

Conceptual Spaces

"A fundamental stimulus to the investigations of Hybrid Intelligent Systems (HIS) is the awareness in the academic communities that combined approaches will be necessary if the remaining tough problems in artificial intelligence are to be solved. Recently, hybrid intelligent systems are getting popular due to their capabilities in handling several real world complexities involving imprecision, uncertainty and vagueness. Current research interests in this field focus on the integration of the different computing paradigms like fuzzy logic, neurocomputation, evolutionary computation, probabilistic computing, intelligent agents, machine learning, other intelligent computing frameworks and so on. The phenomenal growth of hybrid intelligent systems and related topics has created the need for this International conference as a venue to present the latest research. HIS' 03 builds on the success of last year's. HIS'02 was held in Santiago, Chile, 1-4 December 2002 and attracted participants from over 26 countries."--Preface.

Providing a fresh approach to the theory of design, *Landscape: Pattern, Perception and Process* synthesizes planning, design and ecology and shows a new view of where design can develop. The book brings together the work and subject areas of a range of disciplines including psychologists,

philosophers, geologists, ecologists, cultural geographers, foresters, urban planners and landscape architects and synthesizes all these together. Since many landscape and environmental problems require multi-disciplinary approaches for their solution, this book demonstrates how the best integration can be achieved. Highly illustrated, it contains examples from North America, Canada, Europe and Australasia. Glossary, references and further reading provide the reader with guidance and back-up resources.

This volume provides an overview of applications of conceptual spaces theory, beginning with an introduction to the modeling tool that unifies the chapters. The first section explores issues of linguistic semantics, including speakers' negotiation of meaning. Further sections address computational and ontological aspects of constructing conceptual spaces, while the final section looks at philosophical applications. Domains include artificial intelligence and robotics, epistemology and philosophy of science, lexical semantics and pragmatics, agent-based simulation, perspectivism, framing, contrast, sensory modalities, and music, among others. This collection provides evidence of the wide application range of this theory of knowledge representation. The papers in this volume derive from international experts across different fields including philosophy, cognitive science, linguistics, robotics, computer

science and geography. Each contributor has successfully applied conceptual spaces theory as a modeling tool in their respective areas of expertise. Graduates as well as researchers in the areas of epistemology, linguistics, geometric knowledge representation, and the mathematical modeling of cognitive processes should find this book of particular interest.

Milieus of Creativity is the second volume in the book series *Knowledge and Space*. This book deals with spatial disparities of knowledge and the impact of environments, space and contexts on the production and application of knowledge. The contributions in this volume focus on the role of places, environments, and spatial contexts for the emergence and perpetuation of creativity. Is environment a social or a spatial phenomenon? Are only social factors relevant for the development of creativity or should one also include material artefacts and resources in its definition? How can we explain spatial disparities of creativity without falling victim to geodeterminism? This book offers insights from various disciplines such as environmental psychology, philosophy, and social geography. It presents the results of a research conference at Heidelberg University in September 2006, which was supported by the Klaus Tschira Foundation.

Why do people like books, music, or movies that adhere consistently to genre conventions? Why is it

hard for politicians to take positions that cross ideological boundaries? Why do we have dramatically different expectations of companies that are categorized as social media platforms as opposed to news media sites? The answers to these questions require an understanding of how people use basic concepts in their everyday lives to give meaning to objects, other people, and social situations and actions. In this book, a team of sociologists presents a groundbreaking model of concepts and categorization that can guide sociological and cultural analysis of a wide variety of social situations. Drawing on research in various fields, including cognitive science, computational linguistics, and psychology, the book develops an innovative view of concepts. It argues that concepts have meanings that are probabilistic rather than sharp, occupying fuzzy, overlapping positions in a “conceptual space.” Measurements of distances in this space reveal our mental representations of categories. Using this model, important yet commonplace phenomena such as our routine buying decisions can be quantified in terms of the cognitive distance between concepts. Concepts and Categories provides an essential set of formal theoretical tools and illustrates their application using an eclectic set of methodologies, from micro-level controlled experiments to macro-level language processing. It illuminates how explicit attention to

concepts and categories can give us a new understanding of everyday situations and interactions.

