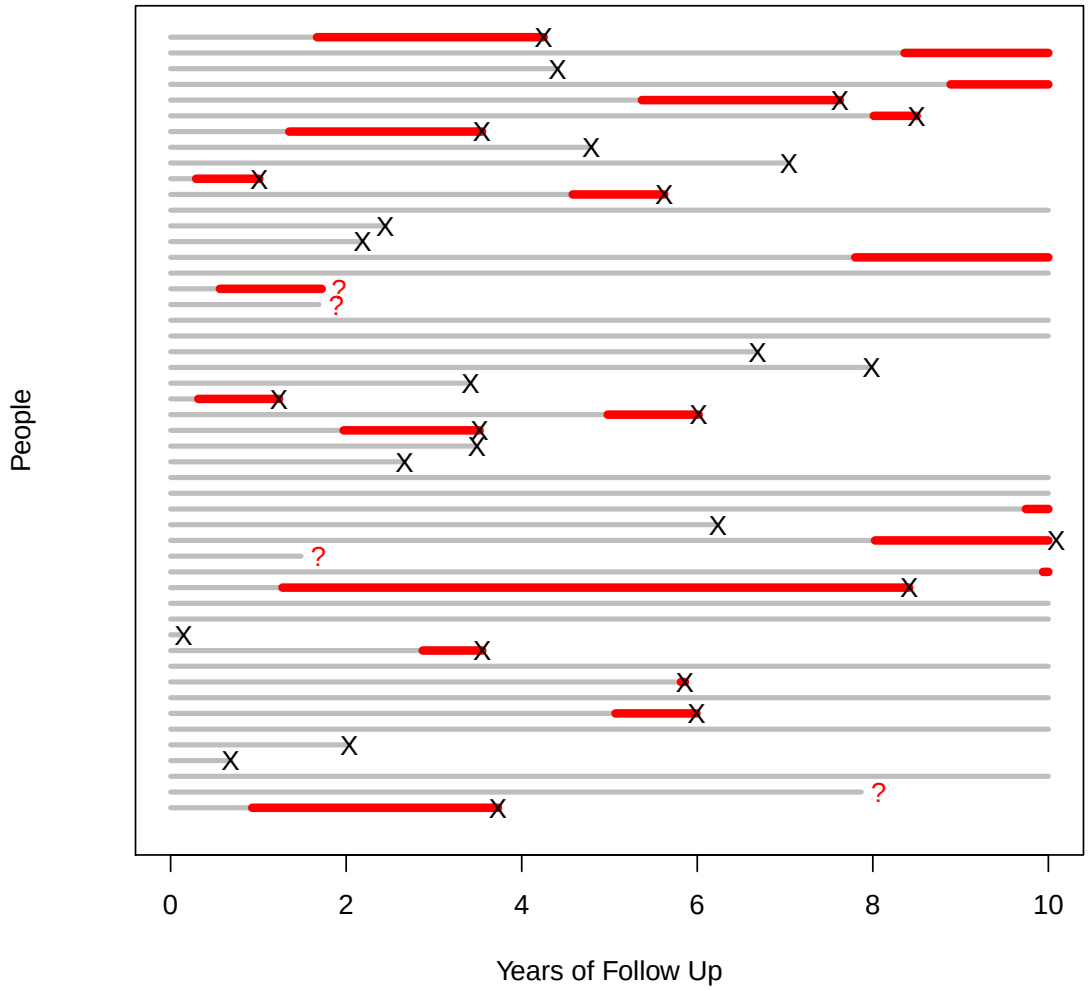
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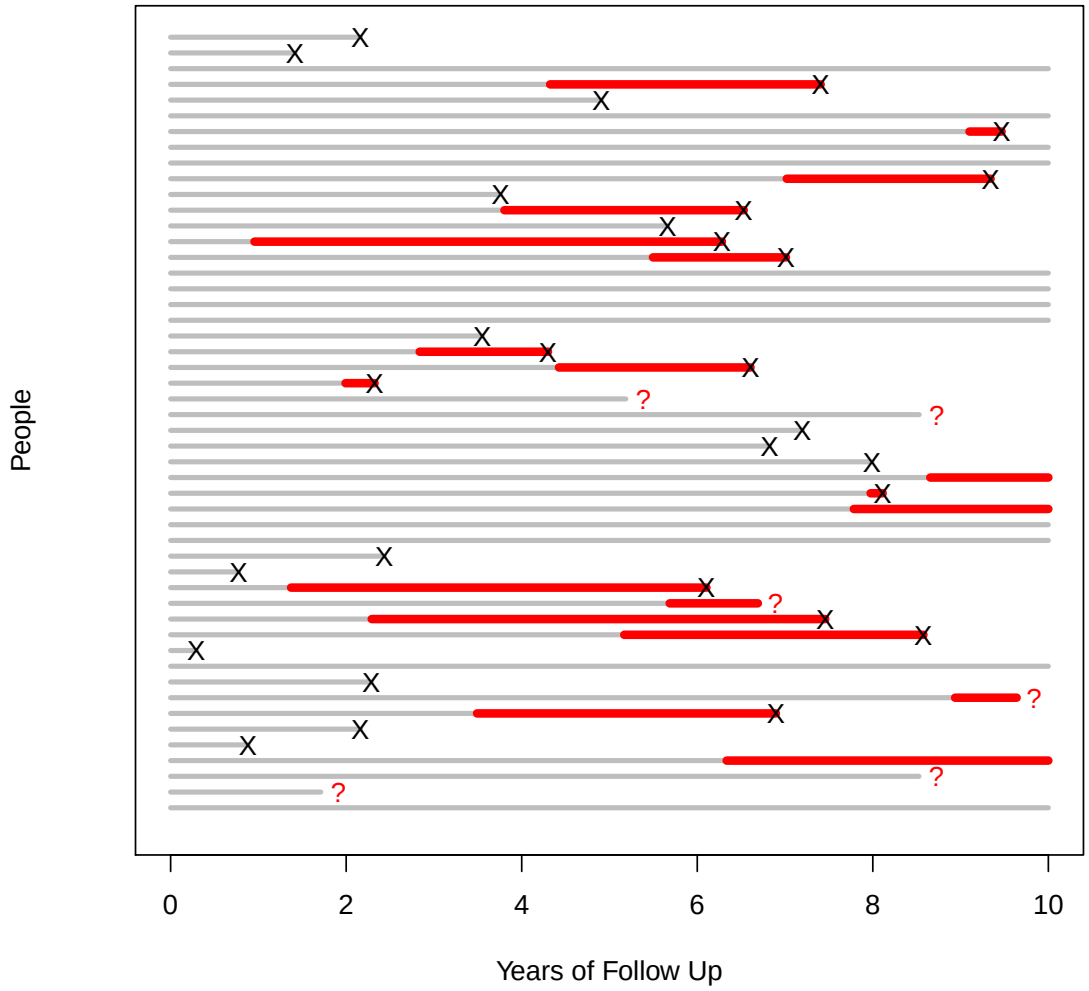
