

Newsletter

The Society of Actuaries in Ireland

McEneaney Debate - 27th March 2002

The Society had almost a full attendance at its evening debate on 27th March last. This was undoubtedly due to the high quality of the speakers and the importance of the topic in question.

John Logan chaired the evening and introduced the topic by explaining its significance. The principle controversial aspect of the McEneaney Judgment concerns the real rate of return used in arriving at lump sum settlements in Irish courts. In recent years, the norm had been 4%. Mr. Justice O'Sullivan (who incidentally has become more famous in recent weeks as being the judge at the centre of the Bobby Molloy incident) ruled that the rate of return should be 2.5% for loss of earnings and - 0.5% (yes minus one half of one percent!) for medical related costs (although what exactly these cover wasn't specified). John explained that while this case does not form a precedent (only a judgment delivered in a higher



Des Peelo, Shane Whelan, Eamonn Heffernan, Colm McCarthy, Brendan Walsh, John Logan.

court forms a precedent for a lower court) it is "out there" until another court says otherwise.

John outlined the effect of these changes on the multipliers used in calculating lump sums. For a 20-year-old the loss of earnings multiplier increases by 23% (assuming loss of earnings to age 65). However, the medical related costs multiplier increases by 185%. For an infant the medical related costs multiplier increases by 277% (i.e. the lump sum awarded is close to 4 times the current level). The financial implications of this for the general insurance industry are obvious, both for outstanding claims and future rates. The Judgment not only has clear implications in this area, but also has implications for any actuary who uses a real rate of return as part of their work in other fields.

Brendan Walsh then took the floor. He argued that historic Irish real

returns are largely irrelevant to the debate due to changing exchange rate regimes in the past. He stated that the richest evidence came from the US and the UK where real returns have been between 2.2% and 2.5% for three quarters of a century (based on price inflation and government debt).

Brendan referred to French index linked bonds which are currently yielding 3% above French price inflation. But Irish price inflation has been over 3% higher than French price inflation since January 1999, when our exchange rates were fixed. Hence investing in these would have yielded approximately 0% after Irish price inflation. The question then arises - will the inflation differential diminish over time? Brendan quoted the European Central Bank which stated that significant differentials could persist for some time within a monetary union.

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McEneaney Debate continued . . .

Brendan then turned to the question of which measure of inflation was relevant for medical costs. He argued that an appropriate (but not ideal) measure of the rate of inflation is the medical or health component of the CPI. He concluded that there are no safe investment instruments that offer a reasonable prospect to an Irish investor of realising a rate of return in excess of medical inflation. Hence a zero or even negative real return is a reasonable benchmark.

Des Peelo then took over. Des gave a detailed description of the proceedings in the McEneaney case. He proposed that people dependent on investment income to buy bread for the table are not in a position to take risks. He argued that quite often when stock markets have grown, it is five or six stocks that are responsible - the rest are dormant. He believes that the 2.5% real rate of return for loss of earnings was about right, but that the 3% differential for medical costs was too high.

On a broader note he felt that structured settlements would happen in Ireland, but that security of the funds will be an issue. He suggested that the Personal Injuries Assessment Board will not be a runner, as it will have to adopt the role of the defendant, which will lead to problems. He also thought that the state probably should have a role to play when people become catastrophically injured.

Colm McCarthy then made his contribution. Colm illustrated that Irish, UK and US equities had all exceeded price inflation over the last 30 years by on average 9% per annum. Irish government bonds had

outperformed CPI over the same period by 4.5%. In the UK, government bonds had exceeded price inflation by 8% per annum over the last 10 and 20 years. He then stated that in all except 2 decades out of the last 10, UK equities had produced a real rate of return in excess of 4%. He also showed that in 12 out of 16 major economies, the real rate of return on equities had been in excess of 4% over the last 100 years.

Colm mentioned the French index linked stocks previously referred to by Brendan, and showed that their real return was 3.5% to 3.7%. He concluded that long term real returns of 2.5% are unprecedented. He would argue strongly for 4%.

