

Conclusion

There is no perfect system when it comes to estimating marks, as candidates perform differently on different units/components. The current estimation process and the z-scores method both rely on the correlation between units/components being as close to one another as possible, but in practice this is never met. The z-scores method does take into account the relative positioning of candidates in respect to other candidates but it is also affected by different shaped distributions and estimates can be artificially capped. It does, however, try to address the over-inflating of written paper marks where a skewed coursework distribution is used to estimate these.

On linear specifications, z-scores would ensure the mean difference between the estimated and actual mark is zero and thus the direction of any errors in estimating marks would be balanced both positively and negatively across the mark range. This cannot be guaranteed with the current estimation method. However, for unitised schemes (which are continuing to increase in number) it is less clear, as in some cases the estimates were very similar; in some cases better and in some cases worse. This is very much dependant on the types of units, correlations between units marks and distribution types.

Unitised schemes by their nature allow candidates to take units throughout the course of study; allow more unit choice; and include a larger number of types of units. Part of the benefit of using z-scores is that it is able to put a measure on the relative position of how well one candidate does in respect to another taking the same paper. However, this benefit becomes less apparent when the candidates taking any one unit are not the same as those taking another unit.

Both methods suffer from different amounts of over-estimating

candidates' marks at the lower end of the mark range and under-estimating candidates' marks at the top end of mark range. The z-score method would not always work in all cases, as it would require a minimum number of candidates entered on a particular unit/component to produce sensible z-scores.

A method to improve on the estimations by effectively applying statistically determined scaling adjustments on the marks to counter the effect of under/over-estimating of marks was suggested. To create these scaling adjustments regression analysis was used. Regression analysis can in its own right estimate marks as it takes into account the correlation between the unit marks. The downside of using this method is that it would require the majority of marks to be available before any estimation of missing marks could take place. Its biggest downfall would most likely be the set-up and processing time required on our exams processing system. Further work using regression analysis to estimate marks is planned.

Overall, it seems both the current method and the proposed z-score method produce similar outcomes for unitised schemes. Most of the new GCSE specifications will be unitised, not linear. Therefore, the benefits of changing the current estimation method do not appear to be that great, and brings into question the amount of effort required to bring in a new method which will make no significant improvement on the current method.

References:

Gray, E. & Shaw, S. (2009). De-mystifying the role of the uniform mark in assessment practice: concepts, confusions and challenges. *Research Matters: A Cambridge Assessment Publication*, 7, 32–37.

EQUITY ISSUES

'Happy birthday to you'; but not if it's summertime

Tim Oates Assessment Research & Development, **Dr Elizabeth Sykes** Independent Consultant in Cognitive Assessment, **Dr Joanne Emery, John F. Bell and Dr Carmen Vidal Rodeiro** Research Division

For years, evidence of a birthdate effect has stared out of qualifications data for the United Kingdom; summer-born children appear to be strongly disadvantaged. Whilst those responsible for working on these data have, through mounting concern, periodically tried to bring public attention to this very serious issue, it has been neglected by agencies central to education and training policy. Following a flurry of press interest during 2007 and 2008, it has – justifiably – become a key part of the recommendations which may flow from the Rose Enquiry of the primary curriculum.

Researchers at Cambridge Assessment have had a long interest in the birthdate effect because it is so readily observable in the assessment data that they have worked with (Bell and Daniels, 1990; Massey, Elliott and Ross, 1996; Bell, Massey and Dexter, 1997; Alton and Massey, 1998). More recently, Cambridge Assessment decided to review the issue with the intention to advance the understanding of the extent and causes of the birthdate effect in the English education system (Sykes, Bell and Vidal

Rodeiro, 2009). A number of hypotheses have been advanced for its cause – clarity in understanding this fully is a vital part of determining possible remedies. Although the review focuses on understanding the birthdate effect in England, it uses international comparisons as one means of throwing light on key factors.

This article outlines the findings of the review. There is robust evidence from around the world that, on average, the youngest children in their year group at school perform at a lower level than their older classmates (the 'birthdate effect'). This is a general effect found across large groups of pupils. In the UK, where the school year starts on September 1st, the disadvantage is greatest for children born during the summer months (June, July, August). Individual summer-born pupils may be progressing well, but the strength of the effect for the group as a whole is an issue of very significant concern. Since the effect of being the youngest in the year group holds in other countries where the school year begins at other times in the calendar year, medical/seasonality hypotheses regarding pre-natal

exposure to viral infections during the winter months for summer-born children can be ruled out as a major explanation of this effect.

As would be expected, given that one year is a smaller proportion of the total life of a sixteen year old than for a four year old, the birthdate effect is most pronounced during infant and primary school but the magnitude of the effect gradually and continually decreases through Key Stage (KS) 3, 4, and A-level. This pattern is particularly evident in research by the Institute of Fiscal Studies (Crawford, Dearden, and Meghir, 2007). The disadvantage for August-born children over September-born children in attainment dropped from an average of 25% at KS 1 to 12% at KS 2, to 9% at KS 3, to 6% at KS 4 and to 1% at A-level. Despite this decrease, the effect remains significant at GCSE, A-level and in respect of entry into higher education. Likewise, analysis of the results from all of the GCSE examinations taken by over half a million candidates born in England, Wales and Northern Ireland within the same academic year showed a consistent depression in grades achieved for students born from September through to August. In addition, the same pattern of depression was detected in the number of subjects undertaken. Despite decrease in magnitude, the birthdate effect persists until the end of higher education (Alton and Massey, 1998).

