

Trust and Distrust in Long-Term Business Relationships

Schwarz, R. / Ewaldt, J.W.

Schwarz, R.: Head of the Chair of Managerial Economics, Management Accounting and Control Systems (BTU Cottbus) and

Head of Chair of Management (Graduate School of Management Lodz)

Ewaldt, J.W.: Scientific Assistant at the Chair of Managerial Economics, Management Accounting and Control Systems (BTU Cottbus)

Brandenburg Technical University of Cottbus

Department of Mechanical, Electrical and Industrial Engineering

03013 Cottbus / Germany

Tel. +49 355 / 69 2389 or 2993

Fax. +49 355 / 69 3324

Email: rasz@tu-cottbus.de

Email: j.ewaldt@tu-cottbus.de

URL: http://www.wiwi.tu-cottbus.de/controlling/e_index.htm

Abstract

The problem of trust and distrust in an economic setting is discussed within different theoretical approaches. Based on the recent literature on trust and the concepts of principal-agent theory, this paper focuses on the evolution of trust and distrust from a system dynamic perspective. The decisions of the different parties in the long-run are influenced by expectations and rewards.

The paper is divided into five parts. After an introduction to the problem the theoretical framework is presented. Then the most important causal loops of a business relation of two persons are identified. The third part familiarize with the structure of the model. The forth part summarizes the results of certain simulated scenarios. Finally an outlook of the implications of the model and questions for further research are presented.

1 Introduction

A common criticism of the neo-classical theory of the firm argues, that the assumptions are too far from the reality of enterprises. The firm is described by a technical input-output relation undisturbed by conflicts. Whereas the traditional theory of the firm reduces 'business relationships' to a production function, modern neo-institutional approaches perceive the business world as a network of contracts and transactions. This view seems to be more specific and nearer to reality. Agency theory is based on the assumption that people are principally opportunistic and lazy if they are not monitored. Expensive control mechanisms are needed to fight cheating and to bring people in the firm to goal-oriented work. The world is dominated by distrust and conflict, but rarely grounded on technical relations.

ALBACH (1997) developed, in contrast to this perspective, the vision of a harmonic model of the firm where the relations between people are based principally on trust and solidarity. SADOWSKI ET AL. (1998) raises two arguments against this position. They assert that institutional economics is not restricted to the analysis of conflict. Secondly, trust is dependent on conditions and not static. The authors hope that the harmonic approach and the conflict approach could be interconnected.

In our opinion, the reason for the different positions is not founded in the predisposition of different authors to trust or distrust. It is neither a succession of theoretical approaches in time. It seems that both the trust literature and the agency (distrust) literature argue from a static view. There is almost no room for the accumulation of trust and distrust. The evolution of trust and distrust in time is mentioned qualitatively, if at all. The switch between trust and distrust is up to now mainly treated in the tit-for-tat- manner of the theory of repeated games (see DASGUPTA, 1988). We propose to investigate the interaction between trust and distrust with the method of system dynamics.

In this paper we show from a system dynamics perspective how trust can change over time into distrust in business relations and vice versa. They cannot be captured by disjunct theoretical models who assume either a world of conflict or a world of harmony. Which of the two situations prevails depends on the dynamic interplay of many factors.

CREED and MILES (1996, 16) mention the growing scientific interest in trust since the 1980s “as a response to the emphasis on opportunism that pervades agency theory and transaction cost economics (BROMILEY and CUMMINGS, 1992; ETZIONI, 1988)”, a similar position to that of ALBACH (1997). They identify agency (and mistrust) as the typical approach of the 19th century management based on direct, personal control. The authors argue that in contrast to this old fashioned position, a much higher level of trust is needed for the rapid evolution of network firms at the end of the 20th century. The trust level for survival of this type of firm has to be much higher than before.

This level is mainly determined by the core beliefs, the mood and the embedded predispositions of the managers. If the modern theory of the firm assures students of management that the business universe is dominated by opportunism and cheating, the core mental models of coming managers will be formed this way. In this respect agency theory certainly runs contrary to the core success factors of managers in network firms and in many other real firms as well. Indeed, with globalization and the role network firms are playing in it, adaptation velocity is one of the key success factors. Minimizing adaptation costs is decisive for the profit maximization and the success of a network firm. In terms of adaptation costs trust-dominated adaptation seems to have a comparative advantage against contract-based adaptation.

There is another important factor for the growing appreciation of trust: Investments in human capital “make sense only if managers have high confidence in both the educational potential of organizational members [...] and their trustworthiness.” (CREED and MILES, 1996, 30-31).

Although the demand for trust is growing nowadays with network firms, with the needs of investment in human capital and organizational learning, the concept of trust is much older in business relations. In economic relations it is similar to the notions of loyalty, goodwill, creditworthiness and others. The evolution of the economic credit mechanism was based on trust *and* contract (which has to cover distrust). So the deeper reason for trust seems to be not new, the comparative cost advantage of trust versus distrust is older. This cost advantage is rooted in the ability of trust to reduce complexity more quickly and with less effort than by means of contract, institutional procedures or scientific investigations (they may have other advantages: be more refined, more correct and so on)¹.

Nevertheless, the concept of trust is up to now very vague. It is defined in various disciplines very differently.² The word is often used as a synonym to confidence, solidarity, familiarity etc. but seldom gets its meaning in a theoretical framework (LUHMANN, 1988 and BARBER, 1983). Trust has by far not won such a sophisticated theoretical solidification in economic theory as cheating has in agency theory.

We conceptualize trust as an expectation in face of risk of one person about a specific action of an other person which is part of an interpersonal exchange between both. This expectation influences the decision about the own action before the action of the other person can be monitored (see DASGUPTA, 1988). This usage excludes the understanding of trust as "the reliance upon information" insofar as interpersonal exchange is not stressed.

With this understanding, we reflect from the literature some concepts, factors and relationships in our assumptions or in the model structure. Most authors elaborate the concept of trust from a wide-spread organizational perspective, an aspect we will not focus on in this paper.

