The 5th Interdisciplinary Research Conference

ORT Braude College

October 14-15, 2009

Carlton Hotel, Nahariya

Book of Abstracts

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Preface

Dear Colleagues,

The primary objective of the ORT Braude College Research Conference being held this year in Nahariya, is to expose our researchers to the activities and achievements of our colleagues in other departments. This exposure, coupled with the curiosity this is expected to generate, will undoubtedly lead to highly desirable interdisciplinary collaborations. The Conference setting accommodates small meetings, dialogues, discussions, in addition to lectures and presentations. Among other activities, there will also be a tour of Akko by night, providing entertainment as well as additional free time for leisurely discussions.

Each of the two Conference days will begin with two plenary lectures by guest speakers representing diversified and intriguing areas:

- Physics and the Information Revolution, by Prof. Mordechai Heiblum
- Between Order and Chaos - on Chaos Theory, Complexity, and the Notion of the Edge of Chaos in Science, Personal Life, Society and Economy by Dr. Yoav Ben-Dov
- The Quantum Measurement Problem - Open Questions and Application Promises, by Prof. Avshalom Elitzur
- Positive Psychology - The Science of Happiness: The Transition from Learned Helplessness to Resilience, by Prof. Oren Kaplan

We trust that these opening lectures will energize the Conference with motivation and inspiration towards fruitful discussions in the departmental sessions.

This booklet contains 64 abstracts, marking a record for ORT Braude College. We take pride in this most significant achievement which is indicative of an increasing orientation towards research and its positioning within the academic agenda of the college lecturers.

I take pleasure in commending the outstanding organizational skills and dedication of the Research Conference Committee, Prof. Zeev Barzily, Mr. Kobi Ganor, and especially Dr. Judith Gottlieb and Dr. Boris Shnits for their extraordinary efforts.

Many thanks to Ms. Linda Weinberg for her dedicated and skilful editing of the abstracts included herein.

I look forward to your full and active participation.

Have a rewarding and enjoyable conference!

Prof. Arie Maharshak
Organizing Committee Chairperson

תכנית הכנס

	יום ד' 14.10.09		
09:00-09:30	***התכנסות ורישום, קפה ועוגה***		
09:30-09:50	**דברי פתיחה וברכות:** **פרופ' יוחנן ארזי- נשיא המכללה ופרופ' דוד שוחט- סגן הנשיא לעניינים אקדמיים** (אולם שביט)		
09:50-10:40	**הרצאת מליאה: פרופ' מרדכי הייבלום, מכון ויצמן למדע, רחובות** (אולם שביט)		
10:40-11:30	**הרצאת מליאה: ד"ר יואב בן דב, פילוסוף של המדע** (אולם שביט)		
11:30-11:50	***הפסקת קפה***		
	מושב 1: תעשייה וניהול I יו"ר: ד"ר רחל רביד	**מושב 2: תוכנה I** יו"ר: ד"ר מירי וייס-כהן	**מושב 3: מכונות** יו"ר: ד"ר גדעון אביגד
11:50-12:10	אולם שביט	אולם ירח לבן	אולם אופק
12:10-12:30			
12:30-12:50			
12:50-13:10			
13:10-14:30	***ארוחת צהריים + הפסקה להתארגנות בחדרים***		
	מושב 4: תעשייה וניהול II יו"ר: ד"ר הילה פרץ	**מושב 5: מתמטיקה- פיסיקה I** יו"ר: ד"ר עופר אייל	**מושב 6: ביוטכנולוגיה** יו"ר: ד"ר יהודית גוטליב
14:30-14:50	אולם שביט	אולם ירח לבן	אולם אופק
14:50-15:10			
15:10-15:30			
15:30-15:50			
15:50-16:10	***הפסקת קפה***		
16:10-16:30	אולם שביט	אולם ירח לבן	אולם אופק
16:30-16:50			
16:50-17:10			
17:10-17:30			
19:00-20:00	***ארוחת ערב***		
20:00-23:00	***סיור לילי בעכו***		

	יום ה' 15.10.09		
08:00-09:10	***ארוחת בקר***		
09:10-10:00	**הרצאת מליאה: פרופ' אבשלום אליצור, אייר - המכון הישראלי למחקר מתקדם** (אולם שביט)		
10:00-10:50	**הרצאת מליאה: פרופ' אורן קפלן, אוניברסיטת ת"א והמכללה למנהל** (אולם שביט)		
10:50-11:10	***הפסקת קפה***		
	מושב 7: הוראה ולמידה יו"ר: ד"ר אורית הרשקוביץ	**מושב 8: מתמטיקה- פיסיקה II** יו"ר: ד"ר לביא קרפ	
11:10-11:30	אולם שביט	אולם ירח לבן	
11:30-11:50			
11:50-12:10			
12:10-12:30			
12:30-12:50			
12:50-13:10			
13:10-14:10	***ארוחת צהריים***		
	מושב 9: חשמל ואלקטרוניקה יו"ר: פרופ' פנחס שכנר	**מושב 10: תוכנה II** יו"ר: ד"ר מתי גולני	**מושב 11: אנגלית** יו"ר: גב' לינדה ויינברג
14:10-14:30	אולם שביט	אולם ירח לבן	אולם אופק
14:30-14:50			
14:50-15:10			
15:10-15:30			
15:30-15:50	***הפסקת קפה***		
15:50-16:10	אולם שביט	אולם ירח לבן	
16:10-16:30			
16:30-16:50			
16:50-17:10			

The 5th Interdisciplinary Research Conference
ORT Braude College

PROGRAM

Wednesday – October 14, 2009

09:00-09:30	REGISTRATION
09:30-09:50	WELCOME GREETINGS *Prof. Yohanan Arzi, President, ORT Braude College* *Prof. David Shoikhet, Vice President for Academic Affairs, ORT Braude College*
09:50-10:40	PLENARY Physics and the Information Revolution *Prof. Mordehai Heiblum, Head of the Joseph H. and Belle R. Braun Center for Submicron Research, Weizmann Institute of Science, Rehovot*
10:40-11:30	PLENARY Between Order and Chaos - On Chaos Theory, Complexity, and the Notion of the Edge of Chaos in Science, Personal Life, Society, and Economy *Dr. Yoav Ben-Dov, Philosopher of Science*
11:30-11:50	COFFEE BREAK
11:50-13:10	**SESSION 1: Industrial Engineering and Management (I)** ***Chair: Dr. Rachel Ravid***
11:50-12:10	Ternary Ordinal Quality Data: Interpretation and Process Control *Emil Bashkansky, Tamar Gadrich*
12:10-12:30	A Framework for Service Quality Deployment *Shuki Dror, Yafit Sukenik*
12:30-12:50	Waiting Time in the Sequential Occupancy Problem *Tamar Gadrich, Rachel Ravid*
12:50-13:10	A Probabilistic One-Time Special Purchasing Opportunity *Hussien Naseraldin, Edward A. Silver*
11:50-13:10	**SESSION 2: Software Engineering (I)** ***Chair: Dr. Miri Weiss-Cohen***
11:50-12:10	Improving Instruction Level Parallelism Using Fast Evaluation Techniques of Algebraic Circuits *Yosi Ben Asher, Esti Stein*
12:10-12:30	On the Query Complexity of Testing Orientations for Being Eulerian *Eldar Fischer, Oded Lachish, Arie Matsliah, Ilan Newman, Orly Yahalom*
12:30-12:50	Device Independent User Interface Specification *Eliezer Kantorowitz*
12:50-13:10	A Comparative Approach to Microarray Data Analysis *Katerina Korenblat, Zeev Volkovich*

11:50-13:10	**SESSION 3: Mechanical Engineering** ***Chair: Dr. Gideon Avigad***
11:50-12:10	Set-Based Design and Evolution (SBDE) *Gideon Avigad*
12:10-12:30	The Multi-Single Objective Problem and its Solution by Way of Evolutionary Algorithms *Gideon Avigad, Erella Eisenstadt*
12:30-12:50	Comparing Cooling Methods on Extracted Teeth *Uri Ben-Hanan, Michael Regev, Peter Konvalina, Asaf Hadar, Itay Oz, Herb Judes*
12:50-13:10	The Influence of the Cooling Rate on Bulk Metallic Glass Formation in $Mg_{80}Cu_{15}Y_5$ and $Mg_{80}Cu_{10}Y_{10}$ *Michael Regev, Haim Rosenson, Zamir Koren, Alexander Katz-Demyanetz*
13:10-14:30	LUNCH
14:30-16:30	**SESSION 4: Industrial Engineering and Management (II)** ***Chair: Dr. Hilla Peretz***
14:30-14:50	A Cross-Cultural Study of Human Resource Information Systems *Hilla Peretz, Yitzhak Fried, Ariel Levi*
14:50-15:10	Methods for Activating the Decision Making Process that is Used for Controlling Flexible Manufacturing Systems *Boris Shnits*
15:10-15:30	Interrelationships between Technological Innovation and Business Performance Measures in Galilee Businesses *Shai Solomon, Miri Gilenson, Alina Grosman, Irina Gurfinkel, Yohanan Arzi*
15:30-15:50	On Interpretation of Marketing Messages Across Realities *Arie Maharshak, Doron Faran*
15:50-16:10	COFFEE BREAK
16:10-16:30	The Problem with Strategy Validation: The Absence of the Major Premise *Doron Faran*
14:30-17:30	**SESSION 5: Mathematics and Physics (I)** ***Chair: Dr. Ofer Eyal***
14:30-14:50	Derivation of the Langevin Function from the Principle of Detailed Balance *Jorge Berger*
14:50-15:10	On an Approach for Replacing State Constraints with Control Constraints in Linear Systems *Valery Glizer, Vladimir Turetsky*
15:10-15:30	The Space Quantization as a Reason of Space Angle *Roman G. Vorobyov*
15:30-15:50	A Characteristic Approach to Einstein's Constraint Equations *Lavi Karp*
15:50-16:10	COFFEE BREAK
16:10-16:30	Double Well Bose-Hubbard Model: A Playground for Quantum Control *Shimshon Kallush, Ronnie Kosloff*
16:30-16:50	A Rigidity Theorem for Commuting Holomorphic Functions *Marina Levenshtein, Simeon Reich*

16:50-17:10	Liquid Jet Erupted by Falling of a Test Tube - the Phenomenon and a Suggested Explanation Model *Eli Raz, Ofer Eyal*
17:10-17:30	Flexible PCBs *Arie Maharshak, David Pundak*
14:30-17:30	**SESSION 6: Biotechnology Engineering** ***Chair: Dr. Judith Gottlieb***
14:30-14:50	Proliferation of Myoblasts and Tissue Expression on Electrospun Hybrid Scaffolds *Rosa Azhari, Iris Bonshtein, Reut Mualem, Ehud Kroll*
14:50-15:10	Synergetic Effect of Photocatalytic Degradation and Adsorption Processes on the Removal of Phenolic Compounds from Agro-Industrial Effluent *Kaite Baransi, Yael Dubowski, Isam Sabbah*
15:10-15:30	Biological Markers and Flow Regimes Governing the Initiation of Atherosclerosis *Orit Braun Benjamin*
15:30-15:50	Use of Art Media in Physical Chemistry and Corrosion Education *Alec Groysman, Olga Groysman*
15:50-16:10	COFFEE BREAK
16:10-16:30	The Effect of Paracetamol Overdose on Oxidative Stress in Rats *Masha Grozovski, Sarit Osipov, Zvi Ackerman*
16:30-16:50	Molecular Modeling of Carbon Nanotubes Dispersion in Aqueous Media *Dafna Knani, David Alperstein, Chaim Sukenik*
16:50-17:10	Modeling the Desorption Rates of Aged Naphthalene and Phenanthrene from Environmental Solids *Isam Sabbah, William P. Ball, Peter C. D'Adamo, Edward J. Bouwer*
17:10-17:30	Water Soluble Copper Oxide Nanoparticles as an Antifungal Agent *Iris S. Weitz, Kalanit Knani, Michal Maoz*
19:00-20:00	DINNER
20:00-23:00	NIGHT TOUR OF AKKO

Thursday – October 15, 2009

08:00-09:10	BREAKFAST
09:10-10:00	PLENARY The Quantum Measurement Problem – Open Questions and Application Promises *Prof. Avshalom Elitzur, IIAR - Israeli Institute for Advanced Research*
10:00-10:50	PLENARY Positive Psychology - The Science of Happiness: The Transition from Learned Helplessness to Resilience *Prof. Oren Kaplan, Academic Director of the MBA Management and Business Psychology Program at the College of Management and of the Positive Psychology Program at Lahav, Faculty of Management, Tel Aviv University*
10:50-11:10	COFFEE BREAK