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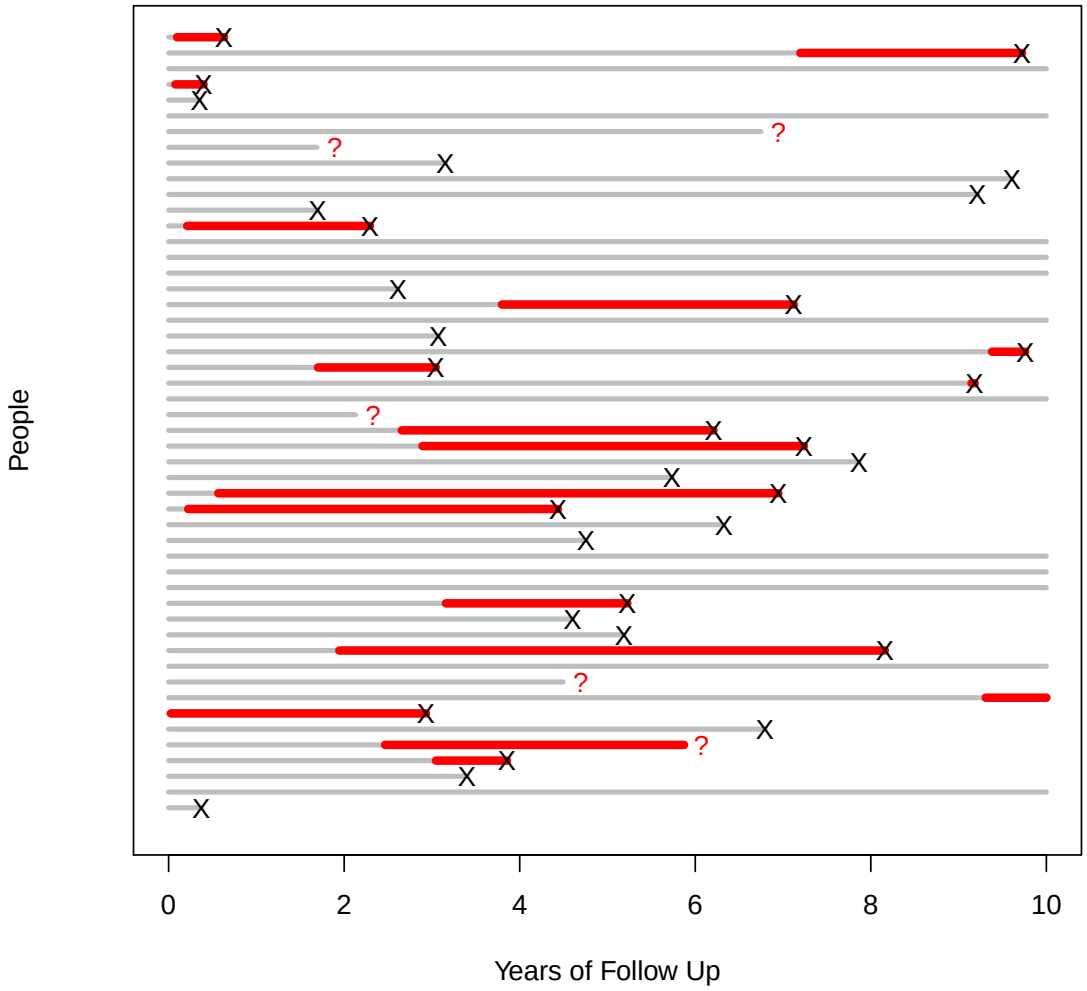
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