



Newsletter

Operations Research Society of South Africa
Operasionele Navorsingsvereniging van Suid Afrika

"This article highlights empirical results of analysis, and the effect a sample size increase will have on application scorecard development statistics." - Margarete Bester

ANYLOGIC

-  Asset Management
-  Business Processes
-  Ecosystems
-  Healthcare
-  Manufacturing & Logistics
-  Marketplace & Competition
-  Pedestrian Dynamics
-  Social Dynamics
-  Supply Chain
-  Telecom & IT Infrastructure
-  Traffic & Transportation

**Agent Based,
Discrete Event,
System Dynamics, and
Multi-Paradigm Modeling**

Distributed by:



Tel: (011) 447 9916

Fax: (011) 447 9911

info@bluestallion.co.za

FROM THE EDITOR



Basie Kok

Welcome to the winter edition of the ORSSA newsletter 2007! I'm sure many of you are extremely busy this time of year, but if you would like a refreshing and inspiring read, grab a cup of coffee and have a look at some of the amazing work being done in the field of OR in our country.

The theme of this edition is *OR in finance and economics* and I was fortunate enough to receive two excellent contributions on the topic. The first is an article entitled

Sampling for Scorecard Robustness, by Margarete Bester from PIC Solutions, and features a case study where the effect of sample size during scorecard development is investigated.

Die tweede artikel wat ek ontvang het, gaan oor die vernootskap tussen ON, Wiskundige Ekonomie en Finansies, wat volgens Petrus Potgieter van UNISA, baie vrugbare kan wees!

A member profile of last years Tom Rozwadowski winner, Leanne Scott, is also featured in this edition along with another excellent book review from Hans Ittmann and an inspiring word from the presidents desk.

I hope you enjoy the issue!

Features	Page
FROM THE PRESIDENTS DESK	2
MEMBER PROFILE: LEANNE SCOTT	3
SAMPLING FOR SCORECARD ROBUSTNESS	4
ON, WISKUNDIGE EKONOMIE EN FINANSIES: 'N VRUGBARE VENNOOTSKAP	9
BOOK REVIEW: THE POWER OF THINKING WITHOUT THINKING	11

ORP³ 2007



Guimaraes, Portugal, 12-15 September 2007
Minho University (<http://www.uminho.pt>)

Host City

The city of Guimaraes is located at a distance of 50km from Porto and 35km from Braga. Guimaraes is a nominated city from UNESCO (world heritage), see <http://www.cm-guimaraes.pt>

Conference Topics

The conference is open to the whole scope of OR, but the following topics are mostly welcome:

Non-linear Optimization; Derivative free Optimization; Multi-Objective Optimization; Simulation; Integer programming and Combinatorial Optimization; Linear Programming; Bundle Methods

Organizing committee chair: A. Ismael, F. Vaz (Chair)
(aivaz@dps.uminho.pt)

IFORS
sandton
2008

**18th Triennial Conference of
the International
Federation of Operations
Research Societies**

July 14-18, 2008

**Sandton Convention Centre,
Sandton, South Africa**

See www.ifors2008.org

FROM THE PRESIDENT'S DESK

By Marthi Harmse (marthi.harmse@sasol.com)
ORSSA President



Marthi Harmse

Dear ORSSA friends,

As I am typing to you, I watch my kids growing up. Somehow our kids are very closely connected to ORSSA: just one week after I attended the national conference hosted in Bellville in 2000, our daughter was born. Three weeks after I was elected vice-president (in Bellville again) in 2004, our son was born. Our kids remind me of all the other youths who crossed my Operations Research path – learners participating in Operations Research learning events, new colleagues joining the team, interviewees for new appointments, etc.

Many ORSSA members are involved in the development of young Operations Researchers, but also in enhancing other young professionals' careers with Operations Research competencies. These involvements are on various levels (from undergraduate to postgraduate to continuous development), and these Operations Research roses are known by many other names. As could be expected from good Operations Researchers, ORSSA (by means of our members) often reflect on which institutions offer which Operations Research related modules / programmes / qualifications in which departments known by which names utilising which methodologies, methods, technologies, techniques, etc. We often have discourses about what the above should or could include and exclude.

The above dialogue will continue during the workshop on Operations Research education hosted for the first time by Operations Research Practice in Africa (ORPA) in collaboration with the Institute for Operations Research and the Management Sciences (INFORMS) from the United States. The workshop is scheduled at the University of Cape Town for 10-11 September 2007. More information is included in this newsletter, or visit the ORSSA website or the ORSSA/ORPA 2007 website at <http://www.orssaorpa2007.org.za/>. Whether you are from the academic environment, business or industry, be sure not to miss this opportunity to contribute to the development of Operations Research.

The opportunity to aid development and propagate sustainable growth through the use of Operations Research techniques is extended during the ORSSA/ORPA conference at the University of Cape Town from 11 to 13 September 2007. The conference is intended to bring academics from all over the world together to discuss and present some of the most recent developments in our field. The intention is also to bring industry and academics together to ensure effective and beneficial implementations of Operations Research in practice.

Some other youths who have crossed my Operations Research path were street children. One of the most important lessons I

learnt from them is that while I was involved in their development, they were also involved in my development. A lesson reiterated by my own children. May we as Operations Researchers always have open hearts and minds to be able to learn from those who we hope to help.

Marthi Harmse

QUERIES AND CONTRIBUTIONS

Address all queries or contributions to the editor:

The Newsletter Editor
ORSSA
PO Box 3184
MATIELAND
7602

E-mail: orssa_newsletter@dip.sun.ac.za

Tel: (082) 320 0313

Fax: (021) 808 3778

Contributions and other forms of communication with the editor can also be conducted from the website at:

www.orssa.org.za.

Advertising in the Newsletter

Getting the right people, in the right places, to know about you at the right price.

BENEFITS OF ADVERTISING IN THE ORSSA NEWSLETTER

- **Double impact** – your advertisement appears in both the ORSSA newsletter *and* on the ORSSA website.
- **Hitting the target** – your advertisement will reach a targeted group of highly qualified people at management level.
- **Global WWW audience**
- **Links** to your website.

Advertising packages can be tailored to meet your needs.

For further details of advertising rates and advice on how to place an advertisement contact Leo Tomé:

The Newsletter Business Manager
ORSSA
PO Box 3184
MATIELAND, 7602

E-mail: orssa_newsletter_bm@dip.sun.ac.za

Tel: (021) 595 1731

MEMBER PROFILE: LEANNE SCOTT

By Basie Kok (bkok@dip.sun.ac.za)



Leanne Scott

Leanne Scott is currently a senior lecturer in the Department of Statistical Sciences at UCT. She received a BSc. in Zoology and Mathematical Statistics from UCT in 1979 and went on to obtain a BSc Hons and MSc. in Operations Research. From 1983-1987 she worked as a research fellow at the Clinical Operational Research Unit, University College, London and thereafter

returned to South Africa as a research officer for the Institute for Maritime Technology. After doing freelance consulting for a few years she entered her current position in the Department of Statistical Sciences.