11:10-12:50	**SESSION 7: Teaching and Learning** ***Chair: Dr. Orit Herscovitz***
11:10-11:30	"Personal Coaching" as a Tool for Assisting Under-Achieving Students in an Academic College of Engineering *Ita Donner, Miri Shacham, Orit Herscovitz*
11:30-11:50	Peer-Learning Workshops for Supporting First-Year Students' Learning *Orit Herscovitz, Orna Muller, Miri Shacham, Michal Maoz*
11:50-12:10	A Program for Supporting Underachiever Students *Orna Muller, Hagit Even-Zur, Arnona Etzion, Orit Herscovitz*
12:10-12:30	Tool for Diagnosing Innovation in Academic Teaching *David Pundak, Orit Herscovitz, Miri Shacham, Rivka Weiser-Biton*
12:30-12:50	Marketing Insights of English Language Text Books *David Pundak, Arie Maharshak*
11:10-13:10	**SESSION 8: Mathematics and Physics (II)** ***Chair: Dr. Lavi Karp***
11:10-11:30	Some Initiatives in Calculus Teaching *Buma Abramovitz, Miryam Berezina, Abraham Berman, Ludmila Shvartsman*
11:30-11:50	Emission Lines in Quasi Stellar Objects *Nathan Netzer*
11:50-12:10	A Theorem on Existence of Invariant Subspaces for J-Binoncontractive Operators *Victor A. Khatskevich, Tomas Y. Azizov*
12:10-12:30	Photon Localization and Dicke Superradiance in Atomic Gases *Eric Akkermans, Aharon Gero, Robin Kaiser*
12:30-12:50	On Multi-Weighted Parabolic Systems in Sobolev Spaces *Oleg Kelis*
12:50-13:10	Exploring the Coupling Mechanism of High-Tc-Superconductors by Seeking an Analog to the Isotope Effect in the CLBLCO Family *Meni Shay, Amit Keren, Gil Drachuck*
13:10-14:10	LUNCH
14:10-16:50	**SESSION 9: Electrical and Electronic Engineering** ***Chair: Prof. Pinchas Schechner***
14:10-14:30	Efficiency of Glucose Fuel Cells with Nano-Fibrous Anodes *Eugenia Bubis, Ehud Kroll, Hana Feiger, Pinchas Schechner*
14:30-14:50	A New Approach to Electronic Circuit Reliability Evaluation *Radu Florescu*
14:50-15:10	Emerging Technologies for Realization of Three Dimensional (3D) Novel Devices *Michael Jubran, Liav Grinberg, Rona Sarfaty, Roni Pozner, Yossi Rosenwaks, Gideon Segev, Avraham Kribus*
15:10-15:30	Usage of Cloud Computing Services for Storing, Handling and Validation of Electronically Signed Laboratory Reports *Samuel Kosolapov, Nisim Sabag*
15:30-15:50	COFFEE BREAK

15:50-16:10	Characterizing Finite Uniform Cascade of a Two-Port Network *Shmuel Y. Miller*
16:10-16:30	Use of the Cognitive Radio Scheme Based Dynamic SNR to Reduce the Handoff Call Blocking Probability in Cellular Networks *Jamal Raiyn*
16:30-16:50	Inorganic Fuel Cells in Braude 2008-2009 *Pinchas Schechner, Ehud Kroll, Hana Feiger, Eugenia Bubis*
14:10-17:10	**SESSION 10: Software Engineering (II)** ***Chair: Dr. Mati Golani***
14:10-14:30	Machine-Assisted Design of Business Processes Using Descriptor Similarity *Maya Lincoln, Mati Golani, Avigdor Gal*
14:30-14:50	Lower Bounds on the Minimum Average Distance of Binary Codes *Beniamin Mounits*
14:50-15:10	Energy-Efficient Circular Sector Sensing Coverage Model for Wireless Sensor Networks *Peter Soreanu, Zeev Volkovich*
15:10-15:30	On Application of the K-Nearest Neighbors Approach for Cluster Validation *Zeev Volkovich, Zeev Barzily, Mati Golani, Renata Avros, Dvora Toledano-Kitai*
15:30-15:50	COFFEE BREAK
15:50-16:10	A Minimal Spanning Trees Approach to Cluster Stability Problem *Zeev Volkovich, Zeev Barzily, Gerhard Wilhelm Weber, Dvora Toledano-Kitai, Renata Avros*
16:10-16:30	On Characteristic Function of Generalized Convolutions *Zeev Volkovich, Dvora Toledano-Kitai, Renata Avros*
16:30-16:50	Reconstruction of 3D Models from Measurements Obtained by a Moving Sensor *Miri Weiss-Cohen, Alina Bondarenko, Yoram Halevi*
16:50-17:10	Axisymmetric Intrusions with a Source Term in Linearly Stratified Ambient *Tamar Zemach, Marius Ungarish*
14:10-15:30	**SESSION 11: English Studies** ***Chair: Ms. Linda Weinberg***
14:10-14:30	'Impaled on its Own Sword': The Self-Destructiveness of Evil in the Harry Potter Series *Lauren Berman*
14:30-14:50	Rowling's Devil: Ancient Archetype of Modern Manifestation? *Lauren Berman*
14:50-15:10	A Contextual Study of Language Learning Attitudes in a Technology-Enhanced Environment *Linda Weinberg*
15:10-15:30	“If I Don’t Read in My Own Language, Why Would I Want to Read in a Foreign One?” *Linda Weinberg*

Proliferation of Myoblasts and Tissue Expression on Electrospun Hybrid Scaffolds

Rosa Azhari[1], Iris Bonshtein[1], Reut Mualem[1], Ehud Kroll[2]

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Keywords: Tissue engineering, skeletal muscle, scaffolds, electrospinning

In common tissue engineering practices cells are seeded on scaffolds and grown in bioreactors in an attempt to obtain functioning tissue. The composition and structure of the scaffold on which the cells are seeded, the medium used, biochemical factors in the medium, the mechanical environment, the bioreactor used and the parameters of its operation, affect cell proliferation and differentiation and the properties of the tissue obtained.

In our previous studies, electrospun, hybrid, micro-fibrous scaffolds have been produced, combining a synthetic polymer, polycaprolactone (PCL), with natural connective tissue components, chondroitin sulfate and gelatin. We have shown that the scaffolds have high tensile strengths and elongations and that skeletal muscle cells' (C2 myoblasts) affinities and tissue expression are higher on hybrid scaffolds when compared to PCL ones.

In the current study a computer-controlled stretching machine was used to induce various stretching patterns on the scaffolds while measuring cell growth, tissue expression and tissue organization. It was found that cells proliferate and express tissue on the electrospun scaffolds. The cells do not penetrate the scaffolds and remain on the surface only. Nevertheless, the inner layers of the cells in the 3D tissue formed did not undergo necrosis due to nutrients supplied through the porosive electrospun matrix. No significant difference was found between non-stretched samples and samples stretched in a slow gradual manner, with deformations up to 50% of the original length. Further studies are now being conducted to evaluate the effects of rapid stretching leading to higher strains in the sample.

Acknowledgement: This study was supported by a grant from the Israeli Science Foundation and the ORT Braude College Research Committee.

Synergetic Effect of Photocatalytic Degradation and Adsorption Processes on the Removal of Phenolic Compounds from Agro-Industrial Effluent

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Keywords: Agro-industrial wastewater, photo-catalysis, adsorption, polyphenols

Agro-industrial wastewater is considered a major environmental pollutant. Most of its effluent contains high concentrations of phenolic compounds. These compounds contribute to toxicity and antibacterial activity, where they could limit the microbial degradability of the biological treatment systems. Thus, the development of alternative physicochemical methods used for pre- or post-treatment of agro-industrial wastewater is required. This work examined heterogeneous photocatalysis (TiO_2) as an efficient technology for degradation of phenolic compounds. In order to resolve the problem of achieving optimum adsorption strength of TiO_2 while increasing photo-catalytic efficiency, activated carbon as a co-adsorbent was added to TiO_2. The activated carbon adsorbed the pollutant and its metabolites in close vicinity to TiO_2, thus enabling their transfer and decomposition.

The synergetic effect of both photo-catalysis by TiO_2 and adsorption by activated carbon was tested under various conditions: different concentration levels of the phenolic compounds, pH, activated carbon addition, as well as sources of UV light (sun light or artificial UV source) for the photo-catalysis process. The potential for reuse of the catalyst in additional runs was examined as well.

Acidity of the solution is a major importance in determining adsorption capacity. At low pH, high adsorption capacity followed by a high photo-degradation rate was achieved. Increasing the light intensity, especially over the TiO_2 band gap (approximately $\lambda < 388$ nm), enhances the photo-degradation rate of the phenolic compounds. This has an important implication for agro-industrial wastewater treatment in the Middle East: by utilizing the region's semi-arid climate and high solar intensity, one might reduce the cost of treatment. Additions of co-adsorbent (activated carbon) has been shown to increase photo-catalytic efficiency, and -therefore the combination of adsorption processes along with photo-catalysis improved photo-degradation at high phenolic concentrations. Activated carbon strongly adsorbs the contaminants and its intermediate products in close vicinity to TiO_2, enabling decomposition following the "adsorb-and-shuttle" approach.

Biological Markers and Flow Regimes Governing the Initiation of Atherosclerosis

Orit Braun Benjamin

Supervisor: Prof J. Cohen
Advisors: Prof N. Resnick and Prof D. Seliktar

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Atherosclerosis, a chronic cardiovascular disease, and its complications are a major morbidity cause in the western world. The focal distribution of atherosclerotic lesions in areas of aortic branches and bifurcations suggests that hemodynamic forces, and more specifically flow shear stress, play a major role in atherogenesis initiation. A striking difference in the response of endothelial cells to physiological uniform laminar shear stress versus spatial and temporal shear stress gradients has been shown both *in-vitro* and *in-vivo*. These differences were demonstrated in both the morphology of the cells and the pattern of gene expression, and suggest that endothelial cells are capable of sensing and responding to different patterns of shear stress.

Studies with cultured cells suggested that shear stress patterns in the bifurcation region are not homogeneous, pointing at the "micro environment" of shear stress that coincided with morphological variations and growth patterns of the endothelium. However, these micro environments are not well characterized either in their fluid dynamics or in the response of the endothelium.

This research is one of the very few attempts to better characterize flow patterns within a model which simulates a stenosis and to correlate this pattern with endothelial morphology and gene expression. It is unique in that it attempts to critically test and control the fluid regimes involved in the shear stresses affecting the growth patterns.

In the present work an experimental system was built with the purpose of addressing this issue: establishing a link between the endothelial cellular response to flow and the local flow regime. The flow field was measured in a straight and constricted capillary at different Reynolds numbers, with a near wall resolution of $60\mu m$. In order to examine the feasibility of the experimental system, the flow results were correlated with morphological remodeling of the cells and the expression of β- Catenin and activation of NfκB. These biological markers were chosen as they are important players in the early stages of atherosclerosis initiation. Two similar experimental systems were constructed with identical geometry (a symmetric constriction) and flow conditions - one for the biological experiments and the other for flow measurements in a PIV (Particle Image Velocimetry) system. In the biological experimental system, a confluent monolayer of bovine aortic endothelial cells (BAEC) was grown inside 2.5mm capillaries. The cells were subjected to the flow for 48 hours and then fixed and stained for several biological markers.

Our results correlate the activation of NFκB to regions of flow separation and reversal flow. In a straight capillary subjected to laminar flow (Reynolds 180) the activation of NFκB was prominently lower than the activation level just upstream and downstream to the capillary constricted area. Staining results for β catenin in regions exposed to laminar was continuous and distributed around the entire periphery of cells.

In the reattachment region which had been exposed to 24 h of disturbed flow, however, the β catenin staining became intermittent, showing frequent gaps.

Use of Art Media in Physical Chemistry and Corrosion Education

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Keywords: Physical Chemistry, corrosion, art, education

How to present scientific and sometimes dull materials to students in an interesting and memorable way? We would like to recommend art, aesthetic, philosophical and historical aspects to be included in Physical Chemistry and Corrosion education.

The Nobel Prize laureate poet Joseph Brodsky wrote that "*an aesthetic instinct develops in man rather rapidly, for, even without fully realizing who he is and what he actually requires, a person instinctively knows what he doesn't like and what doesn't suit him*." It is not a secret that students accept, like and understand a subject when a lecturer uses art and aesthetic forms such as literature, poetry, music, humor, philosophy, historical comparison, etc. Our work concerns the use of art and aesthetic, philosophical and historical aspects in the education of Physical Chemistry and Corrosion.

Physical Chemistry is a branch of Theoretical Physics, and is not simple for students to understand. Many processes and concepts in Physical Chemistry are abstract, or imaginary, and in many cases are impossible to realize, e.g. *thermodynamically reversible processes*, the *Carnot cycle, entropy, enthalpy, zero absolute temperature, the Gibbs energy*, etc., etc. Such situations can be compared with abstractionism in art.

Poets and artists are engaged by scientific achievements, just as scientists are engaged by art. Poets and artists use scientific inventions, developments and discoveries in their art compositions. The poet Wyston Hugh Auden wrote the beautiful verse "*The Entropy Song*". Some pictures of Salvador Dali reflect the Beauty of Science, for example, "*Phosphene*", "*Galacidalacidesoxyribonucleicacid*", "*Desoxyribonucleic Acid*", "*The Alchemist*". On the other hand, we can use the same works of art in chemistry education.

Many physico-chemical and corrosion phenomena have uncertainty and duality. The main uncertainty in kinetics is that the writing down of a chemical reaction does not usually reflect its mechanism. All these remind use of problematic explanations in philosophy, and allow for the use of philosophy in physical chemistry and corrosion education.

