NEWSLETTER OF THE INTERNATIONAL STUDY GROUP FOR RESEARCH ON LEARNING PROBABILITY AND STATISTICS

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1. NOTES AND COMMENTS

Happy New Year and thank you to those who sent information for this specific newsletter.

In 1998 the main event will be ICOTS 5, The International Conference on Teaching Statistics, which is organised once every four years by the IASE (International Association for Statistical Education). Many study group members are either involved in organising some session or plan to

present their works at the conference, which will be a good meeting point for us. This issue contains information about this and other conferences with statistical education sessions.

Some young researchers in our group are turning their attention towards combinatorial reasoning itself, and not just as a calculus took for probability.They have asked me to provide basic references in this field, so I am including a special section with specific references, as well as a summary of a research paper by Efraim Fischbein and Aline Grossman. Please, let me know if there are other themes of interest to you.

The newsletters are available from our web page at the University of Granada (http://www.ugr.es /~batanero/). This option could be useful for recovering past issues or for printing the newsletters more easily.

If there are any corrections or additions to the newsletter, please post them to all members on the list by using the e-mail address alias: stated_list@goliat.ugr.es

2. NEW MEMBERS

Enrique de Alba,

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Enrique is an actuary by the National University of Mexico (UNAM), M.S. and Ph.D. (Statistics), the University of Wisconsin-Madison. His areas of interest are Bayesian econometrics, and Bayesian forecasting. He is currently director general (Dean) of the Division of Actuarial Science, Statistics and Mathematics, Instituto Tecnologico Autonomo de Mexico (ITAM). as well as associate professor, in the Department of Experimental Statistics, New Mexico State University. He has been visiting scholar at the Graduate School of Business, the University of Chicago, president of IASI (1996-1998) and has participated in the organisation of several international statistical meetings. He is member of the Inter-American Statistical Institute (IASI), the Mexican Statistical Association, ASA, International Association of Survey Statisticians, International Statistical Institute, and International Society for Bayesian Analysis (ISBA).

His recent publications include papers in _Advances in Econometrics_, _ASA Proceeding of the Section on Bayesian Statistical Science_, _International Journal of Forecasting_, _Journal of Business and Economic Statistics_, _El Trimestre Economico_, _Revista de Estudios Economicos COLMEX_, _Revista de Inversion y Finanzas_, as well as conference papers, book chapters and technical reports.

Jeff Banfield

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Jeff is an associate professor of statistics at Montana State University. His research areas have been in cluster analysis, statistical pattern recognition and graphical data analysis. Recently his research interest has focused on statistical education and using technology for distance learning. For anyone interested, his graphical data analysis course is on-line at:

http://www.math.montana.edu/~umsfjban/STAT438/Stat438.html

Jeff has just started reading the literature on statistical education. His particular interests include how to move the ideas coming out of statistical education research into the classroom and to determine if they work, how technology can be used to help students grasp the concept of a distribution, and how social constructivism can take place on-line. He is currently working on how he can take the 50 students he has in his second semester undergraduate statistics course, cover all of the material that is listed in the syllabus and have the students take something away from the course other than the idea that, for some vague reason, .05 is an important number.

Lisbeth K. Cordani

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Lisbeth K. Cordani

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For several years Lisbeth was attached at a measurement error models group as a main research project. It was shared with an intensive care with teaching and also consulting teaching. Now her interest in teaching continues but she is also interested in studying some fundamental statistics, in order to make some comparisons between the classical and the Bayesian approach. She belongs, also, to a project to teach elementary statistics to secondary teachers of several fields, as math, biology, physics, etc.

Henrik Dahl

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Henrik has been lecturing statistics since 1967. His main interests are teaching statistics and the history of probability and statistics. In 1994 he published a paper in _Teaching Statistics_: "Teaching independence", which won the price as the best article in _Teaching Statistics_ that year. An early version of the paper was presented at the RSS Conference in 1992 in Sheffield. He has supervised a master degree on Abraham De Moivre and hope to do more master degree supervising in the future for students of their newly established master program in math education. He is a member of the education committee of the Norwegian Statistical Association, and hope to combine the task of supervising students and developing better textbooks for Norwegian schools.

Sue Haller

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Sue's current activities include presenting workshops to middle grades teachers in the topics of probability and standards-based probability curricula. She also is currently applying for grants to prepare workshops in which technology and standards-based curricula will be used to enhance K-8 teachers' understanding of probability and statistics. Sue is interested in networking with others who have an interest in teachers' (especially middle grades) knowledge of probability and statistics and methods to enhance their understanding of these topics.

Li Jun

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Li is currently working on her Master Thesis on the development of students' understanding of the concept of probability. She is just at the beginning of the research. Before she came to study in Singapore, she worked in East China Normal University. Her main interest is on student's learning. She is also interested in culture.

Jacqueline Klasa

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For the moment, Jacqueline is more involved with integrating technologies in the teaching of all mathematics than in particular aspects of probabilities and statistics. However, she plans to work about dealing with the plus and minus of Minitab.

Mike Perry

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Mike Perry is professor of mathematical sciences at Appalachian State University, a campus of the University of North Carolina system. He is interested in the improvement of the teaching of university statistics courses, especially the introductory courses, and in recent years has focused on

the development of problem solving activities for middle school and secondary school level students, as well as the statistical education of teachers. His efforts include being project director of seven statistical education projects funded by the National Science Foundation. The recently funded project PRE-STAT will work with mathematics educators in the USA who are involved with the pre-service training of mathematics teachers. He considers himself a user (rather than a producer) of research, which focuses on the understanding of statistical concepts for two purposes: (1) as a basis for designing intervention strategies, and, (2) for the evaluation of intervention strategies.

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3. CHANGES IN E-MAIL ADDRESSES

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4. BRIEF NEWS

Note: Throughout the newsletter, members' names are highlighted in capital letters.

4.1. THOMAS L. SAATY PRIZE

Jorge Luis ROMEU has been awarded with the 1997 Thomas L. Saaty Prize. As you know, these prizes are awarded annually for, respectively, applied advances and theoretical advances in the mathematical and management sciences, based on the best applied and theoretical papers appearing in the previous year's volume of the _American Journal of Mathematical and Management Sciences_. The title of the paper is "A new graphical test for multivariate normality" by Jorge L. ROMEU and Aydin Ozturk, which "provides a practical approach to a common problem" with "a new methodology for assessing distributional assumptions of multivariate data, complete with properties and comparisons". Congratulations!

