

# research newsletter

Eastern Mediterranean University



Age Related Changes in  
Intelligence

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Dear Colleagues,

We are happy to present the *EMU Research Newsletter* issue 2009/4 to our readers. This issue marks the end of our term as the current editorial team. In the last two years, throughout the eight issues we have published, we aimed at highlighting in particular the following concepts about research at EMU:

- international research environment,
- importance placed on graduate student research, and
- interdisciplinary research projects.

Towards these aims, we have featured 24 articles in total. About a third of these articles were from international graduate students and international faculty members of the EMU community. We have featured works from 17 different departments of EMU, highlighting the success stories from different fields of research. As an interdisciplinary field, biomedical science was introduced and the research in this area at EMU has been included in all of our 2009 issues.

In this issue, we present an article by Hasan Kömürçügil on soft computing and its applications. Neuroclinical psychologist Lori Miller discusses her work on age related changes in intelligence. Graduate students Zülal Yalınca and Amin Almassian present their interdisciplinary research projects at the interface of chemistry and biology, and at the interface of computer science and neuroscience, respectively.

With each issue, we strived to further develop and bring improvements to the Newsletter. In the Special Feature Section of this issue, we present an overview of the Newsletter's evolution over the last two years. I particularly thank my team members for their hard work and commitment to the Newsletter.

We thank all those who have actively contributed to the Newsletter and appreciate the continued interest of our readers.

With best regards,

Bahar Taneri

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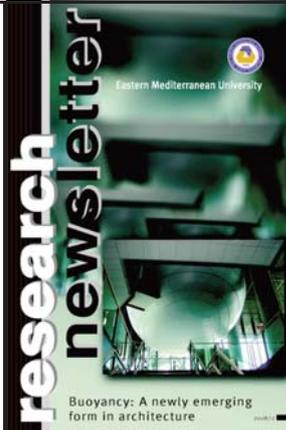
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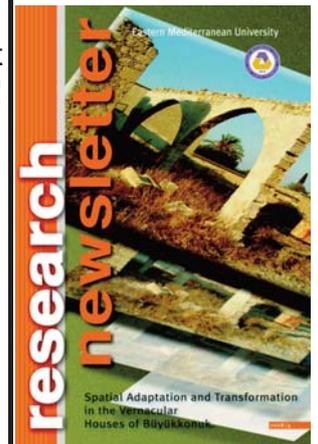
**2**

**years of the EMU Research Newsletter?**

Our team started its job with a makeover of the Newsletter cover!



We introduced the section “*Interview with an EMU Researcher*” where we highlight student researches of EMU!



2008

issue 1

2008

issue 2

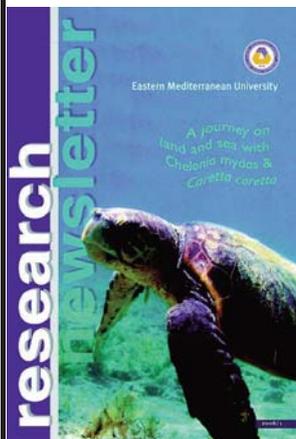
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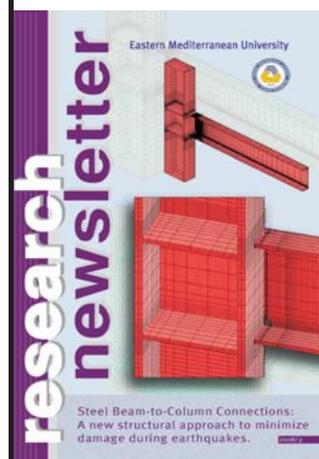
issue 4

We highlighted the importance of Quality Assurance in further development of research at EMU!



We highlighted Type B research project award recipients in detail.

We added “*About the Researcher*” boxes to each of our articles, where we present short biographies of our authors!

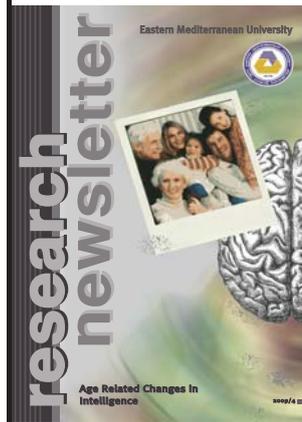


We started a new section called “Where are they now?”, where we feature EMU alumni and their current research careers.

We launched a series of articles on Biomedical Science Research at EMU.



We devoted a section to arts at EMU!



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2009  
issue 1

2009  
issue 2

2009  
issue 3

2009  
issue 4

We introduced our “Notice Board” section, where we feature announcements for upcoming conferences and other research related events at EMU!

Starting with this issue, our newsletters are only available in the eco-friendly electronic only version.



With each of our issues, we were happy to serve you with improved and developed newsletters!

We thank you for your continued interest and support!



### Research @ EMU

#### ■ EMU-PDRAM's Panel on '25<sup>th</sup> of November-International Day for the Elimination of Violence against Women'

On December 3<sup>rd</sup>, 2009, a panel discussion was organised regarding the '25<sup>th</sup> of November - International Day for the Elimination of Violence against Women' by the psychologists of EMU-PDRAM. Different aspects of the issue were discussed by five female speakers coming from different academic and social backgrounds. The first speech was given by Biran Mertan, director of EMU-PDRAM, regarding how North Cyprus women are exposed to 'discrimination' on different levels of the government. Ceren Göynüklü Moral, lawyer of 'Turkish Cypriot Human Rights Foundation' spoke about human trafficking and gender inequality in North Cyprus, where patriarchal society prevents women from fully enjoying their human rights and that the lack of rules prevents perpetrators of domestic violence from being sentenced by the law. She also talked about CEDAW (The Convention on the Elimination of All Forms of Discrimination against Women), which has not been applied by recent governments although it was ratified in 1996 by the parliament of the TRNC. Aysel Bodi, as the Founding President of 'Akova Women's Association' spoke about their NGO's vision and mission, talked about motivated women living in rural areas of North Cyprus and their hard work in the "men's world". Another woman entrepreneur, Melek Doğan, who is the Founder of Halk Vakfı - Sınırstü Elderly Nursing Home, shared her own experiences on how difficult it was to establish the Centre and give sufficient and required services while having very limited bounds of possibilities provided by the government. EMU-PDRAM psychologist Uğur Maner was the last speaker who gave an informing speech on the importance of being a media-literate



EMU-PDRAM psychologists with the guest panelists.

person. She encouraged the audience to develop critical intelligence to be able to question the hidden messages about women through the media. She gave various examples to address gender stereotypes and images presented through movies, music, newspapers and magazines.

News submitted by: *Gözde Pehlivan*  
EMU-Psychological Counseling,  
Guidance and Research Center.

#### ■ The English Language Teaching Innovation Awards (ELTONS)



The English Language Teaching Innovation Awards (ELTONS) is now the single most prestigious event in the English language teaching calendar, attracting numerous entries from across the world. Following on from last year's success in being shortlisted for the international award for their research into data-driven approaches to English language learning, Nilgun Hancioglu and John Eldridge of the

General Education Department, along with their colleague Steve Neufeld, formerly of EMU, have now also been shortlisted for the 2010 international award category. Their application for the 2010 award consists of a website developed on the MOODLE educational software platform. This website comprises two courses, one of which is the ENGL 501 thesis writing course that has been offered to postgraduate students at EMU for a number of years and which has now been developed into a fully online medium, based on the PhD thesis of Nilgun Hancioglu, conducted under the supervision of Gulsen Musayeva Vefali in the Department of English Language Teaching. The second course is an online teacher development course exploring the relationship between the acquisition of vocabulary and content-integrated language learning (CLIL) within a Web 2.0 environment. Having succeeded in reaching the final stage of this international competition, the instructors have again been invited to the ceremonial presentation in London to be held in March 2010, and which last year was presided over by Lord Neil Kinnock, formerly leader of the UK Labour party, and UK European Commissioner. The awards are sponsored by the British Council in collaboration with Cambridge ESOL and receive widespread international coverage and publicity. The research conducted has also been widely disseminated in international journals such as English for Specific Purposes, and, forthcoming, Teacher Trainer, the International CLIL Research Journal, and The Reading Matrix. Many of the practical applications have also been widely

explored in courses taught by the instructors involved, both in the General Education Department and the English Language Teaching Department.