According to CREED and MILES (1996, 18-19), trust can be influenced by the number of positive exchanges, a disposition to trust, perceived social similarities and/or social institutions. The last two factors we assume away. Trust influences the decision about the own action before the action of the other person can be monitored (see DASGUPTA, 1988). It can arise from expectations based on reputation. We will show the accumulation of reputation as a coflow, but not feed back it into the dynamics. LEWICKI and BUNKER (1996) see trust depending on the history of the relationship and situational factors. We restrict our investigation to the influence of positive or negative actions on trust, of the history and to the role of disposition.

The literature states a broad range of positions about the relation of trust to reward and control systems. Trust itself can be seen as a control mechanism (BRADACH and ECCLES, 1989). In this paper, rewards and the aspect of monitoring are recognized.

Trust can be conceptualized as an investment in a situation of risk. In this case, one party gives positive actions over a few periods in the expectation that the other party reacts, somewhere in the future, positively. This SD model demands the reaction in the same period.

2 Theoretical Framework of the Model

2.1 The Assumptions

The model is based on a combination of some relations common to agency theory with the trust framework of LEWICKI and BUNKER (1996). They expanded the description of SHAPIRO ET AL. (1992), SHEPPARD and CHERASKIN (1992) who proposed three stages of trust development: deterrence-based trust, knowledge-based trust and identification-based trust. The first stage (named also calculus-based trust by LEWICKI and BUNKER, 1996) is characteristic for business relationships and this is the stage we concentrate on. To get an operational basis for SD modeling the theoretical framework is simplified by the following assumptions:

1. The behavior is reduced to one kind of action. There are no conflicting needs or actions. The complicated interplay between different economical and social exchanges will not be modeled.
2. The result of a positive action can be measured by different degrees of output.
3. The absence of the expected action is regarded as a violation of trust (negative action of the same kind):
4. The value of a violation can be expressed as a negative multiple of the positive action. A minor violation destroys a small number of positive actions. A heavy violation destroys almost all positive actions and instantly all accumulated trust.
5. The change from a positive to a negative action (violation) is freely chosen by the actor. It is not the result of situational or environmental (uncontrollable) factors. The actor is fully responsible for the violation. Therefore:
6. All situational factors are regarded as constant (*ceteribus paribus* approach).
7. Trust and distrust are conceptualized as a level. The initial values of this level are influenced by different factors: the predisposition of experience and sentiment, and the first impression of the other actor.
8. Only deterrence-based (calculus-based) trust is modeled using rewards and sanctions.
9. There are only two parties which enter a new relationship. There is no history at the starting point to be regarded but in the end a reputation is built up.
10. The interaction between both parties is necessary and cannot be terminated. Actions and violations are specified and fixed by a contract with infinite exit costs.
11. In each time period, there is an action and the reaction of the other party.
12. The technical output function is a classical S-shaped function (see fig. 1), the human efficiency function is a negative marginal rate function (see fig. 2). The small letters a and b indicate the assumptions of A and B upon the A's output function.

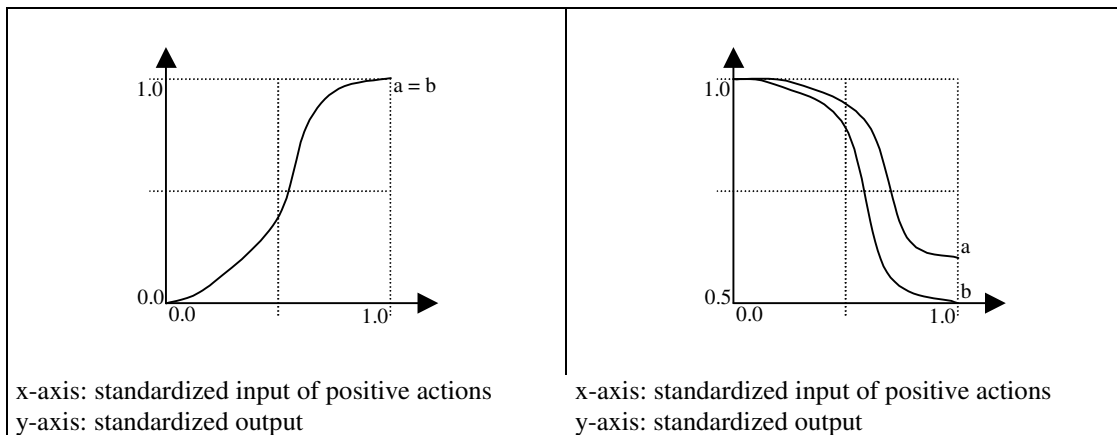


Fig. 1: The technical output function

Fig. 2: The human efficiency function

2.2 The Key Relationship

The model is based on a two-person business relationship. The working tasks and results of both partners are highly related to each other. The results of one person interacts with the work of the other (see Fig. 3). But both don't know everything about the partner's work. Additional to the minimum work necessary to keep the relationship going on, both actors can invest a certain amount of work, not knowing whether this effort will be followed by an adequate reward. The underlying decision depends on the trust or distrust on each other. The consequential loop forces each person to reflect on the previous experiences with his partner to decide on the amount of effort in the actual period (see fig. 3). Of course there exist relationships where one party hopes for no specific reward, but we believe that a reward of some kind is always involved in business relationships.

