

Leveraging the Cross-Cultural Capacities of Artificial Agents as Leaders of Human Virtual Teams

Matthew Gladden

Institute of Computer Science, Polish Academy of Sciences, Warsaw, Poland and NeuraX-enetica LLC, Indianapolis, USA

matthew.e.gladden@gmail.com

Abstract: The human beings who manage global virtual teams regularly face challenges caused by factors such as the lack of a shared language and culture among team members and coordination delay resulting from spatial and temporal divisions between members of the team. As part of the ongoing advances in artificial agent (AA) technology, artificial agents have been developed whose purpose is to assist the human managers of virtual teams. In this paper, we move a step further by suggesting that new capabilities being developed for artificial agents will eventually give them the ability to successfully manage virtual teams whose other members are human beings. In particular, artificial agents will be uniquely positioned to take on roles as managers of cross-cultural, multilingual, global virtual teams, by overcoming some of the fundamental cognitive limitations that create obstacles for human beings serving in these managerial roles. In order to effectively interact with human team members, AAs must be able to decode and encode the full spectrum of verbal and nonverbal communication used by human beings. Because culture is so deeply embedded in all human forms of communication, AAs cannot communicate in a way that is “non-cultural”; an AA that is capable of communicating effectively with human team members will necessarily display a particular culture (or mix of cultures), just as human beings do. Already researchers have designed AAs that can display diverse cultural behaviors through their use of language, intonation, gaze, posture, emotion, and personality. The need for AA team leaders to display cultural behavior raises the key question of *which* culture or cultures the AA leader of a particular human virtual team should display. We argue that the answer to this question depends on both the cultural makeup of a team’s human members and the methods used to share information among team members. To facilitate the analysis of how an AA team leader’s cultural behaviors can best be structured to fit the circumstances of a particular virtual team, we propose a two-dimensional model for designing suites of cultural behaviors for AAs that will manage human virtual teams. The first dimension describes whether an AA deploys the same cultural behaviors for its dealings with all team members (“objectivity”) or customizes its cultural display for each team member (“personalization”). The second dimension describes whether the AA always displays the same culture to a given team member (“invariance”), or possesses a repertoire of cultural guises for a particular team member, from which it chooses one to fit the current situation (“situationality”). The two dimensions of objective-personalized and invariant-situational cultural behaviors yield four archetypes for AAs leading virtual human teams. We consider examples of each type of AA, identify potential strengths and weaknesses of each type, suggest particular kinds of virtual teams that are likely to benefit from being managed by AAs of the different types, and discuss empirical study that can test the validity and usefulness of this framework.

Keywords: virtual teams, cross-cultural collaboration, socially and culturally competent virtual agents, user interfaces and human computer interaction, artificial intelligence (incl. robotics)

1. Background and introduction

1.1 The potential desirability of artificial agents as leaders of human virtual teams

Our human managerial capacities and practices evolved in a world whose lack of communication technologies meant that interpersonal relationships between workers were typically local, face-to-face, and culturally homogeneous. However, technological advances have compelled human beings to adapt to a new reality in which relationships between managers and employees are often culturally heterogeneous, spatially and temporally dispersed, and mediated extensively by technology. One manifestation of this technological mediation of work relationships is the phenomenon of virtual teams. Through the use of email, text messages, telephones, videoconferencing, and online document-sharing and project management tools, virtual team members can collaborate closely without ever meeting face-to-face. In an international organization, virtual team members may dwell in different time zones, which creates challenges in scheduling meetings and distinguishing “work time” from “non-work time.” Membership in this sort of global virtual team can bring with it the expectation of an employee’s availability for almost round-the-clock, instantaneous communication and decision making.

While human beings have been remarkably successful at adapting to these new technologies, we are still subject to fundamental biological limitations that affect our ability to successfully manage global virtual teams.

This raises the question of whether some sort of *nonhuman* being – such as an advanced form of artificial agent – can be developed whose capabilities would allow it to match or exceed our human effectiveness at managing certain types of human virtual teams. (Throughout this paper, the phrase “human virtual team” refers to a virtual team that includes some human beings as members, although the manager and additional members of the team may be artificial agents.)

