

2 Theoretical Background

In this dissertation, culture-related differences in human behavior are formalized in a computational way to be simulated in a virtual agent application. As pointed out in our general approach (Section 1.2), as a first step, we address culture as it appears in the social sciences, in order to learn more about the notion of culture and, in particular, culture-related behavioral differences.

This chapter introduces the theoretical background of culture and human behavior as required for our purposes. In the first section of this chapter (Section 2.1), different definitions of culture are introduced to point out different approaches of investigating culture, e.g. on a national level or from an anthropological viewpoint.

Culture can manifest itself on different channels of behavior. Therefore, in Section 2.2, different aspects of human behavior are described that can, in principle, be influenced by people's cultural background and, thus, seem to be relevant to the simulation with virtual characters.

The workflow carried out in this dissertation is exemplified for the German and Japanese cultures. Therefore, in Section 2.3, profiles for these two cultures are presented based on the theories from the social sciences described earlier in this chapter. In addition, expectations for the two target cultures are stated for the aspects of human behavior that have been pointed out as being relevant before, based on reflections on the cultural profiles designed for this purpose.

Finally, this chapter is summarized in Section 2.4, including the assumptions on behavioral differences for the targeted cultures based on the findings from literature on culture and human behavior.

2.1 Culture

In this section, the theoretical background on culture is investigated. In the social sciences, there are very different approaches that explain the concept of culture. Culture can on the one hand be described as national cultures, distinguishing countries, and on the other hand, culture can correspond to groups such as ethical, regional or religious groups.

In general, many descriptions of culture are rather abstract and are, thus, not very helpful for building a computational model. Therefore, in this section, we concentrate on theories from the social sciences which explain culture along dimensional models or dichotomies that help understand culture in a more descriptive manner and therefore seem to be well suited for our purposes.

First, different levels of culture will be introduced that help understand to what extent culture influences human behavior at all. Subsequently, some dimensional models are described that categorize cultures along different attributes. In the last subsection, dichotomies of culture are presented as a more abstract and anthropological approach of distinguishing cultures.

2.1.1 Levels of Culture

In this subsection, theories will be introduced that use layers to describe the influence of culture on human behavior. These layers point out, among other things, that culture does not only determine behavioral differences on the surface but that it also works on cognitive level. Thus, when building a computational model, different approaches can be taken as well, such as building cognitive models of an agent's mind or modeling differences in behavior.

When investigating culture, the notion of levels can be used in different ways. On the one hand, culture can be seen as one layer within a model that influences human behavior along with other levels such as personality. On the other hand, culture can be divided into different levels itself, explaining how culture influences either internal values or external aspects such as behavior. With this subsection, it becomes clear that culture should only be seen as one factor that can be integrated into a virtual character's behavior among other things such as personality. However, culture constitutes an important factor in human behavior and should therefore be investigated. Another insight of this subsection is the fact that culture does not only influence human behavior that can be seen on the surface, but also determines people's mindsets and internal drives.

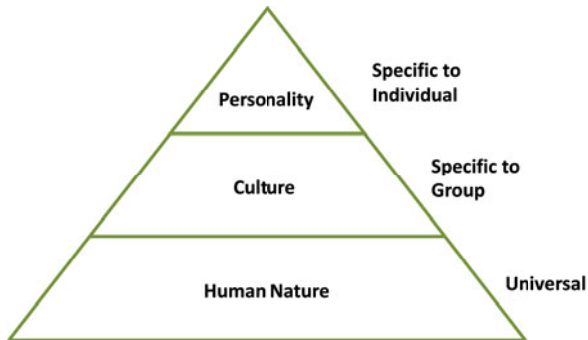


Figure 2.1: Hofstede's levels of uniqueness in a human's mental program [Hof01].

2.1.1.1 Culture as Part of a Mental Program

Human behavior depends on several personal factors such as gender, age, personality, emotional state or personal relationships. Culture as a social phenomenon influences a whole group of people. To what extent these personal and social factors determine an individual's behavior is hard to formalize. Hofstede [Hof01] refers to this as a mental program that individualizes every human and affects people's behavior. This so-called "software of the mind" can be categorized into three layers: human nature, culture and personality. These three layers are presented graphically in Figure 2.1 and are described as follows:

- **Human nature** represents the universal level of people's mental program and, thus, applies to every human individual. It contains basic physical and psychological functions and is inherited with people's genes. Thus, every human is able to have emotions such as fear, joy, sadness, anger or love. Also abilities such as the facility to observe people's environments and talk to other humans are part of this level of the mental program.
- **Culture** is the middle layer of the mental program that determines human behavior. In contrast to the other layers, this layer is purely learned and not inherited. Culture is specific to the group and the environment, which ranges from the domestic circle, the neighborhood or workplace up to the living community of the country an individual lives in. Culture plays a crucial role in the perception and selection of behaviors, mainly without this being realized. Consequently, behavior is sometimes perceived as inappropriate without realizing that there is a cultural gap causing the problem. According

to Hofstede [Hof01], this layer should be distinguished from human nature as well as from personality, although the borders are still up for discussion.

- **Personality** as a level is specific to the individual and is, according to Hofstede [Hof01], partly inherited and partly learned. Learned in this case means modified on the one hand by the influence of people’s culture and on the other hand by the personal experience. The personality contains a unique set of mental programs that characterizes a person and is not shared with anybody else.

In this model, culture is one of three layers that determines every individual’s mental program. While human nature and personality are rather simple to understand, culture is hard to grasp. Although everybody intentionally knows what the term “culture” means, it is hard to describe what exactly culture is and how different cultures can be distinguished. Moreover, the influence culture has on people’s values or thinking is difficult to formalize, as it is to explain what drives people to feel as a member of a certain culture. However, culture does influence human behavior and moreover, it influences on a subconscious level and is thus often not taken into account when critically reflecting on certain situations.

While the layers of human nature and personality have been investigated in virtual characters research a lot, e.g. Aylett and colleagues [ALD⁺05], Gratch and colleagues [GRA⁺02], or Rist and colleagues [RAB03a], the aspect of culture came into focus only recently (see Section 3.1 for an explanation). By adding culture to the behavioral models of virtual characters, a more complete simulation of a human’s mental program as described by Hofstede [Hof01] can be reached.

2.1.1.2 Different Levels of Depth

In comparison to the theory described above, culture can not only be seen as one layer that influences human behavior, but can also be divided into several layers itself. Another model introduced by Hofstede and colleagues [HHM10] explains culture on several layers along the four terms symbols, heroes, rituals and values. Figure 2.2 shows these manifestations of culture at different levels of depth, with symbols as the most outer and thus most superficial level and values as the most inner and deepest level.

The layer of symbols covers words, gestures or pictures that have a particular meaning and are recognized by the members of a culture, such as clothes, jargon or

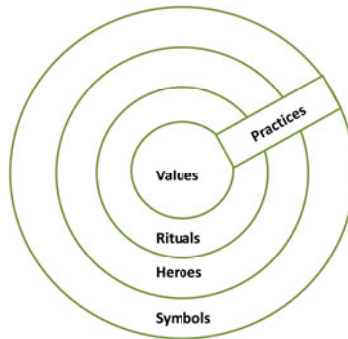


Figure 2.2: Hofstede's manifestations of culture at different levels of depth [HHM10].

hairstyles. According to Hofstede and colleagues [HHM10], new symbols are developed constantly while old ones disappear. Heroes are related to persons that are well known in a culture and serve as guidelines for behavior. Thereby, these heroes do not necessarily have to be living persons but can be imaginary such as Batman or Barbie. Rituals are collective activities that are considered essential within a culture, such as greeting or showing respect to others. In addition, rituals include discourse and thus the language that is used in certain interactions [HHM10].

As shown in Figure 2.2, the three layers described above are subsumed by the word practice, since they can be seen from the outside. According to Hofstede and colleagues [HHM10], the meaning, however, can not be seen from the outside and is dependent on the observer who judges only what can be seen.

The most inner layer in Figure 2.2 consists of values, which describe tendencies for members of a culture to prefer certain situations. According to Hofstede and colleagues [HHM10], values deal with pairings such as good and evil, normal and abnormal, natural and unnatural.

2.1.1.3 Implicit and Explicit Levels

Another theory that describes levels of culture is introduced by Trompenaars and Hampden-Turner [THT97], who distinguish implicit and explicit levels (see Figure 2.3) that are ranging from very concrete to subconscious.