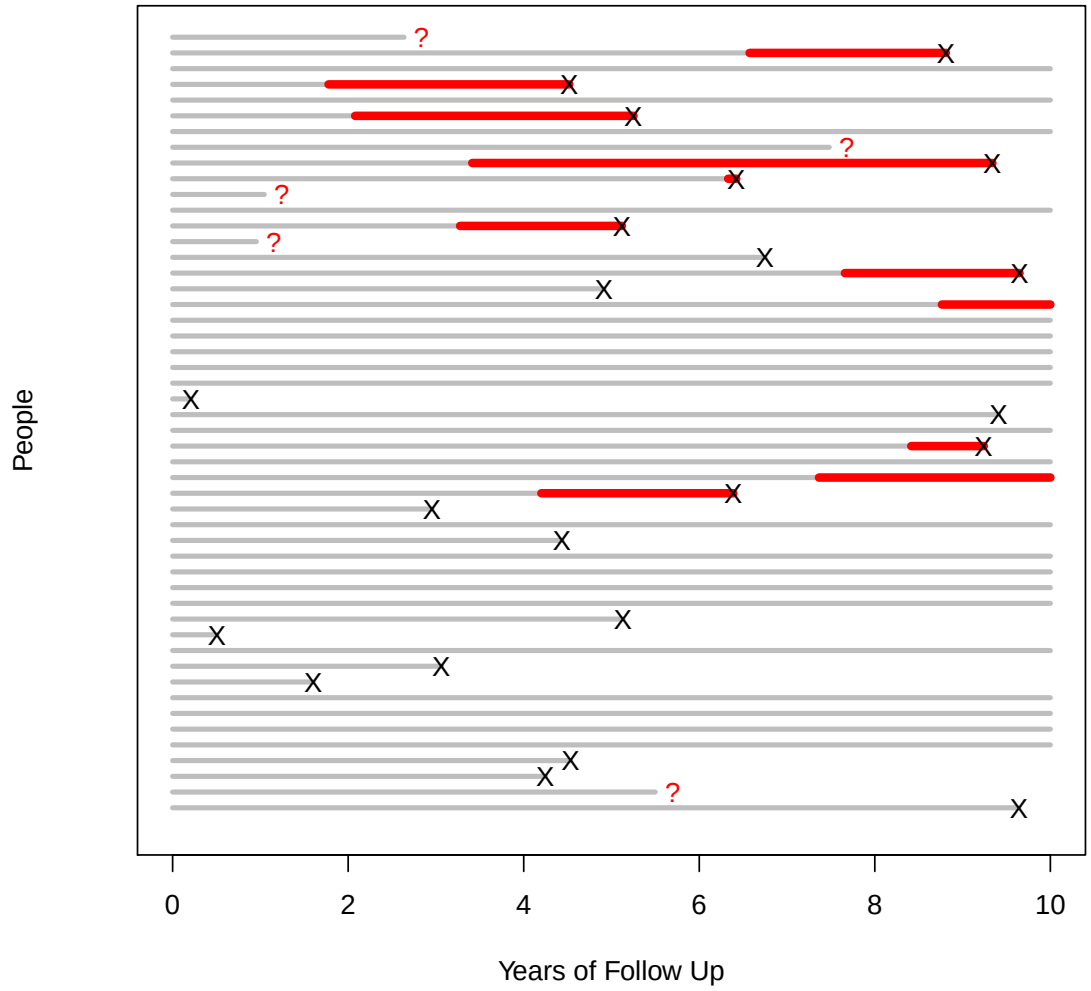
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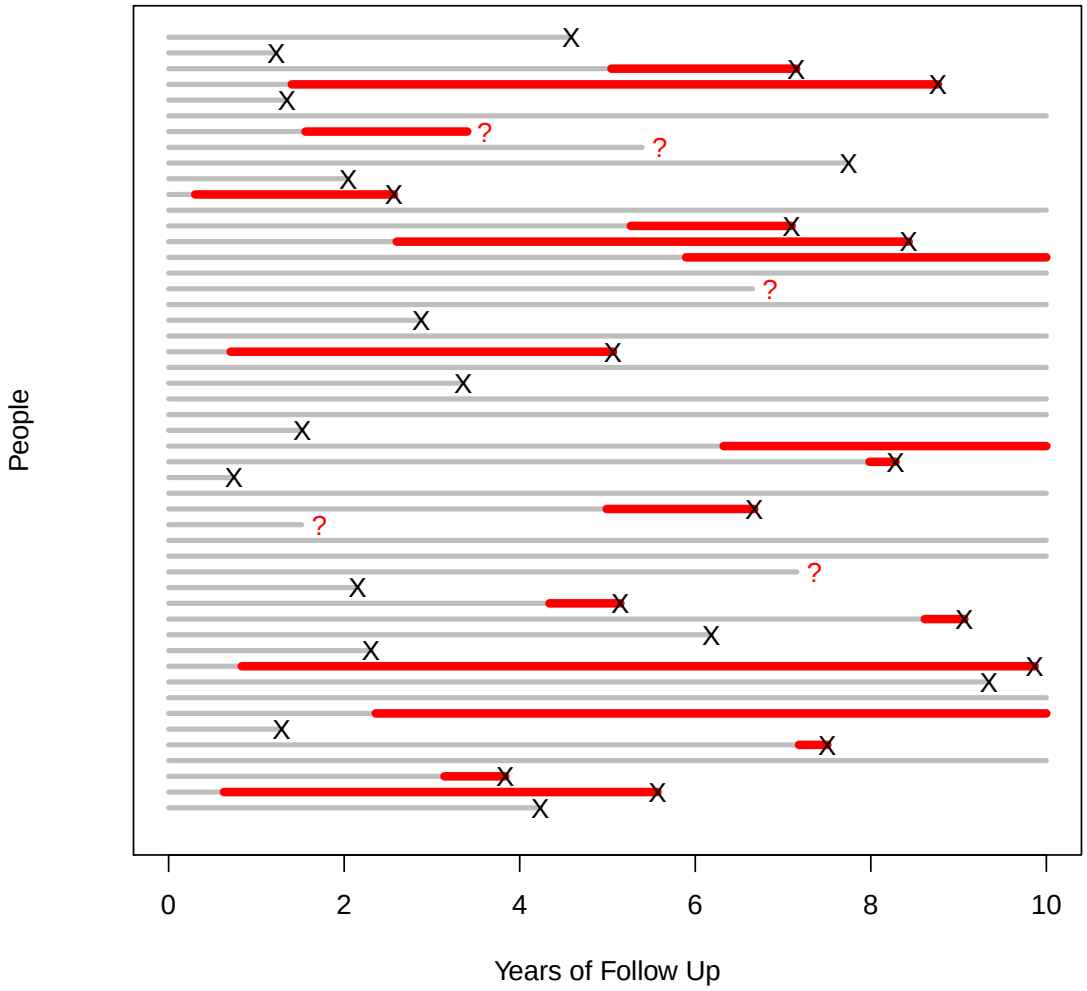