Cognitive Developments in Economics proposes an interdisciplinary approach to the study of human problem solving, choice, decision-making and change, to explain economic transactions, and the nature and evolution of organisations and institutions. The book contributes to a large spectrum of economic fields such as consumer theory, economics of the firm, economics of innovation, evolutionary economics and experimental economics.

Is there a right way to study how the brain works? Following the empiricist's tradition, the most common approach involves the study of neural reactions to stimuli presented by an experimenter. This 'outside-in' method fueled a generation of brain research and now must confront hidden assumptions about causation and concepts that may not hold neatly for systems that act and react. György Buzsáki's *The Brain from Inside Out* examines why the outside-in framework for understanding brain function have become stagnant and points to new directions for understanding neural function. Building upon the success of *Rhythms of the Brain*, Professor Buzsáki presents the brain as a foretelling device that interacts with its environment through action and the examination of action's consequence. Consider that

our brains are initially filled with nonsense patterns, all of which are gibberish until grounded by action-based interactions. By matching these nonsense "words" to the outcomes of action, they acquire meaning. Once its circuits are "calibrated" by action and experience, the brain can disengage from its sensors and actuators, and examine "what happens if" scenarios by peeking into its own computation, a process that we refer to as cognition. The Brain from Inside Out explains why our brain is not an information-absorbing coding device, as it is often portrayed, but a venture-seeking explorer constantly controlling the body to test hypotheses. Our brain does not process information: it creates it.

A novel cognitive theory of semantics that proposes that the meanings of words can be described in terms of geometric structures. In *The Geometry of Meaning*, Peter Gärdenfors proposes a theory of semantics that bridges cognitive science and linguistics and shows how theories of cognitive processes, in particular concept formation, can be exploited in a general semantic model. He argues that our minds organize the information involved in communicative acts in a format that can be modeled in geometric or topological terms—in what he terms conceptual spaces, extending the theory he presented in an earlier book by that name. Many semantic theories consider the meanings of words as relatively stable and independent of the

communicative context. Gärdenfors focuses instead on how various forms of communication establish a system of meanings that becomes shared between interlocutors. He argues that these “meetings of mind” depend on the underlying geometric structures, and that these structures facilitate language learning. Turning to lexical semantics, Gärdenfors argues that a unified theory of word meaning can be developed by using conceptual spaces. He shows that the meaning of different word classes can be given a cognitive grounding, and offers semantic analyses of nouns, adjectives, verbs, and prepositions. He also presents models of how the meanings of words are composed to form new meanings and of the basic semantic role of sentences. Finally, he considers the future implications of his theory for robot semantics and the Semantic Web.

The first volume of the two-volume set *Body, Language and Mind* focuses on the concept of embodiment, understood in most general terms as "the bodily basis of phenomena such as meaning, mind, cognition and language". The volume offers a representative, multi- and interdisciplinary state-of-the-art collection of papers on embodiment and brings together a large variety of different perspectives, from cognitive linguistics, cognitive science, philosophy, psychology, semiotics and artificial intelligence. Being envisioned as a reader of sorts in theoretical and empirical research on embodiment, the book revolves around several core

issues that have been addressed previously, to a large degree independently, in various disciplines. In particular the volume illustrates the diversity of notions of embodiment that has arisen in various disciplines over the last twenty years, and addresses the question how these different interpretations relate to each other, i.e. are they different aspects of or different perspectives on the same phenomena, or do they actually contradict each other? For this purpose, several aspects of cognition and language, such as phenomenal experience, perception, action, conceptualization, communication, meaning creation, social interaction and culture, are illuminated from the perspective of different theories of embodiment. The contributions are integrated through cross-connections between individual authors' papers and through an introductory essay that identifies the different strands of research, the central issues that they share, and the synergies that can be gained from addressing embodiment from an interdisciplinary perspective.