She has been involved in many large scale projects including a collaboration with the CSIR developing a model of a National Poverty Alleviation System. She has provided technical advice to the presidency regarding government policy and possibly most notably won the Tom Rozwadowski medal twice, firstly as a joint winner with Prof. T Stewart for a paper entitled *A scenario-based framework for multicriteria decision analysis in water resources planning* in 1996, and secondly in 2006 for a paper entitled *Unpacking developmental local government using Soft Systems Methodology and MCD*.

She is an occasional reviewer of *Orion*, the African Development Journal, the *Journal of Income Distribution* and the *Journal of Multi-Criteria Decision Analysis* to name a few.

She is a regular delegate at ORSSA conferences and her wealth of experience and expertise in the field of Operations Research makes her a true asset to the society!

How long have you been involved in OR and what attracted you to it?

I graduated with a BSc. Hons in Operational Research in 1980 and I guess, like most people, I sort of wandered into the field in a not very purposeful way! I originally studied Zoology and Statistics and ended up in OR because it seemed an interesting way of combining interests in many fields in a way that wasn't too confining (especially as we still haven't quite agreed what OR is!)

Your research involves Soft Systems Methodology. What are some of the unique aspects of this field and what contributions do you believe it can make to the OR discipline in general?

At the moment I am employed at the university which involves teaching and research and provides a fair amount of scope for taking on interesting action research projects. My research involvement has become in increasingly "softer" areas over the years but seems always to have involved decision making (although most OR does really). Most of what I do could probably be called problem structuring and the tools I use most

frequently probably fall into the area of MCDA. I suppose the attraction for me is in finding ways of bringing concerns and ideas from different sectors and domains together, and in seeing the inevitable creativity and synergy that results when people find a common medium to communicate through. Action research of this kind is very exhausting though, and I particularly enjoy the sense of reflection and renewal that I get from taking the learning back into my teaching.

Have you recently been involved in an OR project that you thought was particularly successful?

Um,... "success" is quite a weighty outcome to lay claim to! I have particularly enjoyed working on a project with colleagues at the CSIR over the last 18 months or so. The project was satisfying in that it provided an opportunity to interact with other OR scientists and to develop theory alongside practice. Part of the project involved developing a framework for interrogating a "poverty alleviation system". As a case study for this model, we worked with community leaders in Kensington, Cape Town, who were committed to addressing developmental needs in their area in different sectors. We attempted to use the framework that we had developed as a basis for interaction with the community and for highlighting and contrasting perceived problems and potential solutions. It was exciting to work in both theoretical and practical domains and the experience made me want to do more collaborative work with other OR practitioners.

Do you believe OR will eventually reach its full potential in South Africa. If not what are some of the obstacles that would prevent this and what role could ORSSA play in removing them?

The potential for OR to contribute towards the developmental challenges in SA is, I think, very great. As always it depends on us as practitioners, academics and theoreticians as to how we package our strengths and position ourselves to be at the right place to make maximum impact. Somehow we need to get closer to the "problem owners" in such a way that we understand enough of the problem context and can communicate enough of our trade to be in a position to make a difference.

What has been the highlight(s) of your OR career to date?

Probably winning the Tom Rozwadowski medal which created a very nice warm fuzzy feeling of "they" think my work's OK! ... and I certainly felt very honoured to have been awarded this recognition, especially as it has been associated with some very illustrious names in past years! But I still have a long way to go so don't feel I've quite got to the highlights yet...!

Do you have a message for any aspiring OR practitioners?

Embrace your work wholeheartedly and make your way of doing OR uniquely yours. Knowledge is packaged into subjects and courses at school and university. Out in the real world of problems (and messes!) it's a relief to find that there are no such tedious boundaries and you can have fun constructing meaningful ways of interacting with theory and practice.



Sampling for Scorecard Robustness



By Margarete Bester (MBester@PICsolutions.com)

Introduction

This article highlights empirical results of analysis, and the effect a sample size increase will have on application scorecard development statistics.

A scorecard is developed using samples of historical data and is based on the assumption that past behaviour will predict the immediate future behaviour of a debtor. These samples should be representative of the main population of past debtors to ensure that:

- the scorecard developed on the sample data is *effective* in separating good and bad accounts for both the sample and the sampled population;
- the scorecard developed on the sample is *robust* enough (does not over fit the sample and population from which the sample was drawn) to separate good and bad accounts of profiles that were not present at time of development.

Due to a trade-off existing between accuracy and robustness, the size of the sample should be smaller than the total population dataset at time of development. Care must be taken to ensure that the size of the sample is not too small, as this can significantly decrease the accuracy of the model when applied to real datasets.

The aim of this analysis was to determine how many accounts should be sampled to attain maximum benefits from the application scorecard.

Increasing the sample size makes it easier to identify significant attributes (categories) within characteristics. For example, in a sample of 200 accounts, only 2 significant attributes could be identified for age, namely 18-30 and 30-55. By including an additional 100 accounts in the original sample,

however, another significant attribute could become visible so that there are 3 attributes 18-25, 25-30 and 30-55 as seen in Figure 1.

The scorecard based on the sample of 200 will penalise or allocate a lower score to applicants in the age category 25-30, whereas a higher score will be allocated to the sample of 300 as this is a more accurate reflection of the risk for this group. The figure below shows a visual representation of the risk behaviour pattern for age and how it becomes more specific with a larger sample size.

The gain from more defined risk behaviour patterns is offset by the increased complexity of the problem and solution space. More attributes per characteristic implies additional restrictions, parameters to calculate and computation time. For example, if a scorecard only consisted of the age characteristic, the increase in sample size and attributes would require three weight values (scores) to be calculated for the sample of 300 accounts instead of two for the sample of 200 (a 50% increase in requirements).

