

Preface

In this era of globalization, people from different countries and cultures have the opportunity to interact directly or indirectly in a great diversity of situations. Despite differences in their way of thinking and reasoning, their behaviors, their values, lifestyles, customs and habits, languages, religions, in a word, their cultures, they must be able to collaborate on projects, to understand each other's views, to communicate in such a way that they do not offend each other, to anticipate the effects of their respective actions on others, and so on. It is then of primary importance to understand how culture affects people's mental activities, such as perception, interpretation, reasoning, emotion, and people's behavior, in order to anticipate possible misunderstandings due to differences in handling the same situation, and to try and solve them.

Artificial intelligence, and more specifically, the field of Intelligent Systems design, aims at building systems that mimic the behavior of human beings in order to complete tasks more efficiently than the latter could by themselves. Consequently, in the last decade, experts and scholars in the field of Intelligent Systems have been tackling the notion of cultural awareness. A Culturally-Aware Intelligent System can be defined as a system, where culture-related or, more generally, sociocultural information is modeled and used in designing its human-machine interface or intervenes in the task carried out by this system, be it reasoning, simulation, or any other task involving cultural knowledge.

The first part of the book is devoted to the presentation of some Culturally-Aware Intelligent Systems, devised in the field of artificial intelligence.

The two following parts intend to be a source of inspiration for building modelizations of culture and of its influence on the human mind and behavior, to be used in new Culturally-Aware Intelligent Systems. They, respectively, deal with the results of experiments carried out in two fields that study culture and its influence on the human mind's functions: Cultural Neuroscience and Cross-Cultural Psychology. Cultural Neuroscience is a sub-domain of both Cognitive Neuroscience and Cultural Psychology and Cross-Cultural Psychology is a sub-domain of Cognitive Psychology, that is the reason why, in Chap. 1 of Volume 1, entitled "Introduction," before the part devoted to the Culturally-Aware

Intelligent Systems, the goals that characterize each discipline and the tools used to conduct experiments in each field will be recalled.

Here is a brief outline of each chapter of the three parts.

Overview of the Chapters

Part I Culturally-Aware Intelligent Systems

Chapter 2: Culturally-Aware HCI Systems

R. Heimgärtner

Culture strongly influences human–computer interaction (HCI), since the end user is always operating within a certain cultural context. Chapter 2 describes a Culturally-Aware HCI System, in the context of automotive navigation, which culturally adapts its interaction with the end user over time.

Chapter 3: Building Time-Affordable Cultural Ontologies Using an Emic Approach

J. Petit, J.C. Boisson and F. Rousseau

Culturally-Aware Intelligent Systems often need to have a representation of a given culture. Most of the time, this representation is subjective because it is based on an etic approach, aiming at discovering cultural universals from an outsider perspective. However, this clearly fails at capturing a culture’s specificities. Chapter 3 presents an emic approach that consists in building cultural knowledge in the form of ontologies, whose goal is to identify from an insider view, concepts, and behaviors that constitute typical traits of the concerned culture.

Chapter 4: Teaching an Australian Aboriginal Knowledge

C. Kutay

Teaching cultural competency is an important purpose of Culturally-Aware Intelligent Systems. Chapter 4 presents gaming environments involving intelligent agents modeling cultural rituals, values, and emotional responses to support the learning of cultural competency. It describes the development of cultural knowledge sharing processes to allow students to experience the conflicts felt by Aboriginal Australians within the mainstream culture.

Chapter 5: Culturally-Aware Healthcare Systems

L. Yin, T. Bickmore

Culturally-Aware Intelligent Systems often use conversational agents representing a specific culture that matches the user’s one. Moreover, the messages sent through these agents, targeted and tailored for this culture, increase their impact on users belonging to that culture. Chapter 5 presents such a system, whose aim is to improve the efficacy of health care on patients.

Chapter 6: Combining a Data-driven and a Theory-Based Approaches to Generate Culture-Dependent Behaviours for Virtual Characters

B. Lugrin, J. Frommel and E. André

To incorporate culture into Intelligent Systems, for example, to generate culture-dependent behaviors in conversational agents or any virtual agents, two approaches are commonly used: theory-based approaches that build computational models based on cultural theories to predict culture-dependent behaviors, and data-driven approaches that rely on multimodal recordings of existing cultures. Chapter 6 presents a hybrid approach combining a data-driven and a theory-based approaches to generate culture-dependent behaviors for virtual characters.