Everyday utopias enact conventional activities in unusual ways. Instead of dreaming about a better world, participants seek to create it. As such, their activities provide vibrant and stimulating contexts for considering the terms of social life, of how we live together and are governed. Weaving conceptual theorizing together with social analysis, Davina Cooper examines utopian projects as seemingly diverse as a feminist bathhouse, state equality initiatives, community trading networks, and a democratic school where students and staff collaborate in governing. She draws from firsthand

observations and interviews with participants to argue that utopian projects have the potential to revitalize progressive politics through the ways their innovative practices incite us to rethink mainstream concepts including property, markets, care, touch, and equality. This is no straightforward story of success, however, but instead a tale of the challenges concepts face as they move between being imagined, actualized, hoped for, and struggled over. As dreaming drives new practices and practices drive new dreams, everyday utopias reveal how hard work, feeling, ethical dilemmas, and sometimes, failure, bring concepts to life.

First established in 1993 with a conference in Elba, Italy, COSIT (the International Conference on Spatial Information Theory) is widely acknowledged as one of the most important conferences for the field of spatial information theory. This conference series brings together researchers from a wide range of disciplines for intensive scientific changes centered on spatial information theory. COSIT submissions typically address research questions drawn from cognitive, perceptual, and environmental psychology, geography, spatial information science, computer science, artificial intelligence, cognitive science, engineering, cognitive anthropology, linguistics, ontology, architecture, planning, and environmental design. Some of the topical areas include, for example, the cognitive structure of spatial knowledge; events and processes in geographic space; incomplete or imprecise spatial knowledge; languages of spatial relations; navigation by organisms and robots; ontology of space; communication of spatial

information; and the social and cultural organization of space to name a few. This volume contains the papers presented at the 9th International Conference on Spatial Information Theory, COSIT 2009, held in Aber Wrac'h, France, September 21–25, 2009. For COSIT 2009, 70 full paper submissions were received. These papers were carefully reviewed by an international Program Committee based on relevance to the conference, intellectual quality, scientific significance, novelty, relation to previously published literature, and clarity of presentation. After reviewing was completed, 30 papers were selected for presentation at the conference and appear in this volume. This number of papers reflects the high quality of submissions to COSIT this year.

Historical surveys consider Judeo-Christian notions of space, Newtonian absolute space, perceptions from 18th century to the present, more. Numerous quotations and references. "Admirably compact and swiftly paced style." — Philosophy of Science.

This book constitutes the refereed proceedings of the 5th International Conference on Scalable Uncertainty Management, SUM 2011, held in Dayton, OH, USA, in October 2011. The 32 revised full papers and 3 revised short papers presented together with the abstracts of 2 invited talks and 6 “discussant” contributions were carefully reviewed and selected from 58 submissions. The papers are organized in topical sections on argumentation systems, probabilistic inference, dynamic of beliefs, information retrieval and databases, ontologies, possibility theory and classification, logic programming, and applications.

This book constitutes the thoroughly refereed post-conference proceedings of the JSAI-isAI 2012 Workshops LENLS, JURISIN, ALSIP, MiMI, which took place on November/December 2012, respectively, in Miyazaki, Japan. The 17 contributions in this volume were carefully reviewed and selected from 42 submissions. They are an excellent selection of papers that are representative of topics of AI research both in Japan and in other parts of the world. LENLS (Logic and Engineering of Natural Language Semantics) is an annual international workshop on formal semantics and pragmatics; its topics are the formal and theoretical aspects of natural language. JURISIN (Juris-Informatics) deals with juris-informatics. This workshop brings together people from various backgrounds such as law, social science, information and intelligent technology, logic and philosophy, including the conventional “AI and law” area. MiMI (Multimodality in Multispace Interaction) focuses on how multispace is managed in socially, temporally, and sequentially complex environments. The four volume set LNAI 3681, LNAI 3682, LNAI 3683, and LNAI 3684 constitute the refereed proceedings of the 9th International Conference on Knowledge-Based Intelligent Information and Engineering Systems, KES 2005, held in Melbourne, Australia in September 2005. The 716 revised papers presented were carefully reviewed and selected from nearly 1400 submissions. The papers present a wealth of original research results from the field of intelligent information processing in the broadest sense; topics covered in the fourth volume are innovations in intelligent systems and their applications,