Methodology

The *empirical analysis* was based on sampling and developing scorecards for three distinctly different populations: two retail populations and a mail catalogue population. Sample sizes ranged from 500 to 5000 with increments of 500. Each stratified sample contained the same number of good and bad accounts to ensure that the scorecards developed would not be predominantly better in identifying only goods, or only bads. For each sample a scorecard was developed using Fair Isaac's *Model Builder for Predictive Analytics (MB4PA)* Scorecard Module. This module utilises sequential quadratic programming to maximise the divergence subject to restrictions imposed by

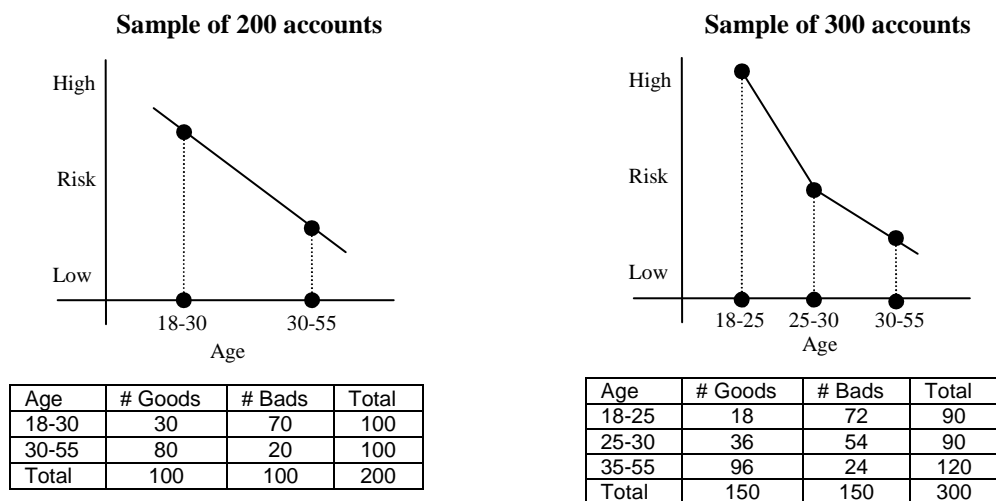


Figure 1: Significant attributes dependant on sample size.

the characteristic behaviour patterns.

During the development of each sample scorecard, certain steps in the PIC Solutions scorecard development methodology were not used:

- the inherent risk behaviour patterns of characteristics was not validated against a hold-out sample (PIC Solutions develops scorecards on 80% samples and validates the risk behaviour patterns against a 20% hold-out sample)
- the biasing of the risk behaviour patterns of characteristics by the accept/reject policy was not evaluated (PIC Solutions evaluates the accept/reject policy to determine whether the risk patterns can be trusted or whether they were the result of targeted best selection)
- the scorecards were only developed on the known performance of the accepted population, so no inference of the rejected population was conducted (PIC Solutions infers the behaviour of previous rejected applicants and develops scorecards on the full population of applicants)

The aim was to select 8-14 of the most predictive characteristics, each having no more than 8 attributes, to provide the best separation of good and bad accounts in the sample. The sample based scorecard was applied on the sample and the results of the divergence and Gini coefficient were recorded.

Divergence is a measure of the predictive power of the scoring system in terms of the degree of separation of goods from bads. This calculation combines the difference between the mean score of the goods and the mean score of the bads (the greater the difference, the greater the divergence) with the deviation of goods and bads from their respective means (the lesser these deviations, the greater the divergence.)

The *Gini coefficient* measures the efficiency of the scoring system in separating goods from bads. The Gini is calculated from a trade-off curve showing the cumulative percentage of

bads against the cumulative percentage of goods. A Gini of 100% efficiency would be achieved if 100% of the bads could be identified without evaluating any goods. The greater the Gini of the scorecard, the more efficiently the scorecard identifies bads (more bad accounts are identified and separated from the goods).

The sample based scorecard was also applied to the full population to monitor efficiency (Gini coefficient) of the separation between good and bad accounts in the full data set. The process flow of the empirical analysis is outlined in Figure 2.

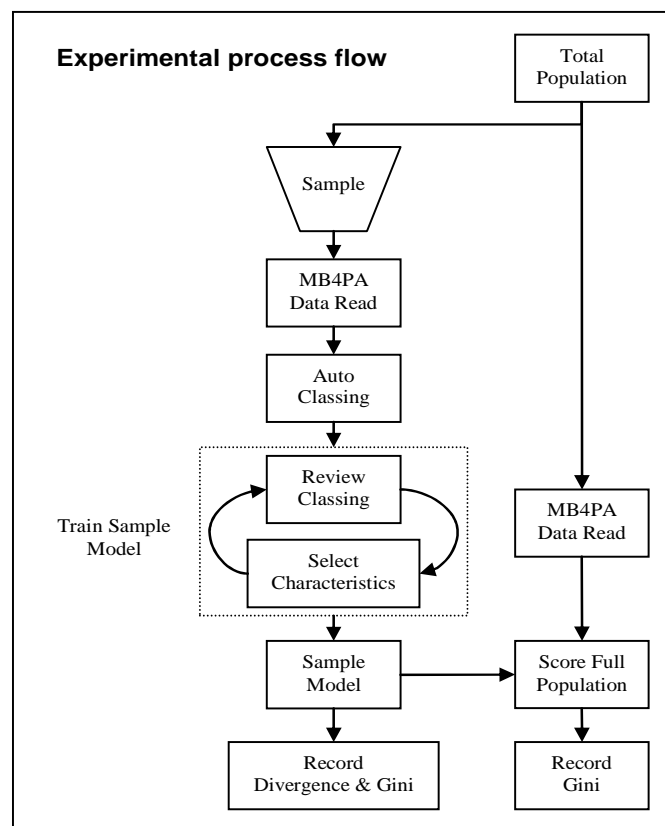


Figure 2: Experimental process flow

OR creates bridges

Prague, July 8 - 11, 2007
22ND EUROPEAN CONFERENCE
ON OPERATIONAL RESEARCH

EURO XXII, Prague, 2007

Deadline for abstract submission: February 28, 2007

Notification of acceptance: March 15, 2007

Deadline for early registration: April 15, 2007

Conference: July 8-11, 2007

For more information visit <http://www.euro2007.vse.cz/>

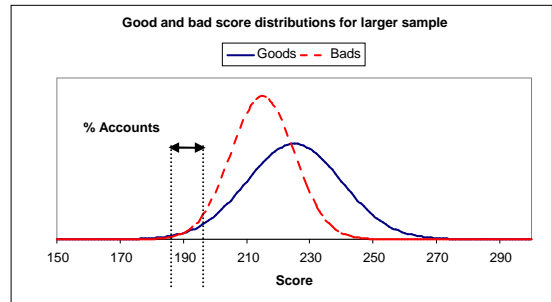
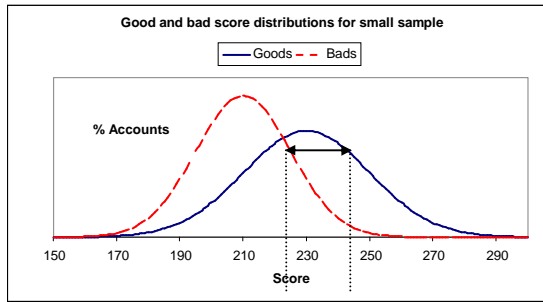


