Science Day 2009

Tuesday 30th June 2009

Registration: 09:00 Kier Hardy (Room 130)

Presentation Summaries

Science Day Schedule of Presentations

09.00 – Registration in Keir Hardie Building, room 130

Keir Hardie, Room 130

Time	Presentation	Chair
09.30 – 11.00	1. Life extension methods for components under high temperature creep **Zakaria A. M. Abdallah** 2. Ocular hazard assessment of intense light source (ILS) systems under British Standard BS 8497-2 **Caerwyn Ash** 3. Investigating atomic behaviour using ultrafast laser pulses **Jamie Nemeth**	Caerwyn Ash and Jamie Nemeth
11.00 – 11.15	Tea and coffee break	
11.15 – 12.45	1. Antifungal Resistance **Alun Newsome** 2. A novel growth strategy for propagation and bacteriocin production of lactobacilli **Myrto Zacharof** 3. Functionalisation of Semiconductor for biosensor applications **Zari Tehrani**	Jamie Nemeth
12.45 – 13.30	Lunch Break	
13.30 – 15.00	1. On the mechanism of CDOs behind the current financial crisis and mathematical modelling with levy stable distributions **Wei Yang** 2. Automated verification of train control software **Phillip James** 3. Formal verification of an electronic payment system **Temesghen Kahsai**	Tom Owen
15.00 – 15.15	Tea and coffee break	

Keir Hardie, Room 152

Time	Presentation	Chair
09.30 – 11.00	1. Quantitative phosphoproteome analysis of the effect of oxysterol on neurons **Ian Gilmore** 2. Quantifying free oxysterols in plasma by an isotope dilution liquid chromatography – mass spectrometry (IDLC-MS) based approach **Michael Ogundare**	Alun Newsome
11.00 – 11.15	Tea and coffee break	
11.15 – 12.45	1. An overview of ontology in visualisation **Matjaz Bone** 2. Flow visualization using vector glyphs **Zhenmin Peng** 3. Flow visualization with stream surfaces **Matt Edmunds**	Michael Ogundare
12.45 – 13.30	Lunch Break	
13.30 – 15.00	1. Lifestyle risk factors for osteoporosis **M. Almatari** 2. Breath on glass: A novel **Jennifer Cryer** 3. Hospital beds are more interesting than you thought! **Chitra Acharya**	Jed Chandler
15.00 – 15.15	Tea and coffee break	
15.30 – 16.45	1. A characterization of HSDPA capacity using EXIT chart techniques **Sholiyi Abiodun** 2. Comparison between the performance of WLAN 802.11g and 802.11n technologies in multipath channel **Salim Abukharis** 3. The challenges of implementing large-scale healthcare information systems: technological, behavioural and managerial issues **Taghreed Jastniya**	Simon Robinson

Keir Hardie, Room 303

Time	Presentation	Chair
09.30 – 11.00	1. Title to be confirmed but in the area of experimental manipulation of human mating strategies **Andrew Thomas** 2. Relative vs. Absolute Mode of Categorization **Darren Edwards**	Michael Scott Evans
11.00 – 11.15	Tea and coffee break	
11.15 – 12.45	1. Supporting early document navigation **Tom Owen** 2. Evaluating haptic feedback for information discovery **Simon Robinson** 3. Improving user interfaces before involving the user **Patrick Oladimeji**	Wei Yang
12.45 – 13.30	Lunch Break	
13.30 – 15.00	1. Research Methods in Psychology **Michael Scott Evans** 2. A study to investigate the meaning of beauty and associated experiences in six Chinese female students: a clinical perspective **Ian Simandl** 3. Impairment in the recognition of emotion across different media following traumatic brain injury **Claire Williams**	Michael Ogundare
15.00 – 15.15	Tea and coffee break	
15.30 – 16.45	1. The effects of the effective dynamic stressing rate on measurements of the tensile strength of deionised water **Chris Chan** 2. Zinc Oxide Nanostructures **Mark Penny**	Alun Newsome