data mining and soft computing applications, skill acquisition and ubiquitous human computer interaction, soft computing and their applications, agent-based workflows, knowledge sharing and reuse, multi-media authentication and watermarking applications, knowledge and engineering techniques for spatio-temporal applications, intelligent data analysis and applications, creativity support environment and its social applications, collective intelligence, computational methods for intelligent neuro-fuzzy applications, evolutionary and self-organizing sensors, actuators and processing hardware, knowledge based systems for e-business and e-learning, multi-agent systems and evolutionary computing, ubiquitous pattern recognition, neural networks for data mining, and knowledge-based technology in crime matching, modelling and prediction. Thirteen papers on different subjects, focussing on writings and inscriptions in medieval art, explore the faculty of writing to create and determine spaces and to generate the sacred by the display of holy scripture. The subjects range from book illumination over wall painting, mosaics, sculpture, and church interiors to inscriptions on portals and façades.

This is the tenth volume in a series on information modelling and knowledge bases. The topics of the articles cover a wide variety of themes in the domain of information modelling, design and specification of information systems and knowledge bases, ranging from foundations and theories to systems construction and application studies. The contributions in this volume represent the following major themes: models in intelligent activity; concept modelling and conceptual modelling; conceptual modelling and information

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requirements specification; collections of concepts, knowledge base design, and database design; human-computer interaction and modelling; software engineering and modelling; and applications.

The complex diachronic and synchronic status of the concepts be and have can be understood only with consideration of their full range of constructions and functions. Data from modern Slavic languages (Russian, Czech, Polish, Bulgarian) provides a window into zero copulas, non-verbal have expressions, and verbal constructions. From the perspective of cognitive linguistics, be and have are analyzed in terms of a blended prototype model, wherein existence/copula for be and possession/relationship for have are inseparably combined. These concepts are related to each other in their functions and meanings and serve as organizing principles in a conceptual network of semantic neighbors, including give, take, get, become, make, and verbs of position and motion. Renewal and replacement of be and have occur through processes of polysemization and suppletization involving lexical items in this network. Topics include polysemy, suppletion, tense/mood auxiliaries, modality, causatives, evidentiality, function words, contact phenomena, syntactic calques, and idiomatic constructions.

Leading researchers offer a range of disciplinary perspectives on the implications of spatial thinking and reasoning for education and learning. The current "spatial turn" in many disciplines reflects an emerging scholarly interest in space and spatiality as central components in understanding the natural and cultural worlds. In *Space in Mind*, leading researchers from a range of disciplines examine the implications of research on spatial thinking and reasoning for education and learning. Their contributions suggest ways in which recent work in such fields as spatial cognition,

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geographic information systems, linguistics, artificial intelligence, architecture, and data visualization can inform spatial approaches to learning and education. After addressing the conceptual foundations of spatial thinking for education and learning, the book considers visualization, both external (for example, diagrams and maps) and internal (imagery and other mental spatial representations); embodied cognition and spatial understanding; and the development of specific spatial curricula and literacies. Contributors Kinnari Atit, John Bateman, Ruth Conroy Dalton, Ghislain Deslongchamps, Bonnie Dixon, Roger M. Downs, Daniel R. Montello, Christian Freksa, Michael F. Goodchild, Karl Grossner, Mary Hegarty, Scott R. Hinze, Christoph Hölscher, Alycia M. Hund, Donald G. Janelle, Sander Lestrade, Evie Malaia, Nora S. Newcombe, David N. Rapp, Thomas F. Shipley, Holger Schultheis, Mary Jane Shultz, Diana Sinton, Mike Stieff, Thora Tenbrink, Basil Tikoff, Dido Tsigaridi, David Waller, Ranxiao Frances Wang, Ronnie Wilbur, Kenneth C. Williamson, Vickie M. Williamson

Contemporary linguistic forms are partially the product of their historical antecedents, and the same is true for cognitive conceptualization. The book presents the results of several diachronic corpus studies of conceptual metaphor in a longitudinal and empirical “mixed methods” design, employing both quantitative and qualitative analysis measures; the study design was informed by usage-based theory. The goal was to investigate the interaction over time between conceptualization and cultural models in historical English-speaking society. The main study of two linguistic metaphors of anger spans five centuries (A.D. 1500 to 1990). The results show that conceptualization and cultural models—understood as non-autonomous, encyclopedic knowledge—work together to determine both the meaning and use of a linguistic metaphor. In addition, historically a wide

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variety of emotion concepts formed a complex cognitive array called the Domain Matrix of emotion. The implications for conceptual metaphor theory, research methodology, and future study are discussed in detail.