Finally, Shane Whelan took to his feet. Shane pointed out that there are no freely traded Irish index linked stocks (the last dealings were Sept 1995!). The index-linked market in the UK has apparently been quite distorted since the minimum funding requirements introduced by the Pensions Act 1995. Prior to that the real rate of return was about 3.6%.

Shane addressed the issue of differential inflation in the Eurozone, and quoted an ECB report stating that over the long term inflation does converge across such zones. Shane illustrated the differential between Irish price inflation and UK price inflation from 1925 to 1979 (when they shared the same currency, but different governments). With the exception of the "emergency" years, the differential was roughly zero. Therefore, he argued that investment in French index linked gilts is appropriate and

would yield a real rate of return of 3% to 4%. Shane stated that a diversified portfolio of equities, bonds and cash in the 20th century would have yielded a real return of over 3%. He concluded that a real yield of 3% to 3.5% is reasonable (measured against CPI).

Then Shane addressed Irish price and wage inflation. He demonstrated that wage inflation was CPI plus 0% to 2%. Therefore if the real return relative to CPI is 3%, then the real return relative to wage inflation is about 1.5%. He argued that medical inflation could not outstrip wage inflation in the long term, as that would make medical care unaffordable.

There was a very lively question and answer session afterwards, with several valuable contributions being made by people who practice in court work. There was close to a consensus that in practice (for simplicity) one rate was needed for loss of earnings and medical costs. The level of interest in the topic was such that rumbling stomachs were not satisfied until about half-past nine.

Ger Bradley

Editor's note:

Since the McEneaney Debate, Mr. Justice Finnegan (President of the High Court) has issued his judgment on the *Boyne v Bus Atha Cliath* case. He ruled that "the appropriate multiplier having regard to the Plaintiff's particular circumstances should be calculated upon the basis of a real rate of return of 3%". The case did not involve future medical related costs.

An Introduction to Risk Management - 20th March 2002

Presented to the Society of Actuaries by:

- Angela Darlington
- Simon Grout
- John Whitworth

Introduction

This presentation was a follow on from the paper presented to the Staple Inn Actuarial Society "How safe is safe enough". The paper was originally written with the following events in mind:

- Technology boom and bust;
- Failure of the Equitable Life;
- Failure of Barings bank.

However, more recent events like the failure of Enron and the losses suffered at AIB have heightened the awareness of risk management around the world.

What is Risk?

Risk is not an easy concept to define and there was some discussion and debate at the meeting over its definition. The group defined it in terms of maximising shareholder value. This includes the risk of missed opportunities as well as threats to a company.

How is Risk Measured?

The group highlighted a number of tools used in analysing the risks to a company:

- Risk Maps
- Utility Theory
- Game Theory
- Extreme Value Theory

How is Risk Monitored?

Traditionally risk management was a bottom-up process. For risk management to succeed the process must be driven from the top by the directors of the company. A top-down process will also ensure that risks across subsidiaries are appropriately considered.

Risk Regulation

Even before the previously mentioned events, the regulators were beginning to look at a risk based capital approach. The FSA in the UK are moving in that direction. They will be focusing attention on companies with the biggest potential risk.

Fair value accounting will also encourage companies to assess the risks inherent in guarantees.

Lively Discussion!

There followed a lively debate about risk management. The pros and cons were discussed in some detail. The following are some of the interesting points raised:

- Risk management can create a culture of "no bad news". However, the philosophy of "bad news early" may be more appropriate as a risk management culture.
- There is a risk that the risk management process itself can be manipulated.

- It is difficult to mitigate risks which the rest of the market don't recognise.
- Disasters often occur with a combination of "unlucky" events. Risk management processes should quantify the likelihood of a number of bad events happening together.
- Often the threats and strengths of a company are correlated.
- Peer review should be part of the risk management process.

This very interesting, topical and easy to follow paper can be downloaded from the Society website (www.actuaries-soc.ie). The paper also contains some excellent Bushisms and links to other useful websites.

