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NeuroIS: Hype or Hope?

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NEUROIS: HYPE OR HOPE?

Panels

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Abstract

This panel discusses the opportunities and challenges of applying cognitive neuroscience theories, methods, and tools to inform IS theories, methods, and data (termed "NeuroIS"). Given the ability of cognitive neuroscience to localize the functionality of brain areas that underlie higher-order human processes using functional neuroimaging tools, many social scientists in economics, psychology, and marketing use such tools to derive many interesting insights by opening the "black box" of the brain. Recently in the IS discipline, there have been some attempts to explore the potential of cognitive neuroscience for IS research (e.g., Dimoka, Pavlou, and Davis 2007). The purpose of this panel is to explore the potential of cognitive neuroscience and functional neuroimaging tools for IS research, and consistent with the theme of this year's ICIS, suggest whether and how NeuroIS may help IS academics conduct IT research that really matters.

This panel will host an intellectual debate on the opportunities and challenges of employing cognitive neuroscience and functional neuroimaging tools in IS research. The panelists come from different disciplines (Marketing, IS, Neuroscience), theories (technology adoption, IS economics, IT productivity, design science), and methods (behavioral/organizational, economics, technical), and they will discuss how IS theories and methods in their respective areas can be complemented by cognitive neuroscience theories and neuroimaging data. They will also debate the potential of physiological data for IS research, the pros and cons of functional neuroimaging tools, and whether NeuroIS can help IS researchers do research that they could not do with other means.

The panel will have a broad appeal to IS researchers who may be interested in the potential of cognitive neuroscience for IS research but they are concerned about the challenges associated with using neuroimaging tools. The panel will debate whether NeuroIS can help IS researchers learn more than they already know, and whether, how, and when cognitive neuroscience will prove beneficial for IS research. The panel will also debate whether and how NeuroIS can contribute to IS research, whether and how the IS field can benefit by cognitive neuroscience theories, and what research questions could arise from using neuroimaging tools in IS research. The panel's ultimate goal is to gauge whether NeuroIS is "hype or hope," aiming to conclude whether NeuroIS could provide valuable opportunities for IS research, or whether the challenges associated with neuroimaging tools will impede their wide usage.

Keywords: Cognitive Neuroscience, IS Economics, TAM, Brain Imaging Tools, NeuroIS

Panel Motivation

In recent years, there has been an explosion in the abilities of neuroscience to study the functionality of the brain using functional neuroimaging tools. The field of cognitive neuroscience examines observable brain activities to identify the brain areas that underlie human functions and processes. Functional neuroimaging tools such as functional magnetic resonance imaging (fMRI) and electroencephalography (EEG) can capture brain activation, either in response to a given stimulus (e.g., image, design) or a human task (e.g., thoughts, decisions, activities). These tools have led to a better understanding of how people make economic and social decisions, deal with risk, uncertainty, and ambiguity, respond to rewards and form utility, trust and distrust, cooperate or compete with others, predict others' behaviors, and search for and process information. Social scientists, mostly in marketing, psychology, and economics, have teamed up with neuroscientists to examine a variety of social phenomena, and they have made notable advances in our understanding of decision making and human behavior. Many interesting insights are emerging from these neuroimaging studies that can revolutionize their respective disciplines by opening the "black box" of the brain (Zaltman 2003; Glimcher and Rustichini 2004; Camerer, Loewenstein and Prelec 2005). Firms, like Microsoft, are also betting on neuroimaging tools with formal research programs (Tan and Lee 2006). Also, the video gaming industry is using EEG-based headsets to observe the brain activations of people while playing games, and they use these activations to modify the gaming experience (www.emotiv.com).

Given that functional brain imaging tools have increasingly become more sophisticated, accessible, and affordable, there have been some recent attempts in the IS discipline, to employ cognitive neuroscience theories and tools. Moore et al. (2005) and Randolph et al. (2006) used EEG in handicapped patients to examine brain-computer interaction. Dimoka and Davis (2008) employed fMRI to identify where the TAM constructs reside in the brain. By understanding the neural correlates of TAM, it is possible to design IT systems that enhance higher adoption and use. Benbasat et al. (2009) examine differences in brain activity when subjects interact with recommendation agents whose avatars vary in terms of race and gender to infer hidden brain activations not elicited by self-reports. Adomavicius et al. (2009) contrast various combinatorial auctions interfaces by examining patterns of activation in the "cognitive overload" areas of the brain, aiming to enhance the design of IT interfaces. Dimoka (2009) finds that trust and distrust activate two different networks in the brain, thus showing that they are two distinct constructs. Finally, Riedl et al. (2009) used fMRI to investigate the neural correlates of trust in online environments.