4.2. CALL FOR PAPERS

In Fall 1999, an issue of the _Mathematics Teacher_ will focus on statistics, and the Editorial Panel is seeking manuscripts for this focus issue. A call for papers has been done in the journal issue of October, 1997, pg. 580. Dead line for receiving proposals is May, 1, 1998. More information is available from Dan Fendel, fendel@mathe.sfsu.edu

4.3. INTERNATIONAL STATISTICAL COMPETITION

The Department of Statistics at Kinnaird College for women, Lahore in Pakistan have launched an international competition of data analysis for the world-wide community of students/young adults aged 18-26. The competition aims at enhancing the data analytical skills of the young generation of today. It carries attractive incentives such as engraved shields and beautiful souvenirs along with certificates. More information can be obtained from Ms. Saleha Naghmi Habibullah (hagha@brain.net.pk).

4.4. GRETAF-CI (Groupe d'Etude sur l'Education en Afrique, Section Cote d'Ivoire)

This is an NGO which has joined the International Association GRETAF based in Paris, France.

The members are statisticians, demographers, educators, from the Ministries of Education and Formation. Their interest is the knowledge of education processes and important indicators. This Association is a new member of IASE. All people who are interested in research on education in Africa may become members (200FF per year). Contact Dr. Alice Kouadio, Coordonnateur National du GRETAF-CI, 06 BP 1265 Abidjan 06, Tel: 225 21 99 06, E-mail: akouadio@africaonline.co.ci.

4.5. STOCHASTICS EDUCATION RESEARCH PAPERS FROM 1997

This is a collection of research papers on stochastics education which were presented at different conferences during 1997 (e.g., PME, MERGA, AERA). This collection will be available for approximately $25 (US) in December. Please contact Joan GARFIELD (JBG@maroon.tc.umn.edu) for further information.

4.6. STOCHASTIC GROUP AT MERGA

The Mathematics Education Research Group of Australasia, (MERGA) has a Special Interest Group in Stochastics. Kath TRURAN (kath.truran@unisa.edu.au) is the co-ordinator of this group, which was formed about 5 years ago and which meets at each MERGA Conference. The group communicate by newsletter approximately 4 times per year. This allows members to be aware of each other's research and provides support as well as an opportunity to air ideas and concerns.

The group has a membership of approximately 25 although this fluctuates according to member's research interest. Members are currently considering the publication of a monograph on the subject of teaching probability and statistics in primary and secondary schools.

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5. PUBLICATIONS BY MEMBERS

BURRILL, G. (1996). Data Driven Mathematics: A curriculum strand for high school mathematics. _The Mathematics Teacher_, 86(6), 460-65.

The Data driven Mathematics Curriculum project has produced 11 modules for use in grades 8-12. The modules integrate data analysis using real applications into the teaching of traditional mathematics topics. The data-analysis skills build connections between mathematics and other subjects and also outside the classroom.

CAI, J., & Moyer, J. C. (1995). Middle school students' understanding of averages: A problem solving approach. In D. T. Owens, & M. K. Reed (Eds.), _Proceedings of the International Group for the Psychology of Mathematics Education. North American Chapter XVII_ (v.1, pp. 359-364). Ohio State University.

This study used an open-ended problem solving approach to teaching and assessing middle school students' understanding of the concept of arithmetic average. Three main results of this study show evidence of positive instructional impact on students' understanding of averages: (1) the number of students who gave correct answers increased from pre-test to post-test; (2) more students used appropriate strategies on the post-test than on the pre-test ; (3) more students used multiple representations on the post-test to explain their solutions than on the pre-test.

CANIZARES, M. J., & BATANERO, C. (1997). Influencia del razonamiento proporcional y de las creencias subjetivas en la comparación de probabilidades. (Influence of proportional reasoning and subjective beliefs in comparing probabilities). _UNO_, 14, 93-104.

We present a study of 10 to 14 year-old students' capacity to compare probabilities. Noelting's different levels of proportional reasoning are taken into account, as well as subjective elements in some items, which produce a change in the predicted difficulty of problems. The analysis of students arguments allows us to determine the strategies followed, among which we found the "outcome approach", as well as previously described strategies. The analysis of patterns in the responses by the same student to different items served to show that there is not complete coincidence between the level of difficulty in proportional and probabilistic tasks and the existence of different types of probabilistic reasoning for the same proportional reasoning level.

Cobb, G. W., & MOORE, D. S. (1997). Mathematics, statistics, and teaching. _The American Mathematical Monthly_, 104(9), 801-824.

The authors address several questions regarding the role of mathematics in statistics instruction: How does statistical thinking differ from mathematical thinking? What is the role of mathematics in statistics? If you purge statistics of its mathematical content, what intellectual substance remains? The article provides an overview of statistical thinking, contrasts statistics instruction with mathematics instruction, and emphasises that statistics should be taught as statistics.

Dauphinee, T. L., SCHAU, C., & Stevens, J. J.(1997). Survey of Attitudes Toward Statistics: Factor structure and factorial invariance for females and males. _Structural Equation Modeling_, 4, 129-141.

White undergraduate students completed the Survey of Attitudes Towards Statistics (SATS) at the beginning of their introductory statistics courses. Using confirmatory factor analysis techniques to test several possible structural models, their responses supported the validity of a four-factor structure composed of Affect, Cognitive Competence, Value, and Difficulty. The four-factor model fit well for both female and male responses. Only two significant differences in model fit were found: the Value variance was greater forfemales and the correlation between Affect andValue was greater for males.

ESTEPA, A., & SANCHEZ, F. T. (1997). Organizacion de la informacion en los primeros niveles de educacion primaria (Data handling in primary education). In _Actas de las Octavas Jornadas para el Aprendizaje y la Ensenanza de las Matematicas_ (pp. 417-422). Salamanca: Sociedad Castellano-Leonesa de Profesorado de Matematicas.

A reform of the Spanish curriculum for primary and secondary Education is being carried out since 1992. Statistical contents were not included in the Spanish curriculum at primary levels until that date. This implies a change for primary teachers, who have no an "implicit model" for teaching statistics. In this paper, we analyse the problems of introducing data analysis in primary education, and present specific examples of teaching situations.

Enyedy, N., VAHEY, P., & Gifford, B. (In press). Active and supportive computer-mediated resources for student-to-student conversations. To appear in the _Proceedings of the 1997 Computer Supported Collaborative Learning Conference_, Dec. 1997, Toronto, CA.

Communication is a central aspect of human learning. Using the Probability Inquiry Environment (PIE) as an example, we examine how external representations (both textual and iconic) mediate face-to-face conversations among students, and support productive mathematical discourse. We provide quantitative data that suggests that seventh grade students who used PIE learned some of the basic principles of probability. Two cases studies illustrate how communication supported by computer-mediated representations contributed to this success. The first case study demonstrates how the computer can actively prompt student conversations that lead to learning. The second case study examines how an animated graphical representation supported these productive

conversations.

