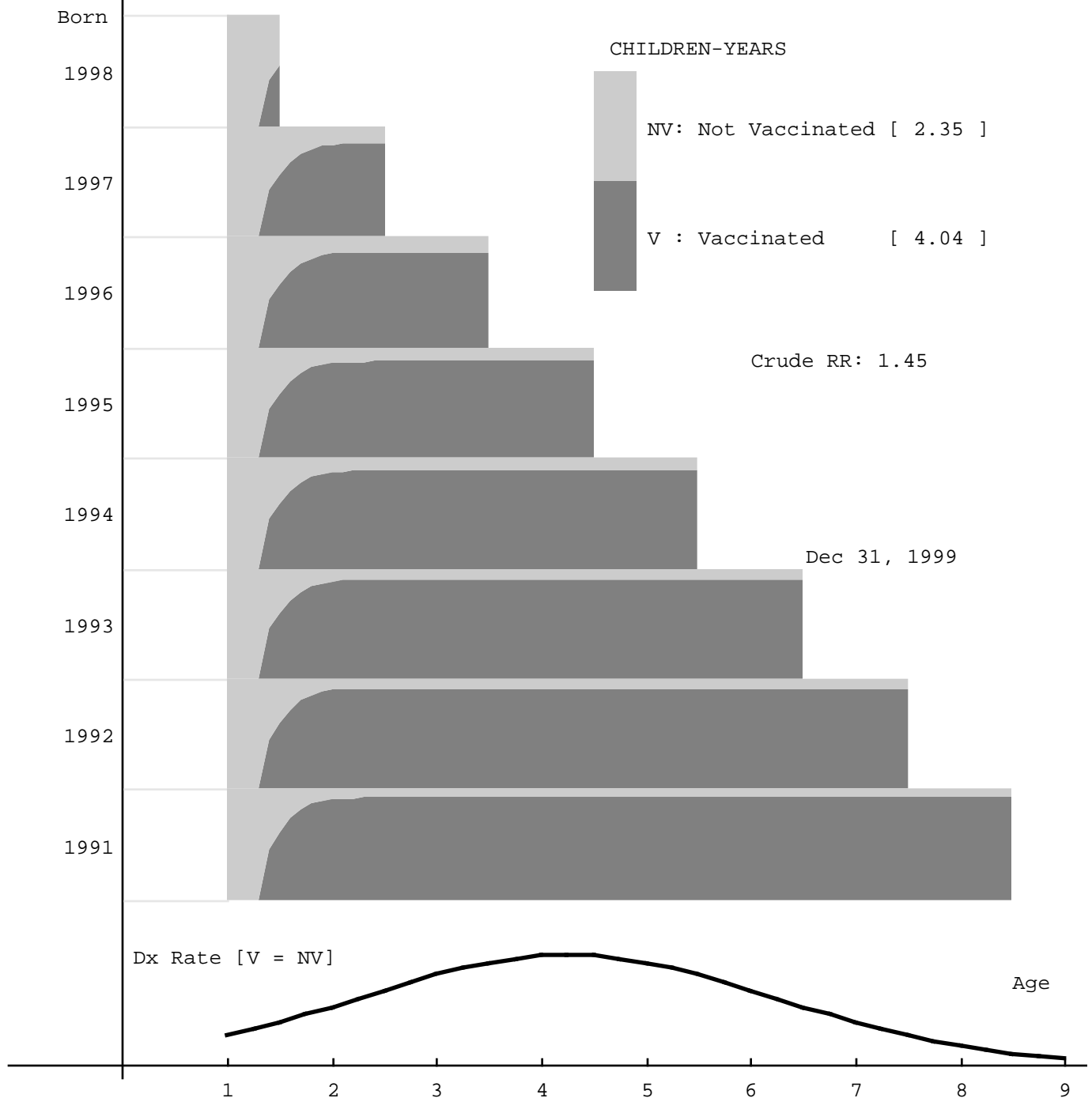


Why can the crude Rate Ratio (RR) be 1.45 if RR=1 at all ages and in all years?

