Wood et al Data Memo

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```
## Loading required package: parallel
## Loading required package: foreach
## Loading required package: iterators
## Loading required package: doParallel


## [[1]]
## [1] "ARPobservation" "snow"           "methods"        "stats"
## [5] "graphics"       "grDevices"      "utils"          "datasets"
## [9] "base"
##
## [[2]]
## [1] "ARPobservation" "snow"           "methods"        "stats"
## [5] "graphics"       "grDevices"      "utils"          "datasets"
## [9] "base"
##
## [[3]]
## [1] "ARPobservation" "snow"           "methods"        "stats"
## [5] "graphics"       "grDevices"      "utils"          "datasets"
## [9] "base"
```

This document contains a brief memo on the MLE and PLE for PIR and WIR data as applied to a subset of the data from Wood, Hojnoski, Laracy, and Olson (2015).

Data and Analysis

The authors provided us with scans of the original hard copies of interval data for 16 of the 24 participants in the study. Two coders transcribed the data to a spreadsheet independently. After checking for agreement, the single disagreement on a single interval for one record was checked against the scanned records and corrected. For the purposes of this analysis, any missing intervals in the middle of the recording were simply discarded and we treated only those intervals containing data as the "complete" record without any missingness in the intervals.

Prevalence

Prevalence MLE by Proportion of Intervals
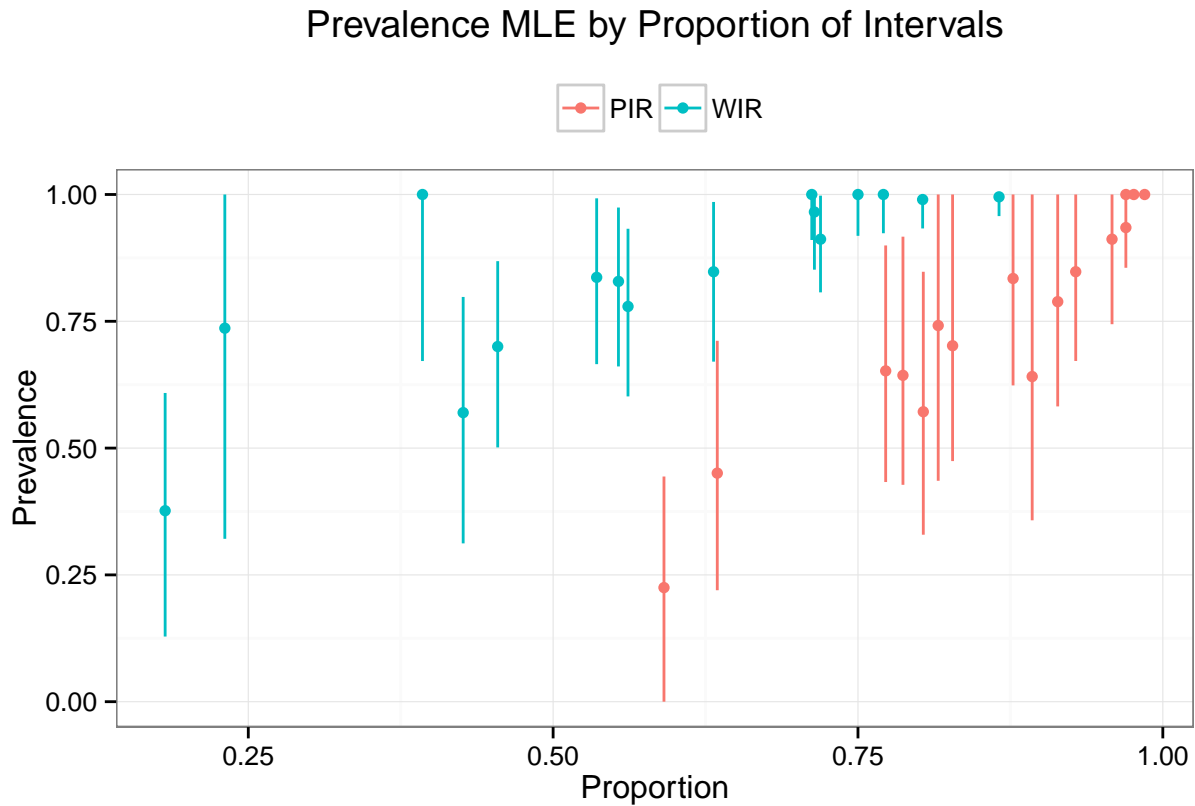
The first plot contains the MLEs for prevalence plotted against the proportion of intervals given a score of "1", or the "summary" estimate. The summary WIR estimates are generally lower than the PIR estimates, consistent with the fact that WIR tends to underestimate prevalence and PIR tends to overestimate prevalence. As when we applied this data to another dataset, the PIR estimates of prevalence are generally slightly lower than WIR estimaates. When summary proportion is fairly high, above about 0.95 for PIR and as low as 0.75 for WIR, and then estimates automatically go to the ceiling of prevalence. In addition, the difference between the two is slightly more extreme than it was in other datasets - probably a byproduce of the modified PIR used in Wood et al (2015). Potentially the MLE may be over-correcting for the slightly reduced upward bias in the modified PIR estimates.