Dermot O'Hara

Peter Clark, President of the Institute of Actuaries, Address to the Society - 5th March 2002

Peter Clark used the words Change, Challenge and Communication to headline his address to the Society at the evening meeting on 5th March.

Actuaries have always faced change but the pace of change has accelerated in recent years. The challenge for the profession is to embrace this change and through enhanced communication, maintain the high standing of the profession.

In all areas of life there is now a greater demand for transparency, openness and accountability. The profession needs to be able to demonstrate that it operates to high standards and compliance reviews are part of this process. The format of compliance reviews is currently under very active discussion and important decisions have to be taken on how they will be implemented. A balance must be maintained between the individual skills of the actuary and the collective skills of the actuarial profession.

Given his background in the life assurance side of the profession, Peter Clark has a particular interest in the future role of the Appointed Actuary. The role of the Appointed Actuary has worked well over the years but it is a position which is now in the spotlight since the difficulties experienced by Equitable Life.

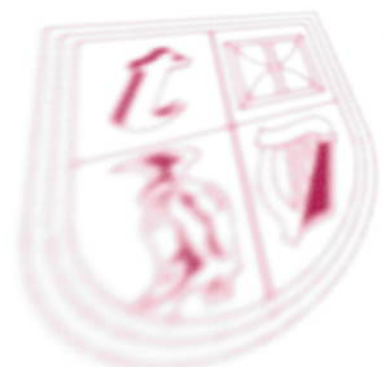
The importance of the role of the Appointed Actuary is recognised but the reliance on one individual with no independent external review inevitably poses risks. The need for external review is now accepted and much discussion is taking place on the form of this review.

The other aspect of the role of the Appointed Actuary which is under active discussion is the relationship between the Appointed Actuary, the Board of the insurance company and policyholders. Various alternatives regarding the optimum reporting structure for the Appointed Actuary within an insurance company are being examined.

Peter Clark illustrated his views with a number of apt quotations, one of which dated back to 1831. He closed his talk with the following quotation from Frank Redington (FIA 1934):

"We are now ready to dispense with the cloak and say freely - and we are better for saying - that the actuary cannot foretell the future. He cannot break the laws and see through the infinite cloud of probabilities that nature interposes between us and what is to come. What he can do and does is to sense the wide ranging possibilities that the future may have in store and to make them a living part of the present where decisions are made."

Joe McElvaney



Fair Valuation of Liabilities

- 26th February 2002

The 'Fair Valuation of Liabilities' paper was the product of an Institute working party formed early in 2000. Stuart Thompson, one of the seven working party members, was present on the 26th of February to outline the highlights of the paper to the Society and the developments that have taken place since its publication in October 2001.

Stuart described the background to the working party - its goal was to develop a new approach to prudential supervisory reporting, taking into account the proposed changes to international accounting standards. To that end, section 1.4 of the paper sets out the principles that the working party believe should be followed.

The latest version of the DSOP (draft statement of principles) for an international accounting standard for insurance can be found on the IASB website. Eleven of the thirteen chapters are available. The two outstanding chapters deal with performance-linked business and presentation of results - probably the two most important subjects.

Some issues arising from the new accounting standard include:

- The results under the new accounting standard are likely to be volatile but this is because the business is volatile. An analysis of earnings by source, similar to that currently done for embedded value reporting, would therefore be useful.
- The related accounting standard for financial instruments has been pushed back to 2008. Until this comes into force, the accounting for insurance standard will have to be entity-specific fair value rather

than true fair value. Stuart said that he didn't think that there would be much difference in practice between the two approaches.

The working party paper is only a first step in looking at this whole area. The UK actuarial profession has proposed setting up a steering group and four successor working parties, overseen by a project manager, to cover this important subject. The four working parties will cover principles, calculations, with-profits business and stochastic accreditation respectively. The IAA has set up a working party to look into the possibility of an international actuarial standards board to develop standards of practice for IASB valuation of insurance contracts.

A lively discussion followed - kicked off, appropriately enough, by an accountant.

