Is there really a better age to start school?

Postponing entrance into kindergarten of age-eligible children to allow extra time for development—"redshirting"—has become increasingly popular as a tool to enhance achievement. However, students may be better served by asking "Where" would be the best setting for cognitive growth, rather than "When" is the best time to start school.

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Executive summary

- The article raises a question that is currently debated in many countries: What is the most appropriate age to allow children entry to school? Many countries and states of the USA have been raising this limit, supported by evidence that shows that children who enter school at an older age do better than those who enter at a younger age. While it is true that the data show a better performance of older children, the correct interpretation of this data is not straightforward.

- The article proposes that the increase in performance as a function of children's age may be an indicator of the "intensity" of the development (i.e., the speed of children's cognitive growth). From this viewpoint, delaying access to school may result in further widening the differences in performance between children of different socioeconomic levels. From this perspective, it is suggested that educational systems implement flexible assessments including also the evaluation of the home environment of each child in order to determine the most appropriate time for each child to enter school.

About fruits and children

We all know at least a little about maturation processes and development. We realize, simply by looking, that a banana is too green or when a pear is not ready to be eaten. In those situations, we realize that the fruits were probably not attached to their plant long enough (we could also say, attached to the ground long enough) to acquire the expected properties of ripeness: color, texture, flavor, or even nutrients. But, how do we know this in the case of children? Can we know if a child is ready for school (school readiness) by just looking at him? It would probably not be that easy.

Let us play a bit more with this analogy[1]. We cannot say that, since the fruit has remained on the tree (or attached to the ground) for a certain number of days, it will be ripe. In fact, what we know—even from our own experience with fruits—is that there are fruits (even from the same tree) that ripen earlier and others that ripen later. What we do know—by means of statistics—is that there is an approximate time when we can expect mature features to appear in most of the fruits. For large-scale agriculture, this temporary estimate is key because it allows scheduling the collection of the fruit and "assures" the farmer that most of the fruit will be "ready." Something similar happens with children. We need to clearly understand that, from the perspective of cognitive development, there is no such a thing as a "best age" for all children. What we do have is also a large-scale system (the school) that needs a temporary estimation (a time interval, in fact) that "assures" that most children are "ready" to start the schooling process. Typically, this starting date is fixed somewhere between 5 and 7 years old[2].

In the last 30 years, the tendency in many countries has been to raise the average entrance age[3]. This rising trend for the entrance age seems to be justified by empirical data that show that the children's chronological age (measured in months) positively correlates with their academic performance in the first years of schooling. This effect of chronological age on academic achievement is part of the classic literature in education[4]. More recently, several studies have shown that starting kindergarten one year later significantly reduces the need for repetition of subsequent years of the schooling process[5], as well as the lack of attention or hyperactivity which are determining factors for future student achievement[6]. This has led several states in the United States and other countries to encourage late admission to kindergarten based on their concern for the students' performance levels. In addition, many parents choose to wait one year to enroll their children (particularly those children born near the cutoff date for entrance to kindergarten) so that their children could be the oldest of their class. This has given rise to *redshirting*[*]—a term borrowed from college sports that, in education, implies postponement of the entrance into kindergarten of age-eligible children in order to allow extra time for socioemotional, intellectual, or physical growth. These policy reforms are based on the idea that as a system (and as parents) we need to help our children attain the highest possible performance in school. However, perhaps we should begin by asking what we know about how the environment impacts a child's overall development and learning that might relate to when they start school.

Where is the sun?

Maturation (and ripening) always has to do with time. We may look for ways of accelerating this ripening process for an unripe fruit by means of artificial sources of heat, for instance, or by providing environments that emulate the best ripening conditions (maximizing exposure to the sun, for example). Although some external factors may influence the ripening of fruit, most of the ripening process is regulated by internal factors that are genetic, biochemical, and/or enzymatic. Thus, in general, a fruit will ripen if we wait long enough. The passing by of time is what mainly determines the progress of its ripening process.

Still, the progress of cognitive development in children can be slightly different and one of the main reasons is the fact that the development of cognitive skills is guided by an organ (the brain) geared to communication and sensitive to the impact of interaction with others. A child's brain needs a close relationship with others' brains to progress. The development of the brain will strongly depend on the interaction between the individual and his/her environment (*experience*). We know that the brain is equipped with innate mechanisms evolved to guide the acquisition of specific knowledge in human beings and these mechanisms are part of the genetic program upon which we might determine patterns for expected development[7]. However, the acquisition of cognitive skills such as the ability to communicate arises from a program that has a genetic base but, at the same time, needs positive interactions with the environment for its successful deployment[8].