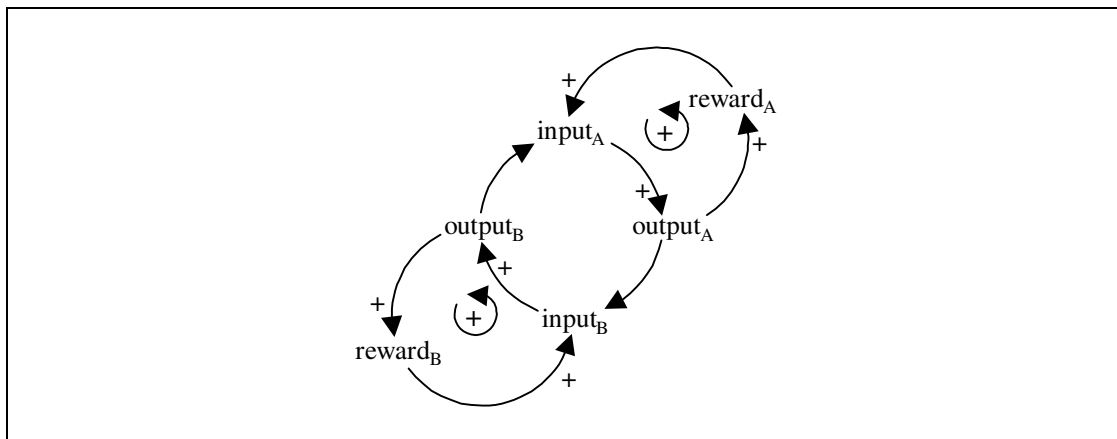


Fig. 3: The working relationship between A and B

The relationship lasts for the whole time horizon of four years. The duration of one period is one week. Therefore, we simulate 208 periods in total. Because of the interdependency no person is able to cancel either their looped working chain nor the communication with the partner in work.

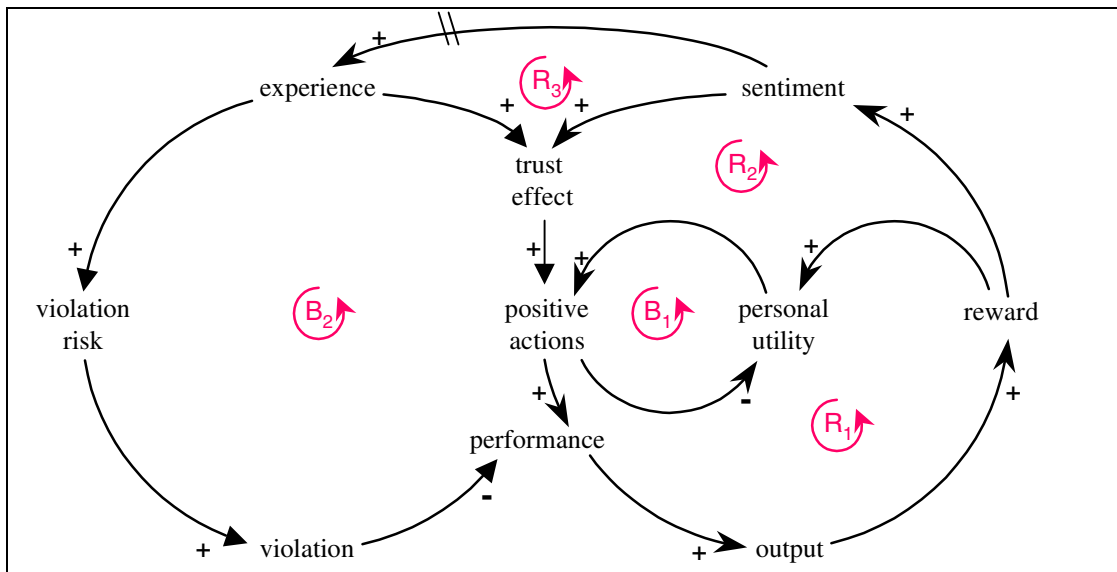


Fig. 4: The loop structure of one person

As seen in Fig. 4, the person named A decides on his effort counted in positive actions. The resulting output of his actions causes a reward, which will be initiated by person B. Any increase in positive actions rises the reward. This growth corresponds to both, an increase of the personal satisfaction by the reward and a decrease of the same personal satisfaction by the substitution of free time by working time. Because the available free time is limited the decreasing effect has a highly positive marginal growth rate.

Besides the received reward, A expects a certain level of reward, based on his own expectations on his output function and the output evaluation by his partner B (see figs. 1 and 2). The relation of expected and received levels influences A's sentiment. The level of sentiment is determined by its former amount, the actual contentment with the received reward and the natural erosion of sentiment. Based on the level of his sentiment, A develops a personal experience about his relationship to B. This development is delayed.

The development of sentiment and experience need different time intervals, but their change per period depend on the same general predisposition towards trust.

All three levels (satisfaction, sentiment, and experience) affect A's next decision on positive actions. The first one limits the development of the system. The maximal possible working hours draws the upper limit - the minimal working hours necessary to sustain the job, the lower limit. The three levels are standardized by the following way. The minimum state is zero, the maximum state is two. Therefore the indifferent frontier between the positive and negative range of satisfaction, sentiment or experience is defined by the value one. The combination of short-term sentiment and long-term experience, weighted by the risk preference of the actor results in a trust effect. This effect can be interpreted as trust if it is higher than 1 and as distrust if it is less than 1.

Any increase of experience has a side effect - an increase of the moral hazard risk. A high level of experience inveigles A to substitute positive actions by negative ones. The violation causes disturbances in the output production. More importantly is the negative effect of B's trust.

The relationship is foremost complete when the second person is set into action. The behavioral structure of B is identical to A. The only difference lays in the value of the personal parameters.