*News submitted by: John Eldridge and Nilgun Hancioglu  
Department of General Education.*

## ■ Security of Information and Networks (SIN 2009)

The Second International Conference on Security of Information and Networks (SIN 2009) was held in Famagusta, 6-10 October, 2009 at Salamis Bay Hotel. It was organized jointly by the EMU; the Southern Federal University (SFU), Taganrog, Russia; and Macquarie University (MU), Sydney, Australia. Specifically, the departments cooperated to organize this event were the Department of Computer Engineering of EMU, Department of Security of Information Technologies, and South-Russian Regional Scientific-Educational Center for Information Security Problems of SFU, and the Information and Networked Systems Security (INSS) & The Intelligent Systems Group (ISG), of Department of Computing at MU. SIN 2009 was organized in technical cooperation with ACM Special Interest Group on Security, Audit and Control (SIGSAC). SIN 2009 proceedings book is published by ACM / Sheridan Press and its full contents is inserted into the ACM Digital Library for perpetual online access. SIN 2009 follows the SIN 2007 conference successfully held in Famagusta in May 2007 jointly organized by EMU and Istanbul Technical University, Istanbul, Turkey, with the hosting of the Department of Computer Engineering and Internet Technologies Research Center (ITRC) of EMU. It has been agreed among the organizers of SIN 2009 that SIN 2010, SIN 2011, SIN 2012 will be held in Russia, Australia, and Germany, respectively. SIN 2009 covered practically all areas of security concerning information and networks and indicated broad areas of interest including access control and intrusion detection, autonomous and adaptive security, cryptographic techniques and

key management, information assurance, network security and protocols, security in information systems, security tools and development platforms, secure ontology-based systems, standards, guidelines and certification, security-aware software engineering, trust and privacy. A total of 114 papers were submitted from around the world. After an extensive reviewing process, 48 papers (26 full papers, 18 short papers, and 4 fast abstracts) were accepted by the program committee. The main theme of SIN 2009 was *Intelligent Systems for Information Assurance, Security, and Public Policy in the Age of e-Euphoria*. Conference main theme was supported by the keynote papers and talks. Vijay Varadharajan (Professor and Microsoft Chair in Innovation in Computing, and Director of Information and Networked System Security Research, Macquarie University, Australia), Elisa Bertino (Professor of computer science and Research Director of the Center for Education and Research in Information Assurance and Security at Purdue University, USA), Erdal Çayırıcı (Professor, NATO JWC & University of Stavanger, Norway), and Sorin Alexander Huss, (Professor & Director CASED Research Center for IT Security, Darmstadt, Germany) were the keynote speakers of SIN 2009. Tutorials were offered by expert tutors in conjunction with SIN 2009. Tutorials took place during the two days immediately prior to the main conference, including *Security of Next Generation Networks* by Serap ATAY, European Commission Joint Research Center, Italy; *Statistical Approaches for Network Anomaly Detection* by Christian Callegari, University of Pisa, Pisa, Italy; *Secrets of Reverse Engineering Software* by Khaled H. Salah, King Fahd University of Petroleum and Minerals (KFUPM), Dhahran, Saudi Arabia. Department of Computer Engineering and the Internet Technologies Research Center of EMU were hosting the event.

*News submitted by: Atilla Elçi and Alexander Chefranov  
Department of Computer Engineering.*

# SOFT COMPUTING AND ITS APPLICATIONS

By Hasan Kömürçügil  
Department of Computer Engineering  
Faculty of Engineering



Hasan Kömürçügil

As one of the co-chairmen of the fifth International Conference on Soft Computing, Computing with Words and Perceptions in System Analysis, Decision and Control (ICSCCW 2009), which was organized during 2-4 September 2009 here at Eastern Mediterranean University, together with the State University of New York and Azerbaijan Association of "Zadeh's Legacy", I would like to give a brief introductory information about soft computing and its applications. It is well known that hard computing (HC) requires a precisely stated analytical model, which is valid for ideal case. However, the real world problems, which exist in non-ideal environment are imprecise and uncertain. Precision and certainty play important roles in determining the cost. In order to cope with this issue, Lotfi Zadeh proposed soft computing (SC) to solve complicated problems which cannot be solved by HC with Neumann type computers. A center called the Berkeley Initiative for Soft Computing (BISC) has been established and directed by Lotfi Zadeh at the University of California, Berkeley, in USA. SC differs from HC in the sense that, unlike HC, it is tolerant of imprecision, uncertainty, partial truth, and approximation. The principal con-

stituents of SC are neural networks (NNs), fuzzy logic (FL), and probabilistic reasoning (PR), which are the key tools for mimicking the human mind (The Berkeley Institute in Soft Computing). SC provides an attractive opportunity to represent the ambiguity in human thinking with real life uncertainty. Therefore, SC can be considered as an emerging collection of methodologies, which aims to achieve robustness, tractability, and low total cost. The technological developments of the recent decade have increased the use of high-speed computers in SC applications. Now, it is possible and economically feasible to use SC in real world problems existing in non-ideal environment. This has resulted in the development of the SC field and a host of new methods based on FL, NNs, and PR. The current applications using SC are becoming increasingly visible as consumer products, ranging from air conditioners and washing machines to photocopiers, camcorders, handwriting recognition, automotive systems, image processing, data compression, decision-support systems, fuzzy logic control and many industrial applications. In the following section, I provide a brief introduction to the key SC techniques.

## Neural Networks (NNs)

An NN is a system composed of many simple processing elements operating in parallel, whose function is determined by network structure, connection strengths, and the processing performed at computing elements or nodes. Therefore, such a system can be considered as a computational structure that is inspired by observed processes in natural networks of biological neurons in the brain (Haykin, 1999). An NN resembles the brain in two aspects:

- Knowledge is acquired by the network through a learning process.
- Interneuron connection strengths known as synaptic weights are used to store the knowledge.

The learning process is performed by adjusting the weights that represent the interconnection strength of neurons. In general, the learning can be supervised or unsupervised. In a supervised learning algorithm, learning is performed by specifying the class to which the pattern is supposed to belong. The weight adjustments are done so as to minimize the difference between the desired and actual outputs. The feedforward NNs (FNNs) where the information flow in the network is directional can be considered as a common structure. On the other hand, supervised learning in FNNs is the most popular research area in

dynamical systems and control applications. Given the inputs, weights, desired outputs, and actual outputs of an NN, the main objective of learning process is to minimize the performance index, which is usually defined as the integral of the difference of actual and desired outputs. Radial basis function based NN (RBFNN) is a particular FNN offering a much faster way of learning (Seng, *et al.*, 2002). In this scheme, the structure of network is much simpler which makes the weight learning much simpler as well. Another class of NNs is the recurrent NNs (RNNs) which has a feedback loop (The Berkeley Institute in Soft Computing). RNNs have also been popular in the area of dynamical systems.

### Fuzzy Logic (FL)

As one of the principal constituents of SC, Fuzzy logic (FL) plays an important role in machine intelligence quotient systems (Zadeh, 1994). It is a way of interfacing inherently analog processes that move through a continuous range to a digital computer that likes to see things as well-defined numeric values. In other words, it can be considered as a digital control methodology that simulates human thinking by incorporating the imprecision inherent in all physical systems. FL works by turning the hard-edged world of binary control variables (hot/cold, fast/slow) into “soft” grades (warm/cool, moderately fast/somewhat slow) with varying degrees of membership. In FL, the degree of truth of a statement changes between zero and one. Generally, the fuzzy sets are defined on some relevant universe of discourses for each input and output variables. Representing states of variables by fuzzy sets is a way of quantifying the variables. There are two concepts within FL which play a central role in its applications:

- A linguistic variable whose values are words or sentences in a natural or

synthetic language.

- A fuzzy IF-THEN rule in which the antecedent and consequents are propositions containing linguistic variables.

The main function of linguistic variables is that of granulation of variables. For example, temperature is a linguistic variable if its linguistic values are very cold, cold, cool, nominal, warm, hot, and very hot. Actually, a linguistic variable is interpreted as a label of a fuzzy set that is characterized by mem-

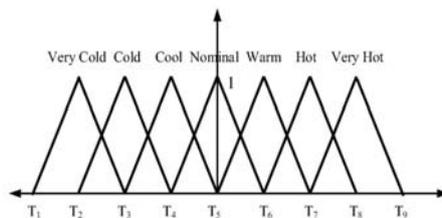


Figure 1. Membership functions of temperature

bership functions as shown in Figure 1.

