Relative Age Effect

Relative Age Effect creates an advantage to those born earlier

The Relative Age Effect (RAE) is a phenomenon that suggests that athletes at elite level are more likely to be born in the first 3 months after the eligibility cut-off date for a particular age group in sports. For example, with sports, such as football, which generally use a cut-off date of January 1st (any player born in 1998 is eligible to play at Under 15 level for the season beginning in 2013) players who compete at elite level of under-age sport are substantially more likely to be born in the months of January, February and March. Similarly if the cut-off date is July 1st then the likelihood of elite players being born in July, August and September increases dramatically. It has been shown that a change in eligibility cut-off date only serves to adjust the RAE to the months following the new date (Butler D; Butler R & Sherman M).

RAE emphasised in the more physical sports

It has also been shown that physical, more demanding sports are more susceptible to RAE than non-contact sports and that male players exhibit the phenomenon more acutely than female players. In addition, RAE tends to be more prevalent in circumstances where competition for places on teams is high, meaning that sports which are more popular in certain territories are more likely to exhibit an RAE.

There are potential repercussions for Rugby

There are many schools of thought regarding the effect that the RAE has on a sport and the development of players. The one that is most frequently adhered to is the bias towards providing relatively older players (who can have up to 11 months more physical and mental development than some of their team mates) with more opportunities to succeed in the sport. This may lead to those others becoming disillusioned with the lack of opportunities and potentially turning away from the sport, or sport in general.

Appendix 1 details the information that has been gathered in relation to Rugby played at under-age competitions under the control of World Rugby.

In comparing the results for age-grade Rugby with elite adult Rugby, teams from the 25 Nations who have competed at least once in the Rugby World Cup were examined for evidence of an RAE. It was found that most do not show any correlation with the phenomenon seen within age grade Rugby.
World Rugby wants to make individual Unions aware of the phenomenon of RAE

Because RAE begins to take effect at the younger age groups within a sport, World Rugby recognises the need to make Unions aware of its potential existence and the research that has been undertaken in identifying and explaining it.

It is also worth noting that players may be being lost to the Game who were born in the latter months of the age grade year as a result of not feeling that they are being provided the same opportunities to play and develop their abilities as their relatively older team mates.

Appendix 2 gives and briefly critiques a number of options proposed by research papers to negate the Relative Age Effect.

Appendix 1

Figure 1: Month of Birth Distribution for IRB Under 20 Competition from 2008 to 2012

Figure 1 shows the distribution of birth months among all participants in the IRB Junior Rugby Trophy and the IRB Junior World Championship (both U20 competitions) since their inaugural tournaments in 2008. The data was collated from IRB databases of all squads which took part in these tournaments with a total number of players listed at 2,530 (players who played in multiple tournaments were counted only once).

Other sports, such as football (Figure 2) and ice hockey (used in initial research and brought to the fore in the book SuperFreakonomics by Steven Levitt and Stephen Dubner) show a very clear distribution across the 12 month periods.
As shown in Figure 1, the RAE phenomenon occurs among the sample of players, with 31% of players being born in the first quarter, 26% in the second and, 24% and 20% in the third and fourth quarters respectively.

Even though World Rugby dictate an eligibility cut-off date of January 1st (as do the International Olympic Committee along with FIFA and the 6 Continental Football Confederations), National Unions are free to assign their own cut-off dates for eligibility for domestic under-age competitions (in the United States for example, USA Rugby have a cut-off date of September 1st), although many of the Unions’ dates coincide with World Rugby’s. With squads of players from 30 countries included in the research this inconsistency of cut-off dates goes some way to explaining the distortion observed in the distribution. With some countries adopting a cut-off date of September 1st or similar a minor peak in quarter 3 is expected and observed.