For example, an artificial agent (AA) team leader that never needs to sleep and is always ready to interact with team members could conceivably mitigate some challenges experienced by global virtual teams, such as coordination delay resulting from spatial and temporal boundaries between members (Cummings et al. 2007).

1.2 General management capabilities needed by AAs in order to lead human virtual teams

Artificial agents such as conversational agents or “chatbots” are already widely used in business applications. For example, a conversational agent might appear on a commercial website in the form of an animated figure that carries on a dialogue with human visitors to the site, to answer their questions or carry out requests (Perez-Marín and Pascual-Nieto 2011).

Progress is being made toward developing AAs that can fill more substantial roles within organizations, such as potentially serving as the managers of human virtual teams. This process will be facilitated by the fact that human beings are not only *able* to form socialized relations with artificial agents as if they were human, but are naturally inclined to do so (Rehm, André, and Nakano 2009; FriedenberG 2011). Already AAs have been designed that demonstrate a number of the general capacities that will prove useful for managing human virtual teams. For example, AAs are capable of selecting communication strategies that maximize trust between managers and employees (Dai et al. 2013) and are capable of perceiving and critically evaluating the performance of virtual teams (Nunes and O’Neill 2012). It has thus far been envisioned that such AAs will serve as “tools” for human beings who manage virtual projects, helping them to improve their performance as leaders (Kriksciuniene and Strigunaite 2011). However, this ability to critically evaluate the work of human virtual team members will also contribute to AAs’ ability to serve as the leaders of such teams.

Among the many such capabilities that an AA manager will need to possess, one that is especially important for managing a global virtual team of human employees is mastery of the perception and display of cultural behaviors.

1.3 The importance of culture for AAs leading virtual teams

Within the context of business communication, the majority of a message’s meaning is often conveyed through nonverbal communication rather than the choice of words used (Ober 2007). Thus virtual team leaders who communicate only through emails or other written texts are at a disadvantage against those who can utilize facial expressions, gestures, tone of voice, and the full spectrum of nonverbal communication (El-Tayeh et al. 2008). An AA that is leading a human virtual team will be most effective if it appears to team members in an audiovisual form that allows it to display the full range of human nonverbal communication.

If an AA appears in a virtual form that utilizes a human-like body and voice, this raises the essential question of culture. An individual’s culture suffuses and is reflected in almost every aspect of his or her verbal and nonverbal behavior and appearance; it is thus not possible for an AA to utilize a full range of verbal and nonverbal communication in a way that is “non-cultural” or “culturally indeterminate”: an AA capable of communicating effectively with human team members will necessarily display a particular culture (or mix of cultures), just as human beings do (Rehm, André, and Nakano 2009; Rehm et al. 2009). In the case of an AA, its “culture” is reflected on several levels, including its (virtual) appearance, gestures, and vocal intonation, choice of actions, emotions, personality, and the background story or “biography” that is attributed to it to explain its body of knowledge and its organizational role (Payr and Trapp 2003).

1.4 Cultural competencies needed for AAs as leaders of cross-cultural global virtual teams

In order to effectively manage a cross-cultural, global virtual team of human employees, an AA will require a significant degree of cultural competence. For example, if an AA is managing a team with human members in Japan and the US, it should “know” that the expression of strong emotion by an AA may be more acceptable in an individualistic culture like the US than in a collectivistic culture like Japan (Rehm, André, and Nakano 2009).

Some of the cultural capacities needed by AA managers have already been developed. Researchers have successfully designed AAs that can perceive, understand, and display diverse cultural behaviors through a choice of actions, language, vocal intonation, gaze, posture, gestures, emotions, personality, the expectations for the kinds of social interactions that occur between individuals in a particular social relation, and other “unwritten rules of human cultures” (Mascarenhas et al. 2013; Friedenbergl 2011; Payr and Trappl 2003). Ongoing advances are being made in this field.

1.5 Choosing the culture(s) that an AA virtual team leader should display

Considering the fact that it is necessary for a successful AA team leader to effectively display specific cultural behaviors, and supposing that it is (or soon will be) possible to create AA team leaders that are capable of perceiving and displaying a sophisticated range of cultural behaviors, this raises the key question of this paper: *which culture or cultures* should the AA leader of a human virtual team display?