This book explores the conceptual spaces and socio-legal context which mental capacity laws inhabit. It will be seen that these norms are created and reproduced through the binaries that pervade mental capacity laws in liberal legal jurisdictions—such as capacity/incapacity; autonomy/paternalism; empowerment/protection; carer/cared-for; disabled/non-disabled; public/private. Whilst on one level the book demonstrates the pervasive reach of laws questioning individuals mental capacity, within and beyond the medical context which it is most commonly associated with, at a deeper and perhaps more important level it challenges the underlying norms and assumptions underpinning the very idea of mental capacity, and reflects outwards on the transformative potential of these realisations for other areas of law. In doing so, whilst the book offers lessons for mental capacity law scholarship in terms of reform efforts at both domestic and international levels, it also offers ways to develop our understandings of a range of linked legal, policy and theoretical concepts. In so doing, it offers new critical vantage points for both legal critique and conceptual change beyond mental capacity law. The book will be of interest to researchers in mental capacity law, disability law and socio-legal studies as well as critical geographers and disability studies scholars.

This book constitutes the refereed proceedings of the International Conference on Spatial Cognition, Spatial Cognition 2008, held in Freiburg, Germany, in September 2008. The 27 revised full papers presented together with 3 invited lectures were carefully reviewed and selected from 54 submissions. The papers are organized in topical sections on

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spatial orientation, spatial navigation, spatial learning, maps and modalities, spatial communication, spatial language, similarity and abstraction, concepts and reference frames, as well as spatial modeling and spatial reasoning.

This book constitutes the refereed proceedings of the First International Conference on GeoSpatial Semantics, GeoS 2005, held in Mexico City, Mexico in November 2005. The 15 revised full papers presented together with 4 short papers were carefully reviewed and selected from 42 submissions. The papers are organized in topical sections on theories for the semantics of geospatial information, formal representations for geospatial data, similarity comparison of spatial data sets, ontology-based spatial information retrieval, and geospatial semantic Web.

This edited book focuses on concepts and their applications using the theory of conceptual spaces, one of today's most central tracks of cognitive science discourse. It features 15 papers based on topics presented at the Conceptual Spaces @ Work 2016 conference. The contributors interweave both theory and applications in their papers. Among the first mentioned are studies on metatheories, logical and systemic implications of the theory, as well as relations between concepts and language. Examples of the latter include explanatory models of paradigm shifts and evolution in science as well as dilemmas and issues of health, ethics, and education. The theory of conceptual spaces overcomes many translational issues between academic theoretization and practical applications. The paradigm is mainly associated with structural explanations, such as categorization and meronomy. However, the community has also been relating it to relations, functions, and systems. The book presents work that provides a geometric model for the representation of human conceptual knowledge that bridges the symbolic and the sub-conceptual levels of representation. The model has

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already proven to have a broad range of applicability beyond cognitive science and even across a number of disciplines related to concepts and representation.

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Dimensions of Creativity brings together original articles that draw on a range of disciplines--from the history and sociology of science, psychology, philosophy, and artificial intelligence--to ask how creative ideas arise, and whether creativity can be objectively defined and measured. Margaret Boden and her colleagues Simon Schaffer, Gerd Gigerenzer, David N. Perkins, Howard Gardner, Colin Martindale, and Hans J. Eysenck demonstrate that creativity requires not only challenging new ideas but their acceptance by some relevant social group. Although some new ideas can arise as novel associations, others are generated by exploiting structural features of an existing conceptual space. Strong motivations often drive the creators and those who evaluate and perpetuate their work. The seven essays--although very different--are complementary. The book can serve as an up-to-date introduction to the study of creativity in various disciplines. The many references provide a way into the relevant literature. A Bradford Book