Let us take the example of language. Infants are born with the ability to discriminate amongst sounds of almost any language but, at some point during the first year of life, their brains begin to specialize in discriminating sounds of their native language and lose the ability to discriminate sounds of other languages. We could say that their brains are naturally tuned to the sounds of virtually all languages but, with *experience*, children become better tuned to their native language. In other words, their brains are shaped by experience. This narrowing of perceptual sensitivity is the basis for learning language. In fact, we know that better discrimination of native language early in life predicts better language skills later in life[9].

Therefore, we may say that the growth of cognitive skills does not always go hand in hand only with time because it depends also on *where* children would find the specific stimuli they need for speeding up their development. Thus, the relevant question for the case of children is not "*When*" would be better to start school but "*Where*" would be the best place to be at that time? (In other words, as in the title of this section, *where is the sun?*) This question is key to the making of public policy decisions, since it is closely related to how we decide the appropriate moment to start school for each child. If the child is not at school, he/she will still be learning and developing, and so the key question becomes whether a specific child is more likely to find the specific stimuli his/her developmental progress requires at school or at home. The political decision regarding school entry age will determine how much he/she spends of that time in school or out of it, but the important underlying question that determines the impact of this decision on children is when, for any individual child, does school become a better place (than home) for his/her maturation processes?

Going deeper

There are several studies that clearly show performance differences in children in relation to chronological age[5]. These studies suggest a linear correlation between children's age and performance measurements. This relationship is clear both for independent performance assessments (standardized tests) and also for the global evaluation that teachers usually do of their students (passing grades, for example). Below this paragraph, we show a graph of the average passing grades of all students of public schools in Uruguay as a function of their chronological age (measured in months after the cutoff date for entrance at school in Uruguay: 30[th] of April). So, for example, a point at 3 on the school Year 1 line (red) corresponds to children born during January, which means children who will start school with 3 months more than the minimum age of entry to Year 1 (5 years and 10 months). Thus, these children would start school with 6 years and 1 month, considering that classes start on 1[st] of March.