Prevalence PLE by Proportion of Intervals Containing Behavior
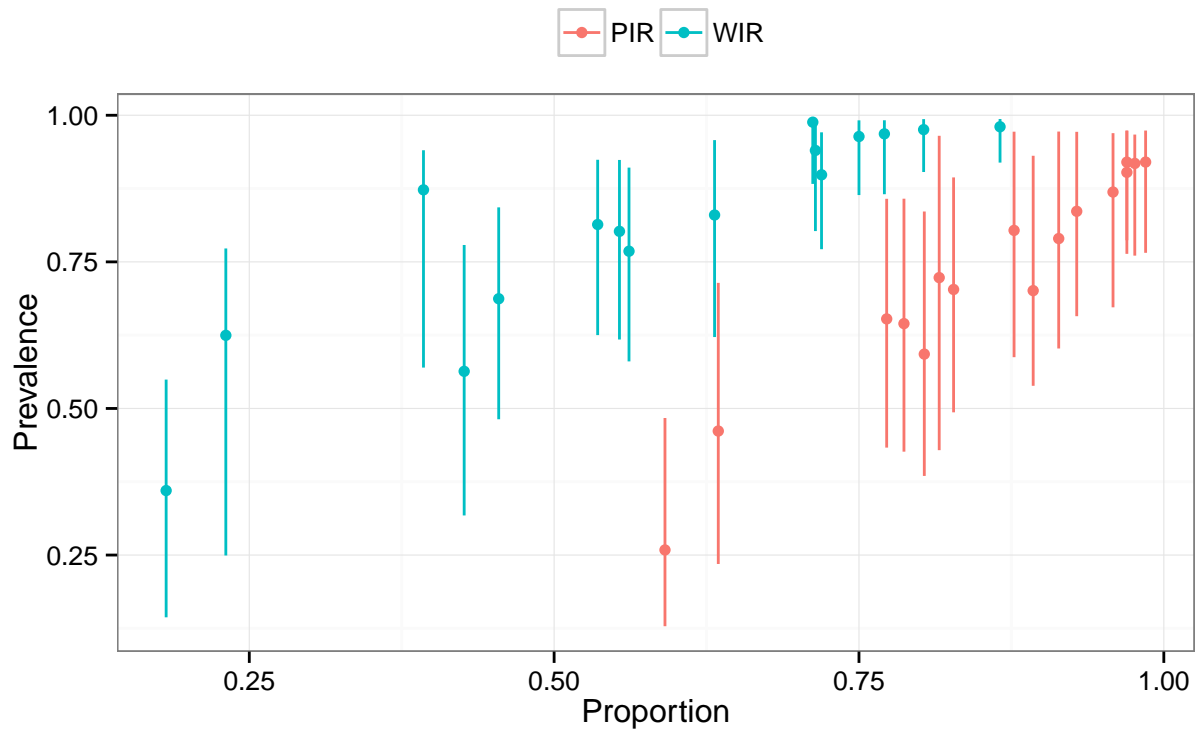
The second plot contains the PLES for prevalence plotted once again against the summary proportion. The general pattern is similar, although the WIR and PIR appear to be slightly closer together, but still farther apart than was observed in other datasets. In contrast to the MLEs, no ceiling effect is observed

Incidence

Incidence MLE by Proportion of Intervals Containing Behavior
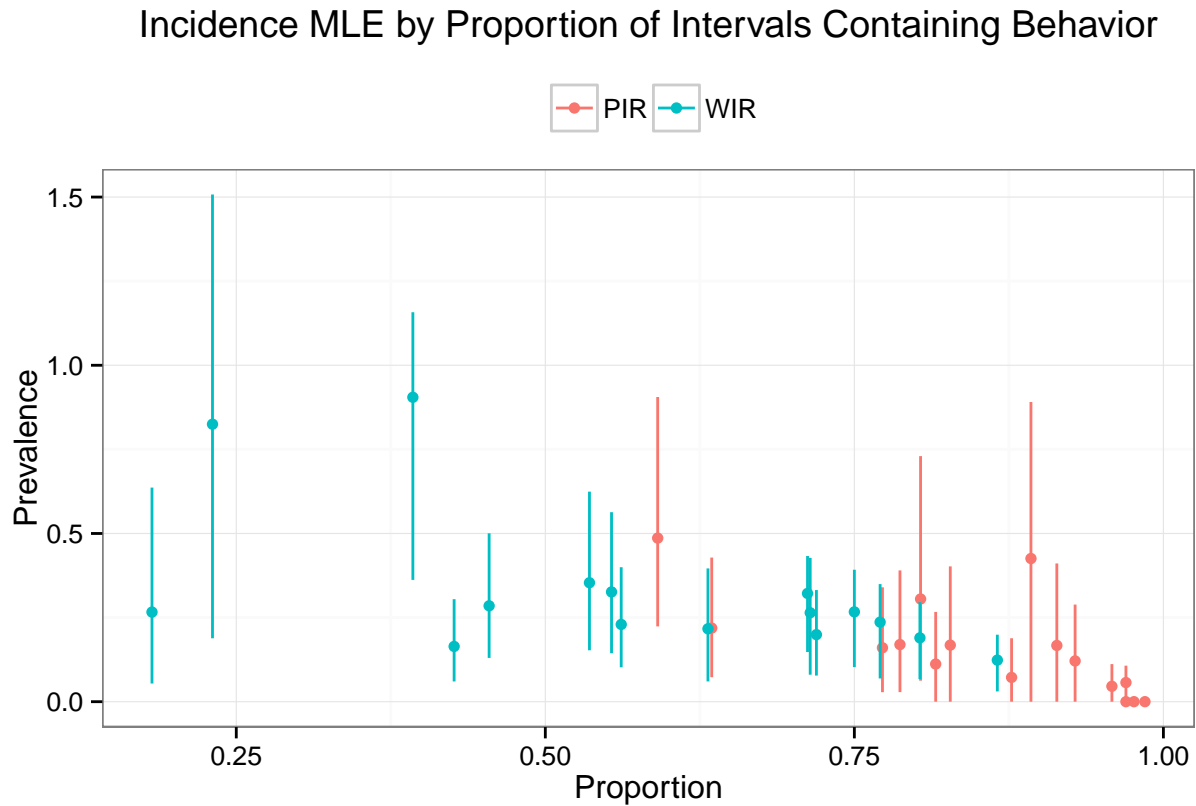
The third plot contains the MLEs for incidence plotted against the summary proportion. Here it's slightly more difficult to judge the relationship of the two, but it appears that WIR has slightly higher estimates of incidence. Perhaps due to the fact that WIR is more likely to have a larger number of discrete chains of intervals scored as 1, suggesting more discrete events? I'm not familiar enough with the math to comment further. Also of note - the PIR estimates that were at ceiling have at-floor estimates of incidence.