It can be seen that the temperature's state no longer jumps abruptly from one state to the next, instead it loses value in one membership function while gaining value in the next. Most current applications of FL employ a simple framework by using triangular or trapezoidal membership functions and the number of linguistic values is usually selected in the range of three to seven (Passino & Yurkovic, 1998). In the control systems domain, Mamdani method which makes use of much intuitive nature of human expert control is a well known fuzzy logic control method (Mamdani & Assilian, 1975). Another well known fuzzy control method is the Takagi-Sugeno-Kang (TSK) method which is more suitable for model-based fuzzy control systems (Takagi & Sugeno, 1985; Sugeno & Kang, 1988). In TSK method,

Table I: Products utilizing FL (Adopted from Self, 1990.)

Product	Company	Role of FL
Air conditioner	Mitsubishi	Determines optimum constant operating level to prevent power consuming on-off cycling
Auto transmission	Subaru	Senses driving style and engine load to select best gear ratio
Elevator control	Fujitec/Toshiba	Evaluates passenger traffic to reduce waiting time and enhance car announcement accuracy
Golf diagnostic system	Maruman golf	Selects best golf club for an individual's physique and swing
Hot water heater	Mitsubishi	Adjusts heating element to correspond to temperature and amount of water being used
Hanheld computer	Sony	Interprets handwritten input for data entry
Stock trading program	Yamaichi Securities	Manages stock portfolios
Television	Sony	Adjusts screen brightness, color, and contrast
Vacuum cleaner	Mitsubishi	Senses floor condition and dust quantity and adjusts vacuum cleaner motor power
Video camcorder	Sanyo Fisher/Canon	Determines best focus and lighting when several objects are in picture
Washing machine	Matsushita	Senses quality and quantity of dirt, load size, and fabric type, and adjusts wash cycle

the system output is a function. Having mapped input variables to the appropriate membership functions and truth values, the inference engine (processing stage) makes decisions for what action to take based on a set of rules. It invokes each appropriate rule and generates a result for each, then combines the results of the rules and finally the defuzzification stage converts the combined result back into a specific control output value. The systems utilizing FL are becoming increasingly visible as consumer products ranging from air conditioners and washing machines to photocopiers, camcorders and many industrial application which are listed in Table I (Self, 1990). It seems that famous corporations are involved in the design of fuzzy software and systems for customers. The simplest way to implement fuzzy logic is to reprogram an existing microcontroller-based system to operate based on reasoning. In some cases, fuzzy logic can be interfaced into existing control systems by using low cost 8-bit microcontrollers with or by a minimal hardware modification (Yorgancioglu & Komurcugil, 2008).

### Probabilistic Reasoning (PR)

PR refers to evolutionary computation (EC), chaos theory, belief networks, and parts of learning theory (The Berkeley Institute in Soft Computing). Some brief overviews of each topic is given below. EC: Among PR technologies, EC technique is the most widely used technology for optimization purposes. The main idea behind the EC paradigm is to mimic the evolution processes observed in nature and utilize them for solving a wide range of optimization problems. EC technologies include genetic algorithms (GAs), genetic programming, and evolutionary algorithms. EC performs directed random searches using mutation and crossover operations through evolving populations of solutions with the aim of finding the best solutions. The criterion which is expressed in terms of an objective function is referred to as a fitness function (Fogel, 1995).

### Chaos Theory:

The chaos theory can be used to explain complex behaviors from rather simple dynamical systems. In mathematics, it describes the behav-

ior of certain dynamical systems whose dynamics are highly sensitive to initial conditions. Due to this sensitivity, the behavior of chaotic systems appears to be complex, and irregular. Chaos exist in many different physical systems such as chemical reactors, fluid dynamics, forced oscillators, laser systems and feedback control devices (Chen & Dong, 1998).

Each method offers some advantages and disadvantages from the user point of view. Table II gives a comparison of capabilities of these methodologies (Fukuda & Shimojima, 1998). It is clearly seen from this table that the methods are complementary of each other. For this reason, their possible combinations may give better results. For example, the combination of FL and neuro-computing, which is known as neuro-fuzzy control has become very popular and has found applications ranging from chemical process control to consumer goods. It can be concluded that NNs and FL form the best couple to mimic the structure and reasoning of human brain.

**Table II:** Capabilities of different methodologies (Adopted from Fukuda & Shimojima, 1998.)

	Mathematical Model	Learning Data	Operator Knowledge	Real Time	Knowledge Representation	Non-Linearity	Optimization
<b>Control Theory</b>	Suitable	Unsuitable	Needs other methods	Suitable	Unsuitable	Unsuitable	Unsuitable
<b>Neural Network</b>	Unsuitable	Suitable	Unsuitable	Suitable	Unsuitable	Suitable	Fair
<b>Fuzzy Logic</b>	Fair	Unsuitable	Suitable	Suitable	Needs other methods	Suitable	Unsuitable
<b>Artificial Intelligence</b>	Needs other methods	Unsuitable	Suitable	Unsuitable	Suitable	Needs other methods	Unsuitable
<b>Genetic Algorithms</b>	Unsuitable	Suitable	Unsuitable	Needs other methods	Unsuitable	Suitable	Suitable

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### About the Researcher

*Hasan Kömürçügil* received his B.Eng., M.Eng and Ph.D. degrees from the Eastern Mediterranean University (EMU), in 1989, 1991, and 1998, respectively. He worked as a Research Assistant in the Electrical and Electronic Engineering Department, EMU, between 1993 to 1998. Currently, he is a Professor and head of the Department of Computer Engineering at EMU. His research interests include microprocessor-based applications, fuzzy logic control, power electronics, and control systems. For more information about this short research letter, please contact our researcher at [hasan.komurcugil@emu.edu.tr](mailto:hasan.komurcugil@emu.edu.tr).

# Age Related Changes in Intelligence

By Lori J. Miller  
Department of Psychology  
Faculty of Arts and Sciences



Lori J. Miller

I would like to introduce a study which examined age related changes in the Wechsler Scales of Intelligence in the various revision of the psychometric instrument from 1955 to 2008. It was undertaken as a collaborative effort with my colleagues in the United States, Wiley Mittenberg, Allison Myers, and Lena Prinzi, of the Center for Psychological Studies, Nova Southeastern University, Fort Lauderdale, Florida.

Declines in IQ scores with advancing age have been observed in each successive revision of the Wechsler Adult Intelligence Scales. Wechsler concluded that intelligence declines with age (Wechsler, 1958). Corrections for these age-related declines have therefore been incorporated into the calculation of IQ's since the publication of the Wechsler-Bellevue Intelligence Scale (Wechsler, 1939) to permit clinicians to distinguish between normal aging and cognitive decline due to neurological, developmental, or psychiatric disorders. Failure to account for age related changes can lead to the misdiagnosis of cognitive impairment or dementia in the normal elderly (Nadler, *et al.*, 1994). Wechsler included routine corrections for the patient's age in subtest and Index scores beginning with the

Wechsler Adult Intelligence Scale, Third Edition (WAIS-3), and subsequently in the Wechsler Adult Intelligence Scale Fourth Edition (WAIS-4) (Wechsler 1997, 2002, 2008a, 2008b) .

A large body of research has indicated that age-related declines were more pronounced on the subtests that measure nonverbal intelligence than verbal intelligence. These differential score reductions were not explained by differences between age groups in educational levels. Speed of thought process (as measured by the Digit Symbol-Coding subtest) showed the greatest decline with age. Reductions in performance on the Block Design subtest were more pronounced than score changes on the Vocabulary and Digit Span subtests, which were relatively stable between the ages of 20 and 74.

Although these declines were inferred from a cross-sectional comparison of age groups in the WAIS-R standardization sample, longitudinal comparisons have demonstrated similar age related changes. Early comparisons showed pronounced decline in nonverbal intelligence and relative preservation of verbal intelligence between the ages of 20 and 74. The reductions were not attributable to

educational differences between age groups because each age cohort on the WAIS-R was compared to the performance of the same cohort 25 years earlier. The patterns of decline were also independent of population increases in IQ that occurred during the time interval between the two standardizations (Flynn, 1984). In a replication of this methodology using standardization data from the WAIS-3 and WAIS-R, Kaufman found similar declines in nonverbal intelligence and relative preservation of verbal intelligence using both cross-sectional and longitudinal comparisons between younger and older age groups (Kaufman, 2001). Ryan, Sattler, and Lopez examined differences in the WAIS-3 subtest scores between age groups in the standardization sample (Ryan, *et al.*, 2000). The greatest age related declines were observed on subtests that measure speed of thought process (e.g. Digit Symbol-Coding), with relative preservation of performance on subtests that assess attention and concentration (i.e. working memory) such as Digit Span. Verbal subtests (such as knowledge of word meanings as assessed by the Vocabulary subtest) showed relatively stable performance across the life span, while measures of nonverbal

intelligence (such as Block Design) declined more precipitously. In Sweden, cross-sectional and longitudinal comparisons of the effect of age on Block Design subtest performance also showed similar declines after 55 years of age that were unrelated to educational attainment (Ronnlund & Nilsson, 2006). Subtests that show the greatest sensitivity to aging also show the greatest age related variability in scores (Ardila, 2007).