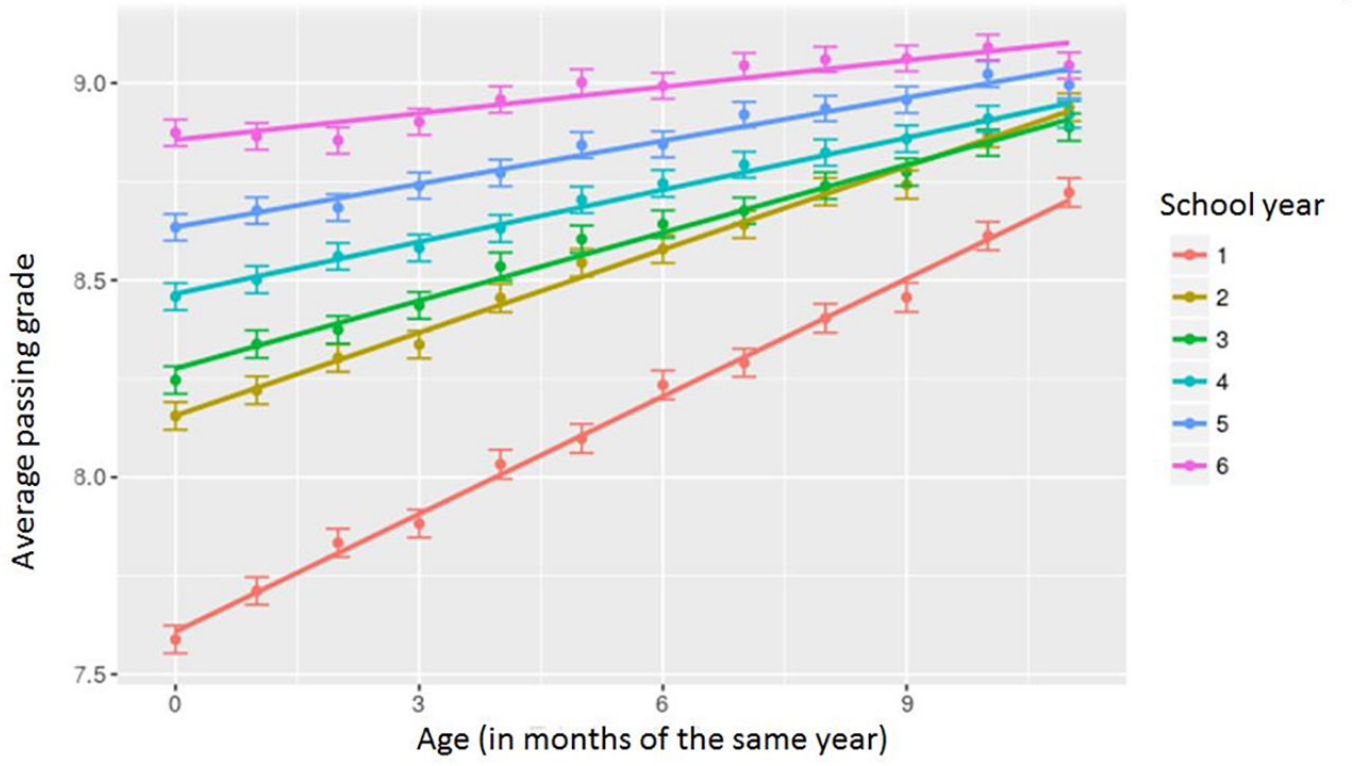

Figure 1. Uruguayan children's grades based on the month they are born (0=youngest children; 11=oldest children).

The empirical evidence shows that age impacts academic achievement in every year, although a deeper analysis is advisable for a more accurate interpretation. We may first ask about the meaning of this relationship: What does a linear correlation between chronological age and academic performance mean? We may even ask: What does the slope of this correlation indicate? It is easy to note that the slope of the line that represents correlation of those children that are in first grade (red line) is much steeper than the others. What could be the meaning of that? The question is relevant since most studies show that slopes of these lines decrease as children go higher in school grades (as our empirical data shows). Some studies affirm that from 5[th] or 6[th] grade the effect of chronological age on performance is no longer seen[10] (but see our empirical data). However, we may still ask ourselves what these steep slopes observed in the first years of schooling are telling us.

From a general perspective, the first thing we should say is that positive slopes are a clear indicator of the development of this group of children. A positive slope shows that something has been gained with age measured in months. In this case, we can assume that this graph shows the evolution of the academic performance (passing grades) in function of months on earth (age) of children we are assessing. Moreover, we could say that the slope of this relationship indicates the speed at which this group of children is developing.

In addition, we could say that when the slopes become close to zero (like in 5[th] and 6[th] grade), something like "learning saturation" is being reached (at least for the unit of time we are using—a month). This could mean that speed of development evolution at 10 years old is very much slower than at 6 years old. Finally, we may say the slope of a graph of performance against months of life (age) reflects the speed (we could say also the "intensity") with which the child is passing through his/her learning stages. Steeper lines would lead us to think about greater progress in performance for the same unit of time.

This agrees well with the data in the literature on the topic, which shows that the correlation between age and performance is not the same across all socioeconomic status (SES) levels[3]. In fact, the effects of delayed entrance age are particularly pronounced for children who come from higher SES, reflecting the greater level of investments and cognitive stimulation their parents tend to provide prior to their entrance at school. The emergence of cognitive processes directly correlates with the quality of the environments and interactions the child experiences throughout his/her development. From this perspective, we may assume that children with scarce stimulation at home are going to be poorly served by staying out of school an additional year (as in redshirting) because they will spend their days without major progress. In this sense, the policies that favor delaying school entrance (or redshirting) mainly harm those children whose background contexts are less stimulating for their cognitive development and may—unintentionally—contribute to enlarging the already existing performance gap in learning amongst children with different SES.

Implications for policy makers

The entrance to school should be seen as a gateway to learning. However, as school is a large-scale system (like agriculture), there is usually a fixed time for entrance that cannot take into account the different history of each child. From our perspective, the educational system has to identify the "ground" that allows children to deploy their abilities as fast as they can, whether this is within or outside of school. In this sense, we understand that assessments regarding the most appropriate time for entering school must be applied with consideration of each child's potential to increase their learning rate. If the new environment of school can boost a child's abilities, then we can be certain it is the right time for schooling.

The ideas discussed here aim to show the advantages of having diverse assessments to evaluate the best moment for each child to enter school. These assessments need to combine tools that measure children's cognitive skills together with an evaluation of the environment children would experience if they do not start school. The aim of these assessments should be to answer the question of *Where* is the place the child would develop cognitive skills most intensively (instead of the *When* question). From this viewpoint, we need to implement a flexible assessment system at the local level, aiming to include visits to the house, interviews with parents, and a complete evaluation of the academic possibilities of the prior environment of each child.

The most beneficial investment for an educational system is that which impacts the abilities children develop in the environments they experience prior to school entrance, typically the home. In this sense, a policy based on empowering parents to support their children's development is surely the most effective way to guarantee an adequate speed of cognitive growth for each child in school and, in turn, to minimize the performance differences that begin prior to schooling.

* The word "*Redshirting*" comes from college sports, where a redshirt (noun) was "a high-school or college athlete kept out of varsity competition for one year to develop skills and extend eligibility" and originated "from the red shirts worn in practice by such athletes." You can find more information about the origin of this word in Wikipedia[7].

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