Life Extension Methods For Components Under High Temperature Creep

Zakaria A. M. Abdallah

Structural alloys applied to aerospace and power generation applications are expected to operate at temperatures exceeding those originally envisaged during design in order to meet the tightening regulations on emissions to satisfy the "green lobby" and also to improve the efficiency of operation. Extended periods of high stress over time will induce *creep* deformation and eventually static failures in such alloys. Current empirical methods to predict *creep* performance are restricted by the amount of long term *creep* data generated on the international stage as the generation of such data is a time/cost challenge. To alleviate this shortfall in measured data, a novel *creep* extrapolation methodology for long-term *creep* predictions has been developed at Swansea University, by Prof. Brian Wilshire, which now requires further research for an expanding database of alloys. An MRes Study, carried out last year in Swansea University, proved the superiority and ability of this new technique to accurately predict the long-term *creep* behaviour of the forged 1Cr-1Mo-0.25V steel, employed for turbine rotors and shafts. The proposed PhD study will assess the sensitivity of this new technique and also correlate *creep* performance to microstructure and deformation mechanisms in a selected advanced aerospace alloy. Titanium IMI834, currently employed in these key industrial sectors, will be used as a model material to enable sensitivity studies using this new technique and will also be used to examine the ability of this new methodology for such future predictions. The traditional extrapolation techniques will be critically reviewed and examined in this study showing their flaws and limitations for such long-term *creep* predictions.

Ocular Hazard Assessment Of Intense Light Source (ILS) Systems Under British Standard BS 8497-2

Caerwyn Ash

British Standard BS8497-2 issued in March 2008 is the first published national standard requiring compliance of ILS protective eyewear with a recognised standard. Many suppliers of ILS equipment in the UK have not completed a risk assessment under BS8497-2:2008 due to the apparent complexity of the standard or through ignorance of its existence. Using a worked example, this study demonstrates the methodology and calculation under BS 8497-2. The assessment was made from four inputs: true pulse duration of the pulse or sub-pulses, dimensions of treatment area on tissue, time-integrated spectral exposure and the retinal thermal hazard weighting function as described in by IEC TR 60825-9. The time-integrated spectral exposure was measured by the National Physical Laboratory (NPL) and the ocular hazard calculated. All measurements were taken with traceability to national standards. The results are presented as a 9-stage flow diagram. The home-use ILS hair removal device used in this worked example under worst-case conditions shows that any exposure to the human eye will not permanently damage retinal tissue and that safety eyewear is not a necessity.

Investigating atomic behaviour using ultrafast laser pulses

G. R. A. J. Nemeth

Near-infrared (750-850nm) ultrafast (10^{-14} s) laser pulses consisting of only a few optical cycles are focused into diffuse xenon gas. A time-of-flight mass spectrometer (TOFMS) separates the laser-generated ions according to their charge-to-mass ratio. An aperture in the TOFMS only allows ions to be detected from a small region (250 m) of the focus, which is translated in order to detect the spatial variation of the ion production. The ion signal at each location is then integrated to give the integrated ion yield for each detected ion species. A deconvolution technique has been used to extract ionization probabilities (values between 0 and 1) from the integrated ion yields, which are fitted and compared to a theoretical model, allowing different ionization processes to be identified, revealing information about the changes to the electronic configuration and physical properties of the atoms.

Antifungal Resistance

Alun Newsome

The Fungal kingdom contains a large number of species, a number of which are significant pathogens of humans, animals or plants. As complex eukaryotic organisms these pathogenic fungi can pose a threat to both global health and crop yields. As a result pathogenic fungi represent a key target for a range of anti-fungal agents. Cytochrome P450s (CYP) and proteins such as ABC transporters and CYP-Reductases, have been shown to be possible targets for both agricultural and medical anti-fungal treatments. In recent years there has been a significant rise in the number of fungal pathogens which show resistance to antifungal treatment. The mechanisms by which these fungi show resistance involve a plethora of factors, such as the CYP complement (CYPome) and drug efflux mechanisms. Our investigations hope to provide an insight not only into function but also the role and diversity of CYPs identified.

A Novel Growth Strategy for Propagation and Bacteriocin Production of Lactobacillus *spp*.

M.P.Zacharof

Lactobacilli spp. is a bacterial group belonging into the genre of Lactic Acid Bacteria (LAB) Their metabolic end products such as lactic acid, acetic acid are applied as food preservatives in the contemporary food industry. LAB in the form of starter cultures are used in dairy wine and food processing industry. Their applications include enhancing the natural ripening of milk and plant origin products, such as butter, cheese, olives and cucumbers. Numerous *Lactobacillus* strains are producing antimicrobial compounds called bacteriocins. Major group are the so called *Lantibiotics. Lantibiotics* are mainly active against bacteria of the same genus they are produced during growth of the bacilli, especially during exponential phase. These metabolic end products can be used as natural preservatives and antimicrobial agents against contamination and food spoilage occurring during or after the fermentation process, and their applications have been a matter of research lately. In this project novel methods for their production will be proposed.