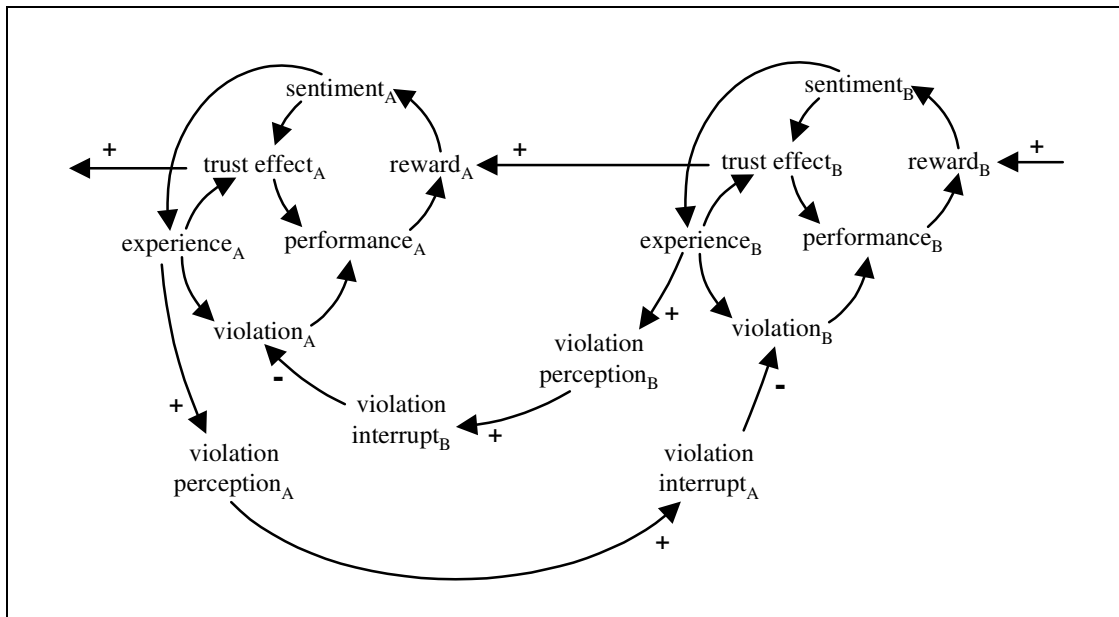


Fig. 5: The simplified loop structure of two persons

The connection between the two actors has three links. First B perceives the incomplete information about A's output. Based on this information and his previous experience with A, he decides about the reward given to A. After a delay, B receives the real output data of A's work. He is then able to compare it with his perception of A's output available at the point of decision to evaluate the efficiency of his reward decision. The third interaction is the perception of A's violation by B and his direct reaction on it.

3 Model Structure

3.1 The Satisfaction Loop

Given a certain level of positive actions ($PosAction_1$)³ the input of A can be characterized by three variables:

Standardized Input (calculated by A)

$$A, 47 \quad StdInput_t = ((PosAction_{1t} * ActionDuration_1) - MinHours_1) / (MaxHours - MinHours_1) \quad []$$

Standardized Perceived Input (calculated by B)

$$A, 49 \quad StdPerInput_t = (((PosAction_{1t} - (Violation_1 * PerceptionFactor_2) * ViolationEffect_1) * ActionDuration_1) - MinHours_1) / (MaxHours - MinHours_1) \quad []$$

Standardized Real Input (impartially calculated)

$$A, 51 \quad StdRealInput_t = (((PosAction_{1t} - (Violation_1 * ViolationEffect_1) * ActionDuration_1) - MinHours_1) / (MaxHours - MinHours_1) \quad []$$

All three variables are based on the amount of time per action (*ActionDuration_1*), the maximal available working hours (*MaxHours*), and the minimal working hours (*MinHours_1*) to keep the relationship going. The *ViolationEffect_1* specifies the effect of a single violation unit in relation to a positive action. The *PerceptionFactor_2* indicates the relative perception of A's violation level by B.

The corresponding output to the particular input can be described by an output function of two factors. The first factor represents the technical aspects of the performance.