IS researchers have typically relied on data from surveys, field and lab experiments, interviews, archival sources, and simulation models. While these techniques have certainly advanced the IS discipline, recent discoveries in neuroimaging tools would enable IS researchers to obtain objective, reliable and unbiased measurements of thoughts, beliefs, and feelings and link them to specific human processes. While self-reported data are susceptible to common method, social desirability, and subjectivity biases, integrating primary data with secondary neuroimaging data gives the opportunity to triangulate multiple measurement methods and strengthen the robustness of data (Mingers 2001). Functional neuroimaging tools can localize IS constructs, examine whether IS constructs actually correspond to the brain's underlying functioning, identify the dimensionality of IS constructs and which brain areas they span, whether IS behaviors are driven by the same underlying brain mechanism, and whether various stimuli cause their intended activation in appropriate brain areas, and therefore compliment existing data collection methods that have traditionally been used in IS with objective brain responses (Dimoka, Pavlou, and Davis 2007).

Although there are several opportunities from using neuroimaging tools in IS research, several challenges exist. First, IS researchers must become familiar with a relatively distant literature (cognitive neuroscience). While the applications of cognitive neuroscience to the social sciences (often termed social neuroscience) makes it easier to learn about cognitive neuroscience through its applications to marketing, psychology, and economics, it is still a burden for IS researchers. Second, using functional neuroimaging tools, require access to facilities that may not be widely accessible to IS researchers. While most medical centers and universities have such neuroimaging facilities, they may not be readily available. Third, learning how to conduct neuroimaging studies, conducting fMRI experiments, and analyzing brain data requires a substantial time commitment. While this could be largely mitigated by teaming up with cognitive neuroscientists, it still requires considerable time investments. Fourth, there is an issue that some neuroimaging tools may be expensive to use. While the data analysis package for fMRI data is free, the cost of using the fMRI scanner can be substantial. Taken together, the touted opportunities from functional neuroimaging tools may be weighed relative to their challenges. Therefore, this panel will debate the opportunities and challenges associated with relying on cognitive neuroscience as a potential reference discipline for IS research, the expected benefits and potential difficulty of employing neuroimaging tools in IS research, and whether and how NeuroIS can actually help IS researchers do IT research that matters.

Panel Overview

This panel will debate the opportunities and challenges of using cognitive neuroscience and neuroimaging tools in IS research. The panelists come from different disciplines (Marketing, IS, Neuroscience), use different theories (technology adoption, IS economics, IT productivity, design science), and rely on different research methods (behavioral, organizational, economics). They will discuss whether and how their theories, and methods can be complemented by cognitive neuroscience theories and functional neuroimaging methods. Moreover, they will debate the potential of cognitive neuroscience for IS research, the opportunities and challenges of using functional neuroimaging tools, and the expected benefits and pitfalls of relying on physiological data for IS research. The panelists will seek to engage the audience in the debates emerging around the opportunities and challenges of NeuroIS, and how to define a NeuroIS research program that will help IS researchers do IT research that matters.

The panel will have the following order, starting with a brief introduction on cognitive neuroscience in IS research, continuing with a discussion on the opportunities of NeuroIS for the three major methodological areas in IS research (behavioral, economics, technical), outlining the challenges associated with the cognitive neuroscience literature and functional neuroimaging tools, and concluding with a discussion of the pros and cons of NeuroIS with the audience.

Angelika Dimoka: What is NeuroIS?

Prof. Dimoka will motivate the panel by introducing NeuroIS as means to complement existing IS theories, methods, and data. Prof. Dimoka will provide a brief introduction of cognitive neuroscience and functional neuroimaging tools to provide a background for the panel and stimulate interest in the panelists' and the audience's attempts to discuss the opportunities and challenges of NeuroIS. She will also introduce the distinguished panelists and note the order of the panel debate.

Fred Davis: What are the Opportunities of NeuroIS from a Behavioral IS Perspective?