Many physico–chemical processes (especially corrosion phenomena) can be understood better if we associate them with the famous musical compositions of Nikolai Borodin, Frédéric Chopin, Tchaikovsky, Rimsky–Korsakov, Edward Grieg, and Aram Khachaturyan. One of our tasks is to show the **beauty** of the subject we deal in and teach. The students receive much interesting, useful as well as non-useful information. Only a little of this information will stay with them. The more aesthetic material we give, the more will remain in their brains. The evidence shows that including art and aesthetic, philosophical and historical aspects fosters a more memorable, effective, pleasant and enjoyable perception of subjects in Physical Chemistry and Corrosion education.

The Effect of Paracetamol Overdose on Oxidative Stress in Rats

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Keywords: Paracetamol, rats, lipid peroxidation, paraoxonase, α-tocopherol, glutathion

Paracetamol is one of the most extensively used analgesic and antipyretic drug. The drug is safe when used at therapeutic doses, and associated with significant hepatotoxicity when taken in overdose. Under normal conditions Paracetamol is primarily metabolized in the liver by glucuronidation and sulfation and a small proportion of the drug is metabolized by cytochrome P450 enzymes into the reactive intermediate N-acethyl-p-benzoquinoneimine (NAPQI). This metabolite is normally detoxified by glutathione (GSH), by non-enzymatically and enzymatically reactions. In overdose, sulfation and glucuronidation become saturated and GSH is depleted by NAPQI. The reduced hepatic content of glutathione may cause increased mitochondrial oxidative stress and hepatic damage

This research focuses on determining the effect of Paracetamol overdose on hepatic lipid peroxidation in rats. A total of 16 Sprague-Dawley rats were randomly divided into two groups: Group 1 included 4 normal rats that were fed with normal chow diet. Group 2 included 12 rats that were treated with Paracetamol (1g/Kg) by intragastric instillation . After 24 hours the rats were sacrificed and liver enzymes, liver histology and hepatic oxidative –antioxidative parameters were studied.

Rats with Paracetamol overdose had an increase of liver enzymes: 580% and 1092% increase in AST and LDH respectively. Administration of Paracetamol overdose was associated with the increase in the hepatic triglyceride concentrations (+29%). Hepatic levels of MDA and glutathione peroxidase were significantly higher (675% and 38%, respectively). Paracetamol overdose rats had significantly lower concentrations of hepatic alpha–tocopherol, paraoxonase activity and total glutathione content (- 55% , - 64% and -34%, respectively). No significant effects on hepatic cholesterol and glutathione reductase activity were observed.

These results suggest that oxidative stress followed by lipid peroxidation might play a role in the pathogenesis of Paracetamol-induced hepatic injury.

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Molecular Modeling of Carbon Nanotubes Dispersion in Aqueous Media

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Keywords: Carbon nanotubes, dispersion, surfactants, molecular modeling

Nanocomposite materials exhibit properties that are significantly different from those of corresponding microcomposites. Carbon Nanotubes (CNT) serve as one of the most important components of nanocomposites due to their extraordinary electrical and mechanical properties. Many researchers have devoted their efforts to understanding and exploring the use of CNT in various fields. However, to realize the potential application of CNT in nanocomposites, a major processing difficulty must be overcome: the insolubility of CNT in either water or organic solvents, which is attributed to strong Van der Waals attractive interactions and CNT and their tendency to form bundles. One of the methods to overcome that difficulty and to achieve homogeneous mixture is to use surfactants. There are many types of surfactants used for stabilizing CNT dispersion. For example, in order to disperse CNT in water, one must use an amphipatic surfactant molecule. The CNT dissolution and stabilization characteristics vary considerably with the surfactant chemical structure. A molecular level understanding of these self-assembly processes and the morphology of the resulting surfactant-coated substrate may be useful to locate appropriate surfactants for CNT in various media. Computer simulations can contribute greatly to a deeper understanding of the surfactant interactions.

The goal of this study is to evaluate the interaction energy of CNT with a large number of commercially available molecular skeletons. The interaction energy evaluation was performed using molecular dynamics methods. Based on this data, one can choose the most promising surfactant to be tested experimentally. The details of our calculations and preliminary results will be presented.

Modeling the Desorption Rates of Aged Naphthalene and Phenanthrene from Environmental Solids

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Keywords: Adsorption, desorption rate, PAHs, diffusion

Slow desorption of organic contaminants from environmental solids may be controlled by hindered pore diffusion through micropores or through soil-organic matter (SOM). Slow desorption as a result of contaminant aging can significantly affect the bioavailability of organic contaminants. Many studies have recently focused on the impact of contaminant aging on the rate and extent of mineralization or degradation in soil slurry systems. For example, aged phenanthrene in natural sediment has lower biodegradation rates as compared to freshly added phenanthrene, which demonstrates that diffusion/sorption processes impact bioavailability. In this regard, most of the studies assume that sorption is linear and desorption kinetics follow a first-order rate model. Recent investigators have proposed intraparticle diffusion coupled with linear or nonlinear sorption to describe the desorption rate of organic contaminants from environmental solids.

The objective of this batch equilibrium and rate studies was to evaluate the effect of "aging" time on rates of desorption and bioavailability using the sorption-related diffusion approach to understand the desorption rate of naphthalene and phenanthrene from Borden sand. In this work a modeling fitting of batch equilibrium and rate studies was applied to evaluate the effect of "aging" time on rates of desorption and bioavailability of naphthalene and phenanthrene from Borden sand using the sorption-related diffusion modeling approach. The advantage of this study is the successful fitting for phenanthrene and naphthalene desorption rate data from aged Borden sand using the dual-diffusion model with two fitting parameters. The results confirm prior findings that retarded diffusion is a relevant mechanism for Borden sand, but that there are at least two dominant time-scales of diffusion.

Water Soluble Copper Oxide Nanoparticles as an Antifungal Agent

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Keywords: Nanoparticles, copper oxide, fungicide, wood protection

Nanoparticles benefit from a high specific surface area and the ability to penetrate biological membranes. Bulk copper oxide (CuO) is known as an excellent fungicide and the active ingredient in common preservatives for wood treatment. However additives, sometimes highly toxic, are needed to induce the antifungal activity of bulk copper oxide.

Based on known literature procedures, a synthetic method was developed for the preparation of CuO nanoparticles smaller than 50 nm and hence readily soluble in water. The nanoparticles are characterized by several analytical tools.

Different concentrations of aqueous solutions of CuO nanoparticles were tested against *T.rubrum*, a dermatophyte and *T versicolor* and *G trabeum – wood decay* fungi. The results demonstrate that CuO nanoparticles effective in controlling fungi growth and in some cases the nanoparticles solutions were found to be lethal to the wood decay fungi. Accordingly, CuO nanoparticles may be a very prospective basis for wood protection products.

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Efficiency of Glucose Fuel Cells with Nano-Fibrous Anodes

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Keywords: Glucose, alkaline fuel cell, power, internal resistance

The fuel cell is an electrochemical device which converts chemical to electrical energy. It is known that the current supplied by fuel cells depends on the electrode surface. Efficiency of fuel cells is influenced by losses in electrodes and electrolyte too. Usually the main losses in a fuel cell are the ohmic losses which are caused by the internal resistance of electrodes and electrolyte.

In our study we used electrodes produced by the electrospinnig method to increase electrode surface. In our tests we investigated how the internal resistance of fuel cell depends on the fiber diameter of the electrode.

The internal resistance of the fuel cell, R_{FC}, was calculated by two different methods. The first was the "Voltage Divider" method. In this method, we used a sudden voltage drop down that occurred immediately after the fuel cell circuit was closed by a given Load Resistance, R_L. The second method used in this work for measuring R_{FC} was the "Current Interrupt" technique. In this method, the circuit was suddenly opened, causing an interruption in the cell’s current, immediate annulment of the ohmic losses and a sudden increase in the cell's voltage. In fact we got the same results for both methods. In addition we studied the power density for the same electrodes

The results from our tests indicate that power density increases as fiber diameter decreases, and internal resistance is smaller for larger fiber diameter. Thus proof was obtained that the efficiency of the fuel cell increases with the decrease of fiber diameter.

A New Approach to Electronic Circuit Reliability Evaluation

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Keywords: Microelectronic devices, reliability prediction, availability, reliability growth, field data, accelerated test, reliability model

Microelectronic devices chip density is limited by the reliability of the manufacture process. Design rules, such as operating voltage or switching speed, in correlation with power dissipation, are chosen to ensure a reliable functional performance. In order to determine the optimal device behavior, the reliability must be modeled for its specific operating conditions.

Unfortunately, all industrial reliability prediction methods, such as MIL-HDBK-217 or BELLCORE-TELCORDIA, are approximate, complicated and unconvincing. To overcome this difficulty, new methods to estimate and improve the VLSI reliability have been studied. Reliability Growth is a good example of tools for advanced reliability modeling and improving.

This paper discusses an approach for system reliability modeling and improving. The method is based on scored integration of reliability and availability information. Examples of such information are:
- Reliability models (metrics);
- Field data (failures, repair, costs);
- Accelerated/Stress test data (designed experiments, site-specific stress comparisons, materials analysis);
- Failure mode effects analyses (identify and confirm failure mode).

To support these assertions, the author has developed a reliability model which is applicable for certain electronic devices and systems. An example is presented.

Emerging Technologies for Realization of Three Dimensional (3D) Novel Devices

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Keywords: Vertical p-n junction, high aspect ratio trenches, sidewall doping

Among the various lateral devices emerging in recent years, most notable are both high-power and high-speed DRAM devices. The realization of three dimensional (3D) device structures remains a great challenge in microelectronics. Among the technological breakthroughs for such devices, the control of dopant implantation along silicon trench sidewalls and formation of vertical P-N junctions is a major issue.

One method of fabricating these vertical P-N junctions is by Ion Implantation technology at small angles through the sidewalls of high aspect-ratio trenches. There have been only a few studies with this approach, tackling only the issue of implantation of both sidewalls with the same dopant. In this study, however, the investigation of ion implantation of different dopants in the opposing sidewalls is proposed. 2D process simulations have been carried out in order to characterize the doping profiles of each dopant in its respective sidewall. Vertical P-N device simulations have also been carried out in order to compare with the more realistic simulations of the process. An optimization was performed in order to establish the most suitable implantation conditions for optimal device performance. Samples were prepared by Tower Semiconductor Ltd. Finally, characterization of the vertical junction profile will be presented based on Secondary Ion Mass Spectrometry (SIMS) analysis.

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Usage of Cloud Computing Services for Storing, Handling and Validation of Electronically Signed Laboratory Reports

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Keywords: Cloud computing, electronics signature, electronics laboratory

The curriculum for the B.Sc. in Electrical and Electronics Engineering includes laboratory experiments as an essential part of the study program. Students are required to write a laboratory report containing relevant raw data and experiment results. In order to focus students and educators on experiments while handling relevant reporting and administrative chores in a reliable and time-effective manner, new logistics based on publically available Google Cloud Computing Services were designed.

Using this methodology, each pair of students compiles a PC based Work Report in real-time while executing their laboratory assignments. All relevant raw data and results are immediately logged as texts, tables, graphs, screen-shots of simulation results, photos of assembled circuits, screens of laboratory devices and any other relevant texts and images. At the conclusion of the laboratory session, students add a short abstract summarizing their completed and non-finished parts. The instructor, following on-the-place (instant/immediate) verification of the originality of the results, electronically signs the MS-Word file by using a specially designed. NET software utility installed in the instructor's PDA/Cellular phone or portable computer. The signed report is g-mailed to the instructor in a special anti-spam format. The combined final grade, compiled from a number of clearly defined check-points, is calculated by an Excel file g-mailed by the student to the instructor. The students MS Word reports and Excel files are stored by using Google Cloud Computing Services, making those files available for searching, commenting and validation from any computer having an Internet connection.

The logistics were tested over seven terms (semesters) in the laboratories of the courses “Introduction to Electronics”, “Analog Electronics” and “Image Processing”. This pilot revealed that students spent less time on the technical and administrative aspects of reporting. Instant logging of nearly all results disciplines the students, resulting in better reports. Usage of Cloud Computing Storage and Search Services results in minimizing the time instructors spend on routine procedures such as logging attendance, and the collecting, searching, handling and evaluating of reports, thereby providing grades in a time-effective, consistent and well-documented fashion. Additionally, the use of developed logistics and Cloud Computing Storage and Search Services prevents well-known administrative and pedagogical problems such as “lost reports”, “inconsistent reports”, "copied reports” and inconsistent grading.

Characterizing Finite Uniform Cascade of a Two-Port Network

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Keywords: Linear systems, ladder networks, transmittance

This study addresses a linear system that consists of a finite uniform cascade of a basic two-port network. Such systems appear in sensor networks where an array of sensors is modeled by a uniform cascade of a repeated two-port front-end network. Another instance where such networks are of interest is the modeling of distributed systems by a finite discrete approximation of lumped elements.

The basic results presented here relate to a general characterization of the cascade system as a function of the elements' values of the basic two-port network. Several results may be deduced from this characterization. The analysis results are applied to noise, bandwidth and gain performance of the cascade system as a function of the number of its basic two-port network repeated blocks. Two cases are investigated including normalized and un-normalized elements' values of the basic two-port network by the number of repeated blocks.