The most outer layer in Figure 2.3 constitutes the explicit layer holding things that can be observed in reality such as language, clothes, buildings or food. Ac-

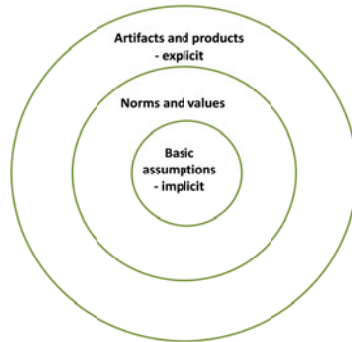


Figure 2.3: Implicit and explicit layers of culture [THT97].

According to Trompenaars and Hampden-Turner [THT97], it is notable that the way this explicit layer of culture is judged, is rather dependent on the observer's cultural background.

The middle level consists of norms and values that are reflected by the explicit layer mentioned above. While norms are related to a group's sense of right and wrong, values are associated to the sense of good and bad [THT97]. Thus, norms determine how people think they should behave, and values determine the way people wish to behave.

The most inner layer of culture is determined by basic assumptions that have vanished from conscious questioning and have become self-evident. Trompenaars and Hampden-Turner [THT97] explain this phenomenon as a result of how people cope with their environment as a need for survival. How people cope with their daily problems has disappeared from their awareness and became absolute assumptions. These basic assumptions can be easily recognized by questioning them in a given culture, which will lead to confusion or even annoyance such as asking a US American or Dutch person why they think that all people are equal [THT97].

The middle layer of Trompenaars' and Hampden-Turner's model can be compared with Hofstede's most inner layer of culture (see previous subsection), since both focus on norms and values that determine people's thinking. Following the distinction between internal drives such as norms and observable differences such as outer appearance, when integrating culture into a virtual character system, different approaches can be taken as well such as building cognitive models of an agent's mind or modeling differences in behavior. For this dissertation, observable differences are modeled to point out differences in behavior using virtual char-

acters. Thus, the explicit level of culture is the most interesting one as it holds information on outward differences.

2.1.2 Dimensional Models

Although culture is often described as an abstract concept that holds tendencies for groups, there are approaches that define culture along different attributes. These dimensional models constitute an excellent starting point for building behavior models for virtual characters, since they describe culture in a very formal manner that can be operationalized for computational models. In this subsection, different dimensional models of culture are introduced.

2.1.2.1 Hofstede's Dimensional Model

The probably most well known example of defining culture along different dimensions was introduced by Hofstede and colleagues [Hof01] who investigated culture on a national level. The theory is based on a broad empirical survey, covering more than 70 countries. Primarily, only 40 countries were analyzed and extended to 50 countries and 3 regions later [Hof12]. Currently, a total of 74 countries are listed [Hof12], whereas the scores on the dimensions are partly based on replications or extensions of the original study. Originally, Hofstede and colleagues introduced four dimensions to explain different cultures: power distance, individualism, masculinity and uncertainty avoidance. The fifth dimension, long term orientation, was added afterwards in order to explain Asian cultures in a more appropriate way, based on Confucian dynamism. So far, this dimension has been applied to 23 countries. Several years later, a sixth dimension, indulgence versus restraint, was added to the model [HHM10] and applied to 93 countries and regions. Each of the dimensions contains two extreme sides, and every culture is thus positioned in a six-dimensional space represented by a value on each dimension. These scores were originally supposed to lie between 0 and 100. But as more cultures were added afterwards, some of the countries exceeded these borders, as they were more extreme on a dimension than a country that was already rated on the most extreme value.

At the current state of the art Hofstede's model holds the six cultural dimensions: power distance, individualism, masculinity, uncertainty avoidance, long term orientation and indulgence. In the following, these dimensions will be further explained.

- The dimension of power distance describes the extent to which a different distribution of power is accepted by the less powerful members of a culture. Scoring high on this dimension indicates a high level of inequality of power and wealth within the society. A low score on the other hand supposes greater equality between social levels, including government, organizations and families.
- The individualism dimension describes the degree to which individuals are integrated into a group. On the individualist side, ties between individuals are loose, and everybody is expected to take care for him- or herself. On the collectivist side, people are integrated into strong, cohesive in-groups.
- The masculinity dimension describes the distribution of roles between the genders, which can be a crucial characteristic for a culture. The two extreme sides are masculine and feminine, whereas masculine values contain attributes such as being assertive or competitive while members of feminine cultures have moderate, caring values.
- The uncertainty avoidance dimension explains a society's tolerance for uncertainty and ambiguity. The extent to which a member of the culture feels uncomfortable or comfortable in an unknown situation is the key-factor of this dimension. Uncertainty avoiding cultures try to minimize the possibility of such situations and stick to laws and rules. Members are emotional and motivated by an inner nervous energy, whereas uncertainty accepting cultures are more tolerant to different opinions and do not express strong emotions.
- The fifth dimension, long term orientation, was included several years later to better explain Asian cultures better. One of the extreme sides, long term orientation, is associated with thrift and perseverance, whereas the opposite side, short term orientation, shows respect for tradition, fulfilling of social obligations and protecting one's face.
- The last dimension, indulgence, describes the subjective well-being that members of a culture experience. Cultures that score high on this dimension have a high percentage of people that consider themselves as very happy and as having a high level of control over their lives. Restrained societies controversially are more pessimistic with thrift being important instead of leisure.