Figure 3: Decrease in difference between mean good and bad scores as sample size increases

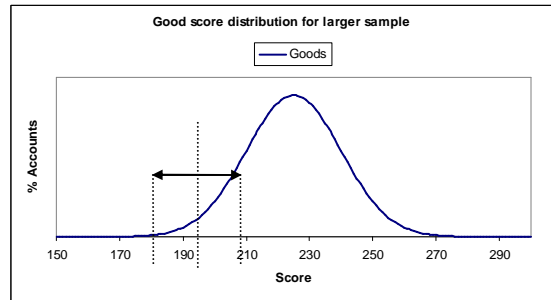
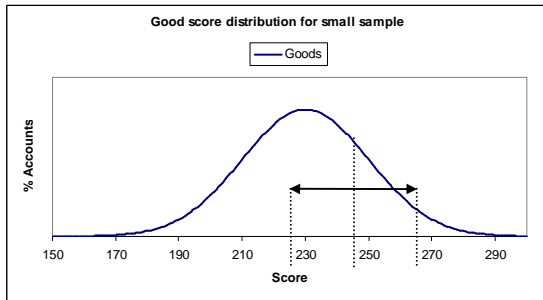


Figure 4: Decrease in standard deviation of good scores as sample size increases

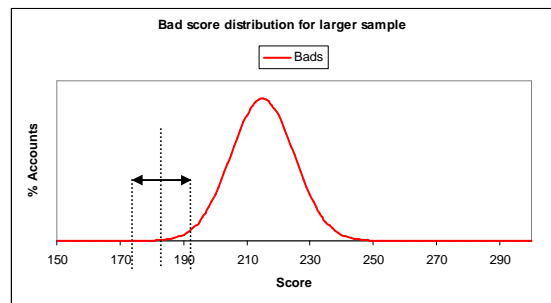
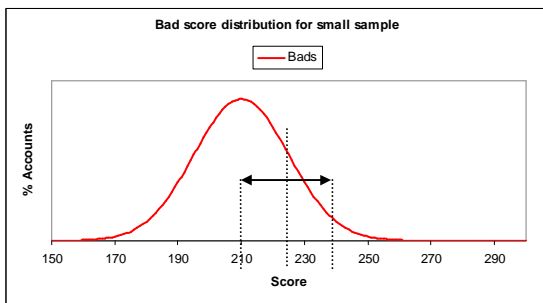


Figure 5: Decrease in standard deviation of bad scores as sample size increases

Results

The results of the analysis focus on the following effects that were observed as the sample size increased:

- decrease in divergence of development sample;
- convergence of Gini coefficients of sample and population.

During the development of the sample scorecards, an unexpected decrease in divergence was observed. By increasing the sample size, the standard deviation of the good and bad scores became smaller and an increase in divergence was expected. The decreasing trend is attributable to the difference between the mean of good and bad scores becoming smaller at a greater rate.

The increase in sample size introduces more profiles that are not that easily identifiable. The majority of these profiles fall in the overlapping area between the two score distributions. There are more bads with marginally higher scores and more goods with marginally lower scores in this overlapping area. The net effect is that the mean good score decreases marginally and the mean bad score increases marginally.

The decrease in divergence as sample size increases should not be misinterpreted to mean that a smaller sample size provides better separation. In smaller sample sizes there are fewer profiles representing the full population. The real value of divergence will be observed when developing a scorecard on the full population (considering all profiles). Any divergence above the full population divergence should be viewed as falsely inflated divergence.

The gap between the sample divergence and the full population divergence decreases as sample size increases. The decrease in sample divergence continues from sample sizes of 500 goods and bads up to a sample size of 2000 goods and bads. From 2000 goods and bads onwards, the divergence stabilises to levels that are close to values that will be obtained when developing the scorecards on the full development population.

The decreasing divergence trend that stabilises from 2000 goods and bads can be seen in Figure 6. Note that there were insufficient bads in population 2 to include samples larger than 2500.

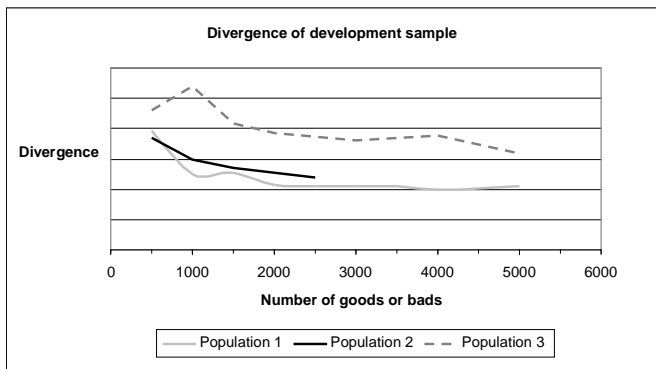


Figure 6: Divergence of development sample

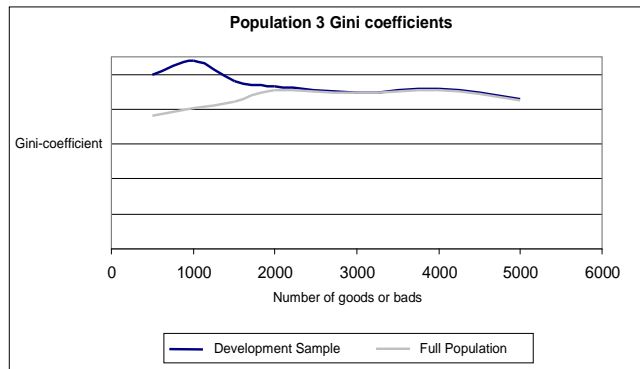


Figure 9: Third Population Gini coefficients

When comparing the Gini coefficients for the sample and full population, there is also a robustness gap that decreases as sample size increases. The efficiency of scorecards developed on smaller samples appears to be much higher than the efficiency of the full population.

Scorecards developed on larger samples are more efficient in separating goods from bads in the total population because larger sample scorecards have more profiles. As mentioned earlier, care should be taken not to over fit the model on the data used.

Figures 7, 8 and 9 illustrate the convergence of the Gini of the development sample and the total population for the three populations analysed respectively.

The results show that the gradient (rate of change) of the sample divergence flattens (decreases to the extent of almost no change) as sample size increases (from samples of 2000 goods and bads onwards.) This result, combined with the decrease in the robustness gap (efficiency) between the sample and full populations, suggests that using a maximum sample size of 2000 goods and bads provides optimal results.

For smaller samples the gap between the divergence (or Gini) on the sample and full population can be reduced by introducing controls such as the validation of risk behaviour patterns against a hold-out sample. PIC Solutions usually develops a scorecard on an 80% sample and validates the risk patterns against a 20% hold-out sample.