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Use of the Cognitive Radio Scheme Based Dynamic SNR to Reduce the Handoff Call Blocking Probability in Cellular Networks

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Keywords: Cognitive radio, cellular networks, handoff

The fourth generation of mobile communication aims to transmit not only voice and text but also videos and multimedia data. Furthermore, in the future it is expected to include web browsing, file transfer and database access. This requires wireless cellular networks to efficiently support packet data traffic. Therefore, the challenge in the design of wireless networks is to support both voice and packet data service of traffic with different quality of service parameters. On the other hand one aspect of this challenge is to develop an efficient scheme for assigning resources to new arriving calls or handoff of different traffic types. Since the blocking probability is one of the most important qualities of service parameters, the quality of service of wireless cellular networks is often measured in terms of two probabilities. The first is the new call blocking probability so that a new call cannot be satisfied because of the unavailability of a proper free channel; and the second is the handoff blocking probability that a proper free channel is not available when a mobile station wants to move into a neighboring cell. To meet this aspect of the challenge, this proposal offers a new assignment scheme based on cognitive radio (CR) to utilize frequency spectrum efficiently and to reduce call blocking probabilities. Cognitive radio offers new tools to manage the resources and to communicate efficiently avoiding interference in cellular systems. Cognitive radio is a new and novel way of thinking about wireless communications. Using cognitive radio in cellular systems will lead to a revolution in wireless communication with significant impacts on technology as well as regulation of spectrum usage to overcome existing lacks. The cognitive radio is a self-aware communication system that efficiently uses spectrum in an intelligent way. Spectrum sensing is defined as the task of finding spectrum holes by sensing the radio spectrum in the local neighborhood of the cognitive radio receiver in an unsupervised manner. The term “spectrum holes” stands for those sub-bands of the radio spectrum that are underutilized at a particular instance of time and specific geographic location. The task of spectrum sensing involves the following subtasks: detection of spectrum holes, spectral resolution of each spectrum holes, estimation of the spatial directions of incoming interference, and signal classification. After sensing is finding a good transmission strategy that is aware of its surrounding environment to adapt transmission parameters to the environment and the interference situation. Spectrum sensing autonomously coordinates the usage of spectrum in identifying unused radio spectrum based on observing spectrum usage. Cognitive radios provide, besides cognition in radio resource management, also cognition in services and applications.

Inorganic Fuel Cells in Braude 2008-2009

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Keywords: Alkaline fuel cell, glucose catalytic anode

Our group is dedicated to developing a fuel cell fuelled by glucose. The important accomplishment obtained during 2008-2009 has been to develop a new glucose catalytic anode. This anode differs from the electrospinning anode produced in cooperation with the Technion and previously used by our group. The new anode is highly reproducible and very low cost. The highest power obtained until now is 14.8 W/m^2. This figure is 7 times higher than the last reported one, using the electrospinning anode. We are optimistic about the probability increase the performance of the cell up to commerciable (this word does not exist – I suggest the expression ‘commercially viable’) power values.

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Set-Based Design and Evolution (SBDE)

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Keywords: Evolutionary multi-objective optimization, engineering design

SBDE is the design by evolution of either a solution, which is represented by a set, or a design of a set of solutions. An example for the former is the evolution of solutions, which are associated with uncertainty in their design variables. In such a case, apart from the nominal case, there is a set of possible realizations for that specific solution. Evolving such solutions should take into account the multi-representations of each solution within the objective space. An example for the latter, is the evolution of a set of solutions, each associated with a different problem but coupled through the use of common component (either 'common components' OR 'a common component). In that case the entire set is the solution to the problem.

It becomes apparent that SBDE is not just evolutionary algorithms, suggested in order to solve existing engineering problems, but also, serves as a base for introducing new engineering problems and approaches.

In the study, we aim at surveying the state-of-the-art as related to SBDE and report on our current studies and research directions within this framework. The studies are conducted in cooperation with several researchers including Amiram Moshaiov (TAU-Israel), Jürgen Branke (AIFB-Germany) Carlos Coello and Oliver Shuteze (Cvintav-Mexico), Erella Eisenstadt, Uri Ben Hannan, Alex Goldvard, Gideon Avigad and Miri Weiss (OBC – Israel). The research directions include various aspects of SBDE such as the Pareto layer, Robotic assortment, worst case evolution, reuse by evolutionary multi objective optimization and more.

In the talk these different approaches will be discussed, and the analytical aspects, briefly explained.

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The Multi-Single Objective Problem and its Solution by Way of Evolutionary Algorithms

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Keywords: Family of designs, multi-objective optimization, evolutionary computation

Sharing components among products is an effective way to cut costs. Expenses are decreased through the reduction in components' design time as well as through savings in manufacturing costs and inventory. By sharing components and production processes among products, companies can develop differentiated products efficiently, increase the flexibility and responsiveness of their manufacturing processes, and take market share away from competitors who develop only one product at a time. Most of the attempts to share components between products are associated with the design of a product family. A product family is a group of related products that share common components and/or subsystems, yet satisfy a variety of market niches. An example for such sharing is the design of a common cockpit for several different aircrafts.

Viewing the current state-of-the-art, it seems that, although sharing of components has been investigated as related to the same objective space, nevertheless the study of sharing within different objective spaces has been neglected. It seems that sharing components between solutions to different SOPs should be an interesting and challenging problem in its own right. This feeling is related to the fact that generally, optimization is practiced in association with single objective problems (although it is recognized that most engineering problems are MOPs) or with MOPs with a predefined utility function. This means that, although the attitude is changing, in the common case (or 'commonly'), the industry is interested in a single solution and not in the Pareto set of solutions. Moreover, in the process of educating new engineers (e.g. within the academic environment/setting) single objective problems are simpler to comprehend and explain.

In the study we look at a relaxed multi-multi objective problem and introduce the multi-single optimization problem. It is an extension to the work introduced in the 4th ORT Braude Interdisciplinary Research Conference by Gilad Harpaz (ORT Braude student) and Gideon Avigad. In the current study we define this design problem and consider three approaches for solving it. Specifically, these approaches are the sequential, the surrogate SOP, and the surrogate MOP approaches. For each of the approaches, a formulation of a design problem is suggested and an evolutionary computation algorithm to solve it is explored. Moreover, a comparison between the approaches is conducted. The results of running the algorithms on different examples demonstrate the applicability of the suggested problem and its solution to real life engineering problems. We are now working on some other implications of the problem, e.g., to multi-unmanned vehicles routing.

Comparing Cooling Methods on Extracted Teeth

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Keywords: Dental bur, grinding, cooling grinding process

The current dental bur cooling method used in high speed hand-pieces is based on water jets aimed towards the center of the dental bur. The number of jets varies from one to five depending on the hand piece type. A double jet hand piece was used in the current study with cooling water capacity of 2.7 ml/sec. This common cooling method is the external cooling one. In this research a comparison between external and internal cooling methods was carried out. For the sake of comparison between the external and the internal cooling methods a special setup was designed. The three main components of the setup were: a special adaptor for injecting the water into a hollow bur, a tooth holder submerged in a water bath with constant water temperature and a temperature monitoring system. The adaptor was designed to be mounted instead of the upper cover of a Kavo model 625 hand-piece. This design allows accurate placement of the epidermic needle at the center of the hollow bur. The adaptor and the hand piece are now a one unit system which is as comfortable to work with as a conventional hand piece. Extracted teeth were prepared in advance by a dentistry student. The preparation included cleaning the tooth pulp chamber and placing a thermocouple inside, a special silicon paste was used in order to ensure good heat conduction between the tooth and the thermocouple. After placing the thermocouple, the pulp chamber was sealed and X-rayed in order to make sure that the thermocouple was in place. During the experiments the tooth was held by a special holder and the lower part of the tooth was kept at a constant temperature close to 34^0 C, a value typical for a human mouth. The temperature changes during the grinding process were recorded. The experiments were designed to compare the temperature changes in the tooth pulp chamber while preparing a slot from one side with the common external cooling and another one from the opposite side with internal cooling.

The experiments were conducted by a well trained dentistry student from the School of Dentistry at the Tel-Aviv University. In addition to the goal of comparing the heat removal efficiency of the two cooling methods, it was important to get the students' impression of the internal cooling method. The results of the experiments show a significant difference in temperature rise between the two cooling methods. the temperature was more than 3^0 C lower with the internal cooling method than with the external cooling method. Another important result was the students' impression that internal cooling produces less mist and that visibility is much better than with external cooling.

Acknowledgement: This study was supported by a MAGNETON grant from the Israeli Ministry of Industry, Trade and Labor.

The Influence of the Cooling Rate on Bulk Metallic Glass Formation in $Mg_{80}Cu_{15}Y_5$ and $Mg_{80}Cu_{10}Y_{10}$

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Keywords: $Mg_{80}Cu_{15}Y_5$, $Mg_{80}Cu_{10}Y_{10}$, metallic glass, gravity casting, melt spinning

Magnesium alloys are attractive for engineering applications such as the automotive industry due to their good physical properties, namely high strength, light weight, good damping absorption and good thermal and electrical conductivity. Furthermore, amorphous magnesium alloys exhibit higher strength, hardness and a large elastic domain in addition to excellent corrosion resistance. Until the 1980s very high cooling rates were required in order to avoid crystallization, leading to the availability of metallic glasses only as thin foils, i.e. splats or ribbons. Today, due to appropriate chemical compositions, bulk metallic glasses (BMG) can be produced. Among the various existing magnesium alloys, the Mg-Cu-Y system is known as one of the best glass formers.

Two compositions were chosen for the current study, namely, $Mg_{80}Cu_{15}Y_5$ and $Mg_{80}Cu_{10}Y_{10}$. Different casting processes applied on both compositions yielded four different microstructures that were characterized by means of X-ray diffraction (XRD), Scanning Electron Microscopy (SEM), High Resolution Scanning Electron Microscopy (HRSEM) and EDS chemical analysis. The different casting procedures were gravity castings of 3 mm diameter specimens into a copper mold held at different temperatures [cooled to -195^0C with the aid of liquid nitrogen, held at room temperature (RT) and heated to 300^0C], and melt-spinning. Only the melt spun specimen yielded what appeared to be an amorphous XRD spectrum.

A detailed microstructure study was then performed on the melt spun specimens by utilizing Transmission Electron Microscopy (TEM) and High Resolution Transmission Electron Microscopy (HRTEM). The above mentioned investigation revealed micro- or even nanocrystalline rather than amorphous structure. These findings will be discussed in detail.

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Improving Instruction Level Parallelism Using Fast Evaluation Techniques of Algebraic Circuits

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Keywords: Algebraic Circuits, Reconfigurable Architectures, compilation techniques

We consider a scheduling technique for reconfigurable architectures based on fast evaluation techniques of algebraic circuits (AC)s. In particular our motivation is based on the existence of parallel algorithms which (in certain cases) can evaluate algebraic circuits faster than their depth. Intuitively such algorithms work by reducing the height of a given AC allowing a larger portion of the AC to be computed in parallel.

We propose to use such algorithms as a compilation technique that can effectively improve parallelism and consequently reconfigurable architectures scheduling (based on the fact that the depth of the resulting circuit is less than the original one). We explain the general idea, propose an evaluation algorithm based on algebraic simplifications, and demonstrate its effectiveness.

On the Query Complexity of Testing Orientations for Being Eulerian

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Keywords: Property testing, Eulerian orientations, orientation model, graph algorithms

Property testing deals with the following relaxation of decision problems: Given a property P and an input structure S, distinguish with high probability between the case where S satisfies the property P and the case where S is "far" from satisfying P. A tester is a randomized algorithm which answers such a question by reading only a small part of the input S, using retrieval procedures that we call queries. Property testing normally deals with very large input structures and/or with costly queries, and thus, the query complexity is assumed to be the most limited resource, rather than the computation time. A great deal of research in property testing is dedicated to graph properties. In most of the testing models, the input is a directed or undirected graph represented by an adjacency matrix or adjacency lists, whose entries are read through queries. In this work we consider the Orientation model suggested by Halevy et. al[*]. Here, the input is an orientation of an undirected graph, whose structure is known in advance. The distance between two orientations is defined as the fraction of edges in which they defer. Compared to the standard models, the Orientation model may be more appropriate in cases where the cost of adding or removing a link between two nodes in the graph is significantly higher than the cost of changing the direction of an existing link. Furthermore, the model gives us greater expressibility, as our algorithms tend to depend strongly on the structure of the graph. We consider the well-studied orientation property of being Eulerian. A graph orientation is called Eulerian if the in-degree of every node is equal to its out-degree. An orientation which is not Eulerian may be corrected by inverting edges along directed paths, each of which go from an unbalanced vertex with an excessive out-degree to an unbalanced vertex with an excessive in-degree.

We give three generic tests that distinguish between Eulerian orientations and orientations which require many such correction paths. Then, we devise lower bounds on the number of required correction paths for orientations that are far from being Euleiran. This gives us tests whose query complexity is constant for dense graphs and expander graphs. We then show that every graph may be decomposed into subgraphs with a relaxed expansion property, obtaining a sub-linear test for general graphs. On the negative side, we show that there exists no test whose query complexity is constant, even if we restrict ourselves to bounded-degree graphs. This is somewhat surprising, as orientation of such graphs may be detected as non-Eulerian by querying a constant number of edges.