Prof. Davis has become seduced by the allure of cognitive neuroscience as a means for "looking under the hood" of behavioral IS theories. He will discuss some of the opportunities from directly and objectively measuring some of the commonly-theorized mental processes, constructs, and mechanisms in IS research, and he will elaborate on the benefits of opening up the black box of the human brain to better understand the nature of IS phenomena and accordingly design IT artifacts and other interventions that can better encourage technology adoption and use, advance user productivity, and design IT systems that really matter.

Prof. Davis will focus on technology adoption and use as an example of a behavioral IS theory that can benefit from cognitive neuroscience and functional neuroimaging tools. He will argue that cognitive neuroscience can help overcome blind spots in behavioral IS research by allowing the measurement of human processes that cannot be easily studied through self-reported measures, such as habit, automaticity, multitasking, attentional loads and switching, implicit learning, knowledge collaboration, and motivational goal self-regulation processes.

Prof. Davis will argue that while IS research on technology adoption and use has made substantial progress over the last three decades (largely within the paradigm of the technology acceptance model (TAM) and its extensions (TAM++)), many observers (including himself) are concerned that the rate of progress in this tradition has stalled out, with additional studies providing at best only marginal incremental advances. Therefore, there is much potential from employing cognitive neuroscience theories and neuroimaging tools to advance this IS research stream. He will thus offer an example of his recent fMRI study that has identified where the TAM constructs (perceived usefulness and ease of use) reside in the brain (Dimoka and Davis 2008). While the TAM literature has viewed usefulness as a purely cognitive construct, his research has identified that perceived usefulness largely resides on the "utility" areas of the brain in the limbic system that is often associated with mostly emotional processes. Accordingly, usefulness may require re-conceptualization to include an emotional component that has been ignored from the TAM literature. This finding may have implications on how users make inferences about system usefulness, which could potentially help IS research design more useful IT systems that users are more likely to adopt and use in practice.

More broadly, Prof. Davis will note that NeuroIS can help behavioral IS theories obtain direct and objective measurements of cognitive and emotional processes that have been either hidden or difficult to measure. In doing so, it stands to help IS researchers improve the quality and practical applicability of behavioral IS theories.

Erik Brynjolfsson: What are the Opportunities of NeuroIS from an IS Economics Perspective?

Prof. Brynjolfsson will discuss some of the opportunities of using neuroimaging data for informing IS economics. First, he will discuss potential implications for standard economic models that assume rationality. In particular, neuroimaging data suggest that these models are not, in fact, accurate for a wide range of important information systems decisions. This has profound implications for IS research that draws on traditional economic modeling.

Second, since utility theory relies on observed choice behavior, Prof. Brynjolfsson will discuss how utility theory can use neuroimaging data as a supplemental approach to measuring utility and welfare.

Third, Prof. Brynjolfsson will discuss whether and how an understanding of the neural processes that underlie an IS phenomenon can help guide model and variable selection, and how economic theories can benefit from neuroimaging data.

Fourth, since accurate behavioral prediction is a fundamental goal of positive economics, Prof. Brynjolfsson will discuss whether neuroimaging data can be used to predict economic behavior, and what implications would this have relative to existing economic predictors of human behavior.

Finally, Prof. Brynjolfsson will discuss his experiences working with sociometric data based on his work on sociometric badges. This research has some provocative parallels to neuroimaging research in its potential to use detailed observation to supersede abstract assumptions and more generic proxy variables to explain business behavior. Moreover, it demonstrates how improvements in information-based technologies has already affected, and will likely further transform, social science research.

Alok Gupta: What are the Opportunities of NeuroIS from an IS Technical Perspective?

Prof. Gupta will argue that design science researchers have started exploring an economics-based design of computing IT artifacts including back-end systems (e.g., databases, electronic transactions) and front-end systems (e.g., web based mercantile mechanisms, such as a variety of auction mechanisms). Economics-based design predicates its design principles on issues of information asymmetry and facilitation of transparent information to enable more efficient decision making. However, economic design artifacts rarely take users' acceptance of the IT artifact into account. Therefore, there is much potential in using functional neuroimaging techniques to objectively measure users' attitudes and intentions about system adoption and use, and use brain data to design IT systems that facilitate more efficient and effective decisions. In doing so, design science researchers stand to gain by designing systems that correspond to the brain's underlying functionality and are more likely to be effectively used in practice.