Data from 13 LEAs providing GCSE results (undertaken in 1990 to 1994) revealed that birthdate effects were still very evident when all subjects were considered. Summer-borns were the lowest attainers in 10 LEAs and Autumn-born children were the highest attainers in 9 of the Authorities. If gender was included in comparisons then summer-born boys had the greatest disadvantage and autumn-born girls had the greatest advantage. Significantly, it was noted that the difference between these 2 groups was about 1 grade at GCSE in each of 9 subjects taken (Sharp, 1995).

Similarly, the IFS researchers (Crawford, Dearden and Meghir, 2007) found that approximately 6% fewer August-born children reached the expected level of attainment in the three core subjects relative to September-born children (August-born girls 55%; August-born boys 44%; September-born girls 61%; September-born boys 50%). Moon (2003) concludes: 'If all the pupils in this cohort who were born in the spring or summer terms were to perform at the level of the autumn-born pupils, it would mean that 213 pupils out of a total of 308 improving their GCSE results by an average of 1.5 grades'. The magnitude of the effect has important implications for pupils' successes and for schools' overall results.

If the birthdate effect is serious in mainstream education, then it can be argued that it is most serious for those who are struggling in the education system. A disproportionately high percentage of relatively young children in the school year also are referred for special educational needs and many of these appear to be misdiagnosed (Sharp, 1995). The birthdate effect may operate in teachers' identification of children in need of special education. Teachers may not be making sufficient allowances for the level of attainment against specific curriculum outcomes of the younger members of their classes.

Beyond GCSE, education becomes more selective with choices being made about further participation. Unfortunately, the birthdate effect seems to have serious consequences. The percentage of GCSE students going on to take at least one A-level drops from 35% in September-born students to 30.0% for August-born students (Alton and Massey, 1998). Likewise, September-born students are 20% more likely to go to university than their August-born peers. The Higher Education Funding Council has concluded that '...if all English children had the same chance

of going to university as those born in September then there would typically be around 12,000 extra young entrants per cohort, increasing young participation by 2 percentage points...' (HEFCE, 2005).

Given the existence of this effect, it is necessary to identify the underlying cause. There are competing theories regarding birthdate effects. One is the 'length of schooling' hypothesis – when school admissions are staggered over the year then the youngest have the least schooling. Another is the 'relative age' hypothesis – even with the same length of schooling, the youngest in a year group will be, on average, less mature – cognitively, socially and emotionally – than their older classmates, leading to unequal competition in all three domains that could impact negatively on the younger group. Although it is sometimes difficult to disentangle these two hypotheses, evidence tends to support the latter. Using a common start date does not solve the problem of this type of disadvantage (Daniels, Shorrocks-Taylor and Redfern, 2000).

Teacher expectancy effects may contribute to birthdate effects – teachers may not take children's relative levels of maturity into account when making assessments of their ability and may therefore label younger children as less able than their older peers.

Evidence from developmental psychology suggests that children between the ages of 4 and 5 may not be ready, developmentally, for formal education. Birthdate effects appear to be greatly reduced in countries where formal education begins at a later age. There needs to be a careful consideration of what is best for all children in the early years of schooling, based on solid evidence from psychological research.

The review described here is far more than a simple rehearsal of the findings of a series of relevant studies. It allows an understanding of the accumulation of evidence in respect of the birthdate effect and certain explanations of why it occurs to be discounted. Crucially, the review considers the whole of the education system and this reveals two critical issues. First, that the birthdate effect persists throughout education and training. Secondly, that a strong selection effect may be in operation at all stages – that is, summer-borns are not progressing onto certain routes and into certain levels of education. This effect is not obvious from individual studies limited to specific phases of education. It explains why the summer-borns who get through to the highest level of education are doing well: it is vital to recognise that disproportionately fewer summer-borns actually get to this level *at all*.

Although the existing research is illuminating in respect of the extent of the birthdate effect and of its causes, there is still a need to identify remedies. We believe that work on remedies is not yet sufficiently advanced; substantial, urgent work is required on the means of devising adequate approaches. Although this review was focussed primarily on UK research, it also noted the effect is present in other countries. However, as Bedard and Dhuey (2006) noted, the effect varies from country to country and there is scope for more international work to identify potential solutions to this problem.

From this review, and from the work of comprehensive reviews of the quality of primary and early years education, it is likely that adequate remedy will lie not only in development of a strategy regarding *when* formal schooling should start, but also – at least – in respect of: specific balance in respect of curriculum elements devoted to cognitive, emotional and social development; the training requirements of teaching and support staff; curriculum frameworks; inspection foci; pupil grouping strategy; management of differentiation; and the articulation between early years units and compulsory schooling.