Chapter 7: Mental Activity and Culture: The Elusive Real World

G.J. Hofstede

Chapter 7 deals with the design of social agents in Culturally-Aware Intelligent Systems, like the conversational agents seen in Chap. 5. Social agents have a mental activity in a social world. Mental activity includes three steps—perceive, interpret, select action—that can result in many differences between agents from different cultures. The social world—in the form of generic sociological theory—and these differences—in the form of Cross-Cultural Theory—can be used for designing these agents. The chapter gives examples from recent literature that can serve as points of departure for further work.

Chapter 8: Affective Body Movements (for Robots) Across Cultures

M. Rehm

Body movements in the human being express affective information but may be interpreted differently depending on the culture of the interpreter. The purpose of Chap. 8 is to both generate and interpret body movements in robots by using a methodological approach that takes into account the cultural background of both the developer and the user during the development process.

Chapter 9: Modeling Cultural and Personality Biases in Decision-Making

E. Hudlicka

The process of decision-making is well-known for including cultural, personality, and affective biases. Chapter 9 describes a method for modeling multiple decision biases resulting from cultural effects, personality traits, and affective states, within the context of a symbolic cognitive-affective agent architecture: the MAMID methodology and architecture.

A great deal of Culturally-Aware Intelligent Systems is made for military and security purposes, because military situations typically involve people from different cultures. Chapters 10 and 11 deal with the notion of culture in such contexts.

Chapter 10: Considering the Needs and Culture of the Local Population in Contemporary Military Intervention Simulations: an Agent-Based Modeling Approach

J.Y. Bergier, C. Faucher

Chapter 10 presents SICOMORES, a simulation system, based on a multi-agent architecture representing the local population in the context of an asymmetric conflict, which simulates the effects of military actions of influence on the population. It takes into account the way culture influences these types of actions, treated like cognitive processes.

Chapter 11: Simple Culture-Informed Models of the Adversary

P.K. Davis

Cognitive models of the adversary are useful in a variety of domains, including national security analysis, but good cognitive models must avoid mirror imaging, which implies recognizing ways in which the adversary's reasoning may be affected by history, culture, personalities, and imperfect information, as well as by objective circumstances. Chapter 11 describes a series of research efforts over three decades to build such cognitive models.

Part II Cultural Neuroscience**Chapter 12: Cultural Neuroscience**

R.T. Bjornsdottir, N.O. Rule

Chapter 12 provides an overview of the research in the burgeoning field of Cultural Neuroscience that results from the convergence of Cultural Psychology and Cognitive Neuroscience, and outlines the history of the field and its origins. This specific field encompasses a wide variety of research and provides a unique lens through which to study cultural differences. Notably, research in this field has provided evidence of subtle and nuanced differences across cultures, where behavioral evidence alone could not, demonstrating the importance of the neuroscientific approach.

Chapter 13: Cultural Neuroscience and the Military: Applications, Perspectives, Controversies

K. Trochowska

Chapter 13 shows the evidence of the culture-brain nexus and its numerous implications for human mind functioning in a variety of domains, reviews the existing solutions and projects that leading military institutions are already conducting in the cognitive field, and, in light of the newest findings of Cultural Neuroscience, proposes new potential solutions and enhancements for the design and conduct of military training and of non-kinetic aspects of military operations.

Part III Cross-Cultural Psychology

Chapter 14: Cross-Cultural Dimensions, Metaphors and Paradoxes: An Exploratory Comparative Analysis

M.J. Gannon, P. Deb

Chapter 14 compares the three most popular ways of describing and analyzing cross-cultural similarities, differences, and areas of ambiguity: dimensions like in Hofstede's works, according to an etic approach, cultural metaphors according to an emic approach, and paradoxes again according to an etic approach. These paradigms are actually complementary in the global understanding of a given culture, and one can go back from one level to a previous one that is then better understood (« feedback loops »).

If the paradigm of dimensions has been largely exploited in AI Systems, we think it would be beneficial to researchers in this field to develop works on operationalizing the concepts of cultural metaphors and paradoxes as well as the notion of feedback loops.

Chapter 15: A Model of Culture-Based Communication

B. Martinovski

Both humans and virtual agents interact with intercultural environments and need to behave appropriately according to the environment. Chapter 15 proposes a dynamic modular model of culture-based communication, which reflects intercultural communication processes and can be used in the design of life-like training scenarios where culture is defined as a semiotic process and a system, which builds upon self and other identities and which is sustained and modified through communication and cognitive-emotive mechanisms such as reciprocal adaptation, interactive alignment, and appraisal.