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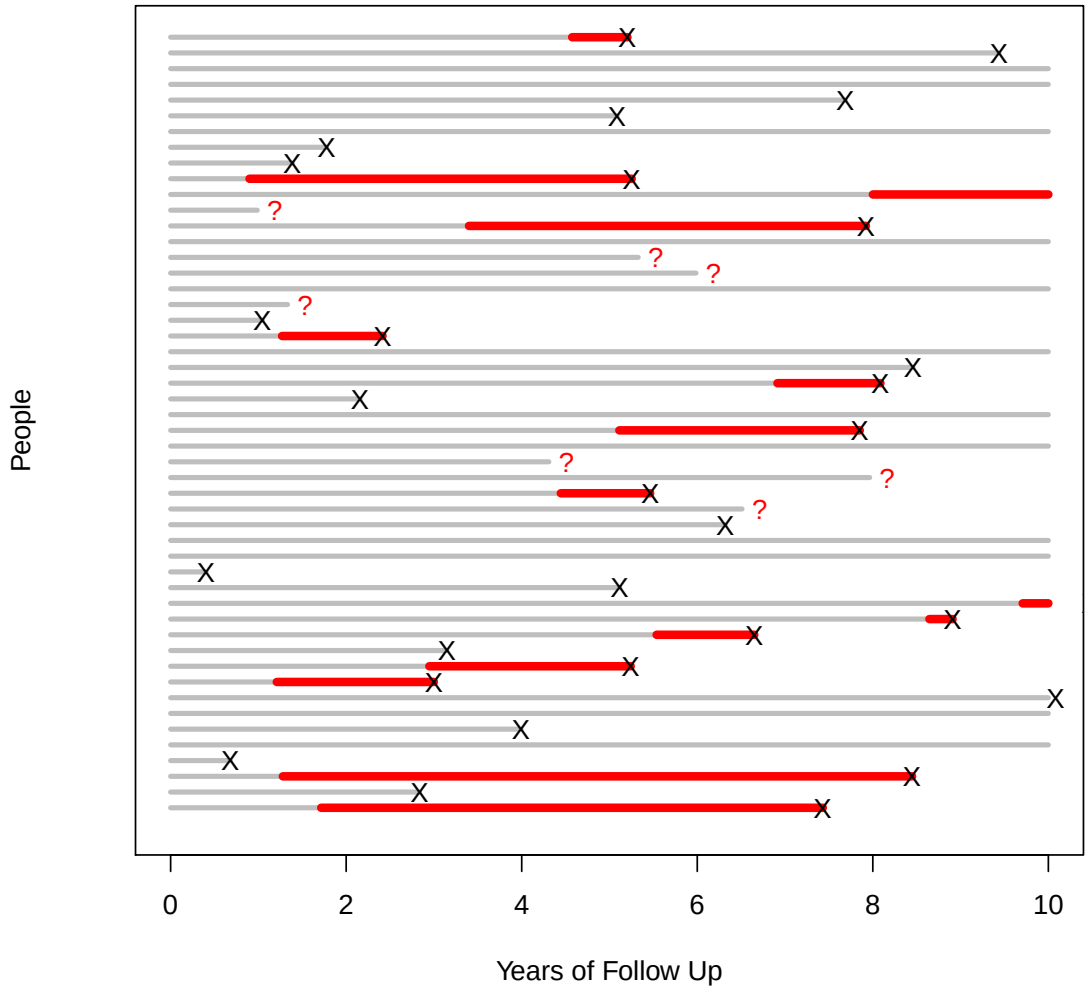
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