Moreover, IS research has recently started taking fairness as a key construct in economics-based system design. Acceptance drives success in terms of providing stability and long-term rules of interaction among trading entities, thereby being one of the key components in the viability of a design artifact. While traditional IS theories, such as TAM and Task Technology Fit (TTF) have the potential to examine adoption related issues, Prof. Gupta will argue that NeuroIS presents an unprecedented opportunity to understand what aspects of design and information facilitation provided by economics-based design artifacts appeal to users – potentially leading to higher level of use.

Finally, Prof. Gupta will discuss some broader opportunities of NeuroIS from an IS technical perspective by outlining some of the interesting preliminary research directions on establishing benchmarks for equivalence of various mechanisms in terms of brain imaging, verification of theoretical conjectures related to information asymmetry and information overload, and studying the impact of emerging economic paradigms, such as fairness, in design science research. Prof. Gupta will conclude that these opportunities offered by NeuroIS will help design scientists conduct IT research that really matters for practice.

Rajiv Banker: What are the Challenges Associated with NeuroIS?

Following the conversation on the opportunities for NeuroIS in behavioral, economics, and technical IS research, Prof. Banker will discuss some of the challenges associated with engaging in NeuroIS studies.

First, since a basic knowledge of cognitive neuroscience is needed to do meaningful work in this area, Prof. Banker will discuss some of the challenges associated with becoming familiar with a relatively distant literature on cognitive neuroscience. Are really IS researchers ready to become "brain scientists"? Moreover, he will outline some of the challenges associated with learning how to conduct neuroimaging studies, including designing

meaningful stimuli for a constrained and intrusive fMRI environment, collecting, processing, and analyzing large volumes of neuroimaging data, and interpreting and reporting complex neuroimaging results.

Second, he will note some of the challenges associated with accessing neuroimaging facilities and overcoming the cost for using fMRI scanners. While neuroimaging facilities are often available in Universities and medical centers, they still require a sizeable expenditure to overcome the cost of the fMRI scanner and the need for trained personnel.

Third, Prof. Banker will discuss concerns about the generalizability and external validity of neuroimaging results given that the fMRI setting and the experimental tasks may be removed from the real-life task.

Finally, Prof. Banker will argue that it may be possible for IS researchers to develop adequate theories to describe IS phenomena while continuing to remain agnostic to the neural processes that underlie the focal phenomenon. Will NeuroIS help IS researchers learn anything new? He will also discuss some of the challenges associated with deriving testable hypotheses and implications for IS theories by relying on brain data. What are the benefits of determining which brain area is associated with a certain human process?

In conclusion, Prof. Banker will discuss the cost-benefit trade-off of neuroimaging studies, and he will evaluate the costs and challenges of NeuroIS relative to the benefits and value that they are likely to offer to IS research.

René Riedl: What are the Challenges Associated with the Use of Neuroimaging Tools in IS Research?

Research methods are not only used to study areas of interest. The history shows that they sometimes define new scientific fields. The telescope, for instance, created astronomy by elevating the science from pure cosmological speculation. In biology, the microscope facilitated similar advances. At the moment, the IS community is evaluating the prospects of cognitive neuroscience methods and theories. However, if IS research wants to adopt neuroscience methods successfully, discussing the (current) challenges associated with their use is necessary. Prof. Riedl will therefore first discuss moral concerns that have been raised in other social sciences, in particular in neuromarketing. Opponents of neuroscience tools in marketing research argue that the main purpose of conducting the studies is to find the “buy button in the brain” and to “create advertising campaigns that will be unable to resist” (Lee et al. 2007). Moral concerns are likely to emerge in IS research as well, especially if one considers Microsoft’s vision of adaptive user interfaces (Tan and Lee 2006). Justin Mullins, a New Scientist journalist recently wrote in an article with the title "Microsoft mind reading": "The company hopes that the data will better enable to them to design user interfaces that people find easy to use. Whether users will want Microsoft reading their brain waves is another matter altogether." Also, in neuroscience studies, sample size is usually relatively small ($N < 20$). Therefore, Prof. Riedl will discuss the implications for statistical analysis, generalization, and the design of experiments. Problems associated with the artificiality of the experimental situation will also be addressed. In case of fMRI, for example, subjects have to lie still and they are restrained with pads to prevent small motions during measurement sessions. Additionally, local sensations on the scalp (e.g., in case of using repetitive transcranial magnetic stimulation, rTMS) and disturbance by the noise of the equipment may have influence on research results (Abler et al. 2005). Moreover, in a recent article Jones (2007) discussed the ethics of neuroscience tools by discussing the example of rTMS. Jones argued that when science publishes research using healthy human subjects, one assumes there is minimal risk and/or vital clinical value. According to Jone's opinion, in neuroeconomics the use of rTMS on healthy subjects does not meet the definition of "minimal risk." Last but not least, a basic message of Prof. Riedl’s debate is that each cognitive neuroscience method has strengths and weaknesses. For example, EEG enables a temporal resolution of milliseconds and this technique can therefore easily detect the time course of neural activity. However, since spatial resolution is limited in case of EEG, triangulation with other methods is important. FMRI, for example, offers high spatial resolution, thereby enabling an exact identification of activity in specific brain areas. Considering this, NeuroIS research findings should be embraced only after they are corroborated by more than one method. Like filling in a crossword puzzle, clues from one method help fill in what is learned from other methods.