References

- Alton, A. & Massey, A. (1998). Date of birth and achievement in GCSE and GCE A level. *Educational Research*, **40**, 1, 105–9.
- Bedard, K. & Dhuey, E. (2006). The Persistence of Early Childhood Maturity: International Evidence of Long-Run Age Effects. *The Quarterly Journal of Economics*, 2006, **121**, 4, 1437–1472.
- Bell J.F. & Daniels S. (1990). Are Summer-born children disadvantaged? The birthdate effect in education. *Oxford Review of Education*, **16**, 1, 67–80.
- Bell J.F., Massey A. & Dexter T. (1997). Birthdate and ratings of sporting achievement: analysis of physical education GCSE results. *European Journal of Physical Education*, **2**, 160–166.
- Crawford, C., Dearden, L. & Meghir, C. (2007). *When you are born matters: The impact of date of birth on child cognitive outcomes in England*. The Institute of Fiscal Studies: London.
- Daniels, S., Shorrocks-Taylor, D. & Redfern, E. (2000). Can starting Summer-born children earlier at infant school improve their National Curriculum results? *Oxford Review of Education*, **26**, 2, 207–20.
- Higher Education Funding Council for England (HEFCE) (2005). *Young Participation in Higher Education*. Report Ref. 2005/03. HEFCE, Bristol.
- Massey, A., Elliott, G. & Ross, E. (1996). Season of birth, sex and success in GCSE English, mathematics and science: some long-lasting effects from the early years? *Research Papers in Education*, **11**, 2 129–50.
- Moon, S. (2003). Birth date and pupil attainment. *Education Today*, **53**, 4, 28–33.
- Sharp C. (1995). What's age got to do with it? A study of patterns of school entry and the impact of season of birth on school attainments. *Educational Research*, **37**, 251–265.
- Sykes E., Bell J.F. & Vidal Rodeiro, C.L. (2009). *Birthdate Effects: A Review of the Literature from 1990–on*. Research Report. Cambridge Assessment: Cambridge.

RESEARCH NEWS

Cambridge Assessment Parliamentary Research Seminar Series – *Better training: Better teachers?*

Sylvia Green Research Division

This seminar series is organised by Cambridge Assessment and hosted by Barry Sheerman MP, Chair of the Children, Schools and Families Select Committee and held in the House of Commons. The aim of the series is to bring together members of the research, academic and education communities as well as policy makers and influencers. This provides the opportunity for those working in educational research to present new ideas and evidence to key decision influencers as well as providing a forum for discussion on important topical issues in the field of education. Previous seminars have covered topics such as, *Aspects of Literacy*, *New Approaches to National Assessment* and *What makes a good teacher?*

The latest seminar took place in February and focused on the issue of effective teacher training. Over 140 teaching professionals attended, including researchers, practitioners and those involved in the delivery of teacher training in both Initial Teacher Training (ITT) and Continuing Professional Development (CPD) contexts. The seminar was entitled, *Better Training: Better Teachers?* This was a topical area since the select committee is undertaking an inquiry into ITT and CPD for teachers and teacher education is a key policy area. There were two guest speakers. The first to present was Professor John Furlong, Director of the Oxford University Department of Education. The second speaker was Dr David Pedder, Lecturer in Educational Leadership and School Improvement at the University of Cambridge.

PROFESSOR JOHN FURLONG

Professor Furlong addressed a series of questions and began by asking, *What is the role of initial teacher education in improving the quality of teaching and learning in our schools?* and *Is the Teacher Supply Model fit for purpose today?* The difficulties he outlined were: the impact of the economic downturn on supply; hidden and suppressed shortages; implications of the changing gender and age structure of the profession;

the flight from private schools; local pressures on school funding; impact of the collapse of the housing market on job mobility.

He also questioned whether we have the right routes into teaching and whether they really bring in different populations. He asked what the right balance of different populations entering the profession should be, whether the quality was the same for each of the routes and why those routes have to be so separate. The data he presented on the quality of the intake into the profession indicated that 58% of those in primary and 54% in secondary had 'good' degrees. Interestingly, the data also showed that in 2007 the average UCAS tariff for undergraduate teacher training was 198 (equivalent of C, D, D), while for Mathematics it was 395 and for European Languages 434. He asked if it was time to abandon the BEd or dramatically increase its intake quality.

The question of quality of provision was discussed and the issue of Teach First was raised. The question was whether there was any evidence to say that Teach First was an effective strategy in raising the quality of entrants to the profession. Another area of the 'quality' discussion related to whether the current approach to quality control is fit for purpose. A great deal of teaching is described as satisfactory and we need to have control approaches (standards, regulatory and inspection frameworks, self assessment documents) that will enhance quality beyond 'satisfactory'. Data were presented on the link between teacher education quality and educational research and the trend was for institutions scoring highly for research to be more highly rated for the quality of their teacher training provision. This led to a discussion about who our teacher educators are and how we recruit and develop them. A survey conducted by Dr Viv Ellis from the University of Oxford, asking *Who are our HEI Teacher Educators?* found that in three months last year a survey of advertised jobs showed that there were 65 posts advertised of which 50% were permanent and 25% were hourly paid temporary workers with pro-rata salaries of £28,000–£35,000.