FALK, R., & Well, D.A. (1997). Many faces of the correlation coefficient. _Journal of Statistics Education_, 5 (3).

Some selected interpretations of Pearson's correlation coefficient are considered. Correlation may be interpreted as a measure of closeness to identity of the standardised variables. This interpretation has a psychological appeal in showing that perfect covariation means identity up to positive linearity. It is well known that |r| is the geometric mean of the two slopes of the regression lines. In the 2 x 2 case, each slope reduces to the difference between two conditional probabilities so that |r| equals the geometric mean of these two differences. For bivariate distributions with equal marginals, that satisfy some additional conditions, a nonnegative r conveys the probability that the paired values of the two variables are identical by descent. This interpretation is inspired by the rationale of the genetic coefficient of inbreeding.

FISCHBEIN, E., & Grossman, A. (1997). Schemata and intuitions in combinatorial reasoning. _Educational Studies in Mathematics_, 34, 27-47.

The problem that inspired the present research refers to the relationships between schemata and intuitions. These two mental categories share a number of common properties: ontogenetic stability, adaptive flexibility, internal consistency, coerciveness and generality. Schemata are defined following the Piagetian line of thought, either as programs for processing and interpreting information or as programs for designing and performing adaptive reactions. Intuitions are defined in the present article as global, immediate cognitions. On the basis of previous findings, our main hypothesis was that intuitions are always based on a certain structural schemata. In the present research this hypothesis was checked with regards to combinatorial problems. It was found that intuitions, even when expressed as instantaneous guesses, are, in fact, manipulated ìbehind the scenesî (correctly or incorrectly) by schemata. This implies that, in order to influence, didactically, studentsí intuitions, these schemata on which these intuitions are based should be identified and acted upon.

GAL, I., Ginsburg, L., & SCHAU, C. (1997). Monitoring attitudes and beliefs in statistics education. In I. GAL & J. B. GARFIELD (Eds.), _The Assessment Challenge in Statistics Education_ (pp. 37-51). Netherlands: IOS Press and International Statistical Institute.

While many teachers of statistics focus on transmitting knowledge and skills, many students have trouble with statistics due to their attitudes. Attitudes can impede (or assist) learning statistics and can affect the extent to which students develop useful transferrable statistical thinking skills and apply them outside the classroom. In this chapter, we define statistics attitudes; discuss attitude considerations in statistics education; describe how statistics attitudes have been assessed; summarize and evaluate some of the research findings about statistics attitudes; and present implications for attitude assessment in the classroom.

MOORE, D. S. (1997). Bayes for beginners? Some reasons to hesitate. _The American Statistician_, 51(3), 254-261.

The author asks, "Is it reasonable to teach the ideas and methods of Bayesian inference in a first statistics course for general students?" This paper argues that it is premature to do so for a variety of reasons. Discussions of the paper and individual replies by the three authors are included in pp. 262-274.

SANCHEZ, F. T., & ESTEPA, A. (1997). Demostraciones y definiciones en la ensenanza secundaria. (Proof and definitions in secondary education). In _Actas de las Octavas Jornadas para

el Aprendizaje y la Ensenanza de las Matematicas_ (pp.507-511). Salamanca: Sociedad Castellano-Leonesa de Profesorado de Matematicas.

This paper is part of a wider research concerning the analysis of correlation and regression in Spanish secondary text books. We analyse the type of definitions and proofs and their role in this educational level. As an example we classify proofs and definitions used in the teaching of correlation and regression.

SCHAU, C., & Mattern, N. (1997). Assessing students' connected understanding of statistical relationships. In I. Gal & J. B. Garfield (Eds.), _The Assessment Challenge in Statistics Education_ (pp. 91- 104). Netherlands: IOS Press and International Statistical Institute.

We believe that connected understanding among concepts is necessary for successful statistical reasoning and problem solving. Two of our major instructional goals in teaching statistics are to assist students in gaining connected understanding and to assess that understanding. In this chapter, we explore the (1) the importance of connected understanding in statistics education, (2) models of connected understanding that are useful in thinking about statistics learning, (3) visual representations of connected understanding, and (4) approaches for assessing connected understanding._

SCHAU, C., & Mattern, N. (1997). Use of map techniques in teaching applied statistics

courses. _The American Statistician_, 51, 171-175.

Students who have completed applied statistics courses often lack knowledge of the interconnections among the important concepts they have studied. According to a cognitive network model of knowledge, they lack connected understanding about statistics and

so are unable to apply these concepts. Connected understanding can be represented visually in the form of a map. Mapping techniques, including graphic organizers and concept maps, are useful (1) for instructional planning, (2) as a learning tool, and (3) for assessment. We discuss each of these uses in statistics education, with an emphasis on assessment.

KINNEY, J. J. (1997). _Probability: An introduction with statistical applications_, New York: John Wiley & Sons.

This is a text for the calculus-based introductory course in probability with statistical topics included throughout. In accordance with recent research on the teaching and learning of probability and statistics, the text makes much of the material visual through the use of the computer algebra system Mathematica. This is one way that probability distributions can be calculated and graphed easily. Some examples are given of distributions that heretofore could not easily be computed or graphed. In addition, some material is given regarding the use of the computer to help the student verify and perhaps overcome some incorrect notions concerning the distributions of some statistics. Statistical topics are introduced when the probability necessary for them is developed, rather than place all of that material together in one place.

VAHEY, P., Enyedy, N., & Gifford, B. (1997). Beyond representativeness: Productive intuitions about probability. In M. Shafto, & P. Langley (Eds.), _Proceedings of the 19th Annual Conference of the Cognitive Science Society_ (pp. 769-774). Mahwah, NJ: LEA.

Although research has found many flaws in peoples probabilistic reasoning, we have found that middle-school students have many productive ideas about probability. This study examines the probabilistic reasoning used by middle-school students as they used a technology mediated inquiry

environment that was conceptualised and developed to engage students in the task of analysing the fairness of games of chance. This research demonstrates that students employ productive probabilistic reasoning when participating in this task, and also demonstrates that commonly reported heuristics such as representativeness do not adequately describe students' reasoning.

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6. RECENT DISSERTATIONS

HALLER, S. K. (1997). _Adopting probability curricula: The content and pedagogical content knowledge of middle grades teachers_. Ph. D. University of Minnesota. Supervisor: Tom Post.

This study had two purposes. The first was to describe middle grades teachers' growth in probability knowledge as they participated in the Rational Number Project Middle Grades Teacher Enhancement summer institute. The second was to document the impact of teachers' probability knowledge and teaching experience on probability instruction as they implemented new National Science Foundation sponsored probability curricula.