The WAIS-4 *Manual* does not directly provide information about the extent of age related changes in subtests, Indexes, or Full Scale IQ's because these scores are inherently corrected for the effects of age (Wechsler, 2008a). However, it is possible to remove these age corrections by using normative data for the 20 to 34 year old reference group (rather than the age specific tables) to derive subtest scores, and to use the resulting subtest scores that are therefore not age corrected to derive age neutral Index and IQ scores. This procedure allows a cross-sectional view of age related changes in intellectual functions. Similar procedures can be followed to derive subtest and IQ scores that were not age corrected from the 1955 WAIS, 1989 WAIS-R, and 1997 WAIS-3. This procedure allows a longitudinal view of age related changes in intellectual function. These methods were followed to provide the following results.

The WAIS-4 was standardized on a sample of 2,200 adults between the ages of 16 and 90 that were selected by stratified sampling to represent the demographic characteristics of the U.S. population (Wechsler, 2008b). The sample was stratified to match the 2005 Census by age, gender, educational levels, geographic region of residence, and ethnicity. Individuals were excluded if they had neurological or psychiatric disorders, were taking medication, had a history of unconsciousness longer than 20 minutes, a history of radiation

or electroconvulsive therapy, or had uncorrected impairment of vision or hearing, which might affect test performance. Scaled score equivalents of raw score totals for each WAIS-4 subtest are presented in the Manual for 13 age groups and a reference group of individuals between 20 and 34 years of age. The mean raw score that corresponded to average performance for each subtest was determined for each age group. Raw scores were converted to subtest scaled scores that were uncorrected for age (Tables 1 & 3) using the scaled score equivalents for the 20-34 year old reference group. These uncorrected subtest scaled scores were summed to produce Index and Full Scale IQ scores that were not corrected for age (Table 2). Average subtest scaled scores and Full Scale IQ's were derived using similar procedures for the WAIS, WAIS-R, and WAIS 3 (Wechsler, 1955, 1981, 1997).

Table 1 shows average changes associated with age on the WAIS-4 subtests. The most precipitous age related declines occurred on the Coding subtest, which

measures speed of thought process. Average reductions reached 1 standard deviation at age 65 and 2 standard deviations by age 85 compared to 20-34 year olds. Subtests that assess nonverbal reasoning were more sensitive to age than those that measure verbal intelligence. Each of the nonverbal subtests (Block Design, Matrix Reasoning, and Visual Puzzles) showed steeper linear gradients of decrement with age than the any of the verbal measures. Declines of 1 standard deviation occurred by age 65 on the Block Design and Matrix Reasoning subtests. In contrast the Vocabulary and Information subtests characterized improvements in verbal ability through middle age, and performance in the average range was maintained throughout the lifespan in comparison to ability at 20-34 years of age. Subtests that assess attention and concentration declined more gradually, reaching 1 standard deviation at age 80 on the Digit Span subtest.

The observed reduction on nonverbal measures appeared to be independ-

**Table 1:** Mean Scaled Scores for the Core WAIS-4 Subtests without Corrections for Age

Age	V	I	S	DS	A	BD	MR	VP	CD	SS
16-17	9	10	9	10	10	10	10	11	10	10
18-19	9	10	10	10	10	10	10	11	10	10
20-24	9	10	10	10	10	10	10	11	10	10
25-29	10	10	10	10	10	10	10	10	10	10
30-34	10	10	10	10	10	10	10	10	10	10
35-44	11	11	10	10	11	9	10	10	9	10
45-54	11	11	10	10	11	9	9	9	9	9
55-64	11	11	10	9	10	8	8	8	8	8
65-69	11	11	10	9	10	7	7	8	7	7
70-74	10	11	10	8	9	7	6	7	6	7
75-79	10	11	9	8	9	6	6	7	5	6
80-84	10	10	9	7	9	6	5	6	5	5
85-90	9	9	8	7	8	5	4	6	4	4

Subtest abbreviations are V-Vocabulary, I-Information, S-Similarities, DS-Digit Span, A-Arithmetic, BD-Block Design, MR-Matrix Reasoning, VP-Visual Puzzles, CD-Coding, SS-Symbol Search.

ent of the slowing of thought process. Age related declines on the Matrix Reasoning subtest (which is not timed) were similar to those seen in timed Block Design performance. Comparison of Block Design scores using the standard bonus points for more rapid solutions and scores without these bonus points for speed (Table 2) demonstrated a decline of 1 standard deviation by age 70 and 2 standard deviations at age 80 with both scoring methods as compared to the performance of the 20-34 year old reference group.

Patterns of change with age in the WAIS-4 Index scores (Table 3) reflect these changes in underlying subtest performance. Compared to 20-34 years olds, Index score declines of more than 1 standard deviation occurred in Processing Speed and Perceptual Reasoning by age 65. Similar reduction of Working Memory was not present until 85 years of age. More pronounced loss in the component ability to perform digit sequenc-

ing was seen than on the Digit Span subtest forward or backward sections (Table 3). Relatively invariant scores on the Verbal Comprehension Index confirmed that verbal intelligence was resistant to changes across the life span. Overall intellectual ability as assessed by the Full Scale IQ was about 1 standard deviation lower than the 20-34 year old reference group by 75 years of age (Figure 1).

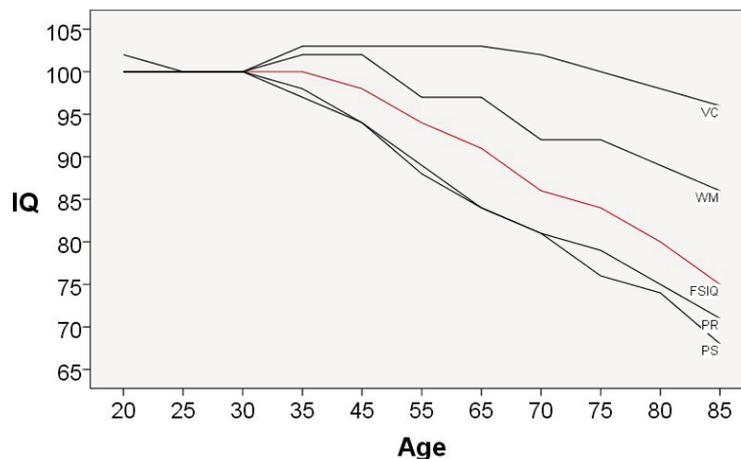


Figure 1 IQ and Age relationship

Table 2: Mean WAIS-4 Process Subtest Scaled Scores without Corrections for Age

Age	Block Design		Digit Span		
	Standard	No Time Bonus	Forward	Backward	Sequencing
16-17	10	10	10	10	10
18-19	10	10	10	10	10
20-24	10	10	10	10	10
25-29	10	10	10	10	10
30-34	10	10	10	10	10
35-44	9	10	10	0	10
45-54	9	9	9	10	10
55-64	8	8	9	9	9
65-69	7	8	9	9	9
70-74	7	7	9	9	8
75-79	6	7	9	9	8
80-84	6	6	9	8	6
85-90	5	5	8	8	6

izations, and is also the age range that corresponds to the average life span during this time period. The vocabulary, Block Design, Digit Span, and Digit Symbol (or Coding) subtests were selected because they are common to the various WAIS revisions, and are the subtests that correlate the most highly with their respective WAIS-4 Indexes (Index scores were not available for the WAIS or WAIS-R). Nonverbal reasoning (Block Design) and attention span (Digit Span) showed declines by age 70-74 that have remained essentially constant from 1955 to 2008 compared to respective reference groups. The Vocabulary knowledge of persons in their 70's is somewhat better preserved in more contemporary population samples. Coding subtest scores suggest that speed of thought process in 70-74 year olds has improved in an essentially linear fashion during the past 53 years. Relative to contemporaneous 20-34 year

**Table 3:** Mean Scaled Scores for the Core WAIS-4 Subtests without Corrections for Age

Age	VC	PR	WM	PS	FSIQ
16-17	96	102	100	100	99
18-19	98	102	100	100	100
20-24	100	102	100	100	100
25-29	100	100	100	100	100
30-34	100	100	100	100	100
35-44	103	98	102	97	100
45-54	103	94	102	94	98
55-64	103	88	97	89	94
65-69	103	84	97	84	91
70-74	102	81	92	81	86
75-79	100	79	92	76	84
80-84	98	75	89	74	80
85-90	96	71	86	68	75

Abbreviations are VC-Verbal Comprehension Index, PR-Perceptual Reasoning Index, WM-Working Memory Index, PS-Processing Speed Index, FSIQ-Full Scale IQ

**Table 4:** Average Scores for 70-74 Year Old Persons on Successive Wechsler IQ Tests without Age Corrections

Test	Vocabulary	Block Design	Digit Span	Coding	Full Scale IQ Test
1955 WAIS	9	7	8	4	80
1981 WAIS-R	9	6	8	5	81
1997 WAIS-3	10	7	8	6	85
2008 WAIS-4	10	7	8	6	86

olds, the Full Scale IQ of the average person aged 70-74 has also increased in a systematic manner from 1955 to 2008.