After the development of manifolds and algebraic varieties in the previous century, mathematicians and physicists have continued to advance concepts of space. This book and its companion explore various new notions of space, including both formal and conceptual points of view, as presented by leading experts at the New Spaces in Mathematics and Physics workshop held at the Institut Henri Poincaré in 2015. This volume covers a broad range of topics in mathematical

physics, including noncommutative geometry, supergeometry, derived symplectic geometry, higher geometric quantization, intuitionistic quantum logic, problems with the continuum description of spacetime, twistor theory, loop quantum gravity, and geometry in string theory. It is addressed primarily to mathematical physicists and mathematicians, but also to historians and philosophers of these disciplines.

This book constitutes the refereed proceedings of the 40th Annual German Conference on Artificial Intelligence, KI 2017 held in Dortmund, Germany in September 2017. The 20 revised full technical papers presented together with 16 short technical communications were carefully reviewed and selected from 73 submissions. The conference cover a range of topics from, e. g., agents, robotics, cognitive sciences, machine learning, planning, knowledge representation, reasoning, and ontologies, with numerous applications in areas like social media, psychology, transportation systems and reflecting the richness and diversity of their field.

The complex diachronic and synchronic status of the concepts "be" and "have" can be understood only with consideration of their full range of constructions and functions. Data from modern Slavic languages (Russian, Czech, Polish, Bulgarian) provides a window into zero copulas, non-verbal "have" expressions, and verbal constructions. From the perspective of cognitive linguistics, "be" and "have" are analyzed in terms of a blended prototype model, wherein existence/copula for "be" and possession/relationship for "have" are inseparably combined. These concepts are related to each other in their functions and meanings and serve as organizing principles in a conceptual network of semantic neighbors, including "give, take, get, become, make," and verbs of position and motion. Renewal and replacement of "be" and "have" occur through processes of polysemization and suppletization involving

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lexical items in this network. Topics include polysemy, suppletion, tense/mood auxiliaries, modality, causatives, evidentiality, function words, contact phenomena, syntactic calques, and idiomatic constructions.

This book examines privacy in public space from both legal and regulatory perspectives. With on-going technological innovations such as mobile cameras, WiFi tracking, drones and augmented reality, aspects of citizens' lives are increasingly vulnerable to intrusion. The contributions describe contemporary challenges to achieving privacy and anonymity in physical public space, at a time when legal protection remains limited compared to 'private' space. To address this problem, the book clearly shows why privacy in public space needs defending. Different ways of conceptualizing and shaping such protection are explored, for example through 'privacy bubbles', obfuscation and surveillance transparency, as well as revising the assumptions underlying current privacy laws.

Within cognitive science, two approaches currently dominate the problem of modeling representations. The symbolic approach views cognition as computation involving symbolic manipulation. Connectionism, a special case of associationism, models associations using artificial neuron networks. Peter Gärdenfors offers his theory of conceptual representations as a bridge between the symbolic and connectionist approaches. Symbolic representation is particularly weak at modeling concept learning, which is paramount for understanding many cognitive phenomena. Concept learning is closely tied to the notion of similarity, which is also poorly served by the symbolic approach. Gärdenfors's theory of conceptual spaces presents a framework for representing information on the conceptual level. A conceptual space is built up from geometrical structures based on a number of quality dimensions. The

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main applications of the theory are on the constructive side of cognitive science: as a constructive model the theory can be applied to the development of artificial systems capable of solving cognitive tasks. Gärdenfors also shows how conceptual spaces can serve as an explanatory framework for a number of empirical theories, in particular those concerning concept formation, induction, and semantics. His aim is to present a coherent research program that can be used as a basis for more detailed investigations.

A thorough rewriting to reflect advances in typology and universals in the past decade.