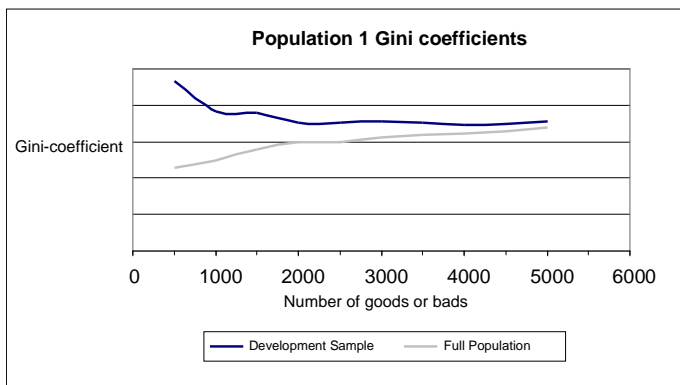


Figure 7: First population Gini coefficients

Conclusion

The analysis has shown that for smaller sample sizes used to develop application scorecards, an over fit of the profiles leads to a gap between the inflated sample divergence and Gini coefficient. The robustness gap reduces as sample size increases and more profiles of the full population need to be catered for. It was also shown, that, regardless of the population, there is not much benefit (better power and better efficiency in the separation of goods and bads on the full population) if samples greater than **2000 goods and bads** are used for the scorecard development.

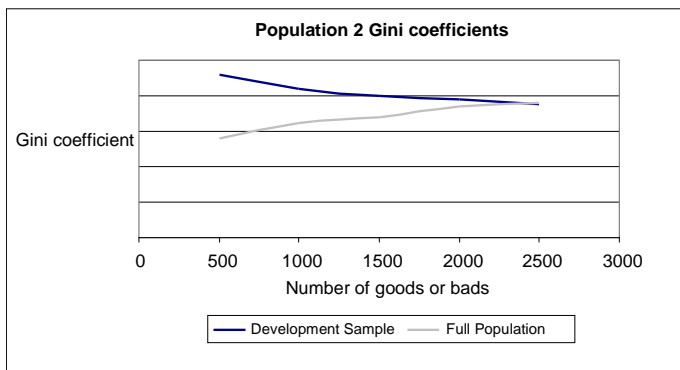


Figure 8: Second population Gini coefficients

About Us

PIC Solutions provides customer management solutions to a wide range of blue-chip organisations. We are experts in the fields of credit, risk and software and have an established track record of success, powered by solutions. For more information on how PIC Solutions can **optimise the credit life cycle of your business**, please contact the office location nearest you:

PIC Solutions - Cape Town
 P.O. Box 2455
 Cape Town 8000, South Africa
 Tel: +27 (0)21 680-6000
 Fax: +27 (0)21 680-6003

Email: Info@PIColutions.com
Web: www.PIColutions.com

StatsSA crunching numbers with Qinfo and SAS Institute

- STATISTICS GIANT TURNS TO ENTERPRISE INTELLIGENCE TO MEET ITS BUSINESS NEEDS

When the official statistical body of South Africa, Statistics SA (Stats SA), needed to implement the new SAS 9 Enterprise Intelligence Platform (EIP), the organisation turned to SAS Institute who assigned one of their partners Qinfo to assist.

Statistics SA aims to provide the South African public, businesses and government with relevant and accurate statistics to inform them about the dynamics of the economy, the population and society at large.

Says Ronelle Brandt, from Stats SA: "We have multiple data sources which need to be accessible to calculate statistics and indicators and produce the required reports. Due to the confidentiality of the data, security is of critical importance in our environment."

THE PROCESS AND SOLUTION

Stats SA took a strategic decision to move its business from PC based processing and analysis to an enterprise based solution.

A project team consisting of resources from Stats SA and Qinfo was established to do the SAS 9 EIP installation, a pilot migration project from version 8 to version 9 and user training on the new environment and tools.

With metadata management connectivity is established to various data sources, access is controlled, processing is made easier with Enterprise Guide and reporting is revolutionised with the integration of Microsoft Office and SAS9.

"I have personally been using SAS for many years and it has been great to work with the technology as it has evolved. I believe in the product and wouldn't keep using it, if I didn't think it met with our business requirements," states Brandt. "We are currently using it for data processing, analysis and reporting. It is a great integrator for a business like ours."

The project was not without teething pains, and Brandt says initially there was a lack of experienced resources to assist with the implementation in the 64-bit environment. "There just weren't enough skilled resources available at the time to assist us, and we had to undergo a relatively steep learning curve. What impressed me the most was that as soon as this was identified as a project inhibitor and the problems were escalated, they were dealt with instantly and resources were made available on very short notice to assist us."

Training was an integral part of the change management of the project, and partner Qinfo combined generic training material with specialised needs. "The feedback received from trainees has been very positive, a true credit to the company. It helped immensely that the trainer from Qinfo is a certified SAS trainer with many years training experience and that he was involved in the implementation process as well."

Brandt adds that technical support and availability are some of the fundamental requirements it needs from any partner.

BENEFITS

The main benefits of the new system according to Brandt include connectivity to various data sources, security and ease of use, version control, as well as integration with Microsoft Office. Working with very sensitive information, the organisation is, with effective security built in, able to ensure more easily that only specific and allowed users are able to access data sets.

"We produce indicators which are important to the economy; there is simply no room for error, and no room for a security breach. We are very happy with the security built into the system as it allows us to stringently control various data sets and user permissions associated with these," stresses Brandt.

In addition to the above she adds that reporting is also a big part of what the organisation does, and the more intuitive and professional means by which reports can be produced by the new system has reduced time to final product dramatically for staff that needs to present reports within short time frames.

"What people don't realise is the pressure that our people work under, and the limited time they have available to get the information, clean it, analyse it and then present it. Being able to automate these processes and save time is critical to us - the new system buys us time ensures good quality" adds Brandt.

Other notable benefits include the ability to centralise information across the enterprise, and the option to be able to work within and from the various Microsoft product sets including Excel, PowerPoint and Word.

THE ROAD AHEAD

With a fair amount still planned for the new system, Brandt says she is keen to explore the additional use of the Business Intelligence side of the enterprise system and the automation of processes. She is also looking at increasing the number of users of the new system and ensuring that it becomes a standard in the organisation.

"For people who have never worked on SAS before the new solution is a lot less challenging as it is more intuitive and there is very little programming required, as was the case with the older technology. Some of the people who are used to the old system seem to have a couple of headaches with the new metadata driven environment, but with the necessary support and training this seems to clear up," adds Brandt.

TO END

"When working on a project of this magnitude it is important to identify partners who view your relationship with them as a long term one. To us this is critical; we look for partners to go the distance with us and ensure that we deliver good quality solutions within the expected time frames. We all know that vendors are in business to make a profit, but Qinfo and SAS have proved that they want us to succeed as much as we do, which ultimately has been the differentiator," ends Brandt.