- There was some comparison with current methods in use under US GAAP and IAS39. Another speaker stressed the importance of the new standard gaining acceptance in the US, where most capital is raised. The need for change in accounting standards in the US is more likely to be addressed following the Enron saga.
- Concern was expressed at the impact of the exclusion of future premiums from the valuation of contracts (these are currently included in embedded values). Stuart explained that future premiums could only be taken into account if the option to pay future premiums represented a valuable option to the client, such as if the premiums were less than the company would charge for a new policy. An example of a contract

where the option to pay future premiums is not a valuable option is a stakeholder pension where there is no surrender penalty. The reasoning behind this ruling is that one should not place a value on a sold option. By contrast, there was general approval for the absence of any requirement to apply a 'surrender value floor' to the valuation of a contract.

- The discussion moved on to the assessment of required risk based capital (RBC) over and above the fair valuation of liabilities. Resilience tests could be used to assess RBC. Ideally the same models would be used for RBC calculations as for fair value calculations. Although the DSOP prescribes stochastic modeling, easier methods could be used for simpler products e.g. unit linked business and term assurance without options.
- Stuart confirmed that contracts could only be classed as insurance contracts under the DSOP if the benefit had a significant effect on the policyholder's cashflow. This means that most savings policies would be classed as financial instruments rather than insurance contracts.

The Vice-President, Pat Healy, closed the meeting by recommending the merits of the fair valuation approach - it treated the liabilities in the same way as the assets and removed the veneer of smoothness in the current approaches to valuation and financial reporting. However, it is a big leap into the stochastic world and the Society needs to link into the ongoing professional developments in the UK.

Carmel Brennan

News in Brief

Pensions / PRSA Committee

The Pensions Amendment Bill has passed the Dáil and Seanad. A considerable number of changes were made to the PRSA provisions as part of the final amendments. Among the most significant were:

- Removing the requirement for insurers to set up a separate PRSA company.
- Removal of the PRSA provider licence provisions.
- Full details of the tax rules.
- Introduction of a PRSA provider code of conduct.

The PRSA Working Party is to meet the Department and the Pensions Board shortly to discuss PRSA regulations and guidance notes.

Cross-Border Committee

Membership of the Cross-Border Life Committee is open to actuaries involved in cross-border life assurance. The main areas of activity at present relate to (a) interpretation of PRE for policies sold on a cross-border basis; (b) regulatory and consumer issues relating to the use of alternative investments in life insurance products; and (c) the advantages and disadvantages of industry-wide policyholder protection schemes.

A new draft Guidance Note has been prepared which sets out in detail how the actuary should discharge his/her responsibilities for monitoring policyholders' reasonable expectations in respect of cross-border business.

The proposed Guidance Note will be submitted to Council for its consideration in the near future.

The Working Group dealing with regulatory and consumer issues relating to the use of alternative investments in life assurance products is finalising a paper which it plans to present to an autumn meeting of the Society.

Finally, the Committee has just kicked off consideration of the advantages and disadvantages of an industry-wide policyholder protection scheme. Such a scheme would improve the attractiveness of products being sold from Ireland on a cross-border basis. The main disadvantage is that great care would need to be taken to avoid the prudent having to subsidise the imprudent.

Life Committee

Seminar

A Seminar "Strategic Issues facing the Life Assurance Industry" held on 24th April attracted a record attendance. A review of the seminar will be in the next issue of the Newsletter.

Illustration Rates

New illustration rates will come into effect from 1st July this year. The maximum assumed future investment returns, currently 8% and 10% gross, will be reduced to 6% and 8%.

With-Profit Working Party

A Working Party has been formed by Brenda Dunne to consider some of the issues in relation to with-profit business and to report back to the Life Committee with their findings and recommendations in the autumn.

Internet Committee

Recent additions to the website

Papers:

- *Fair Value Accounting*
- *Corporate Diversity and the Provision of Financial Services*
- *Fair Valuation of Liabilities*
- *Presentations from the McEaney Judgment Debate, including Colm McCarthy's paper*
- *Compensation Awards and Real Returns*
- *Current Topics Paper*
- *Risk Equalisation Report from the Society's Working Party*

The March issue of the Newsletter is available on the site and all future newsletters will also be available there.