Functionalisation of Semiconductor for biosensor applications

Zari Tehrani

This work demonstrates the functionalisation of silicon wafers and other semiconductor substrates for biosensor applications. Sensors based on silicon nanowire (SiNW) devices can have much greater sensitivity to biomarkers than traditional bioassays. Two methods for modifying the surface of semiconducting -materials for potential biomedical applications are reported. The first method uses the alkene 4-vinyl benzyl chloride and the second uses a diazonium salt to attach to silicon and other substrates. The grafting of these coupling agents to hydrogen terminated silicon wafers was studied. Using the diazonium group enables attachment of nitrobenzene to the silicon surfaces. Attachment of nitrobenzene has been verified using contact angle, Raman and X-ray Photoelectron Spectroscopy (XPS) investigations. Following attachment, the nitrobenzene moiety can be reduced to an amine via electrochemical reduction. The amine group enables links with biological molecules to be established. Successful attachment of an antibody targeted against beta actin has been achieved. Using a quantum dot labelled antibody enabled imaging of the bio-functionalised silicon surface using Confocal microscopy. The next stage is to functionalise silicon nanowire devices for application in highly sensitive and specific biosensors.

On the mechanism of CDOs behind the current financial crisis and mathematical modelling with levy stable distributions.

Wei Yang

Collateralized debt obligations (CDOs) have been the major force in the credit derivatives market. But unlike some fairly straightforward derivatives such as Options and Credit Default Swaps, CDOs are constructs and are designed to satisfy different type of investors, low risk with low return and high risk with high return. By a technique called "tranching", they are structured into different tranches and the tranches have different seniorities: senior tranche, the least risky tranche in CDOs with lowest fixed interest rate, followed by mezzanine tranche, junior mezzanine tranche, and finally the first loss piece or equity tranche. The credit risks in tranches are sold to investors who, in return for an agreed payment, will bear the losses in the portfolio derived from the default of the instruments in the portfolio. We illustrate the mechanism of CDOs and present a mathematical model to price CDO tranches, which incorporates Levy stable distributions to represent heavy tail default dependence.

Automated Verification of Train Control Software

Phillip James

Every scientific discipline has its list of Grand Challenges, from detecting the Higgs Boson (Physics) to curing cancer (Medicine), most of which are motivated by the desire to improve people's lives. One of the long-standing Grand Challenges in Computer Science is to formally-verify railway signal control systems in an effort to render railway signalling failures a thing of the past. In this research project, in co-operation with Westinghouse Rail Systems, we use mathematical verification techniques to indicate if a railway signalling system is safe or not. The approach we have taken has been applied to a real world signalling system, yielding a successful verification process taking only minutes to give a result. Here we present a review of this approach and its successes, commenting on the challenges that have been overcome and current research to improve the verification process further.

Formal Verification of an Electronic Payment System

Temesghen Kahsai

Electronic payment systems represent an important benchmark for both the theory and practice of system specification. In theory, they provide a suitable benchmark to demonstrate the abilities of formal specification languages. In practice, they are classified as critical systems and thus must be developed with due diligence. In this research project we consider such an application by developing a formal specification and reason about its correctness for the electronic payment system EP2 (a new international standard established in order to define the infrastructure for credit, debit and electronic purse terminals in Switzerland). We use a formal specification language, to model the different components, such as data (e.g., amount of money) and processes (e.g., Terminal Software). We prove interesting properties about the system e.g., the system will never deadlock (freeze), and also illustrate how we test some aspects of an actual chip and pin system.