Contact us on:

Johannesburg +27 11 713 3400

Cape Town +27 21 912 2420



**THE
POWER
TO KNOW.**

ON, Wiskundige Ekonomie en Finansies: 'n Vrugbare Vennootskap

deur Petrus H Potgieter, Departement Besluitkunde, Unisa. (www.kolmogorov.net/php)

Tegnieke uit operasionele navorsing (ON) is met groot vrug gebruik in die moderne teorie van finansie en die wiskundige ekonomie, soos 'n mens maklik kan sien deur te blaai deur die inhoudsopgawes van joernale soos die *European Journal of Operational Research*, *Econometrica* of *Management Science*. Departemente van operasionele navorsing en finansiële ingenieurswese is dikwels die tuiste vir dié tipe van studie, soos byvoorbeeld by die bekende universiteit van Princeton. ON, wiskundige ekonomie en finansies het trouens deur die loop van die 20e eeu saam ontwikkel. Hierdie kort bydrae poog om die nou samewerking tussen dié dissiplines uit te lig deur na die werk te kyk van enkele Nobelprysweners in Ekonomie. Die Nobelprys in Ekonomie, eintlik die *Bank van Swede-prys vir die ekonomiese wetenskappe ter nagedagtenis van Alfred Nobel*, is in 1969 ingestel en word deur die Nobelstigting bestuur op dieselfde wyse as die vyf oorspronklike Nobelpryse. Baie van die ontvangers van dié prys het baie naby aan ON gewerk, deurslaggewende gebruik van ON-tegnieke gemaak in hul werk, of deurbrake in ON self gemaak.

RAGNAR FRISCH AND JAN TINBERGEN (1969)

Frisch en Tinbergen was die eerste onvangers van die Nobelprys vir Ekonomie, vir hul onderskeidelike werk aan die ontwikkeling van dinamiese wiskundige programmeringsmodelle in die ekonomie. Frisch was 'n groot voorstaander van die gebruik van wiskundige metodes in die ekonomie. Vir ON het Frisch in die 1954 'n nie-lineêre binnepuntmetode voorgestel vir nie-lineêre programmering.

PAUL SAMUELSON (1970)

Samuelson (gebore in 1915 en lank professor aan MIT) word deur baie beskou as by verre die mees beduidende nog lewende ekonoom. Sy handboeke *Economics: An Introductory Analysis* (1948) en *Linear Programming and Economic Analysis* (1958, saam met Robert Solow en Robert Dorfman) word vandag steeds gebruik. Paul Samuelson se *Foundations of Economic Analysis* was die grondlegging vir die gebruik van wiskundige metodes in die studie van ekonomie. Sy Nobelprys het hy ontvang vir werk wat oortuigend die saak gestel het dat aandeelpryse op 'n lukraak en onvoorspelbare manier verander, in 'n artikel getiteld "Proof that Properly Anticipated Prices Fluctuate Randomly" in die joernaal *Industrial Management Review* (1965). Weens dié beskouing is Samuelson ook bekende vir sy spitsvondige aanmerking

"They also serve who only sit and hold"

in 1974 oor beleggingstrategieë. Die insig van Samuelson dat die juiste benadering tot die analise van aandeelpryse nie die nominale prysvlak (in rand, euro of dollar byvoorbeeld) behels

nie maar die opbrengste (oftwel, die logaritme van die prys) het die pionierswerk van Bachelier uit 1900 voortgesit en verseker dat Brown-beweging en die stogastiese analise die hoeksteen sou vorm van die teorie van wiskundige finansies.

JOHN HICKS EN KENNETH ARROW (1972)

Hicks se *Value and Capital* (1939) het reeds wortels van die moderne ekwilibriumteorie bevat. Hy het die stabiliteit van dié ekwilibrium ondersoek en die teorie van aanvraag wat op nutswaarde baseer is ondersoek. Beide stabiliteit en nutswaarde sou later kernidees in ON word. Arrow het duidelik gemaak dat Hicks 'n belangrike invloed op sý werk gehad het. Onder andere het Arrow die begrip etiese gevaar (Engels: *moral hazard*), die Arrow-Pratt-maatstaf van risiko-vermyding ('n belangrike idee in besluitnemingsteorie) en Arrow se onmoontlikheidstelling oor sosiale keuse ontwikkel. Arrow, toe professor in Ekonomie en ON het in 1986 die mees roemryke prys in operasionele navorsing, die John von Neumann-prys ontvang van die *Operations Research Society of America* en *The Institute of Management Sciences*.

Terloops, die doktorsgraadpromotor van Arrow (en ook van die bekende ekonoom Milton Friedman) was Harold Hotelling, wat in statistiek bekend is vir die bekendmaking van die idee van 'n vertrouensinterval, in 1935. Hotelling het departemente van statistiek begin by Columbia in New York en by die University of North Carolina at Chapel Hill. Hy het ook die Hongaar Abraham Wald gehelp om in 1938 uit Europa te ontsnap en na Columbia te gaan. Wald, op sy beurt, het nie net die Wald-toets in statistiek ingebring nie maar ook die swak aksioma van openbaarde voorkeur (Engels: *weak axiom of revealed preference*, WARP) in ekonomie en besluitneming.

LEONID KANTOROVICH EN TJALLING KOOPMANS (1975)

Koopmans en Kantorovich is seker die mees bekende ON-figure wat die Nobelprys vir Ekonomie ontvang het vir hul bydrae tot die teorie van optimale toekenning van hulpbronne. Hierdie werk is 'n toepassing van dualiteit in lineêre programmering (LP) wat vandag in alle ON-leerplanne onderrig word.

Kantorovich, 'n alumnus van die Leningrad-staatsuniversiteit waar hy in die ouderdom van 18 'n graad in wiskunde verwerf het, was 'n pionier en groot voorstaander van die gebruik van rekenaars in optimering en veral in die ekonomiese beplanning van die Sowjetunie. In wese het Kantorovich die idees en metodes van lineêre programmering onafhanklik van Koopmans en Dantzig ontdek en publiseer in 'n Russiese

boekie in 1939. Koopmans, by die Cowles-stigting (toe nog by die Universiteit van Chicago) het lineêre programmering onder die aandag gebring van jong ekonomie soos Arrow en Samuelson en ook die eerste kongres oor wiskundige programmering gereël.