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Device Independent User Interface Specification

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Keywords: Software engineering, user interfaces

It is sometimes required to run the same computer program (computer application) on different devices, for example on a PC and on a cellular phone. A Graphical User Interface (GUI) designed to fill the large PC screen will usually be too large for the small cellular phone screen. A state of the art solution is to have two different versions of the program. There will thus in our example be a PC version that produces a GUI that fits into the large PC screen and a cellular phone version that produces a GUI that fits into its small screen. The development of a separate version of a program for each one of the different devices may involve a considerable effort. Furthermore, each later program correction or program extension must be introduced in each one of the different versions of the program. The solution employed in the experimental WebSI system is to specify the GUI by its purpose. For example for the purpose of selecting one of n different choices, a PC GUI may be composed of n large legible radio buttons, while a cellular phone GUI may be a space saving folding menu. Our method employs separate codes for the application and for the GUI generation. A program for a PC is produced by combining the application code with a code producing a PC GUI, while a program for the cellular phone is produced by combining the application code with code producing cellular phone GUI. The same single application code version is thus employed in both cases.

A Comparative Approach to Microarray Data Analysis

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Keywords: Microarrays, clustering analysis, feature selection

Recent research in molecular biology and genetics has shifted from the study of individual genes to the exploration of the entire genome. Microarrays are one of the techniques used to measure the expression levels of thousands of genes in a single experiment. Due to a huge amount of derived data, development of effective algorithms of analysis and handling of microarray data is critical for utilization of this technology. Applying clustering analysis to microarray data processing is effective in decision of many tasks of the area. One of such tasks is to find genes most relevant to some disease.

Traditionally, a bottleneck occurs in this task as a comparable dataset of ‘health’ samples is required. Our approach allows the selection of genes characterizing a specific disease without using a ‘health’ dataset. We work on a dataset containing subsets of samples concerning different sub-diagnoses of a given disease. To obtain a set of *active genes* which characterizes the whole disease, first we calculate a set of genes which are most differentially expressed in a considered sub-diagnosis and its complement in the given dataset. To compare two sets of samples we calculate a distance between those sets for each gene. Then we clusterize those distances to pick out the most differentially expressed genes of the two specific sets. Composing active gene groups of all existing sub-diagnoses, we construct a group of genes which are active for the whole disease. With this procedure we ignore genes which are not related to the disease being analyzed. Furthermore, we work with active genes only, and repeat our procedure comparing gene expressions on different sub-diagnoses.

Our approach was evaluated on the widely known Leukemia Dataset. For this dataset we receive a representative group of genes which characterizes leukemia.

Our approach picks out a gene group which is sufficiently stable in several independent datasets. Since the fitting gene group is stable on different datasets, choosing in such a way genes are very perspective for deeper investigations of their influence on the disease.

Machine-Assisted Design of Business Processes Using Descriptor Similarity

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Keywords: Adaptive and context-aware process design, business process repositories, business process integration and management, process choreographies, semantic Web

The growth in the number of available business processes opens up opportunities for the reuse of existing organizational activities for the generation of new business processes. In this work we investigate a method for the structured generation of business processes using a process repository with standardized format and taxonomy. We propose a method to use a structured representation of activities of existing business processes in generating a search space that contains both existing and new activities. We discuss ways for determining the “distance” between activities and suggest machine-assisted methods for navigating within this search space as a tool to assist designers in the design of new business processes. We illustrate our approach and demonstrate its benefits using an aviation industry case study.

Lower Bounds on the Minimum Average Distance of Binary Codes

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Keywords: Binary codes, minimum average distance, linear programming

Let $F_2^n = \{0,1\}^n$ be the n-dimensional vector space over the binary field $F_2 = \{0,1\}$. The Hamming distance between two vectors x and y is the number of components in which they differ, and is denoted by $d(x,y)$. A nonempty subset C of F_2^n with size M is called a binary (n,M) code. The average Hamming distance of C is defined by $d(C) = \frac{1}{M^2}\sum_{x\in C}\sum_{y\in C} d(x,y)$. The minimum average Hamming distance of a binary (n,M) code is defined by $\beta(n,M) = \min\{d(C)\}$ where the minimum is taken over all the binary (n,M) codes. In 1977, Ahlswede and Katona [1] proposed the isoperimetric problem on the extremal combinatorics of Hamming space of determining $\beta(n,M)$ for every $1 \le M \le 2^n$. Ahlswede and Althöfer [2] observed that this problem also occurs in the construction of good codes for write-efficient memories, introduced by Ahlswede and Zhang [3] as a model for storing and updating information on a rewritable medium with cost constraints. This problem also equivalent to a cocycle covering problem in graph theory [4].

In general, exact values of $\beta(n,M)$ are known only for small values of M, and for some special cases $(M = 2^n, 2^{n-1}, 2^{n-2})$. Upper bounds are obtained by constructions. A survey on the known upper bounds is appeared in [4]. In this work we consider the lower bounds on $\beta(n,M)$. All the known lower bounds on $\beta(n,M)$ are useful when M is at least of size $2^{n-1}/n$ ([5],[6]). We derive new lower bounds which give good estimations when size of M is about n. These bounds are obtained using Delsarte's linear programming approach. In particular, it is proved that $\lim_{n\to\infty}\beta(n,2n) = 5/2$ and $\lim_{n\to\infty}\beta(n,4n) = 3$. We also give a new recursive inequality for $\beta(n,M)$.

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Energy-Efficient Circular Sector Sensing Coverage Model for Wireless Sensor Networks

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Keywords: Wireless Sensor Networks, sensing coverage, energy efficiency, circular sector model

Reducing the energy consumption in Wireless Sensor Networks (WSN) is an important goal, sought to extend the life-expectancy of the networks. One of the main problems in actual implementation is their inherently limited life-span, due to the (usually) not field-replaceable energy source. The energy consumption is due to the data and management communication, messages, sensing, processing (and storage) activities of the motes. The sensing may be local, e.g. temperature, radiation, humidity or similar physical measurement. There are a lot of applications, civilian or military alike, which implement some remote discovery, localization or tracking activities. In this case, the active sensing is performed mainly by emitting light, electromagnetic or sound waves. Obviously this imposes a heavy burden on the limited energy resources available to the mote, shortening its life and consequently the life of the WSN itself. Previously published sensing models use a circular coverage area around the motes, with fixed (unit-disk) or variable radius. Our work proposes a more energy-efficient sensing model, based on circular sectors with variable angles and radii, negotiated between the motes, as a function of their current energy capabilities. The performance of this model was checked vs. previously published schemes, using a proprietary simulation program, developed specifically for this purpose. The paper presents the results of simulations, showing significant energy savings. The data obtained confirm the viability and the advantages of this new sensing model. The possible implementation of such a WSN will significantly improve the energy-related performance of the WSN, allowing the development of new applications and improving the performance of existing ones.

On Application of the K-Nearest Neighbors Approach for Cluster Validation

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Keywords: Clustering, cluster validation, stability, two sample test

The term K Nearest Neighbor associates a data element with its closest data elements. It is widely used in the classification of data elements. In the present paper we apply the term in the validation of a clustering procedure. We base our method on the idea that when two stable partitions are compared, then each closest neighbor of a data element should have a probability of 1/2 of belonging to any of the partitions. This idea leads to a binomial distribution of the number of neighboring elements belonging to a partition. Upon this distribution we build a statistical validation test of cluster stability. The goodness of the proposed method is exhibited by several numerical experiments. The true number of clusters is detected in all experiments.

A Minimal Spanning Trees Approach to Cluster Stability Problem

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Keywords: Clustering, cluster stability, minimal spanning tree, two sample test, data mining

Among the areas of data and text mining which are employed today in science, economy and technology, clustering theory serves as a preprocessing step in the data analyzing. However, there are many open questions still waiting for a theoretical and practical treatment, e.g., the problem of determining the true number of clusters has not been satisfactorily solved. In the current paper, this problem is addressed by the cluster stability approach. For several possible numbers of clusters we estimate the stability of partitions obtained from clustering of samples. Partitions are considered consistent if their clusters are stable. Clusters validity is measured as the total number of edges, in the clusters' minimal spanning trees, connecting points from different samples. Actually, we use the Friedman and Rafsky two sample test statistic. The homogeneity hypothesis, of well mingled samples within the clusters, leads to asymptotic normal distribution of the considered statistic. Resting upon this fact, the standard score of the mentioned edges quantity is set, and the partition quality is represented by the worst cluster corresponding to the minimal standard score value. It is natural to expect that the true number of clusters can be characterized by the empirical distribution having the shortest left tail. The proposed methodology sequentially creates the described value distribution and estimates its left-asymmetry. Numerical experiments, presented in the paper, demonstrate the ability of the approach to detect the true number of clusters.

On Characteristic Function of Generalized Convolutions

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Keywords: Generalized convolutions, stable distributions, hypergroups.

A notion of generalized convolutions was introduced by K. Urbanik in the fundamental paper as a commutative binary operation on probability measures on the non-negative half-line satisfying five axioms. The general and flexible "Urbanik system" inspired many researches to investigate this construction and compare it to the known classical analogues. The most of probability objects hitherto studied for classical convolutions are being investigated in this or that form in the framework of the generalized convolutions theory. Our talk is devoted to a survey of the analytical properties of the generalized convolution algebras and their realizations. This issue appears to still actually because of the fact that intensive research of the generalized convolution and connected models is being continued.

Reconstruction of 3D Models from Measurements Obtained by a Moving Sensor

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Keywords: Geometrical modeling, graph theory, Kalman filtering, parameter estimation

A comprehensive method for automatically constructing a 3D solid model from orthographic views obtained by a moving sensor is suggested. The views are constructed from sensors, e.g. distancemeters or cameras, in an automatic fashion using estimation techniques.

The raw distance measurements are processed via a filter that generates estimates of the part dimensions and position. The fact that the outcome of the estimation (measurement) process is a set of explicit contour equations is suitable for the second step, which is creating a 3D model from the orthographic views through a graph theoretic approach.

The process is implemented by using variational geometry representation and graph theoretic tools that enable us to construct a composite graph representing the 3D object. Results of the composite graph are translated into a boundary representation object.

Axisymmetric Intrusions with a Source Term in Linearly Stratified Ambient

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Keywords: Intrusion, axisymmetric, stratified, source

The axisymmetric intrusion of a fixed volume of fluid which is released from rest and then propagates radially at the neutral buoyancy level in a deep linearly stratified ambient fluid, has been widely investigated. However, in many practical cases the motion of intrusive gravity currents is affected by additional external effects. We discuss an important extension of the fixed-volume classical intrusions: a flow generated by an external line source with constant volumetric flow rate Q which is assumed to be located at the origin. Inertia-buoyancy controlled axisymmeric intrusive gravity currents are discussed. The shallow-water theory is presented for this case. The problem is solved numerically and long-term similarity solutions are found. A new approach to finding the analytical similarity solutions is presented .The results obtained numerically and analytically are compared with the experimental data and show good agreement.

Ternary Ordinal Quality Data: Interpretation and Process Control

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Keywords: Quality measures, ternary Scale, SPC, delta method

In the theory and practice of quality engineering and management, many phenomena are measured on an ordinal scale. For instance, quality level estimation, customer satisfaction surveys, QFD methods, FMECA analysis, etc. are all assessed in this way.

The common approach when dealing with such measures is to convert an ordinal estimation into a numerical one by assigning numerical values to each category of the ordinal variable. This procedure is undesirable because it can lead to misunderstanding and misinterpretation of the measurement results. Recently, an alternative approach for dealing with ternary ordinal quality variables, based on constructing a quality ladder, was proposed by the authors.

We proposed a mechanism for constructing a quality ladder based on a proportion ratio criterion. This criterion is used as an ordering mechanism for sorting samples of the same size as the given sample, from the sample that has the lowest quality up to the sample that has the highest quality, according to the increasing ratio between the proportion of items (in the sample) relating to the two highest quality levels and the proportion of elements (in the same sample) relating to the two lowest quality levels. The quality represented by sample data is measured as the relative position of the given sample in a quality ladder built for samples of the same size as the given sample. For estimating quality variation within a sample, we used the Blair and Lacy dispersion measure (obtained for ordinal data). Aiming to facilitate process quality monitoring via control charts using SPC procedures, a suitable executable program was developed, designed for small samples because of computation limitations.

Two case studies demonstrated applications of the proposed approach: (a) monitoring of the conditions of patients visiting their Israeli health maintenance organization; and (b) severity of traffic accidents in Israel for 1996-2007. The case studies described above were published in "*Quality and Reliability Engineering International*" in 2008.

At present, in order to handle large samples we are working on suitable approximations for the dispersion of the quality measure and its variation using the so-called multivariate delta method. The usage of these approximate expressions has significantly simplified the SPC procedure and its implementation.

In summary, the study presents an alternative way to deal with quality data measured according to a ternary ordinal scale based solely on ordinal considerations, without any assumptions about a latent scale assigned to the ordinal quality levels.

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A Framework for Service Quality Deployment

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Keywords: Service Quality, Quality Function Deployment (QFD)

This study develops a causal model that uses a cause and effect diagram to illustrate the behavior of a service quality system.

The model is designed to reveal where the quality of service characteristics requires improvement, as highlighted by the customers. Once this is done, the model translates the deficiencies into internal improvement needs, as viewed by the agents, managers and technologists of the organization under study.

With this model, a service organization can map the system’s gaps and determine which activities need work.

The model's output is an investment prioritization of the different activities, which down the line influence the quality of service characteristics, as the gaps pinpointed by the model are closed.