Chapter 16: Dynamic Decision-Making Across Cultures

C.D. Güss, E. Teta

Chapter 16 studies the decision-making process in complex, uncertain, and dynamic situations, whereas decision-making research had so far focused on simple choices.

The chapter discusses a methodology especially suited for the study of dynamic decision-making and then discusses new empirical research on how culture influences dynamic decision. Such findings contribute to a more comprehensive theory of decision-making and allow for a better understanding of decision-making conflicts. Finally, applications of these findings are discussed and can be utilized in cultural competency training programs or international work teams.

Chapter 17: When Beliefs and Logic Contradict: Issues of Values, Religion and Culture

V. Cavojoja

In real debates, we often do not think about the validity of the arguments from the strictly logical point of view and we often disagree even before we hear the particular argument: This is the *confirmation bias*. Chapter 17 deals with the confirmation bias in reasoning about controversial issues (in this case abortions), and it

examines the effect of cultural parameters, like values (pro-life, pro-choice, neutral) and religious and political affiliations, on syllogistic reasoning. This chapter shows that when beliefs and evidence clash, it is often belief that wins. It is no surprise that people untrained in critical, scientific thinking resort to beliefs as their compass in navigating through the vast ocean of conflicting information (obtained from scientific research) and conflicting values (such as the rights of children vs. the rights of their mothers) that are contemporary, globalized human societies.

Chapter 18: Social Influence and Intercultural Differences

L. Rodrigues, J. Blondé and F. Girandola

Chapter 18 studies the effects of cross-cultural differences (individualistic vs. collectivistic cultures) on cognitive dissonance, social influence, and persuasion. It shows that intra-individual processes, such as the reduction of dissonance and the processing of persuasive information, are regulated by cultural orientations and cultural aspects of the self (independent vs. interdependent self-construal). Considering these cross-cultural effects, new avenues of research open up on change and resistance to change in many fields such as health, environment, consumption, and radicalization.

Chapter 19: The Influence of Emotion and Culture on Language—Representation and Processing

D.M. Basnight-Brown, J. Altarriba

Research focused on the study of emotion, specifically how it is mentally represented in the human memory system, is of great importance within the study of cognition. Chapter 19 examines the factors that make emotion words unique, as compared to other word types (e.g., concrete and abstract words) that have traditionally been of interest. This chapter also describes the factors that influence how those who know and use more than one language process *and* express emotion, and the role that language selection plays on the level of emotion that is activated and displayed. Finally, cross-cultural differences in emotion are examined, primarily as they relate to differences in individualistic and collectivistic contexts.

Chapter 20: Creating a Culture of Innovation

A. Markman

In the context of Chap. 20, the term culture is not limited to nations or ethnic groups, but is broadened to include any group that influences the individual's behavior, actually any organization. This chapter describes a culture of *innovation*, that is, the process of generating and implementing practical new ideas, where key factors are the need to favor innovation over efficiency, to tolerate failure, and to have the flow of information and ideas circulate between people.

To operationalize this broadened view of the notion of culture, we think it would be worth designing new concepts defining a culture and studying the way they can be used to model the effects on the reasoning and behavior of the group of people that adopts it.

Chapter 21: The Wonder of Reason at the Psychological Roots of Violence*M. Maldonato*

The last chapter, Chap. 21, stands apart from the other chapters and deals with the role of culture at the scale of mankind from a psychoanalytical and philosophical point of view.

Aggression, violence, and destructiveness have been part of human nature since its origins. Their roots can be traced back to the unconscious and an elaboration of mourning that uses division in order to save oneself from anguish and guilt, attributing all good to one's own object of love and all evil to an external enemy—just as it happens a stranger, considered dangerous and an enemy, is the object of anguish not because he really is dangerous, but because onto him the internal enemy is projected. Chapter 21 seeks to show how this permanent psychic tension derives from the meeting of opposing, heterogeneous, and unpredictable forces and movements which can be neutralized but are never canceled out. The balance between instinct and rationality can be lost at any time, and, on an individual or collective level, it can degenerate into pure violence. But, if life expresses itself through biological functions of a very high complexity, it also does so through history and culture. A sense of guilt can be elaborated in order to build better civilization and allow for the development of life protected from the worst excesses of violence.

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