As mentioned above, each culture that is categorized in this model is represented by values on each dimension [Hof12]. The scores of a culture on each of

the dimensions have an impact on one another. Besides publishing the scores on each dimension, Hofstede and colleagues give explanations on how the individual scores influence the behavior of their members [Hof12].

Using Hofstede's dimensional model that investigates different cultures on a national level, seems to be a good basis for the integration of culture into the behavioral models of virtual characters, since it defines a complete model of culture along different attributes and can, thus, be integrated in a computational model.

2.1.2.2 Value-Oriented Model

Another approach that distinguishes cultures along different dimensions was introduced by Kluckhohn and Strodtbeck [KS61]. In comparison to Hofstede's theory described above, the authors do not focus on nationalities but describe different so-called value orientations in order to explain culture. According to the Kluckhohn and Strodtbeck, culture consists of explicit and implicit patterns that are transmitted by symbols and constitute the distinctive achievements of different groups. These value orientations cover the following:

- The essential *nature of people* varies from evil to good and explains to which extent people are considered as being trustworthy and good or bad and whether they need to be controlled or not.
- The *relationship to nature* describes what members of a culture think is the appropriate relationship towards the environment. The relationship can range from being determined by nature through external forces and genetics to the thinking that humans dominate nature.
- The *relationship to other people* describes how people prefer relationships and social organizations to be. This is explained in shades that reach from hierarchical (power is distributed unequally) to individual (equal rights for everybody).
- The *modality of human activity* is a value orientation that ranges from the simple concept of being to the concept that efforts will be rewarded and therefore people should work hard.
- The *temporal focus* of human activity describes how people think about time. The orientation can either be in the past, implying one should learn from history, in the present (living for today) or in the future, which results in planning and saving for the future.

With the dimensions, some of the concepts explained by other theories are picked up. Although this theory presents a classification of values in a dimensional manner, the impact on human behavior is described rather vaguely and thus hard to be measured in computational terms. In addition, the model covers aspects of culture rather than building a complete model. For these reasons, we consider Hofstede's model (see previous paragraph) as being better suited for our purposes.

2.1.2.3 Problem-Oriented Model

Trompenaars and Hampden-Turner [THT97] investigate culture according to the solutions people choose to deal with problems. Therefore, the authors distinguish three different categories of possible problems: (1) the relationship to other people, (2) the notion of time (3) and the relationship to the environment. Cultures differs in how their members are solving problems in the different categories.

The first category (relationships) includes different perceptions of following rules or friendship obligations and the understanding of oneself as an individual or as part of a group. In addition, this category determines to what extent it is acceptable to express emotions in different cultures and to what degree a person is involved in a business relationship. The importance of achievement in terms of what an individual has accomplished in comparison to the status he or she had been ascribed by birth, as well as gender or age are also part of this category.

Regarding communication, this category is of special interest, since assumptions about prototypical behavior are made. According to Trompenaars and Hampden-Turner [THT97], communication is the exchange of information, while information is the carrier of meaning, which in turn is culture-dependent. Regarding verbal communication, cultures are divided into Western, Latin and Oriental cultures. While Northern America, for example, is considered a Western culture, the Arab world counts as an Oriental culture, whereas in the Latin group, we find countries such as Mexico for example. Western cultures are described as verbal cultures where members get nervous and uneasy when there are long pauses. Interrupting the conversation partner is considered as impolite. Thus, turn taking is managed in such a way that one starts talking after the interlocutor has stopped. Latin cultures are described as being even more verbal and where interruptions are being regarded as showing interest in the conversation. In Oriental cultures, silence is a crucial part of communication and can be considered a sign of respect. Pauses are used to process information or assure that the conversation partner gives away the speaking floor.



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