Purposive sampling techniques were used throughout this study. Subjects were middle grades teachers having an interest in increasing their pedagogical, psychological, and mathematical content knowledge in order to enable them to effectively implement new curricula. This study took place during the 1996 RNP summer institute and the 1996-1997 academic year, when selected teachers were implementing new curricula in their classrooms.

During the first phase of the study, the probability knowledge of thirty-five middle grades teachers was assessed via pre- and post-instructional written tests, concept maps, and self-ratings. Considering these assessments, four teachers were selected for a multi-case study. Each was interviewed and observed teaching five probability lessons. The lessons and interviews were transcribed verbatim and analysed for themes and patterns. Assessment results indicated that most teachers did not possess probability knowledge required to answer questions they would encounter in the NSF-sponsored curricula. Post-instructional assessment results indicated probability knowledge growth as well as increased confidence in their knowledge.

Participants in the case study were selected to permit comparisons on the bases of teachers' probability knowledge and teaching experience. Knowledge of probability had an impact on whether teachers had errors or misconceptions in their lessons and affected teachers' ability to capitalise on student questions and responses. Teaching experience seemed to have less impact on instruction.

In light of this study, recommendations for mathematics education were presented. Specifically, long-term staff development is recommended to facilitate success of curricular reform. This staff development should include mathematics teaching which models effective pedagogy, review of curricular material, with respect to content knowledge and adaptations required to effectively implement the curricula, and a focus on deeper understandings of key mathematics concepts as well as connections between and within mathematics topics.

Newman, G. A. R. (1996). _The development of a study guide for adult students to learn statistics_. Ed. D. Columbia. University Teachers College. Supervisor J. Philip Smith. D.A.I. Number DA9636007.

The percentage of adult students attending colleges and universities has been increasing in the last fifteen years. Many instructors have been using the same type of textbooks, resources and teaching techniques for all of their students whether or not they are traditional or non traditional. According to the literature, one may want to employ different teaching techniques than those employed with

traditional aged students to instruct older students more effectively.

This investigation was designed to approach the instruction of adult students in a different manner. The vehicle chosen for the study was a non-calculus based statistics course and the device used for instructional purposes was a study guide designed for adult students. The study guide taught statistics using examples that adults might find in their everyday lives and employed other adult-specific strategies recommended by the literature. The study guide was dispensed to 48 adult students in the first week of their class and was used intermittently over a five week period. For the first two weeks the study guide was used with topics taught in the class. For the next two weeks, topics were taught that were not in the study guide. The remaining topic in the study guide was then taught for a one week period.

During each week of the study a student at random was given an interview to see how the lesson for that week was being received. At the end of the study the students were asked to complete a questionnaire to see how the study guide may have assisted them. The questionnaire also sought to determine whether the study guide made a difference in students' understanding of statistics and to see if they felt if their grades had improved. Over 75% of the students found the study guide "quite useful". In addition, more than 70% felt that their understanding of statistics had improved and 15% more felt that their understanding of statistics has somewhat improved because of the use of the study guide.

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7. OTHER PUBLICATIONS OF INTEREST

Alarcon, J. (1996). Sobre el uso de ciertos problemas en la exploracion del razonamiento probabilista de los alumnos (On the use of particular problems for exploring studentsí probabilistic reasoning). In F. Hitt (Ed.), _Investigaciones en Matematica Educativa_ (pp. 111-130). México: Grupo Editorial Iberoamericano.

Many probabilistic problems are paradoxical, due to the strong contrast between some immediate spontaneous solutions and those obtained by applying an adequate procedure. The use of these problems to explore studentsí probabilistic reasoning may serve to attract their wrong responses or to isolate some given behaviours. However, from a didactic perspective, these problems might be insufficient to explore the studentsí difficulties to chose and apply probabilistic models.

Albert, J. (1997). Teaching Bayes' rule: A data-oriented approach. _The American Statistician_, 51(3), 247-253.

There is a current emphasis on making the introductory statistics class more data-oriented to motivate probability distributions. However, difficulties remain in communicating the basic traditional statistical procedures such as confidence intervals and hypothesis tests. Two Bayesian approaches are introduced aimed at helping students understand the relationship between models and data. The Bayesian methods are contrasted with simulation methods.

Beth L., & Chance, B. L. (1997). Experiences with authentic assessment techniques in an introductory statistics course. _Journal of Statistics Education_, 5 (3).

In an effort to align evaluation with new instructional goals, authentic assessment techniques have recently been introduced in introductory statistics courses at the University of the Pacific. Such techniques include computer lab exercises, term projects with presentations and peer reviews, take-home final exam questions, and student journals. In this article, the University of the Pacific's goals and experiences with these techniques, along with strategies for more effective implementation are discussed.

Berry, D. A. (1997). Teaching elementary Bayesian statistics with real applications in science. _The American Statistician_, 51(3), 241-246.

University courses in elementary statistics are usually taught from a frequentist perspective. The paper suggests how such courses can be taught using a Bayesian approach and indicates why beginning students are well served by a Bayesian course.

Bolger, F., & Harvey, N. (1993). Context-sensitive heuristics in statistical reasoning. _The Quarterly Journal of Experimental Psychology_, 46A(4), 779-811.

Previous work has shown that people use anchor and adjust heuristics to forecast future data points from previous ones in the same series. We report three experiments that show that they use different versions of this heuristic for different types of series. Our results suggest that people use a form of the heuristic that is well adapted to the nature of the series that they are forecasting. However, we also found that the size of their adjustments tended to be suboptimal. They overestimate the degree of serial dependence in the data but underestimate trends.

Fisk, J. E., & Pidgeon, N. (1997). The conjunction fallacy: The case for the existence of competing heuristic strategies. _British Journal of Psychology_, 88, 1-27.

A study was conducted to evaluate the effects of training on the incidence of the conjunction fallacy. One group received training in the extension rule (normative), the other training which stressed that judgments should be based on similarity or representativeness (non-normative). Participants receiving the former made fewer errors, those receiving the latter made more errors. However, multiple regression analysis showed that under both training regimes in a majority of instances only the smaller component probability was statistically significant in determining the conjunction. A second study, omitting the training element, replicated this finding. Both studies highlight the fact that existing theories cannot account for the pattern of participants' responses under the training conditions employed. It is proposed that rather than choose between two competing strategies participants derive their estimate in two stages, first selecting a reference point in the probability continuum, usually based on the 'surprise value' of the smaller component event and then assigning a value to the conjunction relative to this point. During the second stage, training is hypothesised to produce its effect as participants weigh the available information deriving some compromise reflecting both normative and non-normative tendencies.