Quantitative phosphoproteome analysis of the effect of oxysterol on neurons

I.R. Gilmore

Oxysterols are biologically active hydroxylated metabolites of cholesterol. The presence of oxysterols invoke a cholesterol containing phosphatase complex to disassemble thereby increasing the level of extracellular signal regulated kinase (ERK1/2) phosphorylation. The aim of the work is to determine changes in the phosphoproteome of 25-hydroxycholesterol treated cells by using stable isotope labeling of amino acids in cell culture (SILAC). SILAC incorporation was analysed by liquid chromatography/mass spectrometry (LC-MS) of trypsin digested 'heavy' peptides. Phosphopeptides, enriched using immobilized metal affinity chromatography (IMAC), were analysed by LC-MS3. Database searching was performed, using Mascot, to identify peptides. Western blotting was performed on protein from 25-hydroxycholesterol treated cells probing for phospho ERK1/2 and total ERK1/2. SILAC labeling of cells was successful as was IMAC phosphoenrichment. This proteomics approach led to the identification of 1028 peptides, of which, 120 were unique phosphopeptides.

Quantifying free Oxysterols in plasma by an Isotope Dilution Liquid Chromatography-Mass Spectrometry (IDLC-MS)-based approach

Michael Ogundare

Accurately quantifying cholesterol side chain oxidized moieties is highly desirable but can be challenging as oxysterols occurs at low levels under normal physiological conditions. The use of Isotope dilution to quantify the levels and types of oxysterols in plasma can tell a lot about the Cholesterol metabolism of an individual. Solid phase extraction was used to separate sterols into a cholesterol and more polar metabolites fraction and to remove excess reagent. Derivatized analytes of interest were submitted for LC-ESI-MS^n analysis and identified by retention time, exact mass with high mass resolution to delineate potential oxysterols. Most of the 24S-OHC identified in plasma were of cerebral origin so its level in plasma may be used to monitor cholesterol metabolism in the brain. Here we describe a Isotope dilution methodology for the identification, of low abundance (low pg) metabolites of cholesterol in human plasma.

An Overview of Ontology in Visualisation

Matjaž. Bone

Automating the creation of visualisation from a dataset is a real challenge. It becomes an even bigger challenge when non-numerical data is taken into consideration. This is why ontologies are being incorporated into the research of visualisation. With ontologies, one can model relations between concepts enabling a computer to construct a mapping from the concepts in the dataset and those in visualisation (such as a treemap, x-y scatter plot,...). The problem of creating a visualisation can then be translated to a problem of ontology mapping. This presentation will give a short survey about the concept of ontology mapping and the use of ontologies in visualisation. Emphasis will be given on the automatic method proposed by Gilson et al.

Flow Visualization Using Vector Glyphs

Zhenmin Peng

Visualization of flow on boundary surfaces from computational flow dynamics (CFD) is challenging due to the complex, adaptive resolution nature of the meshes used in the modeling and simulation process. This paper presents a fast and simple glyph placement algorithm in order to investigate and visualize flow data based on unstructured, adaptive resolution boundary meshes from CFD. The algorithm has several advantages: (1) Glyphs are automatically placed at evenly-spaced intervals. (2) The user can interactively control the spatial resolution of the glyph placement and their precise location. (3) The algorithm is fast and supports multiresolution visualization of the flow at surfaces. The implementation supports multiple representations of the flow–some optimized for speed others for accuracy. Furthermore the approach doesn't rely on any pre-processing of the data or parameterization of the surface and handles large meshes efficiently. The result is a tool that provides engineers with a fast and intuitive overview of their CFD simulation results.

Flow Visualisation with Stream Surfaces

Matt Edmunds

Flow visualisation in general is a classic field of study for visualization specialists. One area of interest is the automatic seeding strategies of surfaces and volumes. The two most well known streamline integrator techniques are the Euler integrator and the second and fourth order Runge Kutta integrator methods. These are used in the implementation of stream surfaces. The stream surface algorithm to be implemented in this project is the 'Fast, Quad-based Stream and Path Surface Algorithm'. The automatic seeding of a stream surface within a steady state vector flow field is both non trivial and novel. Building on current methods such as the reviewed paper 'Creating Evenly Spaced Streamlines of Arbitrary Density', an implementation of an automatic stream surface seeding algorithm is intended for this project.

Lifestyle Risk Factors for Osteoporosis

M.Almatari

Factors which are considered to have an impact on patients' bone density were studied. One main factor is patient lifestyle. Information was collected about lifestyle factors which significantly appear to affect bone density and those known to influence bone metabolism. A self-administered questionnaire was devised for this purpose; it included most of the lifestyle factors that might affect the health of bone. The results showed that family history of osteoporosis was not associated with increased risk of osteoporosis. Also there were no associations between Hyperthyroidism or Diabetes with the risk of osteoporosis. This study shows that intake of HRT, contraceptive pills, dairy mile intake, having hysterectomy, having natural periods and high BMI index are indicators of reduced risk of osteoporosis. However, age and fragility fracture are indicators of increased risk of osteoporosis.