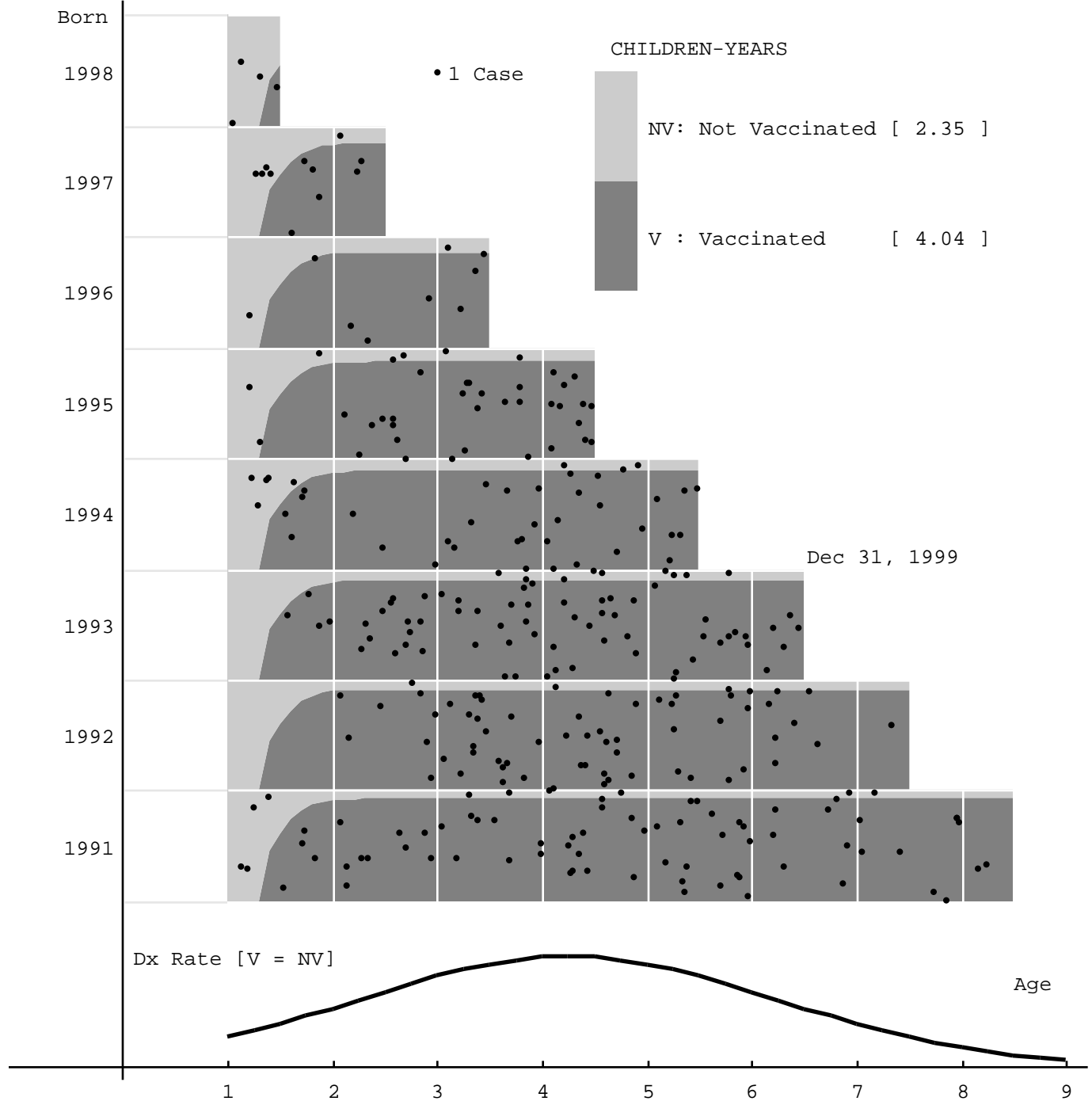
82% vaccinated. Note that 20% of vaccinated, 53% of unvaccinated children were born after 1996
 (would take me too long to set up exactly the 28% and 51% that authors report !)