George, E. A. (1995). Procedural and conceptual understanding of the arithmetic mean: A comparison of visual and numerical approaches. In D.T. Owens, & M. K. Reed (Eds.), _Proceedings of the International Group for the Psychology of Mathematics Education.

North American Chapter XVII_ (v.1, pp. 204-209). Ohio State University.

The purpose of this study was to compare the nature and extent of the procedural and conceptual understanding developed by two groups of students who had received different forms of instruction, one based on the traditional numerical algorithm and the other on a visual algorithm. While both groups of students showed a degree of understanding and flexibility with the procedure they had been taught, students who had learned the visual procedure showed a deeper conceptual understanding of the arithmetic mean.

Giraud, G. (1997) Cooperative learning and statistics instruction. _Journal of Statistics Education_, 5 (3).

This study examined the relative effects of co-operative vs. lecture methods of instruction. Two sections of an undergraduate statistics course were studied. Test scores were dependent variables.

Students in one section were randomly assigned to co-operative groups. Students in both sections completed assignments and practice problems in the co-operative class in groups during class, and in the lecture class individually, outside of class. Students in the co-operative learning class achieved higher test scores. Implications of the study and resulting questions are discussed.

Jones, S. K., Taylor-Jones, K., & Frisch, D. (1995). Biases of probability assessment: A comparison of frequency and single-case judgements. _Organizational Behaviour and Human Decision Processes_, 61(2), 109-122.

Gingerenzer (1991) has recently argued that there is a fundamental distinction between judgments of relative frequency and judgments of single-case probabilities. One of Gingerenzerís major findings is that many representativeness effects, such as the neglect of base rates and the conjunction error, disappear when questions are reworded in terms of relative frequencies. In this paper, we claim that Gingerenzerís distinction between frequency and single-case judgments maps onto Tversky and Kahnemanís (1974) distinction between representativeness and availability. Specifically we suggest that representativeness effect occur primarily in single-case judgments, while availability effects occur primarily in judgments of relative frequency. Two experiments supporting this suggestion, as well as the normative and descriptive implications of these findings are discussed.

Henry, M. (1994). _L'enseignement des probabilites. Perspectives historiques, epistemologiques et didactiques_. (Teaching probability. Historical, epistemological and didactic perspectives). Irem de Besancon.

The three chapters of this booklet are the texts of three conferences presented at Kalouga, 200 km. south from Moscow, during a course of training in the teaching of probability for Russian teachers.

Kratochvila, J. (1997). Thinking processes involved in solving combinatorial problems. In M. Hejny, & J. Novotna (Eds.), _Proceedings of the European Research Conference on Mathematics Education_ (pp. 63-66). Podebrady (Czech Republic): Prometeus.

A student's thinking process when solving combinatorial problems can be broken down into several stages, which are analysed in the paper: 1) Getting an insight into the problem situation; 2) Looking for a strategy which might lead to the solution of the problem; 3) Organising a given set of elements; d) Argumentation. The paper also focus on a student's decision making during his/her solving process.

Nickerson, R. S. (1996). Ambiguities and unstated assumptions in probabilistic reasoning. _Psychological Bulletin_, 120(3) 410-433.

Ostensibly simple probabilistic reasoning problems are sometimes surprisingly difficult. One source of difficulty is the omission from a problem description of information essential to an unambiguous understanding of the situation. When this is so, assumptions must be made to permit the computation of probabilities. Different assumptions lead to different conclusions, and if the assumptions are not stated, disagreements regarding problem solutions can occur, even among experts. The author reviews several such problems and their treatment in the literature. He proposes accounts of why problems can be difficult even when not ambiguous and discusses some approaches that can make solutions easier to find or understand.

Robinson, D. H., & Levin, J. R. (1997). Reflections on statistical and substantive significance with a slice of replication. _Educational Researcher_, 26(2), 21-26.

In this comment, we propose some modifications to Thompsonís (1996) recent suggestions for

AERA editorial policy on statistical significance testing. First, we discuss the potential problems, both procedural and conceptual of adding the modifier "statistically" to "significantî. Second, we illustrate how effects sizes (like p values) can be misinterpreted and misused. Finally, we argue that greater attention to replication should be encouraged in educational research.

Samaniego, F. J., & Watnik, M. R. (1997). The separation principle in linear regression. _Journal of Statistical Education_, 5(3).

In linear regression problems in which an independent variable is a total of two or more characteristics of interest, it may be possible to improve the fit of a regression equation substantially by regressing against one of two separate components of this sum rather than the sum itself. As motivation for this "separation principle", we provide necessary and sufficient conditions for an increased coefficient of determination. In teaching regression analysis, one might use an example such as the one contained herein, in which the number of wins of Major League Baseball teams is regressed against team payrolls, for the purpose of demonstrating that an investigator can often exploit intuition and/or subject-matter expertise to identify an efficacious separation.

Schlottmann, A., & Anderson, N. H. (1994). Childrenís judgments of expected value. _Developmental Psychology_, 30(1), 56-66.

Expected value judgments of 5, 6, 8, and 10-year-olds were studied by using an information integration approach. In one task, probability and value of a single winning outcome were varied factorially. All ages took both cues into account. Your children used an additive integration rule, whereas 8 years and older used the multiplying rule as predicted by mathematical theory. A second task contained games with both 1 and 2 alternative prizes. At all ages, data patterns were similar to the normative predictions. Even young children showed some understanding of probability dependence. A serial version of the addition strategy may contribute to advanced performance in the 2-prize task. These results are consistent with conceptual understanding of expected value.

Wiseman, D. B., & Levin, I. P. (1996). Comparing risky decision making under conditions of real and hypothetical consequences. _Organizational Behavior and Human Decision Processes_, 66(3), 241-250.

This paper examines whether the preference between 2 options involving the investment of time and effort would depend on whether the consequence of the decision was real or hypothetical. In a series of 3 experiments, a total of 122 college students made risky decisions under conditions of hypothetical or real consequences. Task variations across experiments included: (1) type of risk (monetary gambles or investments of time and effort), (2) within-subject and between-subjects manipulations of consequence condition, and (3) single or multiple decisions. The hypothesis of no difference between choices in real and hypothetical consequence conditions was retained in each experiment. Supplemental analyses ruled out various "artifactual" interpretations of the null results.

Cohen, S., Chechile, R., Smith, G., & Tsai, F. (1994). A method for evaluating the effectiveness of educational software. _Behavior Research Methods, Instruments and Computers_, 26(2), 236-241.