Breath on Glass: A Novel

Jennifer Cryer

Recent progress in *in vitro* fertilisation, cloning and regenerative stem-cell-based therapies has raised fears about transgressive raids on the boundaries which secure human identity. My creative work in progress, a novel, is an attempt to explore the power of realist fiction to respond to both the process and ethics of scientific endeavour. The work follows the lives of two young researchers and their family relationships, both inside and outside of the laboratory, exploring the ways in which scientific tensions might give rise to personal ones. In this talk the narrative of science and the narratives of the individual scientists are compared, using readings describing the preparation of a cell strain as an example. The prologue to the novel, as an attempt to integrate aspects of the two accounts, is examined in detail.

Hospital Beds are more interesting than you thought!

Chitra Acharya

The value of research in Human Computer Interaction (HCI) principles and practices was investigated using a commercially available electronically-adjustable hospital bed as a case study. The bed has three control panels: for attendant, nurse, and patient, which adjust the bed to change the patient's posture. If the patient requires cardiac resuscitation (CPR) it is crucial for the bed to flatten quickly, and there is a special CPR button to do this. During our study we found we could "crash" the bed and nothing, including the CPR button, would work! Furthermore, the control panel design violated HCI principles – creating mapping, feedback, and confusion errors. It seems there are many similarly poorly-designed principle-violating medical devices: birthing bed, infant incubator, ventilator, operating table, etc. Device manufacturers and Healthcare purchasing groups should adhere to the standard HCI guidelines and those provided by National Patient Safety Agency (NPSA) and Medicines and Healthcare products Regulatory Agency (MHRA) for the design, regulations and procurement of devices, products, or systems that contribute to patient safety. The research will progress by prioritising the most helpful and effective principles, based on empirical trials and studies with device designers.

A Characterization of HSDPA Capacity using EXIT chart Techniques

Sholiyi Abiodun

High Speed Downlink packet Access (HSDPA) is currently in, use as 3.5G operating at various transmission rates with peak data rates of 10-14MBits/s. Turbo code with higher order modulation is used in channel coding and modulation. In this presentation, the extrinsic information transfer chart (EXIT chart) analysis has been applied as a tool to predict and evaluate the performance of High Speed Downlink Packet Access (HSDPA) with turbo encoding. It would be shown that the UMTS (Universal Mobile Telecommunications System) turbo code is not fully utilizing the capacity of the channel (i.e. bandwidth efficiency and power efficiency are not fully utilized). This would be seen from as the throughput of the system is less than the attainable capacity of the channel. Also the bit error rate curve versus its corresponding Eb/No ratio clearly displays this as well. The performance evaluation is based on the analysis for QPSK modulation and code rates ½ and 1/3 respectively. Recommendation as to how we could optimize the usage channel capacity in transmission is discussed and analyzed as well.

Comparison Between The Performance of WLAN 802.11g and 802.11n Technologies in Multipath Channel

Salim Abukharis

Wireless Local Area Networks (WLANs) have become essential parts of many homes, enterprise and public networks and are widely available today. The most common WLAN technology is the IEEE 802.11. In order to meet the increased demand of multimedia services such as streaming video and IP telephony, a new approach using a Multiple Input and Multiple Output (MIMO) system is used in the IEEE 802.11n. This paper compares the performance of the two WLAN technologies 802.11g/n in a multipath channel. For this purpose a Matlab model is developed for 802.11g/n PHY. In the case of 802.11n model we have used the Space Time Block Coding (STBC) mode of 2x2 MIMO system. This paper has investigated the performance of IEEE 802.11g /n PHY for different signal-to-noise ratio (SNR) conditions in multipath fading channel. The results demonstrated that using Space Time Block Coding (STBC) mode of 2x2 MIMO system in 802.11n has sustainably increased its performance in terms of the coverage and throughput. The results shows clearly that the 802.11n is one of the best technologies that can support home multimedia applications such as video streaming and IP telephony. The characterization of the performance of 802.11g/n is the first step toward abroad investigations on video transmission over WLANs in order to develop new techniques that grantee the QoS is provided by the network.