Obituary - Eoghan O'Donovan

(1969-2002)



Friends and colleagues of Eoghan were shocked to hear of his sudden passing in the early hours of March 12th 2002.

Eoghan joined Irish Life in 1987 as a student of the Institute of Actuaries and spent his time there working in the Valuations departments. Eoghan was very easy going and soft-spoken and made many strong and lasting friendships there.

Eoghan left Irish Life in 1993 and spent the next four years in the University of Limerick taking a degree in Equine Science. Afterwards he returned to the actuarial field doing consultancy work for Irish Life,

Scottish Amicable, Canada Life and Swiss Re.

He spent his last few years abroad, spending time in London and the Isle of Man. He moved to Hong Kong in April 2001 and was working for Prudential overseeing the installation of Prophet in their offices in the South East Asian region.

Eoghan's passion was sport, especially horse racing. He had few equals in his knowledge of the turf and he was always generous with tips for anyone who was short of a few bob at the end of the month. He was a regular visitor to Aintree and Cheltenham and as a special service would place

bets for those of us left behind who wanted to avail of on-course prices.

He was a regular in the post study - room drinking sessions in Tommy Wright's Pub and many tips were passed on in this favourite venue of his.

At this time our deepest sympathies lie with Eoghan's parents, Kieran and Terry and his sister Ciara. We hope their memories of Eoghan and the well wishes of his friends and colleagues will ease their pain at this time.

Friends & colleagues of Eoghan.

Getting to Grips with Fair Value - 9th April 2002

Matt Saker and Michel Abbink of Watson Wyatt presented their SIAS paper "Getting to grips with fair value" to the Society at the St. Stephen's Green Club.

The paper aims to cover the major practicalities involved in fair value accounting for life insurance contracts. It revolves around the interpretation and implementation of the draft statement of principles (DSOP), which the International Accounting Standards Committee (IASC) has been releasing chapter by chapter.

Matt and Michel first gave us an update on the current progress towards implementation. The European Parliament has ratified the decision to implement fair value accounting principles from 2005 onwards for all EU listed companies. In practical terms this means that comparative figures will be required for 2004 and the necessary systems will need to be in place by early 2004 to gather this information.

Matt and Michel also updated the gathering on current disquiet regarding fair value in the US, Germany and Japan where insurance industry bodies have recently written jointly to the IASC. They argue that fair value accounting would produce misleading and deceptively volatile results in financial statements from quarter to quarter that would misrepresent the financial position of assurance entities.

Matt and Michel covered a series of worked examples for non-profit, unit-linked and unitised with-profit business. The examples compared the possible value of liabilities on prudent statutory, embedded value

and fair value bases. Key features influencing the relative size of the fair value liabilities were:

- use of a risk free discount rate
- addition of margins to best estimate assumptions to reflect risk
- no allowance for cost of capital
- allowance for withdrawals.

The examples raised many fundamental issues that were taken up in the lively discussion. This first focused on analysts' likely reaction to fair value accounts. It was agreed that considerable energy will have to be put into communicating the new accounting approach to analysts.

The proposed definition of what constitutes an insurance contract is a fundamental issue for all life offices. This hinges on what level of insurance risk, as opposed to financial risk, is considered to be significant. Currently many unit linked savings and investment contracts may not meet the definition and PRSA's are unlikely to meet the definition either. If a contract falls outside the definition it will be valued according to IS39 - most likely on a market value. IS39 may be altered before 2005 to improve consistency in the change over to fair value accounting.

FRS17 the pension standard was seen to have exacerbated capital market moves as pension funds covered exposed positions. The possibility of fair value accounting having a similar effect on insurers was considered.

The conditions under which future premiums may be offset against liabilities will clearly also influence insurers in terms of product design. In order to create a clear benefit to the customer for continuing with an

existing policy design we may see the return of features such as front-end loading along with loyalty bonuses and guaranteed insurability options. Allowing for fair value at the design and profit testing stages is becoming an urgent necessity. However pricing on a fair value basis may not be sufficient - allowance would usually also be made for the cost of capital.