This paper presents a method for evaluating educational software. The evaluation is designed as a field study, and is comprised of a test of remedial skills, an essay test of conceptual understanding, and a system that records how students use a given program. The instruments were used to evaluate ConStatS, a program for teaching conceptual understanding of probability and statistics. Subjects were 327 undergraduates who used ConStatS and 63 control subjects who used tool-based statistics software but not ConStatS. Subjects in the experimental group did better on 92 of the 103 questions than control subjects; the 10 questions on which the experimental group

showed the greatest improvement over the control group involved transformations, probability, and the concepts of deviation and sensitivity of summary measures.

Huberty, C. J., Dresden, J., & Bak, B. (1993). Relations among dimensions of statistical knowledge. _Educational and Psychological Measurement_, 53(2), 523-532.

The authors reviewed ways of knowing statistical concepts by proposing a general 3-category structure for knowing: (1) calculations, (2) propositions, and (3) conceptual understandings. Test items were developed that correspond to the 1st category and to a partitioning of the two latter categories into words and symbols. 31 items covering the 5 types were administered to 57 graduate students. Correlation of student scores on the 10-item calculations subtest and the 10-item propositions subtest was .61, whereas the other two intercategory correlation were .40 (calculations vs conceptual understandings) and .37 (propositions vs conceptual understandings). Results suggest that students should be tested in more than one domain and that instructors should expect students to develop conceptual understanding and skills in computation.

Reeves, T., & Lockhart, R. S. (1993). Distributional versus singular approaches to probability and errors in probabilistic reasoning. _Journal of Experimental Psychology General_, 122(2), 207-226.

Four experiments examined differences in probabilistic reasoning as a function of whether problems were presented in a frequentist or case-specific form. The experiments demonstrated that these different forms influence the likelihood of subjects committing the conjunction and disjunction fallacies. The authors contend that these 2 forms elicit different approaches to probability. Frequency problems, it is argued, elicit a distributional approach in which probabilities are equated with relative frequencies, whereas case-specific problems elicit a singular approach in which probabilities are equated with the propensities or causal forces operating in an individual case. According to this account, distributional and singular approaches evoke different kinds of inferential rules and heuristic procedures, some of which are more closely aligned with extensional principles than others.

Ware, M. E., & Chastain, J. D. (1991). Developing selection skills in introductory statistics. _Teaching of Psychology_, 18(4), 219-222.

The authors assessed the effectiveness of teaching statistics with an emphasis on selection skills. Subjects were 55 undergraduate students taught introductory statistics in a traditional way, 48 taught in a format emphasising selection skills (SSKs), and 24 not enrolled in statistics. Higher selection scores were found among SSKs subjects than among traditional statistics students. Both groups scored higher than students not enrolled in statistics. Results suggest that emphasising SSKs can increase these skills beyond the levels achieved by conventional methods of teaching statistics.

Macchi, L. (1992). La considerazione della probabilita primaria nel ragionamento probabilistico (The base rate use in probabilistic reasoning). _Giornale Italiano di Psicologia_, 19(1), 101-118.

This paper studies whether the base-rate fallacy in probabilistic reasoning might be due to the verbal structure of the problem, rather than to some heuristics (i.e., causality and representativeness) proposed by other authors. Human Ss: 180 normal male and female Italian adults (aged 18-25 years) (undergraduate students). Six probability problems were presented to different groups of Ss in 3 experiments. In each experiment, an original text (A. Tversky and D. Kahneman, 1980) and a modified text were presented. Ss' integration of the presented information was assessed based on verbal responses.

8. MORE ON THE STATISTICAL TEST CONTROVERSY

Some group members kindly sent me new references concerning statistical testing, which I am including below:

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Kirk, R. E. (1997). Practical significance. A concept whose time has come. _Educational and Psychological Measurement_, 56, 746-759.

Perry, J. N. (1986). Multiple-comparison procedures: A dissenting view. _Forum: Journal of Economic Entomology_, 79, 1149-1155.

Robinson, D. H., & Levin, J. R. (1997). Reflections on statistical and substantive significance, with a slice of replication. _Educational Researcher_, 26(2), 21-26.

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9. COMBINATORIAL REASONING

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FISCHBEIN, E., & Grossmann, A. (1997). Tacit mechanism of combinatorial intuitions. In E. Pehkonen (Ed.), _Proceedings of the 21st Conference of the International Group for the Psychology of Mathematics Education_, (v.2, pp. 265-272). Lahti, Finland: Lahti Research and Training Center,

GODINO, J. D., Navarro-Pelayo, V., & BATANERO, C. (1992). Analysis of students' errors and difficulties in solving combinatorial problems. In W. Geeslin, & K. Graham (Eds.), _Proceedings of the XVI PME Conference_ (v.1, pp. 249-256). Durham, NH: University of New Hampshire.

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in contingency judgment. _Journal of Experimental Psychology. Learning, Memory and Cognition_, 21(6), 1639-1655.

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11. INTERNET RESOURES OF INTEREST

11. 1. ISI COMMITTEE ON WOMEN IN STATISTICS WEB SITE

The ISI Committee on Women in Statistics is a committee of the International Statistical Institute (ISI). The committee is chaired by Dr. Mary H. Regier of the Statistics Department, Case Western Reserve University, in Cleveland, Ohio, USA (e-mail:mhr@po.cwru.edu; fax: 216-368-0252). The committee, which was formally established in name during the ISI Beijing Session in August 1995, held its first meetings during the ISI Session in Istanbul in August 1997.

Initially, what had motivated the establishing of such a committee was concern among the ISI leadership over low female representation in the ISI and its Sections. The committee's Terms of Reference reflect this concern and deal with a number of factors closely related to it. They are:

1. To promote and strengthen the representation of women statisticians in the ISI and its Sections.

2. To help in providing opportunities for women members to assume active and visible roles in the ISI and other statistical associations.

3. To collect information on women in the statistical professions in different countries and to facilitate the flow of information among women statisticians.

4. To stimulate interest in Statistics among women and encourage women students in schools and colleges to study Statistics.

5. To support the compilation of statistics on women, with a view to generating relevant studies concerning women's roles in the various activities in their countries.

More information can be obtained from M. Regier or from the Commitee' web site:

12. INFORMATION ON PREVIOUS CONFERENCES

12.1. RESEARCH ON THE ROLE OF TECHNOLOGY IN TEACHING AND LEARNING STATISTICS, 1996 IASE ROUND TABLE CONFERENCE

A report by Joan GARFIELD, University of Minnesota, jbg@tc.umn.edu

On July 23, 1996, 36 researchers from 13 different countries and 6 continents met in Granada, Spain, for an invitational Round Table conference sponsored by the International Association for Statistical Education (IASE). During the five days of the conference, we listened to presentations, viewed software demonstrations, and discussed challenging issues regarding the use of technology with students who are learning statistics.