The Technological, Behavioural and Managerial Challenges of Implementing Large-Scale Healthcare Information Systems: Analysing large qualitative datasets using the 'Five-stage Analysis Process'

Taghreed Jastniya

This qualitative study investigates the challenges of a national healthcare organisation in Saudi Arabia in achieving a nationwide large-scale healthcare information system implementation. The study also examines the implications on the applicability of organisational change management models in healthcare systems implementations. Semi-structured, in-depth interviews were used with thirty-two participants were who were the key stakeholders involved. The data were analysed using an original 'five-stage analysis process'; specifically designed for this study. This lead to the inductive identification of forty codes, that were further refined and structured through additional stages influenced by Grounded Theory. The most significant challenges were categorised under three broad interconnected themes; Information Technology and Systems (internal and external), Managerial Affairs (managing the project and resources), and Behavioural Issues (change management and leadership). A model for leading change in healthcare systems implementations emerged from this study and can be used to guide implementations in healthcare organisations elsewhere.

Human mating strategies; plasticity and manipulation

Andrew Thomas

Why do some individuals prefer committed monogamous relationships whereas others prefer to be less reserved? From an evolutionary perspective, it makes sense for organisms to remain flexible in their mating strategy, as different environments afford different mating opportunities. Evidence from animal studies has shown that direct manipulation of mating opportunity can lead to a shift in mating strategy. Furthermore, in hunter gatherer societies, positive correlations between mating opportunities and mating effort have been found. Absent from the psychological literature are controlled experiments testing cause and effect relationships between mating opportunity and mating strategy in humans. Our research intends, through both experimental and observational methods, to determine the plasticity of human mating strategies and which factors in ones mating environment contribute to this variation. Within our presentation we will discuss our theoretical reasoning, the development of our dependant measure, pilot results and potential experimental paradigms.

Relative vs. Absolute mode of categorization

Darren J. Edwards

In sum, our results show situations in which classification of test stimuli appears to have a profound influence on the representation of categories acquired in previous (training) phases. Such flexibility in category representation is difficult to reconcile with current categorization models and represents an exciting avenue for their further development. This study was motivated from the relative judgment model (Stewart et al, 2005). According to this model, classification judgments in absolute identification tasks are influenced by the relative context in which they are presented. We examine the generality of this conclusion in categorization. In the present study, in 5 experiments, participants had to classify new items into predefined artificial categories. Overall, we propose that less information about the distributional properties of a category and/or weaker memory traces for the category exemplars (induce, e.g., by smaller item numbers per category, or a time delay respectively) can encourage relative judgment.

Supporting Early Document Navigation

Tom Owen

Document triage is the brief and critical interaction that occurs when an information seeker first views an unfamiliar document to assess its relevance to their information need. We have developed several tools which attempt to aid the user during this important stage. The first system introduces a novel interaction during within–document navigation, specifically the following of figure references. Secondly, we sought how to improve support for the quick review of a document by exploiting the principle of semantic thumbnails for overviews of electronic documents. Most recently, we have investigated techniques that modify the traditional scrolling method, combining it with Speed-Dependent Automatic Zooming (SDAZ). We also examine the effect of adding "semantic rendering", where the displaying of the document is altered depending upon the scroll speed. We demonstrate that the combination of these methods reduces user effort without impacting user behaviour.

Evaluating Haptic Feedback for Information Discovery

Simon Robinson

Geo-tagged views of the places we visit have become increasingly common in recent years with the proliferation of online mapping and low-cost location-based systems. These services work well on the large screens of conventional computers, but often lack elements of usability in mobile scenarios. Our work is motivated by a desire to address this shortcoming and provide engaging, 'heads up' ways for users to discover the digital content associated with the places they visit. Instead of requiring the user to transfer attention from their physical surroundings, our prototype encourages a more immersive interaction, helping them find location information by providing directional vibrotactile feedback. Our user studies indicate that, despite the low resolution feedback provided, users are able to use the system to discover and explore nearby points of interest. Here we present several interesting findings and highlight challenges relevant to the design of future haptic location-aware systems.