A generic service framework that provides a global overview of the important components of different hierarchical levels of a service system is developed. The framework comprises six dimensions: service quality, worker attitude, organization features, information, technology and improvement actions. The basic idea is that in addition to measuring service quality characteristics, an enterprise should monitor characteristics that are likely to influence its future service quality characteristics. The framework is, in essence, a causal model, which assumes that the improvement actions affects the service quality characteristics through two paths – (1) organization features and worker attitude, and (2) technology and information.

A Quality Function Deployment (QFD) method, a product quality design methodology, is used for applying the generic service framework in an individual organization.

The Mean Square Error (MSE) criterion enables the pinpointing of the few essential service characteristics that require improvement in each service dimension.

The model was implemented in a "call center" run by a bank in order to manage incoming product support and information inquiries from consumers.

The model identified the following service deficiencies in the call center: In the worker’s attitude dimension, worker satisfaction and service awareness were below standard. In the information dimension, the organization should focus on the quality and the transfer speed of the information. The organization should also pay attention and improve the quality of the technology dimension, and the efficiency, the work atmosphere and the environment when it comes to organizational features.

The recommendations that emerged from these results were that the organization should focus on investing in equipment, take care of employee qualifications, and establish new organizational connections.

The characteristics within each dimension of the causal model will change from one organization to another as well as the degree of the gaps, and therefore, the investment prioritization will have to be set up accordingly.

The Problem with Strategy Validation: The Absence of the Major Premise

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Keywords: Organizational learning, epistemology, theory-of-action, critical rationalism

Strategies, especially if intended, rest upon a causal theory (other sorts of theories, e.g. structural, are beyond our interest): a rational explanation of the surrounding environment held by the strategist. The theory, first and foremost, demarcates the environment in question; secondly, it names the concepts included therein; and thirdly, it depicts the interrelationships among those concepts. Needless to say, a false theory undermines the emanating strategy. Therefore the validity of the theory has always drawn much attention throughout the management and organizational learning literature.

Knowledge, its validity and truth, are associated with the philosophical branch of epistemology and are at the heart of the philosophy of science. The aim of this study is to investigate the strategic theory's validation from an epistemological perspective. This is a significant deviation from mainstream management research, which typically takes a cognitive standpoint. In science, the growth of knowledge is regarded as a two-phase process: discovery and justification. The former is where a theory emerges, and the latter is where it is validated. A prominent philosopher is identified with each phase: Thomas Kuhn with discovery, and Karl Popper with justification. Both criticize each other vehemently. Kuhn adopts the conventionalist view and argues that "truth" is a matter of social agreement, (a.k.a.) i.e. a paradigm. Popper is rationalist and for him the truth stems from deductive logic. Concerning the strategic theory in point, the management literature reflects by and large the Kuhnian stance, and the vast majority of the remedies aimed at the theory's improvement deal with the discovery phase. Given that despite all those efforts the problem still exists, one may wish to employ the Popperian doctrine in order to address the phase of justification. The study discovers/reveals that the structure of the strategic theory hinders such an attempt. Popper's logical method (called *critical rationalism*) exercises a syllogistic form, in which the tested theory constitutes the major premise and the hypotheses stand for the minor premise(s). That way the rejection of a hypothesis indicates the theory's falsity. In contrast, the two main accounts of theories held by organizations (March & Simon's *means-ends construct* and Argyris' *theory-of-action*) depict a/the hierarchical deduction of hypotheses which is empty at the top – a phenomenon known as *causal ambiguity*. Hence the falsehood of a hypothesis within the hierarchy has no background on which to project. In other words, the major premise is missing. This finding crystallizes a significant weakness in organizational learning, namely the lack of formalized strategic theory. The articulation of such a theory should be subject to further investigation (which is under way).

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Waiting Time in the Sequential Occupancy Problem

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Keywords: Bose-Einstein statistics, indistinguishable items, generating function, waiting time, sequential trials, group throwing

Occupancy Problems Models are constructed and used to analyze randomized phenomena. The models can be classified as one of three categories, each of which corresponds to a well-known physical system: Maxwell-Boltzmann (MB), Bose-Einstein (BE) or Fermi-Dirac (FD) statistics.

We studied the case of sequential trials using a BE model in each trial, i.e. a group of indistinguishable balls were thrown into distinguishable cells with unlimited capacity.

We focused on the waiting time until each cell is occupied by at least one ball.

Decomposition of the waiting time in terms of the number of new filled cells per trial is achieved by the use of recursion generating probability functions.

An application of SQC to the machine's arms that produced the same products gathered in the same collecting zone (products have no mark that identifies the machine arms that produced them) is given.

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On Interpretation of Marketing Messages Across Realities

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Keywords: Advertisement, copywriting, message, communication, reality, awareness

Sometimes a slogan misses its audience. Sometimes a slogan misses its audience. The reasons vary: for instance, the slogan may be unclear or too sophisticated. In this paper we wish to hypothesize another reason: that the reality in which the slogan has been created is different from that of the addressee; different to the extent that the original meaning is untransferable. The philosophical basis for this argument is that of Martin Heidegger, known as "being and time". Heidegger was concerned with the inability to understand texts across contexts being context time- or culture- related. The inability he points to is beyond mere translation; neither is it a conceptual gap. The essence is that the very usage of words reflects a reality within which one exists, and the emphasis is on "within": one is unable to think beyond this envelope. Projected on the realm of advertisement, we suggest that due to dissimilar realities a message can be literally "out of context". In such a case, mere translation or other oral adaptation will fall too short. We propose another perspective: that the advertiser has to encapsulate the appropriate reality in which the message does make sense together with the message. Stated differently, the message should incorporate the original reality wherein it "lives".

Consider the following example: up to the 1907's the typical Israeli kitchen was very modest, small and simply furnished. The social climate in the country was ascetic, and chasing after luxury seemed inappropriate. Under those circumstances some entrepreneurs in the building industry wished to differentiate themselves by offering more modern facilities, kitchen included. Rather than announcing the details, they invented the slogan "American kitchen", standing at once for size, equipment and functionality. Although few people knew at the time how a kitchen really looked in America, the message worked: the word "America" carried the imagined reality of well-being and prosperity. Another example sheds light on the elusiveness of such a cross-reality transfer. Consider the slogan "Coffee to-go": in a busy, hectic metropolitan environment, watching one who grabs a cup of coffee on the run from the metro to the office is commonplace. In contrast, in a milder setting (such as a rural area, small town or an otherwise tranquil society), sipping-while-walking may sound insane. Is a copywriter, who is most probably rooted in the former milieu, capable of noticing the dissimilarity? According to Heidegger, the answer is no. An attempt to see outside one's reality is like the Baron Münchhausen trying to escape from the quagmire by pulling his own hair. One is simply unaware of being confined in a reality; therefore one does not see other horizons. Awareness is the key.

The aim of this paper is to suggest "reality transfer" as a new conceptualization in the advertising context. It contributes another lens in order to discern, analyze and understand meaningless slogans, and above all to turn on the advertiser's awareness to the trap of "being confined inside a reality".

A Probabilistic One-Time Special Purchasing Opportunity

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Keywords: Special purchasing opportunity, discounting, order-up-to-level

Inventory controllers, who replenish a certain item on a regular basis, may encounter a special opportunity to purchase the item at a reduced price. Of particular interest is the case where there is a probabilistic one-time special purchasing opportunity (with known probability) that may occur in the future. The inventory controller can improve the performance of the inventory system by taking advantage of this possible special purchasing opportunity. We propose a model in which we integrate a probabilistic one-time special purchasing opportunity with the on-going replenishment decisions taking into account discounting effects. We show how this single probabilistic opportunity affects the optimal regular replenishment policy and the associated optimal quantities. This paper contributes to the literature by relaxing the requirement that the special purchasing opportunity is a recurrent event. Also we relax the assumption that the special purchasing opportunity happens with probability 1. Moreover, we properly balance present and future costs by continuously discounting all costs. It turns out that threshold values of two key parameters, namely, the probability of occurrence and the remaining time until the moment of the possible special purchasing opportunity, define the nature of the optimal policy and solution.

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A Cross-Cultural Study of Human Resource Information Systems

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Keywords: Information system, communication, national values, human resource

In an era striving for excellence, human resource management (HRM) has become a crucial source of competitiveness. Pfeffer (1995) reported that the five best performing firms in the US from 1972 to 1992 relied less on technology, patents or strategic positioning than on the effective management of their workforce for sustaining their competitive advantage in the marketplace. An important development in improving the effectiveness of HR in organizations is the incorporation of information technology systems for the purposes of collecting, organizing, and disseminating HR-related information to users and decision makers (Lin, 1998). However, at this point, the factors that contribute to the successful implementation and use of information technology systems in the human resource area remain to be identified and examined (cf. Leidner & Kayworth, 2005; Kossek et al., 1994).

In today's increasingly global economy, one important factor that may affect the implementation of information technology in HRM is national culture (see review by Leidner & Kayworth , 2006). There is a clear need for more research on the effect of national (societal) values on HR-related information technology systems and on individual reactions to such systems in different cultures.

Using two large and independent databases, this study explored: (a) the influence of national values on human resource information system (HRIS) variables (type of HRIS and information system communication design) adopted by organizations; and (b) the contribution of the level of fit between national values and these HRIS practices to two key organizational performance indicators: absenteeism and turnover. Results showed that national values explained HRIS practices and supported the hypothesized interactive effects of national values and HRIS practices on absenteeism and turnover. The results have strong implications for organizations concerned with improving their performance by maximizing the fit between their culture and HRIS practices.

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Methods for Activating the Decision Making Process that is Used for Controlling Flexible Manufacturing Systems

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Keywords: FMS control, adaptive scheduling, decision making process activation, simulation based control

This paper deals with controlling flexible manufacturing systems (FMS) operating in volatile production environments. Shnits et al. (2004) and Shnits and Sinreich (2006) developed a multi-criteria dynamic scheduling mechanism for controlling an FMS that can cope with such environments. An important part of the functioning of this mechanism, which impinges directly on its performance, is the activation of its decision-making process.

This study continues the research presented in the above mentioned papers and proposes different triggering methods for activating the control system decision-making process. The main difference between these methods is related to timing and the conditions needed to activate the decision-making process. In this study the operational conditions for each suggested triggering method were analyzed and a comparative analysis between these methods was performed.

Based on the simulation tests performed, it was revealed that the highly dynamic triggering method, which activates the decision-making process right before a resource becomes available, outperformed the triggering methods that use a predefined scheduling period. Among the methods that use a predefined scheduling period, the methods, which are based on the gap between actual and planned performance performed better. In general, it can be concluded that the more dynamic methods that respond in real-time to changes in system status achieve better system performance.

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Interrelationships between Technological Innovation and Business Performance Measures in Galilee Businesses

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Keywords: Technological innovation, performance measurement, effectiveness, data envelopment analysis

Technological Innovation (TI) is the process of acquiring new or improved capabilities, or providing increased value for customers. In earlier stages of the research we developed a systematic methodology and a three-level DEA based model for quantitatively measuring the TI process extent and effectiveness in businesses. The model consists of eight main input factors and six main output factors of the TI process. Each main input and output is an aggregation of several sub-factors that reflect different aspects of the TI process. Altogether, the model takes into account 61 factors: 45 input items and 16 output items. The model measures the effectiveness of the TI process by two different types of measures: (a) relative measures, which assess the business relative to the other businesses; and (b) absolute measures, which assess the business relative to a virtual "ideal" business. We implemented the model in 49 businesses in the Galilee. These businesses are different in sector, size, age, volume and other factors. The three-level TI extent and effectiveness measures were derived for all of them. The measures' values were distributed over quite a large range. On the basis of these values, we analyzed the strengths and weaknesses of the TI process in each business.

Firstly, we analyzed the interrelationships between the TI relative effectiveness, absolute effectiveness and the extent measures. We found a positive relationship between the extent measures and both the relative and absolute effectiveness measures and also a positive relationship between the relative and the absolute effectiveness measures.

Then, we analyzed the inter-relationships between the TI measures and the business performance measures: annual growth in net revenue, annual growth in market share and an aggregate measure of these two measures. We found the following interrelationships: (a) a positive relationship between TI extent and net revenue, and between TI extent and the aggregate measure; (b) no connection between TI extent and growth in market share; (c) a positive relationship between TI relative effectiveness and net revenue, and between TI relative effectiveness and the aggregate measure; (d) no connection between TI relative effectiveness and growth in market share; and (e) a positive relationship between TI absolute effectiveness and all three business performance measures. We also found no relationships between the business sizes, in terms of the number of employees, and all the TI process measures.

Some Initiatives in Calculus Teaching

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Keywords: Mathematical education, self learning, teaching Calculus, understanding

In our experience of teaching Calculus to engineering undergraduates we have had to grapple with many different problems. A major hurdle has been students' inability to appreciate the importance of theory. In their view the theoretical part of mathematics is separate from the computing part. In general, students also believe that they can pass their exams even though they do not have a real understanding of the theory behind the problems they are required to solve. In an effort to surmount these difficulties we tried to find ways to make students better understand the theoretical part of Calculus. This paper describes our experience of teaching Calculus. It reports on the continuation of our previous research.

A Distortion Theorem for Function Convex in One Direction

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Keywords: Univalent function, function convex in one direction, starlike function.

Some classes of univalent functions recently found applications in complex dynamics. These applications are based, inter alia, on distortion theorems.

We present a new distortion result for functions convex in one direction. This result comprises, in fact, a criterion for a function convex in the positive direction of real axis to have bounded imaginary part.