GERARD DEBREU (1983)

Debreu het die bestaan bewys van 'n vektor van pryse waarvoor ekwilibrium heers in sy en Arrow se wiskundige model van 'n markeconomie. In dié model maksimeer deelnemers hul nutsfunksie met betrekking tot 'n aanvanklike toekenning van goedere deur middel van uitruiling teen pryse wat deur die ekwilibriumprysvektor beskryf word. Dié tipe van maksimeringsprobleem is in ON baie bekend en so ook die werktuie wat in die bewys gebruik word: die skeidende hipervlakstelling en Brouwer se vastepuntstelling.

MAURICE ALLAIS (1988)

In die veertigerjare het Allais voortgebou op die werk van Walras en Pareto om die begrip van ekonomiese ekwilibrium wiskundig sinvol te definieer. Sy werk is in die na-oorlogse jare toegepas in die bestuur van groot Franse staatsondernemings soos die spoorweë (SNCF) en die elektrisiteitsvoorsiening (EDF). Allais is ook bekend weens die sogenaamde Allais-paradoks in besluitneming en was Debreu se studieleier. Maurice Allais het in 1958 die Lanchester-prys van Johns Hopkins-universiteit en die Operations Research Society of America ontvang vir die beste ON-artikel van die vorige jaar, getitel "Method of Appraising Economic Prospects of Mining Exploration over Large Territories – Algerian Sahara Case Study."

TRYGVE HAAVELMO (1989)

Haavelmo, wat in Oslo onder Ragnar Frisch studeer het, het die prys ontvang vir sy beskrywing van die rol van waarskynlikheidsteorie in die grondslae van die ekonomie. Sy mees invloedryke werk is waarskynlik sy doktorsale verhandeling met die titel *The Probability Approach in Econometrics* by Harvard, voorgedra in 1941 en verskyn in 1944. Haavelmo se benadering in ekonometrie is baie naby aan probabilistiese modellering in ON.

HARRY MARKOWITZ, MERTON MILLER EN WILLIAM SHARPE (1990)

In 1990 het die Nobelprys die beleggingswetenskap vereer. Na die skok van 1929 het dit meer as 30 jaar en die werk van hierdie prysdraers geneem om die belegging in aandele weer salonvaardig te maak en aan te toon hoe risiko wetenskaplik bestuur en verhandel kan word.

Markowitz het die prys ontvang vir die ontwikkeling van die teorie van portefeuljeseleksie en het daardeur die basis gevestig van die sogenaamde moderne portefeuljeteorie (MPT). Hy het aangetoon hoe diversifisering tussen verskillende bates kan gebruik word om risiko te verminder onderwyl dieselfde

verwagte opbrengste gehandhaaf kan word. Markowitz het lineêre programmering onder Koopmans geleer en in 1989 ook die Von Neumann-prys ontvang en is daarmee in ON-geledere vereer 'n raps voordat hy die hoogste toekenning in ekonomie ontvang het.

Merton Miller het die Nobelprys ontvang vir sy bydrae tot die teorie korporatiewe finansiering, 'n groot deel daarvan in samewerking met 'n vriend van Koopmans, Franco Modigliani. Sharpe se bydrae tot die teorie van prysvorming deur die kapitaalbate-prysingsmodel (Engels: *Capital Asset Pricing Model, CAPM*) is deur dié prys beloon. Sy doktorsgraad is voltooi onder Markowitz by UCLA terwyl Markowitz by die RAND Corporation gewerk het aan LP-modelle. Sharpe se werk het in 1963 in *Management Science* verskyn – toe een van die min ON-joernale.

1994 : JOHN HARSANYI, JOHN NASH EN REINHARD SELTEN

Nash se pionierswerk in die analise van ekwilibria in die teorie van niekoöperatiewe spele, waarvoor hy dié prys verwerf het, is welbekend. Sy werk is verder ontwikkel deur Harsanyi en Selten. Nash was 'n student van Tucker (van die Karush-Kuhn-Tucker-stelling) en die promotor van Harsanyi se tweede doktorsgraad. Harsanyi se werk het ook in *Management Science* verskyn.

1995 : ROBERT LUCAS

Lucas het die Nobelprys ontvang vir sy werk aan die teorie van rasonele verwagtings. Dié werk hou natuurlik nou verband met besluitnemingsanalise in ON.

1997 : ROBERT C. MERTON AND MYRON S. SCHOLES

Die formules van Black, Merton en Scholes vir die bepaling van die regverdigbare waarde van 'n opsie op 'n verhandelde bate is welbekend en word opmerklik baie gebruik vir 'n resultaat in wat maar 30 jaar oud is. Merton en Scholes het hul Nobelprys ontvang vir dié nuwe metode om die waarde van 'n finansiële afgeleide instrument te bepaal. Hulle medewerker, Fischer Black, wat twee jaar voor die toekenning van die prys oorlede is, het 'n doktorsgraad van Harvard gehad in toegepaste wiskunde met fokusgebied ON. Merton se oorspronklike artikel "Theory of Rational Option Pricing" het verskyn in die *Bell Journal of Economics and Management Science* – ook 'n gesiene ON blad.

ROBERT F. ENGLE III EN CLIVE W.J. GRANGER (2003)

Engle het die ARCH-metodiek, vandag algemeen in gebruik vir die modellering van tydreekse met veranderlike volatiliteit, voorgestel. Granger het sogenaamde kointegrasietegniese vir tydreeksanalise ingevoer. Beide

word in ON-kursusse onderrig en in die ON-praktyk gebruik.

SLOT

Daar is nog baie meer konneksies tussen ON, wiskundige ekonomie en finansies as wat hier genoem is. Hierdie dissiplines het 'n beduidende gemeenskaplike geskiedenis en deel baie gereedskap. Ten spyte daarvan dat die drie velde vandag merkbaar verskillende benaderings volg, word hulle saamgebind deur 'n gemeenskaplike geskiedenis. Die multidissiplinêre wese van ON maak ons studieveld 'n gepaste basis om dié samewerking en kruisbestuwing voort te sit.

BRONNE

[1] Jean-Michel Grandmont. Report on Maurice Allais' Scientific Work, *The Scandinavian Journal of Economics*, Vol. 91, No. 1 (Mar., 1989), pp. 17-28, doi:10.2307/3440160.

[2] Leif Johansen. Ragnar Frisch's Contributions to Economics, *The Swedish Journal of Economics*, Vol. 71, No. 4 (Dec., 1969), pp. 302-324, doi:10.2307/3439114.