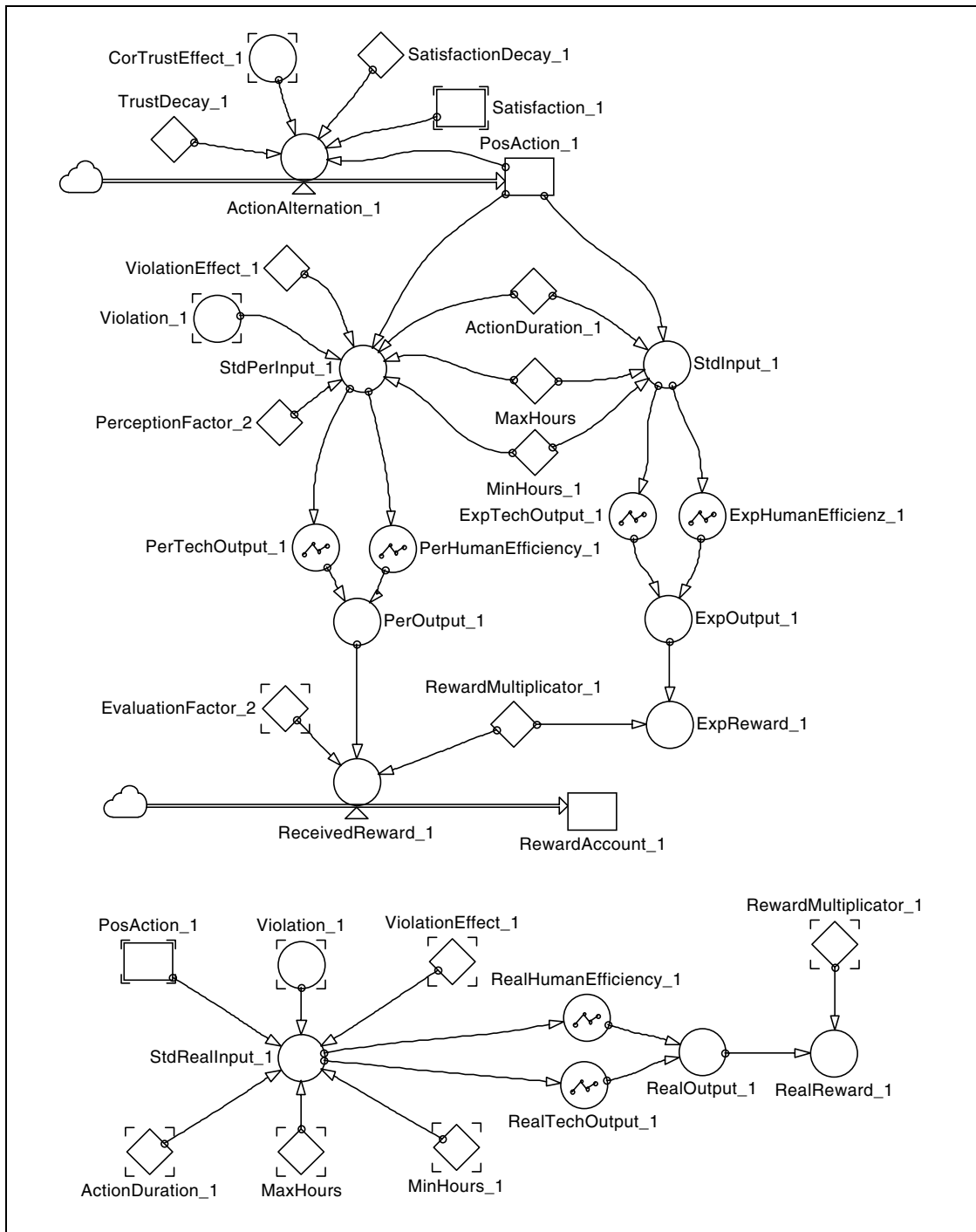


Fig. 6: The different measures of A's performance

According to the three input variables, three different measures of A's performance can be calculated: the expected output, the perceived output, and the real output. A particular input causes an output based on the technical output function (*ExpTechOutput_1*; *PerTechOutput_1*; *RealTechOutput_1*) and the human efficiency function (*ExpHumanEfficiency_1*; *PerHumanEfficiency_1*; *RealHumanEfficiency_1*) (see figs. 1 and 2).

The output (*ExpOutput_1*; *PerOutput_2*; *RealOutput_1*) multiplied by the *RewardMultiplier_1* and *EvaluationFactor_2* result in the *ReceivedReward_1*. The *EvaluationFactor_2* points out B's attitude to fulfill the calculated reward (see fig. 6).

Analogous to the *ReceivedReward_1* we can calculate the expected one (*ExpReward_1*) and the objective one (*RealReward_1*). Both do not need any evaluation factor.

Every action of A decreases his limited free time. Therefore, A has to face increasing costs of substituting free time in working time. A comparison between the *SaCosts_1* and the *ReceivedReward_1* generates a strengthening or weakening of A's satisfaction (*SaInc_1* or *SaDec_1*) (see equations L11, R17 and R15). The limited free time puts an end to all effort to maximize trust (see equation A41).

A, 41	$\begin{aligned} & SaCosts_{1t} \\ & = F_{GRAPH}(StdInput_t) \end{aligned}$	[]
L, 11	$\begin{aligned} & Satisfaction_{1t} \\ & = Satisfaction_{1t-1} \\ & \quad + SaInc_{1t} \\ & \quad - SaDec_{1t} \end{aligned}$	[]
R, 17	$\begin{aligned} & SaInc_{1t} \\ & = IF(SaEvaluation_{1t} \geq 1, ((SaEvaluation_{1t} - 1) * SaDecayFactor) \\ & \quad * (1 - (Satisfaction_{1t} / MaxState)), 0) \end{aligned}$	[]
R, 15	$\begin{aligned} & SaDec_{1t} \\ & = IF(SaEvaluation_{1t} < 1, ((SaEvaluation_{1t} - 1) * SaDecayFactor) \\ & \quad * (MinState - Sentiment_{1t}), 0) \end{aligned}$	[]

The satisfaction loop is closed by the reinforcing effect of satisfaction on the amount of positive actions realized in future periods.

3.2 The Sentiment and Experience Loops

Analogous to the more physical and social oriented satisfaction loop, the sentiment loop is caused by the comparison of the *ReceivedReward_1* with the expected *ExpReward_1*. The level of short-run sentiment is based on the understanding and evaluation of the received rewards of the last weeks (see equations L13, R23, R19 and R21).

The long-run experience (see equation L3, R11, R7 and R9) is a delayed function of the level of sentiment. Both levels have two outflows. First the possibility of a negative event, and second the ordinary erosion of trust. The positive event as well as the negative one is controlled by A's general attitude towards trust. If A is trustful, a

certain positive event is decayed less than a comparable negative event. If A is distrustful the relation between the two predisposition factors is vice versa.

L, 13	$\begin{aligned} \text{Sentiment}_t & \\ = & \text{Sentiment}_{t-1} \\ & + \text{SeInc}_t \\ & - \text{SeDec}_t \\ & - \text{SeErosion}_t \end{aligned}$	[]
R, 23	$\begin{aligned} \text{SeInc}_t & \\ = & \text{IF} (\text{RewardEvaluation}_t \geq 1, ((\text{RewardEvaluation}_t - 1) * \text{IncPreDisposition}_1 \\ & * (1 - (\text{Sentiment}_t / \text{MaxState})), 0) \end{aligned}$	[]
R, 19	$\begin{aligned} \text{SeDec}_t & \\ = & \text{IF} (\text{RewardEvaluation}_t < 1, ((\text{RewardEvaluation}_t - 1) * \text{DecPreDisposition}_1 \\ & * (\text{MinState} - \text{Sentiment}_t), 0) \end{aligned}$	[]
R, 21	$\begin{aligned} \text{SeErosion}_t & \\ = & \text{IF} (\text{Sentiment}_t > 1, (\text{Sentiment}_t / \text{SeErosionRate}_1), 0) \end{aligned}$	[]
L, 3	$\begin{aligned} \text{Experience}_t & \\ = & \text{Experience}_{t-1} \\ & + \text{ExInc}_t \\ & - \text{ExDec}_t \\ & - \text{ExErosion}_t \end{aligned}$	[]
R, 11	$\begin{aligned} \text{ExInc}_t & \\ = & \text{IF} (\text{Sentiment}_t \geq 1, ((\text{Sentiment}_t - 1) * (\text{IncPreDisposition}_1 \\ & / \text{ExDelayTime}_1)) * (1 - (\text{Experience}_t / \text{MaxState})), 0) \end{aligned}$	[]
R, 7	$\begin{aligned} \text{ExDec}_t & \\ = & \text{IF} (\text{Sentiment}_t < 1, ((\text{Sentiment}_t - 1) * (\text{DecPreDisposition}_1 \\ & * (\text{MinState} - \text{Experience}_t), 0) \end{aligned}$	[]
R, 9	$\begin{aligned} \text{ExErosion}_t & \\ = & \text{IF} (\text{Experience}_t > 1, (\text{Experience}_t / \text{ExErosionRate}_1), 0) \end{aligned}$	[]

Both levels, sentiment and experience, are combined in a variable called *TrustEffect₁*. This variable characterizes the actual situation as trustful or distrustful. The relation of sentiment to experience is defined by the risk preference.