Richard Bagozzi: IS NeuroIS Hype or Hope? Insights from Neuromarketing

Following the discussions about opportunities and challenges of NeuroIS, Richard Bagozzi will discuss his experiences in promoting the field of neuromarketing. Prof. Bagozzi will first discuss how functional neuroimaging tools have helped enhance marketing theories, and he will offer examples of his recent neuromarketing work (Roeland et al. 2009). Specifically, he will explain what are the potential benefits from being able to accurately localize which brain area is associated with different cognitive, emotional, and mental processes, and what interesting implications may arise from having a direct and unbiased measurement of these higher-order processes.

Second, Prof. Bagozzi will also discuss how some of the challenges identified earlier by the IS panelists could be addressed based on his own experience. In terms of ethical challenges imposed by the "buy button in the brain" and "create advertising campaigns that will be unable to resist" (Lee et al. 2007), he will explain that neuroimaging methods only observe and do not manipulate consumer behavior. Moreover, researchers must adhere to strict ethical rules for research irrespective of the tools at their discretion. In terms of concerns about small sample size and cost associated with fMRI studies, Prof. Bagozzi will explain the ability of fMRI studies to infer statistically significant results from small sample sizes. Moreover, he will offer a cost-benefit analysis for fMRI studies and the value they provide relative to their cost. Furthermore, he will address issues associated with the constrained environment of functional neuroimaging tools, such as fMRI. Specifically, he will explain how to "translate" paper-and-pencil behavioral experiments into fMRI experiments by accommodating traditional tasks to the fMRI context. Moreover, he will explain that much of the knowledge associated with designing behavioral and economic experiments can be readily extended to design neuroimaging experiments. Finally, in terms of the question whether IS researchers are really wise to try to become "brain scientists," Prof. Bagozzi will explain that the cognitive neuroscience literature, and particularly social neuroscience, such as neuroeconomics and neuromarketing, are not diametrically different from IS research, and it is possible for IS researchers to become familiar with the literature with modest investments. Moreover, he will explain that IS researchers need not necessarily become brain scientists, and much of the work on collecting, analyzing, and interpreting brain data could be done with collaborations with neuroscientists. He will also give examples of successful collaborations with neuroscientists from his own experience.

Finally, Prof. Bagozzi will offer broad suggestions for IS researchers in terms of identifying and undertaking interesting research opportunities for NeuroIS and overcoming the challenges associated with a new methodology. Specifically, he will explain that cognitive neuroscience can help IS researchers learn much more from what they already know by relying on existing techniques, citing examples of how functional neuroimaging offered insights not possible by existing methods. Prof. Bagozzi will also spawn a discussion on how convince editors and reviewers of IS journals to embrace neuroimaging studies.

Panel Format

The panelists will have 10 minutes each to present their arguments, followed by a discussion with the audience. Finally, a general 20-minute discussion with the audience and all the panelists will conclude the debate.

Table 1. Panel Format

TOPIC	PARTICIPANTS
Introduction & Motivation	Angelika Dimoka
What are the Opportunities of NeuroIS?	
NeuroIS Opportunities for Behavioral IS	Fred Davis
NeuroIS Opportunities for IS Economics	Erik Brynjolfsson
NeuroIS Opportunities for Design Science	Alok Gupta
Discussion and Q&A	Audience
What are the challenges of NeuroIS?	
Challenges for IS Researchers	Rajiv Banker
Challenges for using Neuroimaging Tools	René Riedl
Discussion and Q&A	Audience
IS NeuroIS Hype or Hope?	
Insights from Neuromarketing	Richard Bagozzi
General Discussion	**Panelists and Audience**
Synthesis & Concluding Remarks	Angelika Dimoka

Online Repository on the Potential of Cognitive Neuroscience for IS Research

To extend the discussion the potential of cognitive neuroscience for IS research, the panelists will host and maintain an online repository to post material pertaining to cognitive neuroscience and neuroimaging in IS, including the panelists' comments, key questions and comments by the audience, working papers, discussions, and blogs, etc.