We posit that an AA virtual team leader can either: 1) reflect its own unique synthetic nonhuman culture; 2) reflect one or more existing human cultures; or 3) collaborate with its human team members in the development of a shared synthetic culture (Payr and Trappl 2003) that is created jointly by all team members. If team members will be working together for an extended period of time, all three possibilities become viable options. However, options 1 and 2 require significant time and effort on the part of human team members to develop new competencies in a synthetic culture that may have no usefulness beyond a particular team. It may thus be more efficient and effective – especially for a business project team of limited duration – if the AA can simply reflect existing human culture.

We must then consider the question of which human culture or cultures the AA team leader should display. We suggest that this will depend on at least two critical factors: 1) the particular linguistic and cultural makeup of the team’s human members; and 2) the network topology and technological means that the team’s human members typically employ when interacting with one another and their leader.

2. Our proposed two-dimensional model for designing AA team leaders’ cultural behaviors

To help an organization choose the sort of culture(s) that an AA virtual team leader should display – based on these critical factors of a team’s linguistic and cultural makeup and means of interaction – we propose the use of a two-dimensional model for designing suites of cultural behaviors for AAs managing human virtual teams.

The model’s vertical dimension describes whether an AA deploys the same cultural behaviors for its dealings with all team members (“objectivity”) or customizes its cultural display for each team member (“personalization”). The horizontal dimension describes whether the AA always displays the same culture to a given team member (“invariance”), or possesses a repertoire of cultural guises for a particular team member, from which it chooses one to fit the current situation (“situationality”). The two dimensions of objective-personalized and invariant-situational cultural behaviors yield four archetypes for AAs leading human virtual teams. Figure 1 presents an overview of this framework.

3. The four types of AA leaders as categorized according to their cultural behavior

We can now discuss in more detail these four types of AA leaders of human virtual teams and identify some potential advantages and disadvantages of each type.

3.1 Objective-invariant type

3.1.1 Description and examples

When managing a human virtual team, an AA of the objective-invariant type is given by its designers (or selects on its own) a single culture, native language, and apparent age that will best facilitate its work as team leader during the life of the team. The AA displays this single set of characteristics at all times in all dealings with all employees.

For example, imagine a virtual human team of employees from several countries who are involved with a hydroelectric construction project. Given the team’s assigned objectives and personnel makeup, it might be de-

cided that the team’s leader would most effectively manage the team’s members if he or she behaved in a way that made team members comfortable about approaching the leader with concerns or ideas (i.e., if the relationship reflected a low power distance, as defined by Hofstede), encouraged team members to take personal responsibility for their own work (i.e., high individualism), and established clear objectives and procedures to guide team members in their work (i.e., high uncertainty avoidance). Germany is a nation whose culture, broadly speaking, reflects these traits (Hofstede 2014a). Thus it might be decided that the team’s AA leader will appear in the virtual guise of, say, a 35-year-old female German engineer. (The selection of “German” as the culture means that while the AA can speak to team members in any language known to the AA, it speaks all languages with a slight German accent and uses typically German metaphors and allusions.)

