**We are all born with an intuitive number sense. Yes, even you.**

Research suggests that all humans (and many other species as well!) are born with an intuitive number sense. This number sense shows up in many different skills, like being able to look quickly at a group of objects and, without counting them, tell whether one group is bigger than the other. Other animals also have this ability, from rhesus monkeys (Cantlon and Brannon 2007) to robins (Garland et al. 2012).

Oddly, this intuitive number sense is also correlated with “higher” math abilities such as performance on standardized tests (Halberda et al. 2008). And although it is innate to all humans, **it also improves with practice,** and humans who have spent a great deal of time thinking about math often do better on tests of intuitive number sense.

Vice versa, children who have spent a lot of time practicing intuitive number sense activities that perhaps don’t seem like ‘real math’ (e.g. sorting objects, helping out at a family store, trading Halloween candy with siblings) often do better when they are first introduced to ‘formal’ math in school (Halberda et al. 2008). So by the time these children get to school, they might seem ‘naturally’ good at math, when in fact they have been practicing for years, without realizing it!

**Activity: Measure your intuitive number sense**

1. Read the attached popular press article that summarizes Halberda et al.’s study on how intuitive number sense relates to math abilities.
2. Go to the [online tool](http://www.nytimes.com/interactive/2008/09/15/science/20080915_NUMBER_SENSE_GRAPHIC.html) associated with the popular press article on this research. Your instructor will provide a link to the tool. (Note: you will need Adobe flash installed to run this tool. If it doesn’t work, try another browser.)
3. Play the short estimation game at least 25 times. Record the number of times you got the correct answer below. This isn’t a test! Don’t worry if your score is low; like most things, this score also responds to practice.

Number correct: /25

1. Your instructor will compute an average for the class. As a class, did you do better than guessing randomly? What number correct would you expect on average if you just flipped a coin? Was your class score higher or lower than that? Please explain.
2. A ‘growth mindset’ is the belief that skills can improve with practice, rather than being unchangeable and pre-determined by ‘talent.’ If all humans are born with a number sense, does this contradict a growth mindset? Why or why not?
3. Can you think of any past experiences or practices that might have affected your own or your classmates’ intuitive number sense? For example, some video games also require you to quickly and accurately gauge numbers, angles, etc.—even though these reflexes occur before you have time to think, they do improve with practice.

**References**

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