Four broad issues emerged: 1. The need for information on existing software; 2. The changing role of the classroom teacher; 3. The need for good assessment instruments; 4. Directions for future research. Based on individual interests and the focus of the papers presented, three working groups were formed: (1) technology in secondary education, (2) technology issues at the college level, and (3) empirical research issues. These three groups met toward the end of the conference to synthesise and discuss issues related to their particular topic and to make recommendations which were presented at our final session.

The Proceedings of the 1996 IASE Round Table Conference, edited by J. GARFIELD and G. BURRILL are now available from the ISI for $30.00 (US) which includes postage. Below I include a summary of contents

1. Myth-conceptions! A. HAWKINS.

Section 1: How technology is changing the teaching of statistics at the secondary level. These papers addressed not only how computers and graphing calculators are changing the statistical content in secondary education, but also how they affect the content being taught and the ways student learning is assessed.

2. Graphing calculators and their potential for teaching and learning statistics, G. BURRILL.

3. Developing probabilistic and statistical reasoning at the secondary level through the use of technology, J. NICHOLSON.

4. Statistical thinking in a technological environment, D. BEN-ZVI, & A. Friedlander.

5. The use of technology for modelling performance standards in statistics, S. P. LAJOIE.

6. Discussion: How technology is changing the teaching and learning of Statistics in secondary schools, G. BURRILL

Section 2: Developing exemplary software. Demonstrations of some exemplary software programs were accompanied by descriptions of how and why they were developed and how they have been or might be evaluated. Group discussions of these papers focused on requirements for ideal software tools to improve the teaching and learning of statistics.

7. A Framework for the evaluation of software for teaching statistical concepts, R. C. del MAS.

8. QUERCUS and STEPS: The experience of two CAL projects from Scottish universities, M. MCCLOSKEY.

9. Overview of ConStatS and the ConStatS assessment, S. Cohen, & R. A. Chechile.

10. Toward a theory and practice of using interactive graphics in statistical education, J. T. Behrens.

11. Discussion: Software for teaching statistics, D. BEN-ZVI.

Section 3: What we are learning from empirical research. Examples of empirical research involving the use of technology were presented. Discussions focused on generalizability issues and methodological problems related to research studies involving the use of computers in educational settings.

12. What do students gain from computer simulation exercises? An evaluation of activities designed to develop an understanding of the sampling distribution of a proportion, K. LIPSON.

13. Students analysing data: Research of critical barriers, C. KONOLD, A. Pollatsek, A. Well, & A. Gagnon.

14. Students' difficulties in practicing computer-supported data analysis: Some hypothetical generalizations from results of two exploratory studies, R. BIEHLER.

15 Evolution of students' understanding of statistical association in a computer-based teaching environment, C. BATANERO, A. ESTEPA, & J. D. GODINO.

16. Computer-based and computer-aided learning of applied statistics at the Department of Psychology and Educational Sciences, G. SCHUYTEN, & H. Dekeyser.

17. Discussion: Empirical research on technology and teaching statistics, J. M. SHAUGHNESSY.

Section 4: How technology is changing the teaching of statistics at the college level. This set of papers described innovative ways computers are being used in undergraduate and graduate statistics courses and their impact on the way these courses are being taught. Uses of technology discussed included combinations of software programs with new curricular approaches and Internet resources.

18. Workshop statistics: Using technology to promote learning by self-discovery, A. J. Rossman.

19. Examining the educational potential of computer-based technology in statistics, P. JONES.

20. How technological introduction changes the teaching of statistics and probability at the college level, Susan STARKINGS.

21. The Internet: A new dimension in teaching statistics, J. L. Snell.

22. Computer packages as a substitute for statistical training? M. WOOD.

23. Discussion: How technology is changing the teaching of statistics at the college level, C. J. BLUMBERG.

Section 5: Questions to be addressed on the role of technology in statistics education. The last section of papers focused on important problems related to distance learning and teaching statistics

in developing countries.

24. Learning the unlikely at distance as an Information technology enterprise: Development and research, J. WATSON, & J. P. Baxter.

25. The role of technology in statistics education: A view from a developing region, M. J. GLENCROSS, & K. W. Binyavanga.

26. Discussion: Technology, reaching teachers, and content. G. BURRILL.

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13. FORTHCOMING CONFERENCES

13.1. The Fifth International Conference on Teaching Statistics, ICOTS-5, Singapore,

June 21 - 26, 1998

ICOTS meetings are organised by the International Association for Statistical Education (IASE) which is a section of the International Statistical Institute (ISI). These are important international conferences on the teaching of statistics and held in different locations around the world once every four years. They bring together several hundreds statistics educators and practitioners, including those from schools, colleges and universities, industries and governments. IASE and ISI are pleased to announce that The Fifth International Conference on Teaching of Statistics will be held in Singapore from June 21 - 26, 1998.

Final papers must be submitted by February 15, 1998. The deadline for applications for accommodations is May 20, 1998. Complete information is available at the WWW site:

http://www.mrc-apu.cam.ac.uk/mhonarc/conferences/msg00007.html)

ICOTS 5 invited papers in Session 6: Research in teaching statistics. Convener Joan GARFIELD, jbg@maroon.tc.umn.edu

6.1 Research in teaching statistics at school levels. Organiser Carmen BATANERO, batanero@goliat.ugr.es

Linda GATTUSO. Development of the concept of weighted average among high-school children.

Gail BURRILL. Beyond data analysis: Statistical inference.

Sharleen FORBES. Students and assessment .

Antonio ESTEPA & Francisco T. Sanchez-Cobo. Correlation and regression in secondary school text books.

George BRIGHT. Students (grades 6-8) understanding of graphs.

Dani BEN-ZVI. Research in teaching statistics at school levels.

6.2 Research in teaching statistics at post-secondary levels. Organiser Gilberte

SCHUYTEN, gilberte. schuyten @rug.ac.be

Tjaart IMBOS. The knowledge base and its use during research problem solving: a comparison of high achieving and low achieving health sciences students.

John TRURAN. Using students' writings to assess their cognitive and affective development in an elementary economic statistics course.

Joseph Wisenbaker, Fadia Nasser, & Janice S. SCOTT. A multicultural exploration of the interrelationships among attitudes about and achievement in introductory statistics.

Neil Thomason, Sue Finch, & Geoff Cumming. Towards 2000: Reform in research practice and statistical education .

Hannelore Dekeyser, & Gilberte SCHUYTEN. Activating the multiple processing of information: an electronic learning environment for applied statistics.

Pamela SHAW. Why don't students display data?

Martin Valcke. Competency-based statistics courses with flexible learning environments.

Anne Williams. Students' understanding of the significance level concept.

Sue Finch. Explaining the law of large numbers.