The cohort that was 20 years of age when normative data from the WAIS was published would have been members of the 45-54 year old cohort on the WAIS-R, in the 55-64 cohort sampled for the WAIS-3, and members of the 70-74 year old cohort in the WAIS-4 standardization sample. Although the

same individuals were not tested across standardizations, each group was a representative sample of this age cohort on each occasion. Table 5 shows the longitudinal performance of the cohort as compared to the respective 20-34 year old reference group at each point in time. Patterns of age related decline are similar to those seen in the cross-sectional samples on the WAIS-4 (Tables 1 & 2). Vocabulary knowledge remained

relatively stable, nonverbal reasoning as assessed by Block Design declined more rapidly, and speed of thought process on the Coding subtest showed the most precipitous age related loss.

Patterns of age related change on the WAIS-4 are similar to those that have been observed in both cross-sectional and longitudinal analyses of prior versions of the scale. Declines in Full Scale IQ with advancing age are predominantly due to slowing of thought process and reduced nonverbal reasoning ability. Verbal intelligence and working memory are relatively resistant to advancing age. This pattern is similar to that seen in diffuse degenerative process such as Alzheimer's disease or dementia due to head trauma (Wechsler, 2002, 2008b). Relative preservation of verbal abilities and deterioration of nonverbal intelligence is consistent with Ribot's law, that cognitive abilities learned earliest and rehearsed more are most resistant to conditions that effect the brain (Ribot's 1882). Cross-sectional and longitudinal structural MRI studies indicate that normal aging is associated with a 50% reduction of brain volume (Decarli, *et al.*, 2005; Good, *et al.*, 2001; Resnick, *et al.*, 2003). Cell loss is minimal prior to age 50, and accelerates substantially thereafter (Decarli, *et al.*, 2005). These systematic age related atrophic changes have been linked to the cognitive declines that characterize normal aging (Brickman, *et al.*, 2007).

Comparison of the effects of age across the four population samples from the WAIS to the WAIS-4 suggests that the intelligence and speed of thought process of average persons aged 70-74 has increased in an essentially linear manner relative to 20-34 year olds from 1955 to 2008. It is possible that these increases are related to improvements in medicine and general health. The average life span in the U.S. was 69.1 in 1955, 73.9 in 1981, 76.5 in 1997, and 78.1 in 2007 (National Center for Health Statistics, 2006; 2007). It is also possible that the observed increase in scores is in part due to progressively more rigorous

**Table 5:** Longitudinal Changes in Average Scores Across Successive Wechsler IQ Tests without Age Corrections

	1955 WAIS (20-24)	1981 WAIS-R (45-54)	941997 WAIS-3 (55-64)	2008 WAIS-4 (70-74)
Full Scale IQ	100	94	94	86
Vocabulary	10	10	10	10
Block Design	10	8	8	7
Digit Span	10	10	9	8
Coding	10	8	7	6

exclusion from the standardization samples over time of persons with medical conditions that might reduce cognitive performance. Such conditions are likely to differentially affect older more than younger persons.

IQ scores in the general population have increased over time (Flynn, 1984). Manuals for Wechsler's Intelligence Scales show that Full Scale IQ increased 7.5 points between standardizations of the WAIS and the WAIS-R, 2.9 points from the WAIS-R to the WAIS-3, and 2.9 points between the standardization of the WAIS-3 and the WAIS-4. However, these increases are unlikely to account for the progressive improvement shown by 70-74 year olds across standardization samples.

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#### About the Researcher

*Lori Miller* received her B.A. in Psychology in 1993 from the University of Colorado, USA. She completed her M.S. in Clinical Psychology in 1994, and her Ph.D. in Clinical Psychology with a Neuropsychology specialization in 2000, both at Nova Southeastern University, USA. Her internship was completed at the University of Arizona in USA in 1999, and she completed a postdoctoral fellowship at Mary Free Bed Hospital in 2001. She is currently an Assistant Professor in the Department of Psychology at Eastern Mediterranean University. Her research interests include the effects of pediatric and adult brain injury, the development of brief cognitive-behavioral interventions for the prevention and treatment of the sequelae of head injury in both pediatric and adult populations, the neuropsychology of dementia, the development of cognitive-behavioral interventions for the prevention and treatment of aggression in head trauma and dementia patients, investigating the utility of neuropsychological instruments in prognosis and treatment, and psychometrics. For more information about this research project, please contact our researcher at [lori.miller@emu.edu.tr](mailto:lori.miller@emu.edu.tr).

# MODIFIED CHITOSANS AS GENE CARRIERS

By Zülal Yalınca  
Department of Chemistry  
Faculty of Arts and Sciences



Zülal Yalınca

Gene therapy, a technique for treatment or prevention of diseases associated with defective gene expression, involves the insertion of a therapeutic gene into cells, followed by expression and production of the required proteins. Gene therapy could work in two different ways; by replacing the defective genes with genes that work or by inhibition the expression of undesired genes (Grigsby & Leong, 2009). The success of gene therapy largely depends on the availability of suitable delivery vehicles. The ideal gene delivery vehicles, also called gene carriers or vectors, should (1) be non-immunogenic (2) show high transfection/transduction efficiency; (3) allow controlled and targeted transgene expression and (4) be of low cost. The biggest challenge in gene therapy is to find vectors that are non-toxic, have high-efficiency gene transfer, sufficient or regulated gene expression, and are long-lasting within the host.

However, the perfect vector having all therapeutic and safety requirements does not exist and significant advancement in the field is needed for developing clinically safe gene carriers (Grigsby & Leong, 2009; Mintzer & Simanek, 2009; Luten, *et al.*, 2008; Eliyahu, *et al.*, 2005; Roth & Sundaram, 2004).

There are two major methods for delivery of genes. Initial research con-

centrated on using viral carriers that showed high efficiency at delivering both DNA and RNA to numerous cell lines. Viral vectors show rather good transfection properties, both in vitro and in vivo, however can induce potential fatal immune response, may have limited capacity for inserted DNA and difficult large-scale pharmaceutical production (Grigsby & Leong, 2009). Given the problems with viral vectors, stimulates a search for non-viral gene delivery systems. There are two major classes of non-viral systems that can be distinguished, namely those based on cationic lipids and cationic polymers. Frequently studied cationic gene delivery polymers include polyethylenimine (pEI) and poly-L-lysine (pLL) (Grigsby & Leong, 2009; Mintzer & Simanek, 2009; Luten, *et al.*, 2008). Non-viral systems offer potential routes for compacting DNA for systemic delivery. However, these polymers are non-degradable and therefore there is consequently a risk of accumulation in the body occurs, particularly with repeated administration. Further, most of these cationic polymers show, depending on their chemical structure and molecular weight, some cytotoxicity likely due to adverse interactions with membranes resulting in loss of cytoplasmic proteins, in permeabilization of cellular membranes and collapse of the

membrane potential (Mintzer & Simanek, 2009; Luten, *et al.*, 2008).

During the past decade, the use of biodegradable polymers has gained the attention of researchers in the field. The advantages that are now becoming most obvious are the low or even absent cytotoxicity of the polycations, their applicability to almost all of the systems described above, and the prevention of polymer accumulation in the body. Cytotoxicity has been one of the most important drawbacks of the high molecular weight polycations used in gene delivery to date (Mintzer & Simanek, 2009).

