

# Individualism and Collectivism in Trade Agents (Extended Abstract)

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## Abstract

This paper was originally presented at IEA/AIE 2008 [1]. The current paper is an extended abstract for presentation at BNAIC 2008. Agent-Based Modeling can contribute to the understanding of international trade processes. Models for the effects of culture and cultural differences on agent behavior are required for realistic agent-based simulation of international trade. This paper makes a step toward modeling of culture in agents. The focus is one of the five dimensions of culture according to Hofstede: individualism versus collectivism. The paper presents an analysis based on social science literature about national cultures. For cultural differentiation of agent behavior, rules are formulated for individualist versus collectivist agent behavior with respect to negotiations, cooperation or defection in the delivery phase of transactions, trade partner selection, and trust. Example computations demonstrate the feasibility in multi-agent simulations.

## 1 Representation of Individualism and Collectivism in Trade Agents

Agent-Based Economics (ABE) studies economic processes as interactions of individual actors. Cultural differences are known to have their effects on international business interactions and on trust between business partners. Models of culture-bound agents will advance the understanding through ABE of intercultural trade processes as well as differences in trade processes across cultures. Culture has different aspects or dimensions [2]. The current paper focuses on the widely recognized distinction between individualistic and collectivistic cultures. It presents an exercise in multi-agent simulation, with the purpose of better understanding the mechanisms that promote or hinder international trade.

People are gregarious by nature. But the life conditions of societies vary, and they have adapted accordingly. Hunter-gatherers live in small bands, usually consisting of a few nuclear families. In agricultural societies, larger units have developed, and the people may live in extended families or clans. This is still the default model of social organization in most of the world, although it is being put under strain by urbanization. In modern, affluent industrial societies people tend to revert to nuclear families. The variation in basic group size and cohesion between societies has been shown by sociologists, e.g., in the distinction between *Gemeinschaft* and *Gesellschaft* that Tönnies introduced as early as 1887. In a *Gemeinschaft*, people share everything, both material and immaterial, whereas in a *Gesellschaft*, private property and other individual-centered institutions are possible. This variation has been confirmed by social psychological cross-national studies of practices or values, for instance the work of Triandis [3] and Hofstede [2]. These authors speak of the distinction between individualism and collectivism. Table 1 shows some typical distinctions. With respect to geographical distribution, national cultures of East-Asia and Central America are extremely collectivistic, while the Anglo countries are at individualistic extreme of the scale.

On the basis of Hofstede's theory, the paper formulates the expected influence of individualism versus collectivism on the behavior of traders in the processes of trade goal selection, trade partner selection, bargaining, and delivery and trust, as well as the maintenance of beliefs about potential trading partners. Subsequently, the verbal models of culturally differentiated behavior are formalized into production rules that take culture and personal traits of the agents into account.

**Table 1.** Some distinctions between norms in collectivist and individualist societies (source: Hofstede [2]).

Collectivist	Individualist
Maintain harmony, avoid confrontation	Speak your mind
High-context, implicit communication	Low-context, explicit communication
Use the word "we"	Use the word "I"
Show favor to in-group customers	Treat all customers equally
No business without a personal relation	Task is more important than a good relation
A relation brings rights and obligations	Mutual advantage is the basis of relations
Relations are given	Build and maintain relations actively
Save face for in-group	Keep self-respect
Responsible for group interests	Responsible for personal interests

## 2 Simulation Results and Conclusion

Table 2 presents some results of multi-agent simulations. Simulations in populations with collectivistic agents belonging to different groups typically show the distribution of run 1 in Table 2: in-group trade. Individualist agents rapidly develop networks of preferred relations, on which they trade very efficiently. In mixed settings like run 2, the individualists develop the same pattern, but collectivist agents stick to their in-group trade. However, in run 3 where no in-group partners are available, the collectivist agents develop the individual relations pattern. In run 4 only group C agents can find in-group partners and show the collectivist pattern, while the other collectivist agents develop the individual relations pattern.

The work presented in this paper shows that the approach to simulate cultural dependent behavior in agents, leads to behavior that corresponds to human behavior in trade simulation games. Therefore, the paper shows that agent-based simulation contributes to the understanding of international trade processes.

**Table 2.** Number of successful transactions in simulations with 8 suppliers and 8 customers.

1. Customers		collectivist gr A				collectivist gr B				2. Customers		individualist				collectivist gr A			
Suppliers		C1	C2	C3	C4	C5	C6	C7	C8	Suppliers		C1	C2	C3	C4	C5	C6	C7	C8
collectivist	S1	9	7	5	3	0	0	0	0	individualist	S1	3	2	24	0	0	0	0	0
group A	S2	3	8	9	3	1	0	0	0		S2	1	0	0	12	0	1	0	1
	S3	5	6	5	4	0	0	0	0		S3	0	16	1	2	0	0	0	0
	S4	2	3	5	11	0	0	0	0		S4	14	2	0	7	0	0	0	0
collectivist	S5	0	0	0	0	4	5	5	4	collectivist	S5	0	0	0	0	5	6	6	6
group B	S6	0	0	0	0	6	6	5	5	group A	S6	0	0	0	0	8	3	5	6
	S7	0	0	0	0	8	4	6	6		S7	0	0	0	0	5	7	5	8
	S8	0	0	0	0	8	7	8	9		S8	0	1	0	0	8	7	5	4
3. Customers		individualist				collectivist gr A				4. Customers		collectivist gr C				collectivist gr B			
Suppliers		C1	C2	C3	C4	C5	C6	C7	C8	Suppliers		C1	C2	C3	C4	C5	C6	C7	C8
individualist	S1	1	25	1	0	0	0	0	0	collectivist	S1	6	7	7	5	0	0	0	0
	S2	9	1	0	5	1	0	3	6	group C	S2	9	3	4	8	0	0	0	0
	S3	0	0	2	0	0	0	9	4		S3	4	7	6	6	0	0	1	0
	S4	2	0	0	1	15	3	5	0		S4	4	5	5	6	0	0	0	0
collectivist	S5	1	0	0	0	0	20	0	0	collectivist	S5	0	0	0	0	17	0	1	1
group B	S6	0	1	1	17	0	0	4	0	group A	S6	0	0	0	0	1	0	1	16
	S7	5	0	4	0	1	0	1	9		S7	0	0	0	0	0	23	1	1
	S8	1	0	18	0	1	0	1	1		S8	0	0	1	2	1	15	1	2

## References

- [1] G.J. Hofstede, C. Jonker, T. Verwaart Individualism and collectivism in trade agents. In Nguyen, N.T. et al., editors, *New Frontiers in Applied Artificial Intelligence, Proceedings of IEA/AIE 2008*, Springer-Verlag, Berlin Heidelberg, Lecture Notes in Artificial Intelligence 5027: 492-501, 2008.
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