Zamalia Mahmud, & Chris Robertson.Developing and testing a teaching model using experimental design and interview analysis.

6.3 Research in teaching probability. Organiser Kath TRURAN,

Kath.Truran@unisa.edu.au

Jenni WAY.Young children's probabilistic thinking.

Kath TRURAN, Is it luck, is it random or does the dice know?

R. J. Russell. Scratching the surface of probability.

6.4 Challenges in assessing statistical reasoning skills. Organiser Iddo GAL,

iddo@research.haifa.ac.il

Iddo GAL. Challenges in assessing statistical reasoning skills.

Joan GARFIELD. The Statistical reasoning assessment: A simple comparative

research tool.

Jane WATSON. Assessment of statistical understanding in a media context .

Cliff KONOLD. Dilemmas in assessing the development of probabilistic thinking .

6.5 Round table discussions on research. Organiser Joan GARFIELD, jbg@maroon.tc.umn.edu

Flavia JOLLIFFE .What is research in statistical education?

13.2. PME 22, University of Stellenbosch, in Stellenbosch, South Africa 12 -17 July,1998

The conference is to be held at the University of Stellenbosch in the town of Stellenbosch, South Africa. Stellenbosch is an historic town in the heart of the Cape wine lands, about 50 km. from Cape Town.

Contact: Alwyn Olivier (e-mail: aio@akad.sun.ac.za, tel: +27 21 808 2299; fax: +27

21 808 2498). Home page: http://www.sun.ac.za/local/academic/education/pme22/pme22.htm.

In addition to usual research reports, short oral communications and posters, this year a research forum on "Data handling" will be coordinated by P. Laridon

(036pel@cosmos.wits.ac.za)

Working Group on the Teaching and Learning of Stochastics. Coordinators: John TRURAN, University of Adelaide, Kathleen TRURAN, University of South Australia, and

Carmen BATANERO, University of Granada

This Working Group exists as a focus for members interested in the psychology of the teaching and learning of probability, statistics and combinatorics. It maintains an informal network between Conferences by means of an electronically distributed newsletter. It particularly seeks to bring together interested people from all language groups, and does its best to provide translation facilities as appropriate.

At PME in 1997 a proposal was raised for developing a book which presents a survey of the main research done in statistical education within both Education and Psychology. The working group co-ordinators were asked to prepare a first draft of the possible orientation and structure of the book. Planning has proceeded since then and by the time of the 1998 meeting we hope that a first framework will be ready for discussion. A meeting to discuss the framework will also be held during the ICOTS conference in order to involve as wide a range of people as possible.

Part of our Working Group meetings will also be devoted to ensuring that all of us have an opportunity to talk informally about our work. People who wish to be involved in this Working Group are invited, if they wish, to make a 10-15 minute presentation on their interests which might be supported by two or three overhead transparencies and perhaps some handouts of work which they think will be of interest for others.

Part of one session will also be devoted to the making of plans for developing electronic ways of developing data bases which will provide researchers into stochastics understanding to have efficient access to authoritative previous work.

Contact: John TRURAN, University of Adelaide, (jtruran@arts.adelaide.edu.au)

13.3. The First Conference of the European Society for Research in Mathematics Education, CERME 1, 27th - 31st August, 1998,

Place: Osnabrueck, Germany

Topic: Communication, co-operation and collaboration in mathematics educational research in Europe.

Programme Committee: Elmar Cohors-Fresenborg - Coordinator (University of Osnabrueck,

Germany). Milan Hejny (Charles University Prague, Czech Republic), Barbara Jaworski (University of Oxford, United Kingdom), Joao da Ponte (University of Lisbon, Portugal), Andre Rouchier (University of Orléans and IUFM Orléans-Tours,France)

Conference secretary: Sabine Jones, Universitat Osnabrueck, FB Mathematik /

Informatik, CERME 1, D-49069 Osnabrueck, erme@mathematik.uni-osnabrueck.de

http://mathesis.informatik.uni-osnabrueck.de/erme98.html

Deadlines:

February 15th, 1998: Pre-registration

February 28th, 1998: Paper/Poster submission

http://www.erme.uni-osnabrueck.de/erme98.html

13.4. PME-NA XX, Twentieth Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education

North Carolina State University, Raleigh, North Carolina, USA. October 31 - November 3, 1998, http://www.ncsu.edu/pmena98/

Program Chair: Dr. Sarah B. Berenson (berenson@unity.ncsu.edu)

Conference Coordinator: Dr. Wendy N. Coulombe (wncoulom@unity.ncsu.edu)

You are invited to participate in the Twentieth Annual Conference of the North American Chapter of the International Group for the Psychology of Mathematics Education, to be held in Raleigh, North Carolina and sponsored by the Center for Research in Mathematics and Science Education, College of Education and Psychology, North Carolina State University.

January 20, 1998: Deadline for submission of proposals for research reports and short orals.

June 15, 1998: Poster presentation proposals due.

13.5. Statistics Education Topics and organisers at the 52nd Session of the International Statistical Institute Helsinki, Finland, August 10-18, 1999

The National Organizing Commitee of the 52nd Session of the International Statistical Institute has great pleasure in inviting the members of the ISI and its sections as well as all other statisticians to the 52nd Session in Helsinki, Finland, in 10-18 August, 1999. Information is available from Ilkka Mellin (isi99@stat.fi) and from the web site: http://www.stat.fi/isi99

There are seven sessions planned for ISI-52, one of them co-organised with IAOS. Anyone interested in taking part in these sessions should contact the organisers listed below.

- Statistical Education and the Significance Tests Controversy. C. Batanero, batanero@goliat.ugr.es

- Teaching and Training Multivariate Data Analysis. H. Bacelar-Nicolau, ulfphelb@cc.fc.ul.pt

- Statistical Education Using Flexible Learning Approaches. A. Di Ciacio, diciaccio@econ.uniurb.it

- Statistical Education for Life. Organiser: A. Hawkins, ash@maths.nott.ac.uk

- Issues Involved in the Assessments and Evaluation of Student Learning of Statistics. J.B. Garfield, JBG@maroon.tc.umn.edu

- Visualisation as an Educational Tool. L. Weldon, weldon@cs.sfu.ca

- Statistical Training for People working in and with Official Statistics(in co-ordination with IAOS). R. Smulders, and C. J. Blumberg, wncarolj@vax2.winona.msus.edu

Executive Secretariat of the 52nd ISI Session: Ilkka Mellin, Statistics Finland, FIN-00022, Helsinki, Finland, isi99@stat.fi, http://www.stat.fi/isi99

13.6. PME 23 July 1999

The conference of 1999 will be held in Israel.

Contact: Orit Zaslavsky (orit@tx.technion.ac.il)