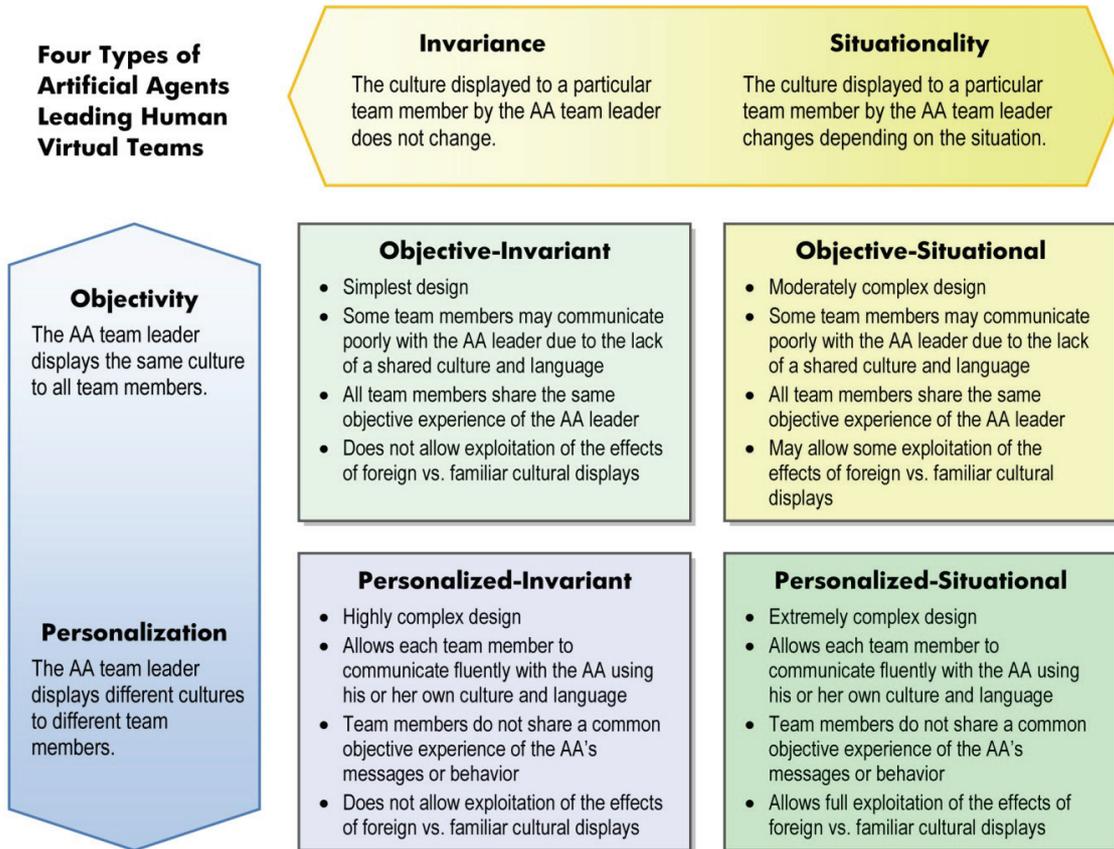


Figure 1: An overview of our two-dimensional model of the cultural behavior of an artificial agent (AA) leading a human virtual team. The axes of objectivity-personalization and invariance-situationality yield four potential types of AA leaders.

The fact that the German culture is a real, historically grounded human culture (rather than a new synthetic culture) means that the AA will display self-consistent cultural behaviors that will be recognizable and predictable to the team’s human members, to the extent that individual team members have been previously exposed to German culture. Moreover, the fact that *German* culture was selected means that particular traits found in this culture (such as low power distance and high individualism) will subtly reinforce the desired workplace atmosphere and work practices that will help both individual team members and the entire team to excel.

As another example, imagine a virtual human team that consists of financial officers at a manufacturer’s plants around the world who participate in a global virtual team led by an AA based at the company’s headquarters. The team’s purpose is to coordinate the sharing of financial data and best practices among the plants. It has been decided that the team leader’s behavior should reinforce the idea that ultimate financial decision-making authority rests with corporate HQ and that the role of individual plants’ financial managers is to efficiently carry out HQ’s directives (i.e., the relationship reflects high power distance), that employees’ highest concern should be the welfare of the whole company rather than the success of individual employees or plants (i.e., high collectivism), and that the financial managers’ role is to ensure the predictability of their plants’ finances, rather than taking entrepreneurial risks (i.e., high uncertainty avoidance). More so than some other nations,

Mexico is a nation whose culture reflects these traits (Hofstede 2014b). Thus it might be decided that the team's AA leader will appear in the virtual guise of, say, a 50-year-old male Mexican financial officer whose cultural behaviors would support the kinds of relationships and work practices desired in team members.

3.1.2 Potential advantages and disadvantages

It is simpler to design an AA that displays the traits of a single predetermined culture than one that displays multiple cultures. Moreover, while some team members might have less familiarity with the objective-invariant AA's chosen culture (and thus may potentially misunderstand the AA's message), the fact that all team members are presented with the same message allows them to more easily discuss it among themselves.