Appendix 1. About our Panelists

Richard Bagozzi

Richard P Bagozzi is the Dwight F. Benton Professor of Marketing in the Ross School of Business and Professor of Clinical, Social and Administrative Sciences in the College of Pharmacy, both at the University of Michigan. A graduate of the PhD program at Northwestern University, Professor Bagozzi in recent years has received honorary doctorates from the University of Lausanne, Switzerland, and Antwerp University, Belgium. He does basic research in the theory of action and theory of mind, applying ideas derived therefrom to research in consumer behavior, emotions, social identity, salesforce behavior, organizational studies, health behavior, self-regulation, and structural equation models.

Rajiv Banker

Rajiv D. Banker is a chaired professor in information technology at the Fox School of Business, Temple University. Previously, Dr. Banker has served in senior professorial and endowed positions at Carnegie Mellon University, the University of Minnesota, the University of Texas at Dallas and the University of California, Riverside. Dr. Banker is internationally recognized as a leader in interdisciplinary research in management, receiving numerous awards for his research. He has published more than 150 articles in prestigious research journals including *Management Science, MIS Quarterly, Information Systems Research, Journal of MIS, Communications of ACM, IEEE Transactions in Software Engineering, Academy of Management Journal, Strategic Management Journal, and Econometrica.* His research articles are cited over 150 times each year by other researchers in a wide range of disciplines. He is recognized by the Institute for Scientific Information (Web of Science) as one of the most highly cited researchers in economics and business worldwide that have made fundamental contributions to the advancement of science and technology. Dr. Banker's research interests range from economic modeling to statistical analysis of data collected from different companies to address complex or emerging problems of importance to managers. His research on information systems explores issues of technology enabled competitive strategy, investments in information technology, software productivity and quality metrics, and management of software development and maintenance. His research has been supported by the National Science Foundation, the Financial Executives Research Foundation, and several leading corporations. Dr. Banker has chaired and served on committees of several professional institutions. He has served as editor and on advisory boards of leading research journals in information systems. He has consulted extensively with many organizations and served as an expert witness. He has been invited to lecture to executives and academics at leading institutions around the world. He serves on the visiting faculty of the London School of Economics, Ecole Nationale-Paris, Indian School of Business and Peking University. Dr. Banker has supervised many doctoral students placed at prestigious research universities. Six of his doctoral students have won awards for best dissertations and three others have received runner-up awards. He has been the recipient of three teaching awards voted by graduate and undergraduate students.

Erik Brynjolfsson

Erik Brynjolfsson is the Director of the MIT Center for Digital Business and the Schussel Professor at the MIT Sloan School. He lectures on information systems strategy and performance, pricing models for information goods, social network analysis, and intangible assets and he teaches courses on the Economics of Information at the MIT Sloan School. Prof. Brynjolfsson was among the first researchers to measure the productivity contributions of information technologies, and his research has been recognized with nine Best Paper awards and five patents. *Businessweek* has profiled him one of five "ebusiness visionaries" and a reader's poll by *Optimize* ranked him as one of the world's two most influential academics. He is the author or co-editor several books including *Understanding the Digital Economy*, *Intangible Assets*, and *Strategies for eBusiness Success*. He is the Chairman of *MIT Sloan Management Review* and editor of the *Information System Network*. He has served on the Editorial Boards of numerous academic journals as well as *Time* magazine's Board of Economists and the Academic Advisory Council of the Federal Reserve Bank of Boston. Prof. Brynjolfsson holds Bachelors and Masters degrees from Harvard University in Applied Mathematics and Decision Sciences and a PhD from MIT in Managerial Economics. He founded three companies and taught two of the first courses on Artificial Intelligence and

Knowledge-based Systems at Harvard University. From 1996-1998, he was a Visiting Associate Professor at the Stanford Graduate School of Business and from 2004-5, he was Marvin Bower Fellow at Harvard Business School.