After the development of manifolds and algebraic varieties in the previous century, mathematicians and physicists have continued to advance concepts of space. This book and its companion explore various new notions of space, including both formal and conceptual points of view, as presented by leading experts at the New Spaces in Mathematics and Physics workshop held at the Institut Henri Poincaré in 2015. The chapters in this volume cover a broad range of topics in mathematics, including diffeologies, synthetic differential geometry, microlocal analysis, topos theory, infinity-groupoids, homotopy type theory, category-theoretic methods in geometry, stacks, derived geometry, and noncommutative geometry. It is addressed primarily to mathematicians and mathematical physicists, but also to historians and philosophers of these disciplines.

Advice involves recommendations on what to think; through thought, on what to choose; and via choices, on how to act. Advice is information that moves by communication, from advisors to the recipient of advice. Ivan Jureta offers a general way to analyze advice. The analysis applies regardless of what the advice is about and from whom it comes or to whom it needs to be

given, and it concentrates on the production and consumption of advice independent of the field of application. It is made up of two intertwined parts, a conceptual analysis and an analysis of the rationale of advice. He premises that giving advice is a design problem and he treats advice as an artifact designed and used to influence decisions. What is unusual is the theoretical backdrop against which the author's discussions are set: ontology engineering, conceptual analysis, and artificial intelligence. While classical decision theory would be expected to play a key role, this is not the case here for one principal reason: the difficulty of having relevant numerical, quantitative estimates of probability and utility in most practical situations. Instead conceptual models and mathematical logic are the author's tools of choice. The book is primarily intended for graduate students and researchers of management science. They are offered a general method of analysis that applies to giving and receiving advice when the decision problems are not well structured, and when there is imprecise, unclear, incomplete, or conflicting qualitative information.

20 years ago, from July 8 to 20, 1990, 60 researchers gathered for two weeks at Castillo-Palacio Magalia in Las Navas del Marques (Avila Province, Spain) to discuss cognitive and linguistic aspects of geographic space. This meeting was the start of successful research on cognitive issues in geographic information science, produced an edited book (D. M. Mark and A. U. Frank, Eds., 1991, *Cognitive and Linguistic Aspects of Geographic Space*. NATO ASI Series D: Behavioural

and Social Sciences 63. Kluwer, Dordrecht/Boston/London), and led to a biannual conference (COSIT), a refereed journal (Spatial Cognition and Computation), and a substantial and still growing research community. It appeared worthwhile to assess the achievements and to reconsider the research challenges twenty years later. What has changed in the age of computational ontologies and cyber-infrastructures? Consider that 1990 the web was only about to emerge and the very first laptops had just appeared! The 2010 meeting brought together many of the original participants, but was also open to others, and invited contributions from all who are researching these topics. Early-career scientists, engineers, and humanists working at the intersection of cognitive science and geographic information science were invited to help with the re-assessment of research needs and approaches. The meeting was very successful and compared the research agenda laid out in the 1990 book with achievements over the past twenty years and then turned to the future: What are the challenges today? What are worthwhile goals for basic research? What can be achieved in the next 20 years? What are the lessons learned? This edited book will assess the current state of the field through chapters by participants in the 1990 and 2010 meetings and will also document an interdisciplinary research agenda for the future. This second edition of *The Creative Mind* has been updated to include recent developments in artificial intelligence, with a new preface, introduction and conclusion by the author.

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Spaces of (Dis)location was a two-day interdisciplinary and international conference which took place on 24–25 May, 2012, at the University of Glasgow, UK, and was funded by the Graduate School of the University of Glasgow's College of Arts. Over the two days of the conference, around 60 papers were delivered, and this volume aims to showcase some of the most engaging and innovative research which was presented. As national and cultural boundaries are blurred in our increasingly global society, the ideas of space and location – whether physical or metaphysical, real or imaginary – are evolving. This notion provided the stimulus for a conference that encouraged creativity and debate across many subjects in the arts and humanities. Topics of essays include: ideas of space (physical and imaginary), globalization, localism, cultural and natural spaces, adaptation, cultural diaspora, immigration, spaces of performance and the space of the body. Most of the essays included in this volume address more than one of the above issues. Disciplines including visual art, literature, cinema, theatre, philosophy, and education are represented in Spaces of (Dis)location, and all of the essays put into practice ideas of interdisciplinarity by examining how different areas of practice and study inform and engage with each other.

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