A, 55	$\begin{aligned} \text{TrustEffect}_t & \\ = & (\text{Experience}_t * (1 - \text{RiskPreference}_1)) + (\text{Sentiment}_t * \text{RiskPreference}_1) \end{aligned}$	[]
-------	--	----

In addition to the effect of the satisfaction level (see above), the *TrustEffect₁* influences the level of actions, that A will choose next week.

3.3 The Violation of Trust

People who have had a positive experience with somebody else for a longer time tend to take advantage of the trust in their relationship. Therefore a high level of experience (*Experience₁*) probably increases the risk of a violation of trust by A (see fig. 7 and equations A61, A59 and A57).

Typically, a single violation action has a larger impact than a single positive action. Therefore, the number of violations per week (*Violation₁*) is intensified by a multiplier (*ViolationEffect₁*). The violation loop is linked to A's performance in the variables *StdPerInput₁* and *StdRealInput₁* (see figs. 2 and 4).

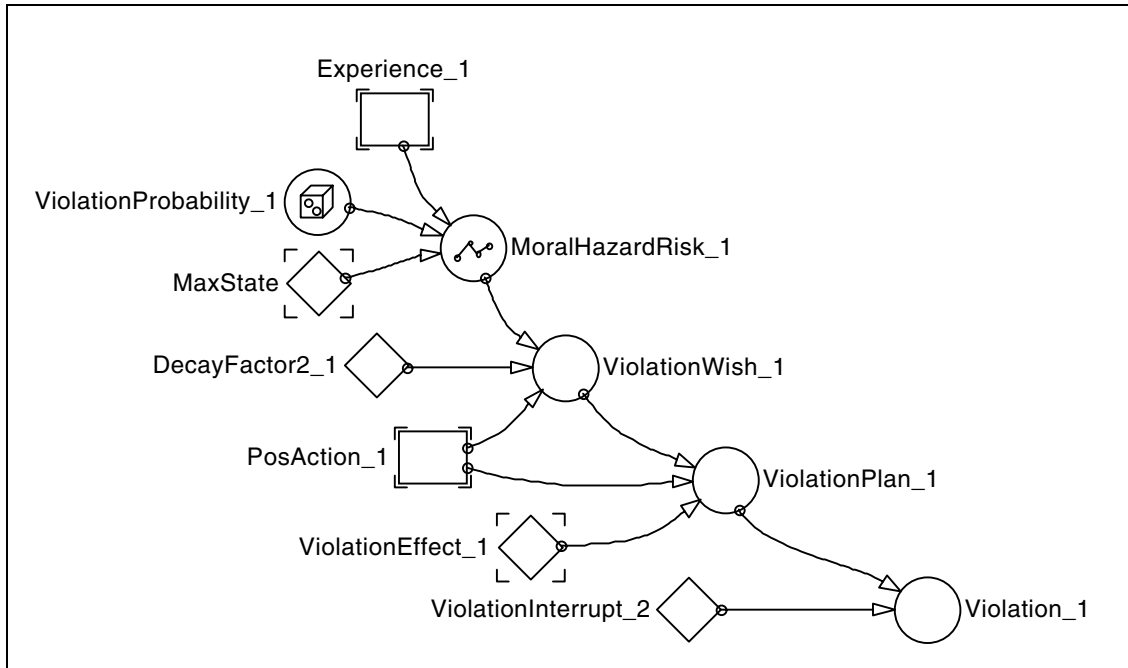


Fig. 7: A's Violation

A, 61	$ViolationWish_{1t}$	[]
	$= PosAction_{1t} * MoralHazardRisk_{1t} * DecayFactor2_{1t}$	
A, 59	$ViolationPlan_{1t}$	[]
	$= MIN(ViolationWish_{1t} * ViolationEffect_{1t}, PosAction_{1t}) / ViolationEffect_{1t}$	
A, 57	$Violation_{1t}$	[]
	$= ViolationPlan_{1t} * ViolationInterrupt_{2t}$	

The relationship between A and B is realized in three ways:

1. the perception of violation and performance of the counterpart,
2. the decision on the given reward, and
3. the opportunity to interrupt the violation of the counterpart.

A, 49	$StdPerInput_t$	[]
	$= (((PosAction_{1t} - ((Violation_{1t} * PerceptionFactor_{2t}) * ViolationEffect_{1t})) * ActionDuration_{1t}) - MinHours_{1t}) / (MaxHours_{1t} - MinHours_{1t}))$	
R, 13	$ReceivedReward_{1t}$	[]
	$= PerOutput_{1t} * RewardMultiplier_{1t} * EvaluationFactor_{2t}$	
A, 57	$Violation_{1t}$	[]
	$= ViolationPlan_{1t} * ViolationInterrupt_{2t}$	

4 Model Experiments

In the simulations, the implications are investigated of the following scenarios on the development of trust and distrust:

Scenario	A starts with	B starts with
S1	trust in B	trust in A
S2	trust in B	light distrust in A
S3	trust in B	heavy distrust in A
S4	trust in B and temporally special evaluation	heavy distrust in A
S5	trust in B, temporally special evaluation, and perception of violation	heavy distrust in A
S6	distrust in B	distrust in A

All scenarios have the following premises:

- Both actors estimate the technical output capability truly.
- Both actors overestimate their own human efficiency for intensive work.
- Both actors start with 45 positive actions per week.
- The risk preference of A and B is neutral ($=0.5$).
- The perception factor of A and B is 0.0. (except in scenario S5)
- The violation interrupt is 1.0 (no interrupt by the counterpart).