On an Approach for Replacing State Constraints with Control Constraints in Linear Systems

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Keywords: Linear system; state constraints; control constraints

In a real-life control problem, the state variables are, as a rule, subject to some physical constraints. Various examples can be found in [1, 2]. Keeping these constraints directly in the mathematical formulation of this control problem makes it considerably complicated [3]. A control problem without state constraints, although subject to control constraints, can be solved much more simply. Therefore, it is very attractive to replace state constraints with control constraints, guaranteeing their fulfillment. In [4], the original optimal control problem with state constraints was replaced with a new, equivalent, control problem with state-dependent control constraints. However, such a replacement does not lead to a substantial problem simplification. Therefore, it was suggested in this work to approximate the new control problem by a sequence of problems with state-free control constraints, such that the respective optimal trajectories converge to the optimal trajectory of the original problem. The existence of this control problems sequence was established, while a constructive algorithm for obtaining such a sequence was not presented. Thus, this approach is of a more theoretical than practical value.

Another approach was proposed in [5] where a pursuit-evasion problem with a first-order acceleration dynamics for each player was considered. In this work, the actual acceleration (state) constraints $|a(t)| \le a^{\max}$ were replaced by the same constraints $|a^c(t)| \le a^{\max}$ imposed on the acceleration commands a^c (controls). In the case of constant $a^{\max}$, such a choice of control constraints helps to keep the state within the interval $[-a^{\max}, a^{\max}]$. This replacment rule ("control constraints = state constraints") is very convenient in engineering practice. However, in the case of time-varying state bounds, this rule can lead to a violation of the state constraints.

In this presentation, conditions of the applicability of this rule are established for a class of linear SISO systems. Moreover, a more general rule of replacing the state constraints with the control constraints is proposed.

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A Characteristic Approach to Einstein's Constraint Equations

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Keywords: Constraint equations, initial data, principle symbol

Initial data for the Cauchy problem for Einstein equations must satisfy constraint equations on the initial surface. The formulas of these equations have been known short after Einstein had announced his paper on General Relativity.

The constraint equations can be derived into two methods: The first is based upon differentiation between two types of derivatives. Computation of second order derivatives on the initial surface clarify the picture: components which do not include time derivatives satisfy the constraints. The second method relies on Gauss-Codazzi equations; equations that describe the relation between a curvature tensors of a manifold and the curvature of its own sub-manifold.

The method I would like to present seemed to be ignored throughout the years. The talk that will introduce this approach will be based on elementary methods such as investigation of algebraic properties of the principle symbol. No previous knowledge in Einstein equations or Differential Geometry is required. This is a paper in progress jointly with U. Brauer.

On Multi-Weighted Parabolic Systems in Sobolev Spaces

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Keywords: Parabolic systems, parabolic initial-boundary value problems, Sobolev spaces, Douglis-Nirenberg systems

The most well-known parabolic equation is the heat equation

$$\frac{\partial u}{\partial t} - \frac{\partial^2 u}{\partial x_1^2} - \dots - \frac{\partial^2 u}{\partial x_n^2} = 0.$$

Differentiation in this equation with respect to the time *t* has a weight *2* whereas differentiation with respect to the spatial coordinates has weight 1. Similarly, for general parabolic operators the *t*-differentiation has a constant weight *2b* with some natural *b*, whereas differentiation with respect to the spatial variables has weight 1.

I.G. Petrovskii (1938), T. Shirota (1955) and V. Solonnikov (1965), introduced successively more general definitions of parabolic systems (see e.g. [2], [3], [4]). Although the entries of matrix operator have different orders with respect to the spatial variables, the *t*-differentiation has a constant weight *2b* with some natural *b*. Therefore, all these systems may be considered as single-weighted parabolic systems.

The purpose of the present study is to investigate more general forms of parabolic systems when the weight *2b* is not constant. These systems are called multi-weighted parabolic systems. We study the uniqueness and existence of the solution for initial-boundary value problems for multi-weighted parabolic systems in appropriate Sobolev spaces. Taking into account the solvability of elliptic systems of Douglis-Nirenberg type developed in [1], [5], [6], [7], we are going to apply similar methods to parabolic systems.

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A Theorem on Existence of Invariant Subspaces for J-Binoncontractive Operators

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Keywords: Krein space, J -binoncontractive operator, invariant subspace

Let H be a J -space and let $V = \begin{pmatrix} V_1 & V_{12} \\ V_{21} & V_2 \end{pmatrix}$ be the matrix representation of a J -binoncontractive operator V with respect to the canonical decomposition $H = H^+ \oplus H^-$ of H. The main aim of these paper is to show that the assumption

$$V_{12}(V_2 - V_{21}V_1^{-1}V_{12}) \in S_\infty$$

implies the existence of a V -invariant maximal nonnegative subspace. Let us note that (1) is a generalization of the well known M.G. Krein condition $V_{12} \in S_\infty$. The set of all operators satisfying (1) is described via Potapov–Ginsburg transform.

A Rigidity Theorem for Commuting Holomorphic Functions

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Keywords: Commuting functions, Denjoy-Wolff point, holomorphic self-mapping, one-parameter continuous semi-group, rigidity

We prove a rigidity theorem regarding holomorphic self-mappings of the open unit disk Δ of the complex plane $\mathbf{C}$ and use it to improve upon a recent result on commuting parabolic semi-groups. This result provides sufficient conditions for two semi-groups of holomorphic mappings to commute.

Photon Localization and Dicke Superradiance in Atomic Gases

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Keywords: Cooperative phenomena, random media, localization

We study photon emission rates from an atomic gas while taking into account cooperative effects such as superradiance and subradiance between the scatterers. To this purpose we consider N identical atoms placed at random positions in an external radiation field. The photon escape rates from the atomic gas are derived by diagonalizing an N×N Euclidean random matrix $U=\sin(x_{ij})/x_{ij}$, where x_{ij} is the dimensionless random distance between any two atoms, for a broad range of sample size and disorder strength. A scaling function, which measures the relative number of states having vanishing escape rates, is introduced. We discover that for a large sample of three-dimensional gas, the photons undergo a crossover from delocalization towards localization rather than a disorder-driven phase transition as for Anderson localization.

Derivation of the Langevin Function from the Principle of Detailed Balance

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Keywords: Langevin function, principle of detailed balance, stochastic differential equations

For a system at given temperature, in which the energy is known as a function of a set of variables, we obtain the fluctuation of the evolution of the variables by replacing the phase-space by a lattice and invoking the principle of detailed balance.

Besides its simplicity, the asset of this method is that it enables us to obtain the Langevin function when the phase-space is anisotropic and when the system is described by means of curvilinear coordinates.

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Double Well Bose-Hubbard Model: A Playground for Quantum Control

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The double well Bose Hubbard model for many body systems is facilitate to demonstrate fundamental aspects of quantum coherent control like control landscapes, classical vs. quantum control, and the influence of the control formalism on the mechanism of the obtained solution. For initial conditions and targets that could be defined classically in phase space, the control of the state-to-state transition was found to be independent on the size of the system, and no interference is required to perform the classical process. For initial and targets that cannot be described in terms of mean-field we show that the control landscape of the problem leads to specificity in the phase relations between several components of the wavefunction. A control process of that kind could be computed in terms of a conditioned sum of several mean field state-to-state transitions, and is therefore semi quantum. The increase of the difficulty for obtaining a solution with the size of the system is discussed.

Flexible PCBs

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Keywords: Double-sided PCB, 'via hole', capillarity

The printed circuit boards (PCBs) industry, in Israel and around the world, is characterized by both conservatism – employing common and recognized technologies - and by a substantial manufacturing capacity. Flexible PCBs, a particular sector in this industry, are used in various applications: cellular phones, computer keyboards, robots etc. However, the current technology does not offer an appropriate solution for the conductive stripe to 'pass through' - from one side of a thin/flexible PCB to the other - a feature known in the industry as 'via hole'.

The present project introduces an innovative approach for producing double-sided PCBs, incorporating the 'via hole' feature, and made of very thin sheets such as paper and plastic. This flexibility enables the PCBs to operate under extreme folding conditions. This approach is unique as it implements a simple physical phenomenon - capillarity - for demonstrating the 'via hole' solution. The capillarity principle allows the conductive material to pass through a thin sheet, at any desired location, via tiny holes. The feasibility of this technique is dependent upon the compatibility of the conductive material's viscosity and the tiny holes' diameter. A patent survey indicates that 'capillarity' is offered for the first time for these kinds of applications. Upon conducting a feasibility study, a wide range of new products are likely to emerge.

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Emission Lines in Quasi Stellar Objects

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Keywords: Active galactic nuclei; emission lines

The discovery of active galaxies dates back to 1908, when spiral nebulae, back then not yet known to be galaxies unto themselves, showed mainly absorption spectra. Hubble, in the course of his work that identified these spiral nebulae as galaxies, found a similar feature in additional galaxies. In 1943, Carl Seyfert found that a very tiny fraction of galaxies showed emission spectrum, attributed to highly ionized elements. These lines were much wider compared with absorption lines in normal galaxies. They emanated from a relatively tiny nucleus. These galaxies are called ``Seyfert galaxies". They constitute most of the “active galaxies".

Seyfert galaxies are divided into two types: type 1 is characterized by strong, very broad emission lines of Hydrogen and of singly and doubly ionized Helium. The full width at half maximum (FWHM) of these lines corresponds to a Doppler shift of thousands, to tens of thousands, kilometers per second. There are also forbidden lines with a width of several hundreds of kilometers per second. The spectrum of the second type consists of lines of FWHM of hundreds of $km\ s^{-1}$, for permitted and forbidden lines alike. They are usually less luminous.

Liquid Jet Erupted by Falling of a Test Tube - the Phenomenon and a Suggested Explanation Model

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Keywords: Hydrodynamics, surface waves

When a test tube partly filled with water is dropped vertically about 10 cm above a stiff plane's horizontal surface, a thin jet of water is erupted from the center of the liquid column, which can reach a height of one meter and even more, above the plane's surface. We have studied the phenomenon by checking the effects of different parameters such as the diameter of the test tube, the amount of water in it, the kind of liquid that is used, the kind of material that the test tube is made of, and the bottom of the test tube's shape. We found that for some conditions the phenomenon is very strong, while for others, no jet is observed. By making experiments and studying the effect of different parameters, we found that surface tension plays a critical role in this phenomenon. Since this phenomenon is very fast, a series of sequential photos were taken in order to study the shape of the liquid's surface just before the test tube hits the plane's surface, during the hitting and just after the hitting.

The suggested model is based on the creation of a circular wave propagating from the perimeter to the center. This wave, if it is symmetric, increases in amplitude as it propagates to the center, where the liquid's is high enough to enable the erupting of the liquid jet. During the time in which the test tube hits the flat surface, the local gravity and pressure of the liquid changes significantly and therefore the velocity of the wave is not constant. Moreover, this leads to dispersion in the wave's velocity which can create the singularity observed by the eruption of the jet. In the suggested model, the surface tension is responsible for the rising of the liquid on the inner surface of the tube, until it reaches an equilibrium which depends on the gravity. During the time in which the tube hits the surface, the equilibrium position changes, thus creating a perturbation which in turn leads to a circular wave.

Although this model suggests a good qualitative explanation to the phenomenon, a quantitative mathematical model is needed to present this singularity. The quantitative model should take into account the rapid changes in pressure and local gravity, and also find how the singularity observed in this phenomenon depends on the geometry and the physical characteristics of the problem.

Exploring the Coupling Mechanism of High-Tc-Superconductors by Seeking an Analog to the Isotope Effect in the CLBLCO Family

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Keywords: High-Tc-Superconductors, thin-films, single crystals

More than 20 years after the discovery of High-Tc-Superconductors, the coupling mechanism of the cooper pairs in these materials is still under debate. In the conventional superconductors it is known that the coupling between electrons is phonon mediated. Proof is given (provided) by the isotope effect, where it is experimentally shown that for different isotopes of the same element $T_c \propto M^{-1/2}$, where T_c is the transition temperature and M is the isotope mass. It is suggested that in the High-Tc-Superconductors an analog to the isotope effect may be found in the CLBLCO superconductors. This material has the formula $(\mathrm{Ca_xLa_{1\text{-}x}})(\mathrm{Ba_{1.25\text{-}x}La_{0.75+x}})\mathrm{Cu_3O_{7+y}}$. It is known that a small variation of x, namely, the amount of Calcium, leads to a large change in T_c while keeping the lattice constant and structure unchanged. It is therefore tempting to explore the energy spectrum of this type of superconductors in order to find which energy level changes with T_c. There are several ways to do that, such as Neutron scattering, Raman scattering and ARPES. All of these methods require a high quality single crystal, or at least a high quality film. In this talk, recent developments in the production of single crystals and high quality films of the CLBLCO superconductors will be presented. The characteristic of recently grown single crystals, using image-zone-furnace and recently grown laser ablated films, will be presented. The afore-mentioned experimental methods to explore the energy spectrum of the crystals will be reviewed with an emphasis on Raman scattering. Preliminary results will be presented.

The Space Quantization as a Reason of Space Angle

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Keywords*:* Metrics. space quantum, quantization

It is assumed that the metrics function form is proved by experimental data. Consequently, during long time the reason of function form was not discussed. This article shows that the possible reason of quadratic metrics can be the space quantization, hence, the hypothesis of space quantum can find the second life.