Chitosan (1-4- $\beta$ -D- polyglucosamine) as a functional polysaccharide, is obtained by the alkaline deacetylation of chitin, which is one of the most abundant natural polymers as the component of exoskeletons of marine animals. It has been employed in biomedical field because of its low toxicity, low immunogenicity, biocompatibility, and biodegradability. Biocompatibility, biodegradability, cationic nature at physiological pH, nontoxicity and physicochemical functionality are properties make chitosans as gene carrier candidate.

Polyethyleneglycol (PEG) is a polymer in biomedical fields and has been introduced to polymeric or liposomal gene delivery research, due to its high

solubility in water and biocompatibility. Poly-N-vinylimidazole (PNVI) is another versatile polymer same as chitosan for biomedical applications since it has also been shown as biocompatible and biodegradable. The cholesteryl group modification onto chitosan was aimed to improve interaction with the cell membrane, polyethylene glycol (PEG) modification lead to improve solubility and reduce immunogenicity. Poly (N-vinylimidazole) modification leads to osmotic swelling and membrane lysis and therefore DNA release (Amiji, 2005).

Toward the goal of synthesizing a low cytotoxic biodegradable gene carrier, I have been working on the preparation and characterization of chitosan-g-poly(N-vinylimidazole) based gene delivery vectors under the co-supervision of Elvan Yılmaz and Bahar Taneri and in collaboration with Hasan Uludağ from the University of Alberta in Canada. To this extent, I have synthesized several chitosan modifications in the Chemistry Laboratory at EMU. These were N-vinyl imidazole grafted chitosan by redox initiation and by UV irradiation. Cholesterol-PEG substituted N-vinyl imidazole grafted chitosan was also synthesized.

I had the opportunity to test the cytotoxicity, buffer capacity and the transfection capacity of these polymers at the Uludağ Laboratory in University of Alberta, Canada. The agarose gel electrophoresis was performed to detect the complex formation between chitosan derivatives and plasmid DNA and at which N/P ratio (the ratio of the number of primary amines on chitosan to the number of phosphate groups on DNA) the plasmid DNA was totally condensed by the non-viral vector. As Figure 1 shows, all synthesized chitosan derivatives had the ability to compact plasmid DNA. Synthesized chitosan derivatives exhibited stronger DNA binding capacity

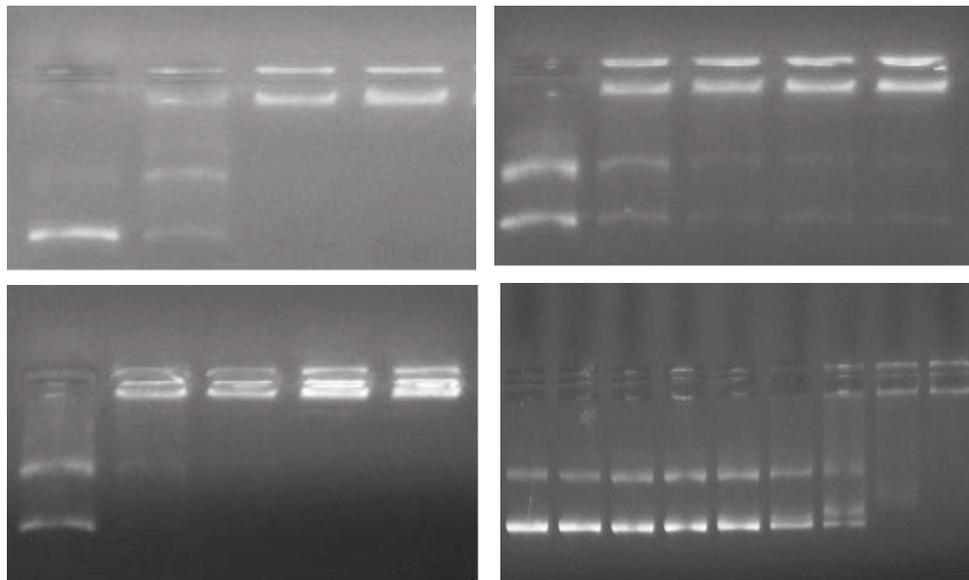


Figure 1. Agarose gel electrophoresis assay of the polymers at various weight ratios of polymer/DNA complexes; CS-IM CHOL PEG, CS-IM (85.5), CS-IM (24.6), PEI-25. CS-IM - Chitosan modified with imidazole. The numerical is the grafting % by simple gravimetric analysis such as,  $(m_2 - m_1 / m_1) \times 100$  where  $m_1$  and  $m_2$  are masses of chitosan and grafted chitosan respectively. Polymer/pDNA (w/w): 0, 0.0025, 0.125, 0.5, 1 and PEI/pDNA (w/w): 0, 0.0078, 0.0156, 0.0313, 0.0625, 0.125, 0.25, 0.5, 1.

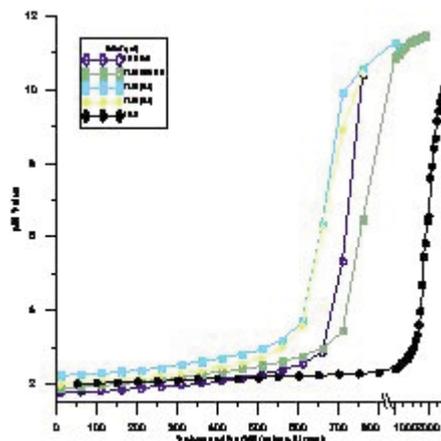


Figure 2. Buffer capacity of chitosan derivatives.

(at pH=7.4) than the PEI-25 even at lower polymer concentrations in cell culture.

In vitro, cell viability assay for cytotoxicity and transfection efficiency of synthesized polymers were performed. Preliminary experiments showed that there is no cytotoxicity of synthesized chitosan samples. The buffer capacity of the synthesized chitosan derivatives (in Figure 2) was much lower than those of polyethylenimine (PEI-25) which has been previously shown to be one of the most efficient nonviral gene vectors. Currently, I am working on further chemical modifications of chitosan derivatives in order to increase their transfection efficiency.

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### About the Researcher

*Zülal Yalınca* received her B.S. degree in Chemistry from the Anadolu University in Turkey and her M.S degree in Chemistry from the Eastern Mediterranean University in 2004 and 2006, respectively. Currently she is continuing her Ph.D studies at the EMU Chemistry department. Her research focus is on the synthesis of non-viral vectors for gene delivery. She has been working as a Research Assistant in the EMU Chemistry Department since 2004. Her research interests include molecular/metal imprinting, cholesterol binding, non-viral gene carrier. For more information about this research project, please contact our researcher at [zulal.yalinca@emu.edu.tr](mailto:zulal.yalinca@emu.edu.tr).



*Amin Almassian, a student at the crossroads of computer science & neurobiology shares with us his research in this interdisciplinary field.*

- **Where are you from? When did you start your studies at EMU? Please tell us a bit about your educational background before EMU.**

I am from Tehran, Iran. I received my Bachelor's degree in Computer Engineering from Arak Azad University in Iran in 2007. After my graduation, I had a break for about one year and in 2008 I came to EMU. Presently, I am enrolled in the Master's program at the Department of Computer Engineering, EMU.

- **How did you decide to come to EMU? Where did you hear about EMU?**

I worked in several software development companies for about 5 years. Meanwhile, I was looking for a place to continue my studies on artificial intelligence. I did not know much about EMU, but one of my friends who studied here told me that EMU is a good university. Then I contacted some of the professors at the Department of Computer Engineering, who are interested in artificial intelligence. I decided to send my documents and I was happy to be admitted.

- **Could you introduce your graduate study subject for our readers?**

I am currently working on computational neuroscience, which is an interdisciplinary field combining neuroscience,

computer science, mathematics, physics, psychology and even philosophy.

- **How did your interest in computational neuroscience start?**

Last semester, I took a course on the neural networks. Although it was not specifically related to computational neuroscience, it included mathematical modeling of neurons, which is widely used in intelligent systems. Numerous efforts have been done to approximate the behavior of intelligent systems to the human brain's behavior, as the most sophisticated intelligent system. However the results have not been satisfactory. I am aiming to conduct research to that extent.

- **How do you imagine connecting computation with neuroscience?**

Let me start my answer by another question. How does the brain respond to the mind's consciousness and has the ability to compute things? This is the main question that neuroscientist are trying to answer. On the other hand, computer scientists are looking for ways to create such a complete intelligent system, which is able to perform the most complicated computations. This sort of overlaps and the complication of this phenomenon on the other hand led us to put this phenomenon into perspective from different points of view. In addition, since the neuron has been known as the main building block of the brain, many scientists have concentrated their research on this tiny cell's networks which is able to perform huge computations.