The use of stochastic projection is a key requirement of the DSOP. This is most likely to affect valuation of unit-linked contracts with guarantees and with profit business. The presenters defended their preference for a state-price deflator approach compared to the risk neutral approach on the basis that while both gave consistent values, state-price deflators were more intuitive and required significantly fewer numbers of projections.

Finally the key issues for general insurers were touched upon. The speakers considered these to be:

- switching to prospective calculations (as opposed to, for example, unearned premiums reserves)
- the introduction of discounting
- uncertainty surrounding the calculation of risk margins
- the level of allowance for catastrophe reserves, and
- possible changes to solvency margin calculations.

Olga Daly

Natural Born Mathematicians

One day old, and already a mathematician.

When was your very first mathematical thought? At age Four? Three? Two? It may surprise you, but it was certainly earlier still - in fact, you were born a mathematician...

In the last few years, researchers have become accomplished at finding out what goes on in the minds of tiny children, even new-born babies. This is done either by watching their gaze (looking away indicates familiarity or boredom, staring intently indicates surprise or interest) or by giving them a dummy (the more they suck, the more interested they are). This means that we can tell what expectations babies have in different situations, and when those expectations are violated. What we have learnt is that, amazingly, we all come into this world ready-supplied with basic mathematical understanding.

"We are born with a core sense of cardinal number", says neuropsychologist Brian Butterworth, author of *The Mathematical Brain*. "We understand that sets have a cardinality, that is, that collections have a number associated with them and it doesn't really matter what the members of that set are. Infants, even in the first week of life, notice when the number of things that they're looking at changes."

Was that a 2 or a 3?

"If you show babies two things and then another two things - you can change what the things are and vary lots of the visual features of these two things, so it's not that you're showing them the same thing over and over again - they gradually lose interest

and start to look away for longer and longer periods. Then you show them a set with threeness, and they become interested again, and then you show them more sets with threeness and they lose interest, and then you show them a set with twoness and they gain interest again."



Impressive as this ability is, newborn babies are even more mathematically accomplished. They have arithmetical expectations, says Butterworth. "If you show a baby that you're hiding one thing behind a screen, and then you show the baby that you're hiding another thing behind the screen, the baby will expect there to be two things behind the screen, and will be surprised if this expectation is violated." So even before babies can focus their eyes, they are surprised to see a sum with the wrong answer!

Numbers on the brain

These core abilities, which Butterworth calls the "number module", may be the foundation of everything we learn about mathematics later in our lives. He speculates on this in *The Mathematical Brain* - "but I have to stress that it is speculation, because what we need to know is whether babies use the same bit of brain as

adults. Adults use the left parietal lobe for this ability to recognise small cardinalities. If babies use the same bit of brain, then the course of learning more advanced mathematics builds on this core. If it's a different bit of brain, it's back to the drawing board."

The notion that children have no mathematical abilities whatsoever until they are old enough to have elements of logical reasoning (four or five years old) is very influential, and was held by the famous educationalist Piaget. Clearly this view isn't correct, but according to Butterworth, some of the mathematical abilities Piaget studied may have deeper aspects that children don't achieve until they're four or five. However, he thinks that "these abilities, such as one-to-one correspondence, are built on a basis which is innately specified. Manipulating sets really does need the achievement of some kind of logical abilities that babies don't have. So maybe Piaget was right in a way, but if he was working today he would see that the child has more going for it when it gets to four or five than simply transitive reasoning, class inclusion, these very general logical ideas, it's also got a primitive idea of cardinality."



continued on page 10 & 11

Natural Born Mathematicians continued . . .



Butterworth explains that he first became interested in the foundations of mathematics when he was studying for a Masters degree in logic. "I read quite a bit about Godel's Incompleteness Theorem and that sort of thing but I didn't actually connect it up to cognition until much later. I had always had in the back of my mind an interest in the foundations of mathematics, actually since I was a teenager, questions such as what are numbers, what makes mathematical statements true. I've never gone along with the people who think that mathematical statements are fiction! So I was interested in these questions, but I never thought to approach them empirically, I only thought to approach them logically."