Incidence PLE by Proportion of Intervals Containing Behavior
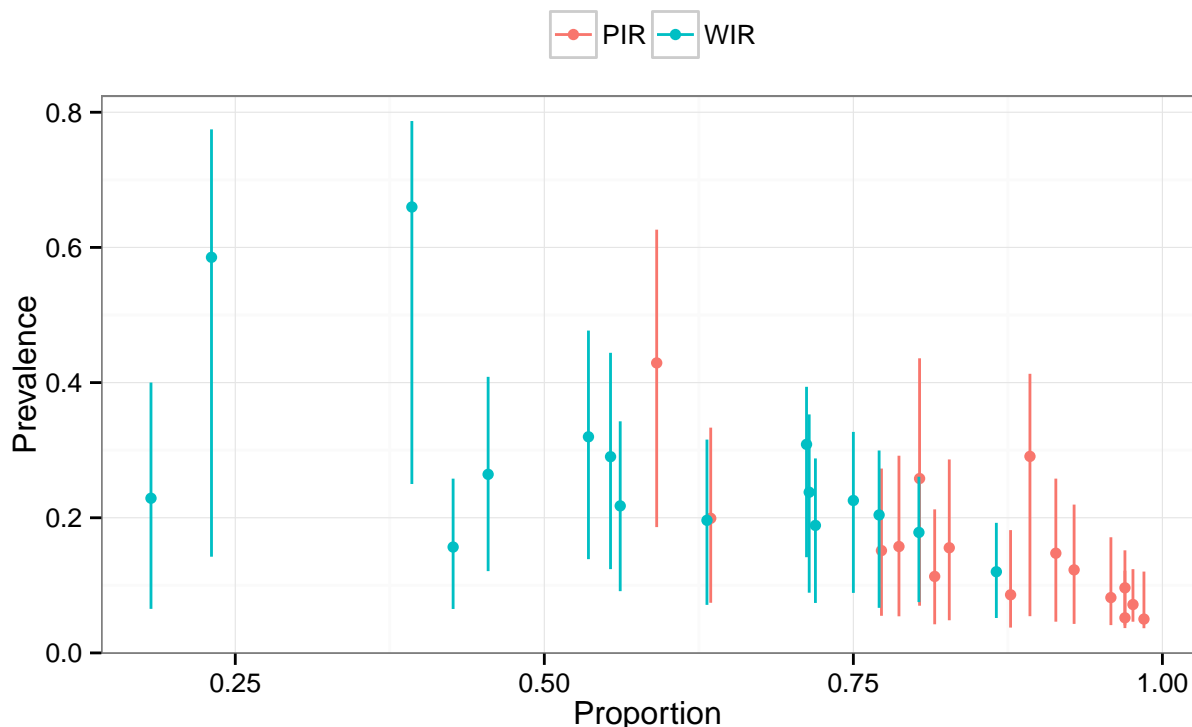
The fourth plot contains the PLES for incidence plotted against the summary proportion. Once again, the pattern appears similar to the MLEs, although the general trend seems to be that the estimates of incidence are slightly higher than with the MLEs. The at-floor estimates are also no longer at floor. Perhaps the slight increase in the estimates counteracts the slight downward push in the prevalence estimates?

Conclusions

In the case of this data, the PLEs do seem to work slightly better for the edge cases, but without an unbiased estimate of incidence it's difficult to say which estimates are more accurate. We have our own simulation data that suggests the PLE, but now that I've done this it occurs to me that we haven't done anything to see if there's any part of the parameter space where the MLE performs better than the PLE. For the most part, even with a large number of bootstraps, the confidence intervals remain quite wide.