- **Particularly, what is of interest to you within the field of computational neuroscience?**

It is hard to specify major subfields. But I am interested in neural modeling, neural coding and neurophysiology to mention a few. I am actually interested in any area of neuroscience that helps me to take one step toward understanding the mechanisms of brain and resembling an artificial brain, no matter what name it has. However, it may be worth talking about what I am already researching on. I am already working on ion channel noise. Ion channels are pore-forming proteins that help establish and control the small voltage gradient across the plasma membrane of all neuron cells by allowing the flow of ions down their electrochemical gradient. It has been postulated and shown experimentally that ion channel

noise in neurons can have effect on the neuron's dynamical behavior. It was seen to be able to cause spontaneous firing in neurons and I am presently working on some computational neuron model incorporating ion channel noise under the supervision of professor Marifi Guler.

■ **Have you had teaching experience at EMU, in addition to your research experience?**

I have been a research assistant for three semesters, and have taught many courses including Principles of Programming Languages and Object Oriented Programming Languages. I have also taught Project Management at the Department of Industrial Engineering.

■ **What kind of projects were you involved in at your department during your M.Sc. program?**

I joined a group working on a Semantic Web project called Manipulating OWL toward Semantic Web Applications and Services. This project was presented at an international conference and was later published. Thanks to Pooyan Balouchian and professor Atilla Elçi for their valuable contribution.

■ **Is there any specific event that you would consider as your most valuable experience at EMU?**

Semantic Web day was an interdepartmental seminar in which we presented our project and it was the best memory I have ever had from an academic presentation. In addition the project I mentioned was quite important for me since it was an opportunity of converting application of knowledge into practice in an academic environment. I have learnt a lot from this project.

■ **How would you say EMU has made a difference in your life?**

I have learnt many things at EMU. I met many professors some of whom helped me to further my studies. I experi-

enced an atmosphere where scientific knowledge is shared respectfully between academicians, no matter what nationality they are.

■ **What are your short-term plans after you obtain your Master's degree?**

I would like to continue my studies on the computational neuroscience in a Ph.D. program.

■ **Where do you see yourself in 10 years from now?**

In order to advance my knowledge and studies, I would like to be in a facilitated laboratory in the field of computational neuroscience, and hope to move towards exploring the human brain as well as the mechanisms by which we can resemble this complicated phenomenon.

■ **Finally would you like to add anything else?**

I want to thank my professors for their help. Also, for her support, I thank my dear wife and best friend Fatemeh, who has been with me throughout my studies at EMU.



**WHY DON'T YOU...**

*...share this interview with your undergraduate students? Please direct them to <http://research.emu.edu.tr>.*

## Where are they now?



### GÖĞEM TOPCU

I received my BSc. degree in Psychology in 2009. I am currently a postgraduate student at the University of Nottingham in UK, studying Health Psychology (MSc). My current research interests include dental health, and psychological aspects of chronic illnesses and disability. My ongoing research explores dental phobic people's perceptions of the origins of their fear. Given the high prevalence of dental fear in the community and the detrimental physical, psychological and social consequences accompanying the avoidance of dental care, there is a great need to understand patients' perceptions. Therefore, it is hoped that the results of my study will direct efforts to prevent and alleviate individuals' dental fear. Studying at EMU Psychology Department was a great opportunity for me which helped me a lot building up a strong background for my current studies.



### HATİCE ÜLSEVER

I received my BSc. degree in Psychology in 2009. Currently I am a research master student in Neuropsychology department at the Maastricht University, Netherlands. Generally, I am interested in the effects of genetic factors which have particular roles on human behaviors. Also I am interested in several brain imaging techniques that can help us to understand which kind of changes or differences (physically and chemically) may affect human behaviors and their relationships with genes.



### İLKEM TUNAR ÖNTAŞ

I received my B.A. degree in Archaeology and History of Arts in 2004. I did my M.A. on Art Gallery Studies in University of Leicester, UK in 2005. From 2006 to 2008 I was a lecturer in Cyprus International University teaching History of Arts, History of Architecture and other relative courses in the Department of Fine Arts. Currently I am working at the Nicosia Turkish Municipality in Foreign Relations Department dealing with art and cultural projects and also working on opening a Contemporary Art Centre under the municipality. I am also in the board of EMAA – European Mediterranean Art Association dealing

with organizing exhibitions, workshops, panels and conferences.



### PEMBE BİLEN

I graduated from the Department of Psychology, in July 2009. I am now a master's student studying in the Psychology Department at Oxford Brookes University in Oxford, UK. I am currently interested in children's ability to distinguish fantasy entities from reality entities on media. I am going to conduct a research project on parents' role in children's understanding of the reality and fantasy distinction.



### NİHAT YILMAZ

After graduating from EMU Department of Computer Engineering, I worked in Kuzey Kıbrıs Turkcell for four years as the Chief OMC Engineer. In 2003, I became the managing director of an ICT company and moved to UK. I worked with this company until May 2009. In the same year, I moved back to Cyprus. While in UK I received my M.Sc. degree in Communications Management from Coventry University and also started an LLM course in University of Strathclyde on ICT Law. I have completed the courses and I am currently writing my thesis. Currently, I am working as Technical Manager in Comtech Ticaret Ltd. and acting as Project Manager on projects including the automation of health system, extension of local telecommunications network to next generation network and replacement of current telecomms infrastructure with IP based NGN network which is funded by EU.



### YELİZ YESİLADA

After graduating from EMU Department of Computer Engineering, I received my M.Sc. in Computer Science from the University of Manchester, UK. I also received an Overseas Research Scholarship to pursue my Ph.D. degree. I received my Ph.D. degree in Computer Science from University of Manchester in 2005. Since then I have been doing research in Manchester. I have worked on various research projects funded by UK Engineering and Research Council, SUN Microsystems and European Union. Besides these research grants, I received a UK Royal Academy of Engineering Award, and a UK Inclusive Digital Economy Network travel grant. I am currently working as a lecturer and researcher in the Computer Engineering department of the Middle East Technical University Northern Cyprus Campus (METU NCC). My primary research interest is centred around the Human Centred Web; in particular Web accessibility, the mobile Web and using Semantic Web technologies to improve user experience.

## Recent Publications and Presentations (October- December 2009)

### ■ Journal Publications (SCI, SSCI, AHCI) ■

The journal publications listed here are those that are listed in Arts & Humanities Citation Index (A&HCI), Science Citation Index Expanded (SCI-Expanded), or Social Sciences Citation Index (SSCI). A search on ISI Web of Science was performed on 26 January 2010 to retrieve articles with at least one author having EMU affiliation. This list may not be comprehensive as some articles could be deposited to ISI after the query date.

Aldabbagh LBY and Mohamad AA. (2009). "A Three-Dimensional Numerical Simulation of Impinging Jet Arrays on A Moving Plate." *Journal of Heat and Mass Transfer* 52(21-22): 4894-4900.

Arjunan TV, Aybar HS and Nedunchezian N. (2009). "Status of Solar Desalination in India." *Renewable & Sustainable Energy Reviews* 13(9): 2408-2418.

Atun RA and Pulhan H. (2009). "Learning from Housing: A Retrospective Narrative of Housing Environments in North Cyprus." *Open House International* 34 (4): 82-93.

Aybar HS and Assefi H. (2009). "A Review and Comparison of Solar Distillation: Direct and Indirect Type Systems." *Desalination and Water Treatment* 10(1-3): 321-331.

Aybar HS and Sharifpur M. (2009). "Modeling Of Two-Phase Flow in Boiling Water Reactor Using Phase-Weighted Ensemble Average Method." *Iranian Journal of Science and Technology Transaction B-Engineering* 33(B5): 355-370.

Bektas E and Kaymak T. (2009) "Governance Mechanisms and Ownership in an Emerging Market: The Case of Turkish Banks." *Emerging Markets Finance and Trade* 45(6): 20-32.

Demirel H and Anbarjafari G. (2009). "Histogram Based Face Recognition System." *Electronics World* 115(1884): 32-37.

Dimililer N, Varoglu E and Altincay H. (2009). "Classifier Subset Selection for Biomedical Named Entity Recognition." *Applied Intelligence* 31(3): 267-282.