[2.35] & [4.40] : Ave. age of Unvaccinated & Vaccinated child-years

In diagram, all born June 30, so $x + 1/2$ years of f-u; in calculations, born uniformly throughout year. same no. born each year.
 Think of timecourse of each of the >67,000 children in each birth cohort as a separate horizontal line; most lines switch from light to dark i.e.. the children become vaccinated. Because of limitations of printer, the 537,000 lines fuse together, they would be visible separately with a million dpi laser printer and a fine microscope, or in a printout with more than 537,000 separate horizontal lines.
The idea of being able to see/count each of the millions of vertical/horizontal dots emphasizes that the denominators in this study are "child-moments" (and, most importantly, that the 2,129,864 child-years can AND SHOULD be subdivided not just into the 482,360 unvaccinated and 1,647,504 vaccinated child-years, but -- to allow comparison of like with like --, the number of unvaccinated and vaccinated child-years within narrower age-ranges (see 1x1 age-calendar "cells" in Lexis Diagram on next page)
 The Child-Time distribution is estimated using above data and assumptions, and from clues in text about the fall-off in vaccination rates over the decade. Likewise, the rate ("incidence") of *diagnosis* of autism as a function of age (same whether V or NV) is chosen to be reasonably realistic: even if the rate curve is not exactly as shown, confounding is still produced by the confluence of (1) the older (younger) age-distribution of the (un)vaccinated child-years and (2) the higher rates of diagnosis in older child-years.



316 Cases Randomly Generated from above Child-Time Distribution and with all Age-Specific Dx RR's = 1



The locations of the 316 cases in this modification of the Lexis diagram were randomly generated by ...

- 1 Calculating the "rate of diagnosis by age" curve (arbitrary scale) at ages=1.25 to 8.25 in steps of 0.5 (i.e. at 15 age-points; to simplify your job of counting cases in the various age cells, the diagram shows coarser, 1 year, i.e., birthday, boundaries)
- 2 Multiplying these "rates" by the numbers of children "in view" at each of these that ages, to get, for each of the 15 vertical age-slices of "child-time", a number proportional to the expected number of cases in that vertical child-time slice; then scaling the 15 expected numbers summing to 316.0: expect an average of 19.0 to be diagnosed between 1 and 1.5 years of age, 23.5 b/w ages 1.5 and 2, ... 31.1, 33.2, 38.8, 35.5, 36.6, 28.4, 25.9, 16.6, 13.3, 6.71, 4.76, 1.58, ... 0.992 between ages 8 and 8.5.
- 3 For each age-slice, randomly generating a count from a Poisson distribution with the corresponding expected value. Repeat until the sum of the observed number of cases is in fact 316, as it was in the actual study. This gave 19 between 1 and 1.5 years of age, 19 between ages 1.5 and 2, and so on, .. 23, 27, 37, 35, 42, 31, 27, 24, 13, 7, 5, 5, ... 2 between ages 8 and 8.5.
- 4 For each of these cases, randomly choose a year of birth (i.e. randomly along the vertical scale, without regard to whether the location will be in a unvaccinated or a vaccinated child-time cell.) and a more refined age at diagnosis (randomly within the 0.25 age-band on each side of 1.25, or 1.75, or etc., without regard to light/dark). If the random location is in the darker(lighter) area, the case involves a child who was (un)vaccinated at the time of diagnosis.

EXERCISE: From the diagram, (manually) count the vaccinated and unvaccinated cases (numerators) in each vertical age-slice. Estimate (roughly) the (relative) sizes of the corresponding vaccinated and unvaccinated child-years (denominators) [hint: the proportions vaccinated by the end of the study range from 0.92 (1991 cohort) to 0.88 (1994), to 0.84 (1997), to 0.55 (1998)]. Using these numerators and denominators, calculate an age-adjusted RR.