This approach also has disadvantages, though. Imagine a team including French, Canadian, and Chinese members. If the AA displays a Chinese accent and speech patterns, utilizes Chinese metaphors and cultural allusions when explaining assignments, and manifests Chinese cultural expectations for the roles of members within the team, then non-Chinese members of the team may be less likely to grasp the full meaning (or even existence) of information conveyed through the team leader's nonverbal communication. The non-Chinese team members could also feel as though the Chinese team members are unfairly benefitting from in-group favoritism, even if the AA has been designed in a way that is intended to minimize such an occurrence.

3.2 Objective-situational type

3.2.1 Description and example

When managing a human virtual team, an AA of the objective-situational type possesses a single suite of multiple cultural "personas" from which it chooses one particular guise to display at a particular moment to all team members.

An AA leader's ability to change its cultural guise allows the AA to take advantage of the fact that in some circumstances, team members will respond better to a leader who shares their own culture – but in other circumstances, team members will respond better to a leader whose culture *differs from* their own. For example, it has been found that a human being experiences greater psychological arousal when interacting with a virtual agent whose cultural behavior is different from the person's own (Obaid et al. 2012). Increased psychological arousal can be beneficial when carrying out critical tasks requiring a high degree of concentration.

Thus, if a virtual team consists of Italian employees, it might be most conducive to effective communication and a productive work environment if the AA leading the team typically appears as a fellow Italian when interacting with team members in their everyday work. However, if the AA is required to give team members instructions for a particularly important task that needs to be remembered and carried out precisely, it may be more effective if the "Italian AA" steps out of the office for a moment, and the AA instead temporarily adopts the guise of a Zambian or Australian or Chilean manager whose cultural dissimilarity would help enhance the Italian team members' attentiveness as the AA conveys critical instructions.

3.2.2 Potential advantages and disadvantages

In comparison to an objective-invariant AA, an objective-situational AA has an additional tool to use in maximizing its team members' effectiveness, insofar as it can exploit the benefits of being able to choose between displaying a familiar or foreign culture in a given situation. However, this effect can only be used to its full potential if the group's cultural makeup is such that there is at least one culture that is "familiar" to all team members and one "foreign" to all of them.

In comparison to an objective-invariant AA, one drawback of an objective-situational AA is that it is more complex to design, because it cannot simply have a single set of cultural behaviors "hardwired" into it. The AA must possess a full knowledge of multiple cultures, must have some mechanism for changing its displayed culture, and – perhaps most challengingly – must know when a situation calls for it to change its displayed behavior from that of one culture to another.

3.3 Personalized-invariant type

3.3.1 Description and example

A personalized-invariant AA represents a more radical rethinking of the way in which a virtual team leader interacts with team members. For each human member of the team, the AA chooses the language, culture (most likely the employee's own native culture), gender, and apparent age that will allow it to interact most effectively with that individual, and the AA displays that culture in all dealings with that particular employee.

An example would be an AA leader that interacts with each team member in such a way that the AA looks, sounds, and acts as though it were that person's "older sibling." To a 20-year-old Venezuelan team member, the AA would display the cultural characteristics of a 25-year-old Venezuelan, while to a 50-year-old Finn, the AA would look, sound, and act as though it were a 55-year-old Finn. When communicating instructions to an American team member, the AA might make some point by using an allusion to baseball, whereas when conveying the same message to a team member from another culture, the AA might use an allusion to cricket or football, instead.

Of particular interest is the fact that it is theoretically possible (through the use of mediating technology) for the AA to display different cultures to different team members *simultaneously*, even when the AA and the team members are all interacting with one another in a live virtual group meeting.

3.3.2 Potential advantages and disadvantages

A personalized-invariant AA would be easiest to implement in a virtual team whose communication processes utilize a star network topology or hub-and-spoke design in which team members communicate primarily with and through the team leader rather than directly with one another. If team members do not directly interact with one another to "compare notes" about their experience of the AA team leader, it is less likely that confusion will arise due to the fact that the leader presents itself to team members under different cultural guises. This hub-and-spoke arrangement also exploits the fact that the information processing needs of a virtual team can usually be most effectively met by a centralized system (Jensen et al. 2010), with the AA perhaps doubling as the team's data storage and processing system.