Simulation results of scenarios S1:

Both actors start with trust. Therefore both continue with the reinforcing development of trust. Only the limits of trust and free time (see 3.1 and 3.2) retard this behavior.

Simulation results of scenario S2:

Starting with a trust value of 1.2 A raises his trust in B over time. Fig. 8 shows that both levels (sentiment and experience) are increasing. The fluctuations in trust are based on large fluctuations of sentiment over time. A change in the risk preference towards experience would cause a slower but less fluctuating increase in trust.

B has low distrust in A at the starting point of the simulation (distrust value of 0.8). His predisposition is also distrustful. The first weeks can be described as a careful get to know process with A. The strong increase in sentiment in the first year causes the steady growth of trust. After around 70 weeks B's attitude towards A can be named trustful. From that point on the distrustful predisposition of B prevents a further increase of trust. The sentiment swings around 1.3 with a rather high amplitude. The level of experience approximates the level of sentiment and starts with the same fluctuations (see fig. 9).

In total, it is observable that the stable trust by A guides B over time to a trustful behavior (see figs. 8 and 9). Distrust is changing into trust.

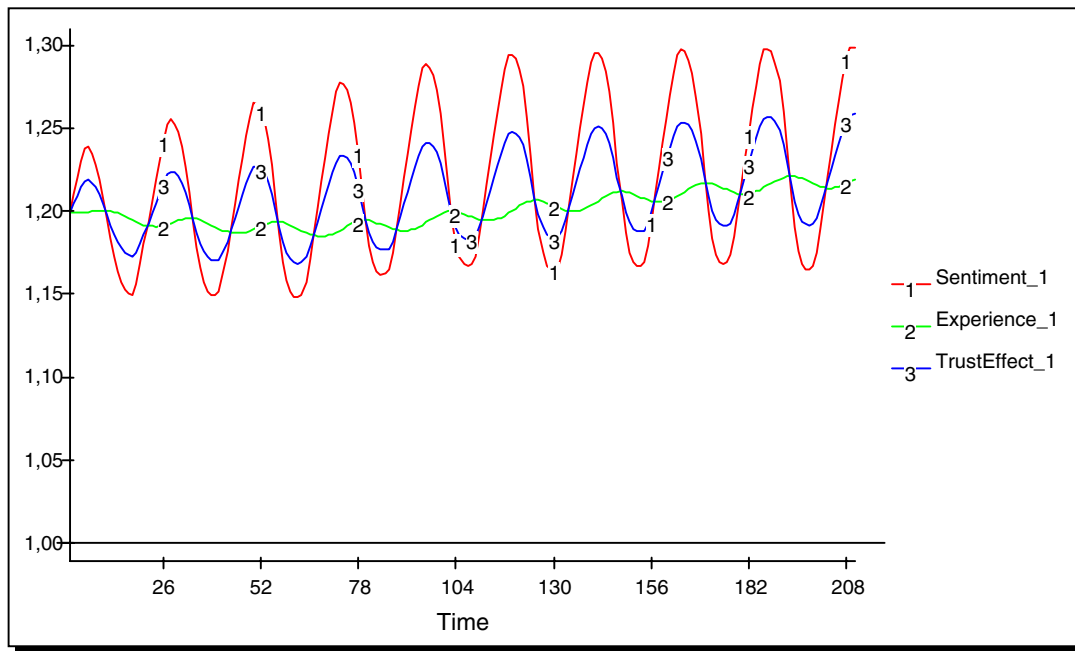


Fig. 8: The development of sentiment, experience and trust of A (scenario S2)

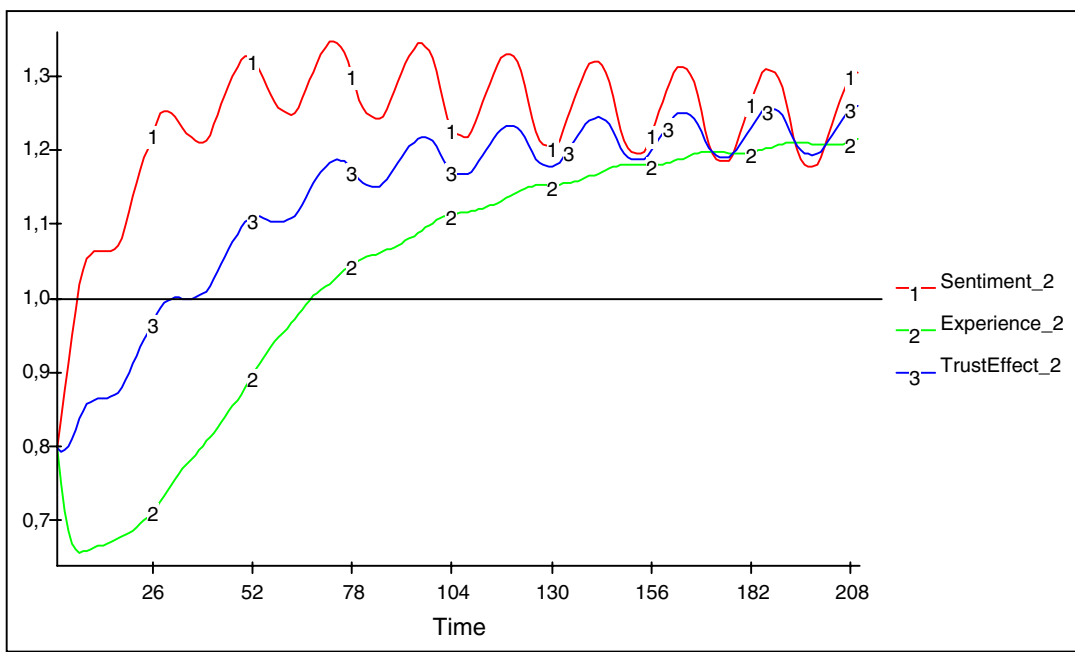


Fig. 9: The development of sentiment, experience and trust of B (scenario S2)

Simulation results of scenario S3:

Compared to scenario S2 the actor B now has a strong distrustful disposition. This leads to completely different simulation results. The trustful beginning of A causes only a slow sentiment increase of B and an ongoing decrease of B's experience. Therefore A loses trust in B over a period of more than a year. In the first half year both parties lose (see figs. 10 and 11).