As known in 1899 Max Planck assumed existence of space quantum as a minimum possible length *q*. If the hypothesis of space quantization is right, it is possible to prove that our space is only Hilbert, i.e. have an angle.

For L^n metrics the problem is reduced to the Fermat's theorem. It is necessary highlight that Fermat's theorem is right not only for natural non-zero numbers, but also for non-zero rational numbers. We can also prove this theorem for the more general case. Let the following assumptions are executed:

1) the existence of coordinate system such as for every vector pair **x** and **y**

$$F(\|x+y\|) = F(\|x\|) + F(\|y\|) \ (1);$$

2) the function $F(\|x\|)$ can be decomposed by Taylor's method.

The set of rational numbers $\{Q\}$ is every dense set in the set of real numbers $\{R\}$, hence multiplicity of rational numbers and real value of quantum length q $\{q \cdot Q\}$ is also every dense set in the set of real numbers $\{R\}$. Consequently, we can equate factors at every degree at the formula (1):

$$a_i Q_{LL}^i = a_i Q_x^i + a_i Q_y^i \ (2)$$

Here Q_l, Q_x, Q_y are corresponding rational numbers for vectors **L**=**x**+**y**, **x**, **y** respectively. But for rational numbers $Q \in \{Q\}$ for *i* > 2 the equation (2) can be satisfied only for $a_i = 0$.

So our quantized space is Hilbert and have an angle.

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"Personal Coaching" as a Tool for Assisting Under-Achieving Students in an Academic College of Engineering

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Keywords: Coaching, under achieving academic status, self regulation

Several projects are taking place in the ORT Braude College in order to promote and assist first year students learning. Project MALAT focuses on students whose academic status is considered under- achieving by the end of their first year of studying in the college. The aim of this project is to give these students another opportunity to successfully complete their engineering studies by getting appropriate support. The students undergo an interview at the Teaching and Learning Center in the college. Some of them receive personal coaching carried out by a trained lecturer from the college.

During the 2007-2008 academic year, 12 lecturers from ORT Braude College participated in a 120-hours training course for a "Personal Coacher's diploma" with special focus on under-achieving students.

During the 2008-2009 academic year, 20 students received personal coaching. The process included a one-hour meeting between the student and his/her coach every week during the semester. The students got personal assignments every week and submitted a reflective report to the coach. Analysis of these reports showed that the students went through a change, taking full responsibility for the decision-making concerning their learning process which promotes their success. Findings of their academic achievements will be presented in the conference.

The trained lecturers who conducted the coaching felt that by the close exposure to different students and learning styles, they acquired important tools for their personal and professional development.

Peer-Learning Workshops for Supporting First-Year Students' Learning

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Keywords: Peer learning workshops, student leaders, students' perceptions

In recent years Ort Braude College has been operating several projects to promote first-year students' learning. One of the projects is the Group Leaders' Project conducted by the Teaching and Learning Center in college.

The Group Leaders' Project comprises students leading workshops for developing self-learning in courses with high rate of failures. Leaders participate in a 28-hour preparatory course for leading workshops that emphasizes cooperative and active learning in small groups of students.

The study focuses on two aspects: (1) perceptions of student participants in the peer-learning workshops (qualitative level) and their achievements (quantitative level); (2) perceptions of student leaders.

We found that the main motivation of students to participate in the peer-learning workshops was to gain a better and deeper understanding of the subject matter. The students who continuously participated in the workshops found them useful and applicable. Analysis of students' achievements at the end of the semester showed that students with high capabilities who participated in the workshops got significantly better scores at the end of the course than students with similar academic capabilities who did not participate in the workshops.

The student leaders felt great satisfaction and high involvement in the project and reported gaining self confidence and developing various skills that may help in their future career.

It seems that the peer-learning workshops address students' needs and have become a substantial support mechanism offered by the college to first-year students.

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A Program for Supporting Underachiever Students

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Keywords: Underachiever students, supporting tools for learning

A student with the status of academic underachievment is identified at Ort Braude College as a student who has accumulated three failures in courses or achieved a low average grade (less than 65) over two consecutive semesters. According to college policy, termination of the student's studies is being considered. Handling underachiever students became essential as they have recently encompassed a discernible population of students in the college. Consequently a program for supporting underachiever students (called MALAT) was design by the Teaching and Learning Center (TLC), and has been gradually established over the past three semesters. The MALAT program’s goal is to support students in order to improve their academic status and to lower the drop-out rate among students with the potential to succeed. Only students who are evaluated by their departments as having good chances for success in their studies are approved to study in the following semester and recommended for MALAT program; others are dismissed by the college. The MALAT program includes two main stages: firstly, students' difficulties and possible reasons for their failures are revealed through (a) the collection of personal information on their background, their grades in the psychometric test and matriculation exams; (b) the opinions of the student's academic advisor and the head of the department; and (c) an extensive personal interview by a psychologist.

Following the analysis of the information collected, students are offered several support tools that may help them overcome difficulties and improve their achievements. Among the tools offered are: tutoring by a peer-student, coaching by college lecturers (trained and certified), emotional counseling, group meetings for overcoming exam anxiety, courses for learning strategies and team-leaders workshops.

Similarly to other projects taking place in the TLC, the MALAT program is documented and evaluated for the purpose of both assessing the rate of success and making recommendations with regard to its future application. The questions that are currently being investigated concerning the MALAT program are: What are the sources of difficulties and reasons for failure among students who participated in the MALAT program? What is the rate of students that improved their academic status after participating in the program? What is the effect of the various support tools, particularly comparing individual-treatment to group-treatment?

This is a mixed-methods research (quantitative and qualitative tools and analysis are used). Research tools include open-ended questionnaires, in-depth semi-structured interviews, and data collection related to the degree of student's participation in supporting activities and achievements. Altogether about 70 students have participated in the MALAT project during the 2008-2009 academic year. Results of preliminary data analysis will be introduced in our presentation, as well as several conclusions drawn and plans for a continuing research.

Tool for Diagnosing Innovation in Academic Teaching

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Keywords: Active learning, instruction innovation, adoption level

In the past two decades there has been great development in active instruction methods in higher education institutions in Israel and abroad. The success of active instruction methods in relation to the students' involvement during courses and final examinations has been reported in many studies. In spite of this success, most instructors in the world tend to continue teaching in traditional ways.

An attitude questionnaire was developed as a research tool especially for the purpose of this study based on of the experience of seven active instructors and interviews with them to reveal the process of change they had undergone in moving from traditional teaching to more active instruction. Over the five-year period in which active learning was developed and integrated in basic courses at our college, the "active instructors" were interviewed twice in each semester. An analysis of these interviews provided the basis for characterizing the attitudes of "active instructors" and subsequently for the development of the research questionnaire. On the basis of a review of the literature and an examination of the attitudes of the "active instructors," a content analysis was undertaken in which the attitudes were grouped into six key areas that can characterize the tendency of a lecturer to adopt the typical teaching methods of active teaching. This study examined the attitudes of 153 instructors in three higher education institutions towards active instruction. Their attitudes were compared with the attitudes of active instructors who, for the past three years, have taught in an active instruction environment. Analyzing the six instruction areas we have found that in all of them there is a significant difference between the attitudes of active instructors and their colleagues. This paper discusses those differences and expands the corpus of theoretical knowledge relating to instructors' attitudes toward active learning, presenting a new tool enabling the characterization of these attitudes.

Marketing Insights of English Language Text Books

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Keywords: Text book, language, marketing

Upon enrolling in an academic institution, a student is suddenly exposed to a new environment. The first year is characterized by new requirements such as self-learning, follow-up, reading of supplemental materials, and practice through the use of English-language books. It seems that most of the students feel threatened by being directed to English-language material. In fact, most of the courses' syllabi present a bibliography of mainly English-language books. On the one hand, the course is 'positioned', among other factors, by the quality and quantity of its English material and, on the other hand, the students do not really use this material to a satisfactory extent, and often look for Hebrew-language alternatives.

A research study focusing on the reading habits of Israeli students in general, and their preferences in using textbooks, in both Hebrew and English, was conducted last year. The participants, 220 first year engineering students in three Israeli academic institutions, were asked to complete a questionnaire examining their reading habits. It emerged that 60% of the students reported reading more than 10 books per year before enrollment. During their academic studies 32% of the students do not read textbooks at all, and 46% read textbooks from time to time before lectures. 75% state it is important to read textbooks during their academic studies. More than 90% prefer to read textbooks written in Hebrew.

The Marketing philosophy strongly favors recognition and understanding of the students' preferences and wants. The current situation demonstrates a kind of dissonance where all parties involved virtually ignore the gap between the syllabus presented and the real world. A marketing approach to this dilemma should illuminate the phenomenon and strive for a proper solution.

'Impaled on its Own Sword': The Self-Destructiveness of Evil in the Harry Potter Series

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Keywords: Children's literature, Harry Potter, evil

In accordance with the message imparted in Bruno Bettelheim's seminal work, The *Uses of Enchantment*, "that evil intentions are the evil person's undoing" (141), this paper explores J. K. Rowling's portrayal of evil in her Harry Potter novels as inherently self-destructive. The self-defeating nature of evil is illustrated in the books through the actions of nefarious characters, who constantly err in favor of good due to their own miscalculations, and are therefore ultimately responsible for their own downfall.

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Rowling's Devil: Ancient Archetype of Modern Manifestation?

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Keywords: Children's literature, Harry Potter, Evil, Devil

The remarkable commercial and critical success of J. K. Rowling's charming and unpretentious adventure series about a young apprentice wizard in a parallel world of magic spells and fantastic creatures has captured the imaginations of children and adults alike. One possible reason for this remarkable success story may lie in the abundance of folkloric references incorporated into the *Harry Potter* novels, which have contributed significantly to the series' appeal. Consequently, this presentation examines the manner in which traditional demonic conventions associated with the notion of the devil in numerous cultures have influenced the author's formation of the ultimate villain in her series, Lord Voldemort. It is argued in this paper, that these well-established themes are manipulated and combined with innovative concepts in order to construct a unique version of the ultimate personification of evil.

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A Contextual Study of Language Learning Attitudes in a Technology-Enhanced Environment

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Keywords: Language learning, motivation, autonomy, EAP, technology

While several decades of research have revealed many possibilities, no straightforward answer has emerged to Gardner and Lambert's question, posed in 1972, as to why, with seemingly equal opportunities, some people can manage to learn a foreign or second language well while others find it almost impossible. Despite the amount of research undertaken in the field, motivation is still an elusive concept. Learner motivation is nevertheless of great concern to most teachers, and, given their pivotal role in the learning process, understanding what can affect learner attitudes could usefully inform their classroom practice. At tertiary level it might be expected that students have internalized the need to invest considerable effort in their studies in order to succeed. There are factors, however, which serve to increase or decrease motivation, and in turn affect learning outcomes.

Human motivation appears to be higher when behavior is volitional, and chances for success are enhanced for learners who take responsibility for their own learning. Conversely, those who perceive their teachers to be controlling are less likely to be intrinsically motivated and learning outcomes may be inferior. Autonomy is thus a central goal of modern language teaching, while one of the aims of online language learning, a tailored version of which is at the centre of this study, is specifically to support learners from dependence towards independence. Unfortunately, student goals in the learning of English for Academic Purposes (EAP) in institutions such as the ORT Braude College, where English is a compulsory course in a crowded schedule, are often simply to pass the course and no more. Furthermore, in a non-English speaking environment, the relevance of this course is not immediately apparent to the students. In this study the potential for enhancing language learning motivation and encouraging greater learner autonomy through the integration of computers and the internet into the EAP course, together with a shift towards a more student-centered classroom, is examined through a comparison of the responses of 599 students, approximately half of whom studied in a technology-enhanced environment.

Pedagogical implications of the research are considered and the potential for computer-based courses to increase language learner motivation and facilitate the adoption of a more autonomous learning style is discussed.

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"If I Don't Read in My Own Language, Why Would I Want to Read in a Foreign One?"

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The main focus of English for Academic Purposes (EAP) courses at tertiary level in Israel is reading comprehension, the purpose of which is to ensure that students have the ability to cope with English-language material related to their main field of study. At Ort Braude College (OBC) the pedagogical approach in EAP combines content-based instruction (CBI) with task-based learning (TBL), both of which should serve to enhance learner motivation by emphasizing the relevance of the course to the students' future needs. Nevertheless, from a study conducted at OBC from 2001-2005 it emerges that initial student expectations are often at odds with the aims of the course. While most students agree that reading, especially for engineers is important, many would prefer to improve their speaking skills or focus on general rather than technical English. Furthermore, it is apparent that the focus of the course itself requires students to engage in an activity which many of them avoid, even in their first language (L1). From the data it emerges that less than 50% read frequently for pleasure in their first language, and this level decreases as the study load increases. During the course of the academic year, while reading for study purposes in both the L1 and in English rises, very few students report reading technical or professional journals related to their field in either language. It can be assumed that reading such material in English is dependent upon proficiency levels in the language as well as familiarity with, and interest in, the subject. Indeed, when asked what would encourage them to read more in English, interest, relevance, and language proficiency are the most commonly cited factors. Proficiency levels are dealt with through streaming according to the students' psychometric score, but finding common interests is a far more challenging issue with which to contend.

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