However, by utilizing sufficiently advanced mediating technologies, an AA could potentially display different cultural traits to different team members at the same time, even while they were all interacting simultaneously in a virtual group meeting. Clearly, an AA of this sort would be highly complex. While the advantages of an intelligent agent that can look and sound different to different individuals simultaneously have long been explored in science fiction (e.g., see Daniels 1966), due to its inherent complexity such an AA has not yet been seriously considered as a feasible business technology. In principle, though, this is simply a further development of established technologies such as the simultaneous live multilingual interpretation of a speaker's remarks used by organizations like the UN.

This personalized-invariant approach has the potential to significantly increase an AA's effectiveness in communicating with individual team members and to eliminate miscommunications arising from a lack of cultural familiarity. This is especially useful for teams whose members do not share a common language or culture. By communicating with each team member using his or her own native language and cultural knowledge, the AA can reduce the heightened stress and obstacles to performance that arise when cross-cultural virtual team members lack fluency in a shared language (Nurmi 2009).

3.4 Personalized-situational type

3.4.1 Description and example

For each team member, a personalized-situational AA possesses a unique suite of at least two possible cultural personas to use in interacting with that employee: one persona reflects the employee's own native culture, and the other reflects a culture that is foreign to the employee. The AA chooses which cultural persona to present to a particular team member at a particular point in time based on the demands of the current situation.

Building on our previous personalized-invariant example, an example of a personalized-situational AA would be an AA leader which, under normal circumstances, appears to each team member as though it were that person's "older sibling" (to cultivate a sense of camaraderie and reduce possibilities for miscommunication) but in moments of urgency or criticality appears as a more senior authority figure from a culture less familiar to that person.

3.4.2 Potential advantages and disadvantages

A personalized-situational AA can easily communicate with and coordinate the work of a team whose members do not share a common language and who possess very different cultures, as the AA can communicate with each team member using their own native language and cultural behaviors, in most situations. However, the personalized-situational AA can also maximize effectiveness by communicating with team members using behaviors from a foreign culture, in circumstances where heightened psychological arousal among team members would be beneficial.

This is the most complicated type of AA to design and operate. As with the personalized-invariant AA, it is more challenging to implement for a team that holds virtual group meetings involving all members than for a team whose AA leader implements a hub-and-spoke network topology in which the AA leader is responsible for transmitting information between team members.

4. Avenues for empirical research regarding this model

Empirical research is needed to verify the validity and usefulness of this proposed two-dimensional model. One study that can be undertaken now is to test the impact on motivation, comprehension, and performance when particular kinds of tasks common to virtual teams are presented to a human worker by AA "managers" displaying cultures familiar and foreign to the human being. This will enhance our ability to identify real-world situations faced by virtual teams in which the ability to exploit foreign vs. familiar cultural displays by an AA leader would have the most beneficial impact.

Other research can take place after further advances are made in AA technology. Once AAs have been engineered that can present a single message to multiple participants in a virtual group meeting using different languages and cultural behaviors simultaneously, it will be feasible to empirically test the hypothesized advantages and challenges of personalized AA types and to concretely measure the cost and complexity of personalized AA types relative to objective types.

5. Discussion and conclusion

A review of current artificial agent technologies and the direction of anticipated progress in the field suggests that sufficiently sophisticated AAs will have the potential to successfully manage virtual teams of human workers. The most capable and effective AA managers will be those whose cultural and linguistic flexibility allows them to lead human workers that communicate using a diverse array of languages and cultural displays. Utilizing the two-dimensional model proposed in this paper, we believe that an AA manager of the personalized-situational type represents the ultimate objective toward which research and development in this field should (and will) be advancing, as it offers the most powerful and effective design for an AA manager.

However, the inherent complexity involved with engineering a personalized-situational AA means that AAs of the objective-situational and personalized-invariant types will likely be developed first, as steppingstones along the way. By considering now the implications of these technologies for managing virtual teams, businesses can most effectively position their current e-leadership strategies within the context of this impending long-term technological change.