Eleyan A, Demirel H and Ozkaramanli H. (2009). "Face Recognition from Low Resolution Video Sequence Using

Weighted Majority Voting." *Electronics World* 115 (1884): 26-30.

Gurtug O and Halilsoy M. (2009). "Restricted Class of Colliding Einstein-Yang-Mills Plane Waves." *International Journal of Modern Physics A* 24 (30): 5579-5585.

Hedayat AA and Celikag M. (2009). "Fracture Moment and Ductility of Welded Connections." *Proceedings of the Institution of Civil Engineers-Structures and Buildings* 162 (6): 405-418.

Isman A, Aksal FA and Gazi ZA. (2009). "Teacher Researchers: Technology and Ethical Considerations While Conducting an Action Research." *Hacettepe University Journal of Education* (37): 84-95.

Karatepe OM and Olugbade OA. (2009) "The Effects of Job and Personal Resources on Hotel Employees' Work Engagement." *International Journal of Hospitality Management* 28(4): 504-512.

Katircioglu ST, Fethi S and Fethi MD. (2009). "Twin deficits phenomenon in small islands: an empirical investigation by panel data analysis." *Applied Economics Letters* 16 (15): 1569-1573.

Kaymak E and Faustmann H. (2009). "Political Data in 2008 Cyprus." *European Journal of Political Research* 48(7-8): 925-938.

Kusaf M and Oztoprak AY. (2009). "Multi Split-Step Unconditionally Stable Finite Difference Time Domain Methods." *Microwave and Optical Technology Letters* 51(11): 2646-2649.

Mazharimousavi SH, Gurtug O and Halilsoy M. (2009). "Generating Static, Spherically Symmetric Black Holes in Lovelock Gravity." *International Journal of Modern Physics D* 18 (13): 2061-2082.

Mazharimousavi SH and Halilsoy M. (2009). "Lovelock Black Holes with a Power-Yang-Mills Source." *Physics Letters B* 681(2): 190-199.

Miller LJ, Myers A, Prinzi L and Mittenberg W. (2009). "Changes in Intellectual Functioning Associated with Normal Aging." *Archives of Clinical Neuropsychology* 24(7): 681-688.

Nadiri H, Kandampully J and Hussain K. (2009) "Zone of Tolerance for Banks: A Diagnostic Model of Service Quality." *Service Industries Journal* 29 (11): 1547-1564.

Osam N and Agazade AS. (2009). "Identification of the Language Attitudes of the Turkish Cypriots towards Greek with Respect to Ethnic Identity." *Bilig* (51): 105-122.

Ozgergin E, Ozarslan MA and Srivastava HM. (2009). "Some Families of Generating Functions for a Class of Bivariate Polynomials." *Mathematical and Computer Modelling* 50(7-8): 1113-1120.

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Riza M, Ozyapici A, and Misirli E. (2009). "Multiplicative Finite Difference Methods." *Quarterly of Applied Mathematics* 67(4): 745-754.

Rogovchenko YV and Tuncay F. (2009). "Oscillation Theorems for a Class of Second Order Nonlinear Differential Equations with Damping." *Taiwanese Journal of Mathematics* 13 (6B): 1909-1928.

Rogovchenko YV and Tuncay F. (2009). "Yan's Oscillation Theorem Revisited." *Applied Mathematics Letters* 22(11): 1740-1744.

Tansu F and Salamah M. (2009) "An Efficient Vertical Handoff Scheme for Microcellular and Macrocellular Interworking." *International Journal of Communication Systems* 22(12): 1495-1513.

Sonaiya OA and Dincyurek O. (2009). "Tradition and Modernism in Yoruba Architecture: Bridging the Chasm." *Open House International* 34 (4): 74-81.

Svatos TD. (2009). "About the Problems of the Martinu Reception in the Anglo-American Musicology." *Osterreichische Musikzeitschrift* 64 (11-12): 22-26.

## ■ Other Journals ■

Fehlmann M. (2009) "Barthélemy Menn Copiste II. Les artistes contemporains." *Geneva* 59: 61 – 90.

Karatepe OM. (2009) "The Effects of Involvement and Social Support on Frontline Employee Outcomes: Evidence

from the Albanian Hotel Industry." *International Journal of Hospitality and Tourism Administration* 10(4): 326-343.

Turhan T. (2009) "Uluslararası İnsancıl Hkuku ve İsrail'in Gazze Harekatı." *İstanbul Üniversitesi Siyasal Bilgiler Fakültesi Dergisi* 41: 161-181.

## ■ Conference Papers ■

Demirel H and Anbarjafari G "Image Resolution Enhancement Based and on Interpolation of High Frequency Complex Wavelet Domain Subbands." in *Proceedings of IEEE International Conference on Image Processing (ICIP'09)*, Cairo, Egypt, 7-11 November 2009.

Komurcugil H. "Integral Sliding Mode Control of a Single-Phase Current-Source Inverter." in *Proceedings of the 35<sup>th</sup> Annual Conference of the IEEE Industrial Electronics Society (IECON'09)*, pp. 1599-1604, Porto, Portugal, 3-5 November 2009.

Komurcugil H. "Nonlinear Control Strategy for Single-Phase PWM Current-Source Inverters." in *Proceedings of the 35<sup>th</sup> Annual Conference of the IEEE Industrial Electronics Society (IECON'09)*, pp. 679-684, Porto, Portugal, 3-5 November 2009.

Mahmoud AY and Chefranov AG. "Hill cipher modification based on eigenvalues HCM-EE." in *Proceedings of the Second International Conference on Security of Information and Networks*, pp. 164-167, Famagusta, North Cyprus, 6-10 October 2009.

Oktay D and Marans RW. "Perceptions of Overall Quality of Urban Life among Residents of the Walled City of Famagusta." in *Proceedings of CSBE-IAPS Conference*, Istanbul, Turkey, 12-16 October 2009.

Turhan T. "K.K.T.C. - Azerbaycan İlişkileri." 7. Uluslararası Kıbrıs Araştırmalar Kongresi, Gazimağusa, KKTC. 4-6 Kasım 2009

## ■ Conference Presentations ■

Aker S and Aker A (2009), "Strategies for SMEs Success During Financial Crisis", West Lake International Conference on SMB (WLICSMB 2009), Oct. 24-26, 2009, Hangzhou, China.

Fehlmann M. (2009). "Konservierung und Restaurierung in

Nordzypern. Nicht eine Erfolgsgeschichte." *Pompeijopolis. Die Metropolis Paphlagoniens und neue archäologische Forschungen in der Türkei*, Ludwig-Maximilian University Munich (Institute for Classical Archaeology), Munich. November 2009.

Svatos TD. "Bohuslav Martinů's Essay on Beethoven's 'Pastoral' Symphony." *Interpretive Choices in Beethoven*, Norwegian Academy of Music, Oslo, Norway. 1-2 December 2009.

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Erhurman T. (2009). *100 Soruda Kıbrıs'ta Federasyon*. Işık Kitabevi, Lefkoşa, KKTC.

Erhürman T. (2009) *Yüzleşme*. Işık Kitabevi, Lefkoşa, KKTC.

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Ozay M. (2009). *Sustainability of Micro-States: The Case of North Cyprus*. University of Utah Press.

Pasaoglulari Sahin N and Doratli N. (2009). *Design Principles of Public Open Spaces in the Walled Cities: A Study in the Walled City of Nicosia*, Cyprus. Germany: VDM Verlag Dr. Müller Aktiengesellschaft & Co. KG.

Turhan T and Tanribilir FB. (2009). *Vatandaşlık Hukuku Ders Notları*. Yetkin Yayınları, Ankara, Türkiye.

**Conference Name:** 1<sup>st</sup> International ex libris  
Competition North-Cyprus.  
**Date:** 15 March 2010  
**Web Address:**  
<http://web2009.emu.edu.tr/images/announcetr/exi-bris-Eng.pdf>

**Conference Name:** The 3<sup>rd</sup> International  
ELT Conference  
**Date:** 5-7 May 2010  
**Web Address:** <http://www.elt-emu.org/>

**Conference Name:** 'Myth of the  
Mediterranean and the Mediterranean of Myths'  
**Date:** 3-6 June 2010  
**Web Address:** <http://web2009.emu.edu.tr/emu-news/announce/aralik2009/duyuru-02-eng.htm>

**Conference Name:** 10<sup>th</sup> International  
Conference on Clean Energy  
**Date:** 15-17 September 2010  
**Web Address:** <http://www.icce2010.org/index.html>