

# Self-assigned student numbers

Andrew Critch, UC Berkeley

January, 2009

Here is an interesting riddle created and solved by various conversations with my friends:

Consider an *isolated* group of  $n$  students. They wish to assign themselves unique student numbers from 1 to  $n$  (no repetitions!) in such a way that each student will know his own student number, but each student should have *no information* about any other student's number. Devise a procedure for the students to achieve their goal with 100% probability.

Some clarifications:

- 1 “*isolated*” means the students have no external aids of any kind (e.g. no pencils or paper or hats); the only actions available to them are talking to each other publicly or privately in groups of their choosing.
- 2 The students cannot conceal their real identities in any way. So if  $X$  talks to  $Y$ , then  $Y$  recognizes  $X$  and  $Y$  recognizes  $X$  (for example, by tone of voice, scent, etc.).
- 3 “*no information*” even excludes probabilistic information: student  $X$  should have no estimates whatsoever about student  $Y$ 's number except that it is a number from 1 to  $n$  that is not his own.
- 4 You can assume that the students all want to achieve this goal, and that they have “idealized minds” like in most thought experiments.
- 5 **For a harder version**, assume that you must decide before the procedure begins how many steps (communications) it will take!

For the answer(s), email me: [critch at math dot berkeley dot edu](mailto:critch@math.berkeley.edu). Enjoy :)