[3] <http://www.allais.info/> [geraadpleeg in Mei 2007]

[4] <http://nobelprize.org/> [geraadpleeg in Mei 2007]



SECONDARY ANNOUNCEMENT

**2ND CONFERENCE ON OPERATIONAL RESEARCH PRACTICE IN AFRICA
NATIONAL CONFERENCE OF THE OR SOCIETY OF SOUTH AFRICA**

**incorporating
The ORPA/INFORMS Workshop on OR
Education**

**University of Cape Town
10–14 September 2007**

We are pleased to give second notice of the above important OR activities scheduled for September 2007. The 2nd OR Practice in Africa (ORPA) conference is being run jointly with the annual national conference of the OR Society of South Africa (ORSSA). In collaboration with INFORMS, the workshop on OR education will take place during 10–11 September, based on the recent successful ALIO/INFORMS Workshop on OR Education held in Latin-America. Full details of the meeting, including a preliminary programme, are available on the conference website:

www.orssaorpa2007.org.za

Please make note of the following important dates:

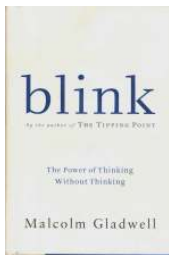
Fri 6 July 2007:	Deadline for submission of abstracts
Fri 13 July 2007:	Latest Notification of acceptance
Tue 31 July 2007:	Deadline for early-bird registration
Wed 5 Sept 2007:	Deadline for conference registration
Mon 10 Sept 2007:	Start of Workshop on OR Education
Tue 11 Sept 2007:	Start of ORSSA/ORPA Conference
Thu 13 Sept 2007:	Conclusion of ORSSA/ORPA Conference

Registration and abstract submission may be done on the conference website



BOOK REVIEW

By Hans Ittmann hittmann@csir.co.za



Blink: The Power of Thinking without Thinking by Malcolm Gladwell, 2005. Little, Brown and Company, New York, USA. pp. 277. ISBN 0-316-17232-4, \$25.95.

Operations Research has been defined as the “*science of decision making*”. Quantitative tools and techniques are used to provide decision makers with a quantitative basis for decision making. The Operations Researcher develops models of real life situations and these are used to provide better insight and understanding of such situations. Ultimately it improves the thinking skills of those involved in addressing the problem situation! When I therefore saw a book with the subtitle “the power of thinking without thinking” I thought this could not only make for interesting reading but maybe even assist in the understanding of how people (decision makers) think and make decisions. Added to this the author, Malcolm Gladwell, had previously published a bestseller with the title **The Tipping Point** so the chances were good that this new book would be as interesting.

In **Blink** the author uses a variety of entertaining, thought-provoking and sometimes alarming examples of both anecdotal and detailed research to open our minds to what our “adaptive unconscious” is doing for us every day. The first story is about a marble statue dating from the sixth century BC. It is potentially worth millions. However, some people when they saw the statue the first time “immediately felt cold” about it, and ultimately they were proved to be correct. The statue was a fake. The question is “did they know why they knew”? Not at all but they *knew!*

“The part of our brain that leaps to conclusions like this is called the adaptive unconscious, and the study of this kind of decision making is one of the most important new fields in psychology. The adaptive unconscious is not to be confused with the unconscious described by Sigmund Freud, which was a dark and murky place filled with desires and memories and fantasies that were too disturbing for us to think about consciously. This new notion of the adaptive unconscious is thought of, instead, as a kind of giant computer that quickly and quietly processes a lot of the data we need in order to keep functioning as human beings. When you walk out into the street and suddenly realise that a truck is bearing down on you, do you have time to think through all your options? Of course not. The only way that human beings could ever have survived as a species for as long as we have is that we’ve developed another kind of decision-making apparatus that’s capable of making very quick judgements based on very little information..... The adaptive unconscious does an excellent job of sizing up the world, warning people of danger, setting goals, and initiating action in a sophisticated and efficient manner.”

Two new concepts are introduced namely “blink” and “thin-slicing”. We “blink” when we make snap decisions, or think without thinking, and this we do by “thin-slicing”, using

limited information to come to conclusions. Many examples are presented to illustrate both these concepts. Most of the examples are of decisions made with the blink of the eye that turned out to be very good and correct decisions. Here and there are also cases where things turned out very nasty. The most dramatic of these is what Gladwell calls “seven seconds in the Bronx”. Amadou Diallo, a guy from Guinea, returned home just before midnight in February 1999. He stood at the top of the steps to his building taking in the night. Four white, plainclothes police officers drove past and within a few seconds, “in the blink of the eye”, the police officers decided Diallo looked suspicious, that the man was brazen and also very dangerous! Diallo was in fact terrified seeing the police officers and started running away. The police officers open fired and killed a totally innocent man!

So, what does the book cover? Gladwell himself outlines three major tasks that he wanted to accomplish:

The first task: decisions made very quickly (through our subconscious processing abilities) can be every bit as good as decisions made cautiously and deliberately.

The second task: that we can learn about how this subconscious processing works and when it can be trusted and when to be wary of it.

The third task: that “*our snap judgements and first impressions can be educated and controlled... as we can teach ourselves to think logically and deliberately (better), we can also teach ourselves to make better snap judgements. The power of knowing, in the first two seconds, is not a gift given magically to a fortunate few. It is an ability that we can all cultivate for ourselves.*”

Unfortunately all three tasks have not been accomplished. There is no proof that snap decisions are necessarily better than decisions taken after proper analysis; the author does not show explicitly how the subconscious works while there is no description of how one can learn snap decisions and control them. In this regard the book sadly fails.

Blink is definitely not the traditional OR related book which is typically reviewed in this newsletter. It is full of very interesting stories of where decision making in “the blink of an eye” is very clearly illustrated. Some of these indicate that good, appropriate and relevant decisions were made. However he also shows where things went horribly wrong in such situations. What is however very disappointing is that Gladwell does not provide proper and meaningful advice on how to improve decision making ability in a practical sense. This is something promised throughout but in the end the book does not meet this expectation. In this sense, and from an OR point of view, the book is a huge disappointment. The author contends that experts often make better decisions with snap judgements than we do with a lot of analysis. It is true that there are decision makers and managers that use their gut feel to make “good” decisions. Whether that implies that proper quantitative analysis is of no use, I seriously question this and frankly **Blink** does not address this real issue. Some of the stories in the book are fascinating and interesting but it is nowhere near an authoritative reference book on decision making.



are you
Analytical?

2 years SAS
Experience?

Do you have a
Degree?

Looking for a new
Challenge?

If so... come to PIC Solutions! Details on
www.PICSolutions.com/Careers.htm

Analytical Applications | Consulting Solutions | Software Services | Fair Isaac Partner
Fraud Management | Predictive Modelling | The Credit Academy

Sign up now for the
PIC Update

The PIC Update is a free e-newsletter read by
credit, risk, ICT and marketing professionals

Bees make one-twelfth a teaspoon of honey in their lifetimes.

**They can't see how their hard work adds up to make a difference.
But you can. With proven software for education from SAS.**

Johannesburg +27 11 713 3400 • Cape Town +27 21 912 2420
www.sas.com/bees



sas

**THE
POWER
TO KNOW[®]**