Adults thinking about mathematics tend to think about it as something logical, which of course it is, it has its own structure, but it doesn't develop according to that structure in our minds. You might think that you would have to have the concept of zero before developing thinking about sets and cardinalities, but what neuropsychology shows is that this isn't so. The number module isn't

something we develop according to some logically consistent scheme, instead it's inbuilt - instinctive, in fact. "The child's acquisition of mathematical ideas actually seems to recapitulate the history of mathematics", says Butterworth. "But it doesn't recapitulate the logic of mathematics. For example, in the history of mathematics, the concept of zero is rather late. In the Frege-Russell construction of numbers it's rather early! So I would say that we can reinterpret the history of mathematics in the light of the child's development. We could say that some ideas are very easy, rather straightforward extensions of what the individual was born with, and some ideas are rather more complicated, because they're not so natural. Ideas like probability for example, are not very natural.

"We're very bad at probability, which of course is why insurance companies and banks are rich! You don't really get a mathematical theory of probability until the seventeenth century. That just reflects that ideas of probability are very difficult. I was on the Brains Trust on Radio 3 once, when somebody asked a strange question: 'Why is it that mathematicians love music but musicians don't love mathematics?' What's happening here is known as the 'base rate fallacy'. The idea is that there's a base rate which the question hasn't taken into account, which is that most people love music and most people don't like mathematics. And mathematicians and musicians are no different from anybody else in this respect."

Using my hands teaches me maths

Interestingly, and suggestively, there is evidence that early mathematical development is related to certain physical skills. We all start to count on our fingers, and only later do most (but by no means all!) of us abandon our fingers in favour of mental calculation. Butterworth and his colleagues have just started a project looking at people with dyspraxia. "This means they have difficulty in controlling their bodily movements", he explains. "There are degrees of it, mostly dyspraxics are just a bit clumsy. They tend to have particularly poor finger dexterity, and we want to know, what's their maths like? We have anecdotal evidence that these people are worse at maths than the average, both as children and as adults. But we don't know why that is. It might have to do with their manual dexterity or lack of it, or it might have to do with something else. There might be a common cause for a whole range of different difficulties. We want to know if the kinds of difficulties they have are the sorts you would expect them to have if they had problems counting on their fingers when they were little."

Putting in the hours

So far we've only talked about the most basic mathematics - arithmetic and an inbuilt notion of cardinal number. What about more advanced, or adult, mathematical ability? The evidence seems to explain how things can go very wrong - via brain damage or physical problems with dexterity - but what about when things go very right? How come some people are so good at mathematics, and so creative?

Natural Born Mathematicians

In Western culture, the most prevalent theory about talent is that it is innate. When someone is outstandingly good at something, we describe them as "gifted", and say they are "naturals". This idea is not so common in other societies, where hard work is seen as the primary reason why some people excel.

According to Butterworth, all the evidence supports the hard work theory. He goes so far as to say that the only "statistically significant" indicator of mathematical excellence is the number of hours put in. This seems to suggest that anyone could be a superb mathematician if they are willing to put in the hours - but the truth is slightly more nuanced. The crucial word here is "willing". Butterworth says that "anybody who is a good mathematician is slightly obsessed with maths - or more slightly obsessed - and they put a lot of hours into thinking about it. So they are unusual in that respect. But they may be no more unusual than anybody who is very good at what they do, because they have to have a certain obsessiveness or otherwise they're not going to be able to put in the hours to get to this level of expertise. This is true of musicians, it's probably true of waiters. Now, if you start putting in the hours when you are very young, how are we going to tell whether your adult state has got to do with what your brain was like before you started to put in the hours, or what it was like because you put in the hours?"