Improving User Interfaces before involving the User

Patrick Oladimeji

Much of interaction errors are born at the designer's drawing board and nurtured on the programmer's workbench. For simple (manageable) devices, it has been shown that analysis of the user interface/ user interaction is feasible and insightful. However, most forms of user interface analyses and UI model discovery tools focus on what goes on inside the device. Typically, the internal states of a device are extracted and connected by user actions or events. It is arguable that this model differs considerably from a user's conceptual/mental model of how the device works. We explore a new technique for automatically obtaining user models of user interfaces by monitoring screenshots, and we show some initial (interesting) differences between the user model and the device internal states.

Research Methods in Psychology

Michael Scott Evans

The purpose of this study was to examine a new notion about affordances: that of informational affordances. Informational affordances are the parts of an object that provide discriminative information about object identity or function. Thirty participants, 14 male and 16 female (Mean age = 26.83, SD = 9.36) from the general public were asked to participate on a voluntary basis. There were two phases; learning phase and test phase. During the learning phase, participants were instructed to select the key that would rotate one of two cubes to the discriminatory side in the shortest path. During the test phase, participants were instructed to ignore the prime image and just concentrate on the stimulus (III-I or I-III). The stimulus appeared after a stimulus onset asynchrony (SOA) of 0, 200 or 800 ms. It was found that compatibility effect emerged when the mapping rule was congruent. In addition, it was also found that mean reaction times at 0 ms SOA were generally slower than mean reaction time at 200 and 800 ms. The findings of this study suggest that informational affordances do seem to be activated automatically.

The Meanings of Beauty and Related Experiences for Six Chinese Women: A Clinical Perspective

Ian Simandl

The presentation is intended to introduce delegates to a qualitative study that will explore the meanings of beauty and related experiences of six Mainland Chinese students. Current beauty ideals and their implications in terms of psychopathology will be briefly outlined. The study utilises a methodology known as Interpretative Phenomenological Analysis. The approach is described and evaluated as a tool for psychological research of this nature.

Impairment In The Recognition of Emotion Across Different Media Following Traumatic Brain Injury

Claire Williams

The current study examined emotion recognition following traumatic brain injury (TBI) and examined whether performance differed according to the affective valence and type of media presentation of the stimuli. Sixty-four patients with TBI and matched controls completed the Emotion Evaluation Test (EET) and Ekman 60 Faces Test (E-60-FT). Results revealed that the TBI group were significantly impaired compared to controls when recognising emotion on the EET and E-60-FT. A significant main effect of valence was found in both groups, with poor recognition of negative emotions. The TBI group were also more accurate recognising emotion displayed in audiovisual media (EET) compared to still media (E-60-FT). These findings support models of emotion that specify separate neurological pathways for certain emotions and different media, and confirm that patients with TBI are vulnerable to experiencing emotion recognition difficulties.

The effects of the effective dynamic stressing rate on measurements of the tensile strength of deionised water

H. H. Chan

This paper reports the results of experiments in which samples of degassed, deionised water are subjected to dynamic stressing by pulses of tension. The pulse reflection technique employed allows the rate of development of tension in the liquid, $\dot{\Omega}_F$, to be varied in a systematic manner, in order to investigate its influence on the resulting measurement of the liquid's 'effective' tensile strength (or 'cavitation threshold'), F_c. Results are reported for experiments involving a range of stressing rates, $\approx 0\cdot43\mathrm{bar}/\mu\mathrm{s} \leq \dot{\Omega}_F \leq 1\cdot79\mathrm{bar}/\mu\mathrm{s}$, for water at a constant temperature ($T=25°C$). These results for water provide an insight into the wide range of values of F_c which are found in the literature and provide evidence to substantiate the claim made by previous workers that the rate of dynamic stressing is an important consideration in understanding the cavitation properties of liquids.

Zinc Oxide Nanostructures

M.W. Penny

Over the last few years zinc oxide (ZnO) has been exciting scientists around the world, due to the discovery that it forms many unusual crystal structures with nanoscale dimensions. ZnO nanopropellers, nanohelices and even nanodonuts have been reported, but the most useful is the simple ZnO nanowire. These have a hexagonal cross-section and are typically less than 100nm in width and can grow tens of μm long. Scientists are particular interested in ZnO nanowires due to their superior electrical, optical, mechanical and thermal properties which are enhanced by their nanoscale dimensions, making them ideal for the fundamental building blocks for nanoscale science and technology. This presentation will give an overview of the work undertaken within the multidisciplinary nanotechnology centre concerning ZnO – detailing how these crystals are formed and the many exciting applications that are made possible because of their unique properties.