References

- Cummings, J.N., Espinosa, J.A., and Pickering, C.K. (2007) "Spatial and Temporal Boundaries in Global Teams," *Virtuality and Virtualization*, International Federation for Information Processing Proceedings, No. 236, pp. 85-98.
- Dai, Y., Suero Montero, C., Kakkonen, T., Nasiri, M., Sutinen, E., Kim, M., and Savolainen, T. (2013) "TrustAider – Enhancing Trust in E-Leadership," *Business Information Systems*, Lecture Notes in Business Information Processing, No. 157, pp. 26-37.
- Daniels, Marc, "The Man Trap," *Star Trek: The Original Series*, Season 1, Episode 1, Paramount, September 8, 1966.

- El-Tayeh, A., Gil, N., and Freeman, J. (2008) "A Methodology to Evaluate the Usability of Digital Socialization in 'virtual' Engineering Design," *Research in Engineering Design*, Vol. 19, No. 1, March, pp. 29–45
- Friedenberg, J. (2011) *Artificial Psychology: The Quest for What It Means to Be Human*, Psychology Press, New York.
- Kriksciuniene, D., and Strigunaite, S. (2011) "Multi-Level Fuzzy Rules-Based Analysis of Virtual Team Performance," *Building the E-World Ecosystem*, IFIP Advances in Information and Communication Technology, No. 353, pp. 305–18.
- Hofstede, G., "Germany", [online], The Hofstede Centre, <http://geert-hofstede.com/germany.html>, accessed June 7, 2014.
- Hofstede, G., "Mexico", [online], The Hofstede Centre, <http://geert-hofstede.com/mexico.html>, accessed June 7, 2014.
- Jensen, K.W., Døjbak Håkonsson, D., Burton, R.M., and Obel, B. (2010), "The Effect of Virtuality on the Functioning of Centralized versus Decentralized Structures—an Information Processing Perspective," *Computational and Mathematical Organization Theory*, Vol. 16, No. 2, June, pp. 144–70.
- Koehne, B., Bietz, M.J., and Redmiles, D. (2013) "Identity Design in Virtual Worlds," *End-User Development*, Lecture Notes in Computer Science, No. 7897, pp. 56–71.
- Mascarenhas, S., Prada, R., Paiva, A., and Hofstede, G.J. (2013) "Social Importance Dynamics: A Model for Culturally-Adaptive Agents," *Intelligent Virtual Agents*, Lecture Notes in Computer Science, No. 8108, pp. 325–38.
- Nunes, M., and O'Neill, H. (2012) "Assessing the Performance of Virtual Teams with Intelligent Agents," *Virtual and Networked Organizations, Emergent Technologies and Tools*, Communications in Computer and Information Science, No. 248, pp. 62–69.
- Nurmi, N. (2009) "Unique Stressors of Cross-Cultural Collaboration through ICTs in Virtual Teams," *Ergonomics and Health Aspects of Work with Computers*, Lecture Notes in Computer Science, No. 5624, pp. 78–87.
- Obaid, M., Damian, I., Kistler, F., Endrass, B., Wagner, J., and André, E. (2012) "Cultural Behaviors of Virtual Agents in an Augmented Reality Environment," *Intelligent Virtual Agents*, Lecture Notes in Computer Science, No. 7502, pp. 412–18.
- Ober, S. (2007) *Contemporary Business Communication*, Cengage Learning, Stamford, CT.
- Payr, S., and Trappl, R. (2003) "Agents across Cultures," *Intelligent Virtual Agents*, Lecture Notes in Computer Science, No. 2792, pp. 320–24.
- Perez-Marin, D., and Pascual-Nieto, I. (2011) *Conversational Agents and Natural Language Interaction: Techniques and Effective Practices*, IGI Global, Hershey, PA.
- Rehm, M., André, E., and Nakano, Y. (2009) "Some Pitfalls for Developing Enculturated Conversational Agents," *Human-Computer Interaction: Ambient, Ubiquitous and Intelligent Interaction*, Lecture Notes in Computer Science, No. 5612, pp. 340–48.
- Rehm, M., Nakano, Y., André, E., Nishida, T., Bee, N., Endrass, B., Wissner, M., Akhter Lipi, A., and Huang, H. (2009) "From Observation to Simulation: Generating Culture-Specific Behavior for Interactive Systems," *AI & SOCIETY*, Vol. 24, No. 3, October, pp. 267–80.