The expected values in Figure 1 are extrapolated from the birth rates per month internationally being used to distribute the same sample size.
The RAE phenomenon in relation to physicality within sports can also be shown through analysis of the above information when comparing the RAE of forward players (traditionally bigger, stronger players) and backs (traditionally quicker and more agile). Figure 3 compares this data. It is clearly shown that the distribution is more pronounced in favour of Quarter 1 within the more physically demanding forward positions. Although the percentages for Quarter 1 are the same for both groups (31%) the forward players have a more even spread across the other 3 quarters while the backs distribution drops off considerably towards the year end.
Taking Irish Rugby as a case study, there are differing approaches to the eligibility cut-off date for under-age players within Ireland. Schools Rugby in one province in Ireland (Ulster) has a cut-off date of September 1st while all other Under-Age Rugby uses a date of January 1st. This uniformity in cut-off dates was made before the start of the of the 09/10 season in Ireland. This means that the players included in the research would be products of varying cut-off dates depending on their path to elite level. This explains the secondary peak evident in Figure 3.

The seasonal variances between the Northern and Southern Hemispheres are seen to have little impact on the observed RAE shown in Figure 1. While the number of players from the northern hemisphere is greater (due to the greater number of participating teams) the trend of players born earlier in the Rugby year continues and can be seen in Figure 4. Of the 16 countries with at least 100 different players, 3 of these have an eligibility cut-off date of September 1st (all in the Northern Hemisphere), while 7 have January 1st as their cut-off date, there is no information available for the other 6. The Effect in the Southern Hemisphere is seen to have a linear relationship while that in the Northern Hemisphere has a secondary peak in Q3, likely due to the varying eligibility cut-off dates.

It is important to reiterate that the distributions shown here occur as a result of the eligibility cut-off date used during the development of players through the under-age pathways defined by each individual Union and not by the January 1st cut-off date assigned by World Rugby for its Under 20 competitions.
Appendix 2

Throughout the research that has been performed on RAE, a number of potential solutions to the perceived problem have been put forward. These are detailed below:

**Variation of eligibility cut-off date within the competition year**

This would involve players becoming ineligible for competition at a time during the competition year depending on where their birthday fell.

It is more suited to individual sports as it would disrupt the team ethos in team sports. Also, it is conditional to competitions being spread out through the calendar year and not concentrated in one particular period.

**Rotation of RAE Advantage**

This provides a set time period greater than the normal 12 months that a player is eligible for (suggestions are 15 months or 21 months) with a rolling eligibility. Its effects are similar to those for the variation of eligibility cut-off date above except that it provides for a larger age-profile on the team to begin with and would require an overlap between age-groups. This method would allow for less physically developed players whose birthday falls during the overlap between age-grades to play at the lower grade, at least until they reach the cut-off.
A disadvantage of this is that teams might be decided upon with players who are not going to become ineligible during the competition year allowing the RAE to take effect in line with the self implemented eligibility cut-off date.

**Distributing RA among potential activities**

This involves agreement between sports bodies to spread the individual sports’ eligibility cut-off dates through the calendar year.

This method would not remove the RAE but merely create advantages for individual sports at different times of the year. In essence it is assigning a sport to a particular person based on their month of birth.

**Age Quotas**

This method involves dictating that a certain number of players from each month/quarter must be present on a team in order for the team to be eligible at that age level.

While an effective way of negating the RAE, this method also would create a scenario that players may be discriminated against due to the month of their birth.

**Average Team Age**

Steve Lawrence of the Cruyff Institute made the following proposal for combating RAE, which considers all of the concerns mentioned above (using U17 football as the example):

1. Any participating squad shall consist of 18 players whose average age on the first day of the competition shall be no more than 16.5;

2. No player within any participating squad shall be more than 2 calendar years older than the youngest player in the squad.

While this method would allow for the participation of players at levels more suited to their abilities, as it allows for overlaps between age-groups, it may create restrictions if a player is playing above their age-group. If for example a player who is 14.5 is playing on the team, then the maximum age of any player allowable is 16.5 which discounts any player over the allowable average age (which in theory could be over half the team).

The allowance that players younger than the required average age less 1 year (in this case 15.5 years) are excluded when calculating the average team age would go some way to alleviating this issue.

**Marc Douglas**, Research Coordinator, World Rugby

* Using the Chi-squared method of verification, there is a 99.9% confidence that the data does not equate to the null hypothesis that the distribution would be equivalent to the average monthly birth rate across the twelve months.
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References