Fred Davis

Fred Davis is Distinguished Professor and holder of the David Glass Chair in Information Systems at the University of Arkansas' Walton College of Business. He received his PhD from MIT and has served on the faculties of University of Michigan, University of Minnesota, and University of Maryland before joining Arkansas in 1999. His research on technology acceptance and computer-aided decision making has been published in journals such as *MIS Quarterly, Management Science, Information Systems Research, Journal of Applied Psychology, and Organizational Behavior and Human Decision Processes*. Current interests include NeuroIS, the application of cognitive neuroscience theory and methodology to IS research. He has served on the editorial boards of various journals including *MIS Quarterly, Management Science, and Information Systems Research*.

Angelika Dimoka

Angelika Dimoka is an Assistant Professor in Management Information Systems and Marketing at Temple University. She also has a joint appointment in the Bioengineering Department. Dr. Dimoka is the director for the Center of Neural Decision Making, Temple University. Dr. Dimoka received her PhD from the University of Southern California. Her PhD specialization is in Neuroscience and Brain Functionality. Her current research interests lie on cognitive neuroscience and functional brain imaging in social sciences and especially in information systems and marketing. Dr. Dimoka's research has appeared in the *Information Systems Research, MIS Quarterly, Neuroscience Methods, IEEE Transactions in Biomedical Engineering*, *Annals of Biomedical Engineering, IEEE in Biology and Medicine*, and the proceedings of *ICIS, INFORMS* and *WISE*.

Alok Gupta

Alok Gupta is Carlson School Professor and department chairman of Information and Decision Sciences (IDSc) department at Carlson School of Management. He received his Ph.D. in Management Science and Information Systems from The University of Texas at Austin in 1996. He was an assistant professor from 1997-2001 at the University of Connecticut and an Associate Professor from 2001-2005 at the Carlson School of Management. His areas of specialization include process management, data communication, electronic commerce, design and evaluation of electronic mechanisms and processes, mathematical modeling of information systems, large-scale systems simulation, and economics of information systems. His research has been published in various top ranked information systems, economics, and computer science journals such as *Management Science*, *ISR, INFORMS JOC, CACM, JMIS, Decision Sciences*, *Journal of Economic Dynamics and Control, Computational Economics, Decision Support Systems, IEEE Internet Computing, International Journal of Flexible Manufacturing Systems, EJOR, IJEC, Information Technology Management, and Journal of Organizational Computing and Electronic Commerce*. He was rated among top 20 researchers in IS researchers in the world based on his publication activity in multiple studies published in 2006. He was a recipient of prestigious ***NSF CAREER*** award for his research in Online Auctions. He has consulted and performed research for several fortune 500 firms including GE capital, GE Supply and Northwest Airlines. From 1999-2001, he served as co-director of Treibick Electronic Commerce Initiative (TECI), an endowed research initiative at dept. of OPIM, University of Connecticut. During 2000-2001, he served on the executive board of edgeLab – a joint educational environment created by University of Connecticut and GE. He is also an affiliate of Center for Research in Electronic Commerce (CREC) at University of Texas at Austin. He served as the academic director of Carlson Consulting Enterprise, at Carlson School of Management from 2004-2006. He serves on the editorial boards of several academic journals such as *Management Science*, *ISR*, *JMIS* and *DSS*. He also holds the position of publisher of MIS Quarterly, the top rated journal in the field of MIS.

René Riedl

René Riedl has been working as an Assistant Professor at the Department of Business Informatics – Information Engineering, University of Linz, Austria. In addition, he serves on the executive board of the Institute of Human Resources and Organizational Development in Management at the University of Linz. In spring 2007, he was a

guest researcher at Harvard University, Harvard Business School. His research activities are currently focused on behavioral decision theory and its implications for the design of decision support systems, NeuroIS (in particular trust in online environments), and IT management (in particular CIO-related issues). Dr. Riedl has published seven books. Moreover, he has published his research in the following journals and proceedings: *Behavior Research Methods*, *NeuroPsychoEconomics*, *WIRTSCHAFTSINFORMATIK*, *HMD – Praxis der Wirtschaftsinformatik*, *Information Management & Consulting*, *ICIS*, *ECIS*, *HICSS*, and *IFIP*, among others. Dr. Riedl contributed a considerable part to the development of the software *DecisionTracer*, which allows for the identification of a decision maker's cognitive strategy. In 2008, he presented the software at the annual conference of the *Society for Judgment and Decision Making*.

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