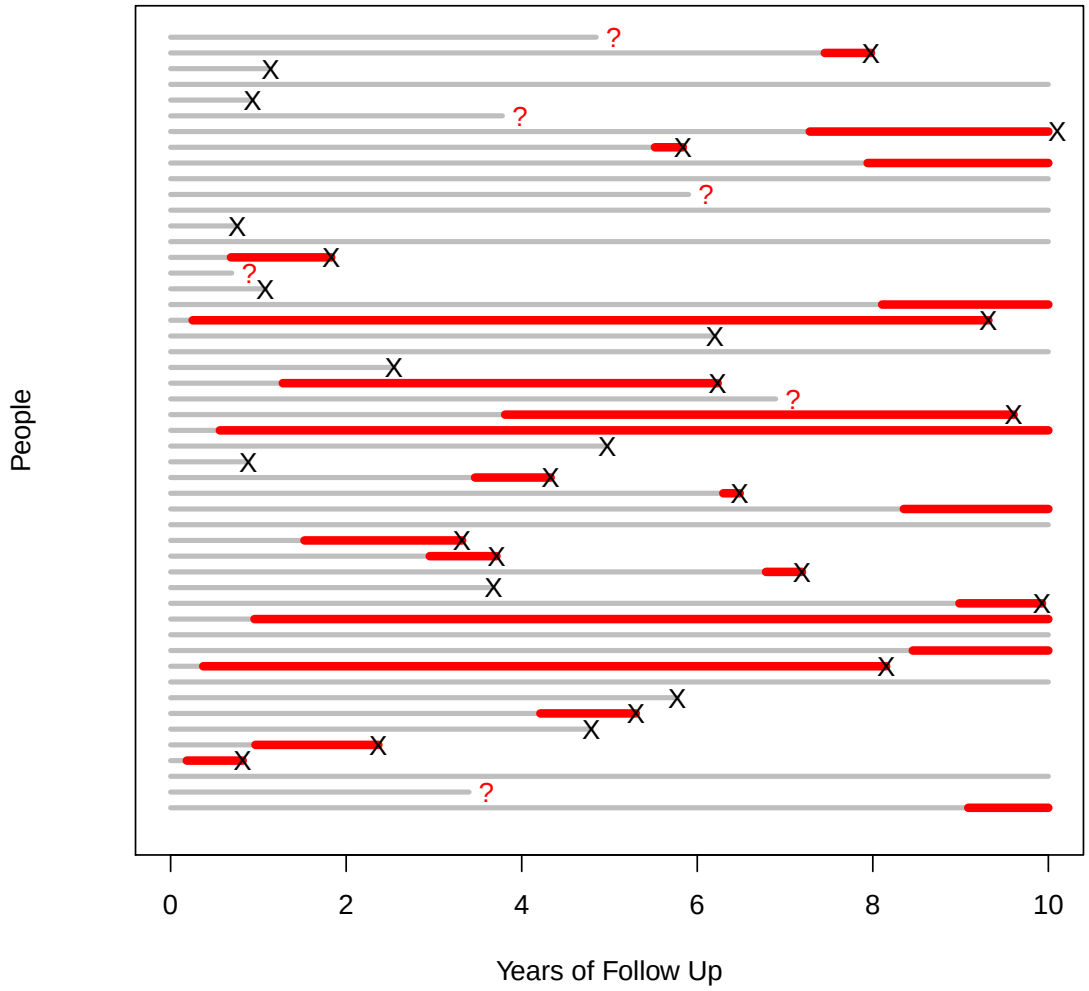

2 For the In-Class Explanation

```
sick = function(rate = 0.03) {
    rexp(1, rate = rate)
}
loss = function(rate = 0.01, lockout = 0.5) {
```

```
    lockout + rexp(1, rate = rate)
}
death = function(rate = 0.025) {
    rexp(1, rate = rate)
}
```