Butterworth is slightly impatient with this chicken and egg question - which comes first, zeal or hard work? He says that "if, for whatever

reason, you start working hard at mathematics when all your classmates don't, then the teacher is going to favour you, so you're going to get external rewards, and you're going to get the internal rewards of being able to do something rather well that your mates aren't so good at, and so you'll start off a virtuous circle of external rewards, internal rewards, you work a bit harder, you get even farther ahead of your classmates, who aren't actually putting in the time. So it wouldn't be surprising that if random people who for some reason select to pursue maths on the whole get rewarded because they are going to be better than their peers."

There are particular cases which give great weight to what we might call the "zeal theory of excellence". Butterworth describes the recent case of Rüdiger Gamm, a German who started to teach himself to become a prodigious calculator in his twenties, because he wanted to win a prize on a TV game show. He won the prize, and became very famous in Germany as a calculator. "He can do wonderful things, because he spent four hours a day since he was twenty working on it, learning new tricks, learning the table of cubes and cube roots, and to the power of four and fourth roots and so on. He learned all the tricks he could find, and worked out tricks for himself."

So the picture of mathematical ability and its provenance is a nuanced one. Newborn babies, commonly thought to be incapable of anything but eating, sleeping and crying, are actually budding mathematicians. We arrive in this world hardwired with basic number abilities, and very

probably everything we learn later in life about mathematics builds on this fundamental core. For some of us, maths will always be difficult, possibly because innate clumsiness made it hard for us to do sums on our hands when we were small. But for the rest of us, how good we end up at maths is mostly to do with how hard we try at it - and that depends on how much we enjoy it.

Dr. Helen Joyce is editor of Plus, an online magazine about maths and its applications, run by the Millennium Mathematics Project, based at the Centre for Mathematical Sciences in Cambridge. She is supported by the Institute/Faculty of Actuaries. This article is a version of one that first appeared in Plus Magazine.

For this article Helen interviewed Brian Butterworth, Professor of Cognitive Neuropsychology at University College, London and founding editor of the academic journal "Mathematical Cognition". He is currently working with colleagues on the neuropsychology and the genetics of mathematical abilities. You can find out more from his website www.mathematicalbrain.com.



NE 14 10 IS ?

The Tennis Society has been revived! Having taken a long break since July 1997, the Tennis Society plans to hold a tournament shortly. Martina Walsh has kindly agreed to take over the captaincy for this year and details of the event will shortly be notified to members. Tom Barry has offered to present a perpetual trophy for what will now become an annual or perhaps even a bi-annual event.

If you are interested in playing, please e-mail Martina, in order to give her an idea of the number of courts required. We will then circulate a notice confirming the date and venue.

Martina.Walsh@buckconsultants.ie

E-mail Addresses

The Society intends to start communicating via e-mail to members as a means of:

- alerting them of forthcoming events.
- alerting them of additions to the website.

If the Society does not have your current email address, please email Mary Butler at actuaries@iol.ie.

New Qualifiers Reception



Oliver Coakley, Suzanne Leydon, Kevin Manning, David O'Sullivan, Steve Gardner, Eamonn Heffernan, Peter Clark, Brian Murray, Alan Murphy, Barry Cudmore.

Diary Dates

May Events

Wednesday 1 May
Evening Meeting - Risk Equalisation Report by the Society's Working Party
- in the Stephen's Green Club

Thursday 9 May
Joint Faculty/Institute Sessional Meeting and Dinner
- in the Conrad Hotel.

Saturday 11 May
Annual Ball
- in Powerscourt, Enniskerry, Co. Wicklow.

Thursday 23 May
Pensions CPD Session (this will be held in the afternoon)
- in the Stephen's Green Club.

Tuesday 28th May
AGM followed by a Consultation Meeting for Members on the Society's Self Regulation Working Party's Report.

On the Move

⇒ Fellow Members

Anton Davies has joined **NetWorth Consulting Ltd.** from Anglo Irish Bank
Martin Ryan has joined **RSA** from Allianz

⇒ Associate Members

Michael Moloney has rejoined **Mercer** from HCM International
Chiara Furlan has moved from Arca Vita Group in Dublin to join **Life Strategies** as General Manager of their newly formed office in **Milan**



Society of Actuaries in Ireland

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