Because A starts with a rather high level of trust B decreases his distrust slowly after several months.

Within the whole simulation B gains back slightly over his starting level of distrust. He never has trust in A. This mistrustful behavior shortens A's sentiment and

experience so constantly that A develops a long-standing behavior fluctuating around a constant value (see fig. 10). It lasts more than a year before both actors have rising trust or decreasing distrust in a cautious manner. A does not regain his starting level of trust.

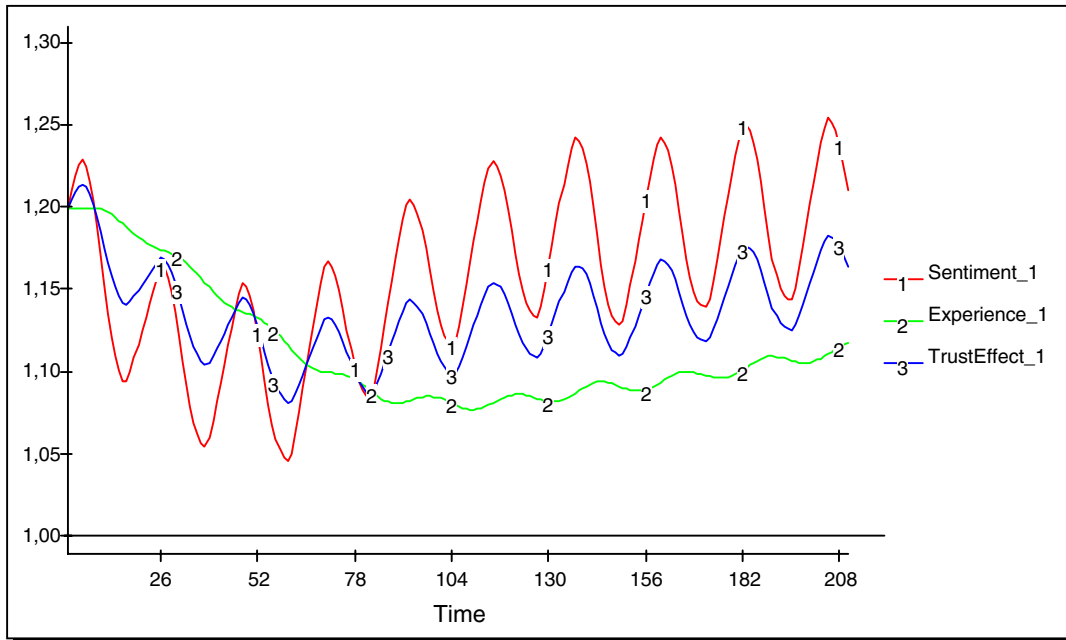


Fig. 10: The development of sentiment, experience and trust of A (scenario S3)

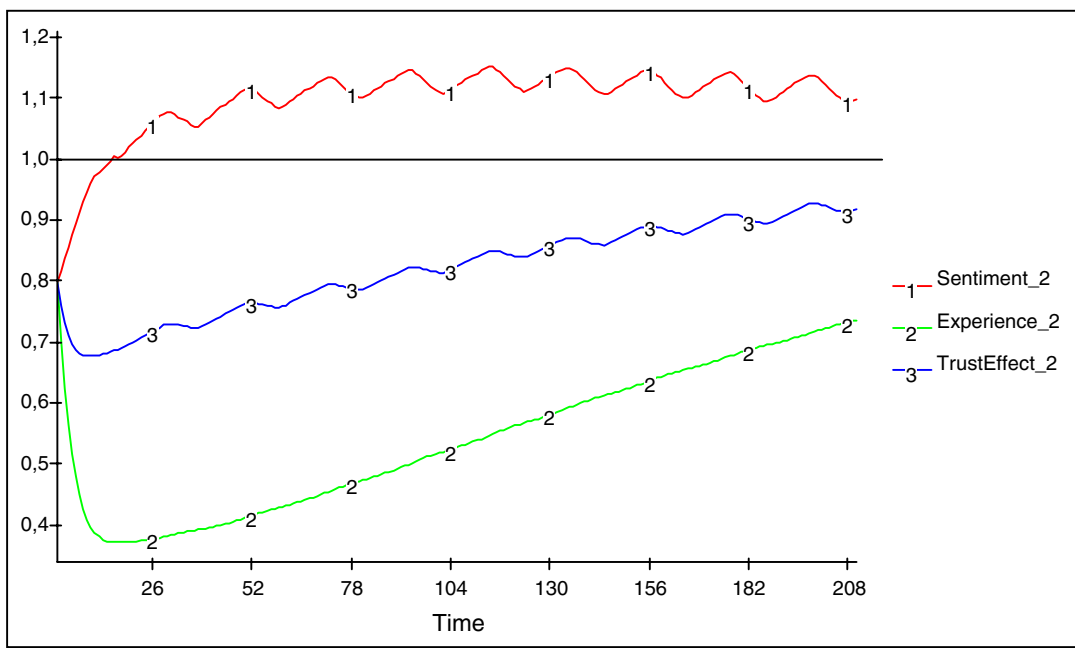


Fig. 11: The development of sentiment, experience and trust of B (scenario S3)

Simulation results of scenario S4:

This scenario is based on scenario S3. The only difference is that A temporally gives a higher evaluation of B's performance resulting in a higher reward given to B in the second and third year (from period 53-156) (see fig. 12).

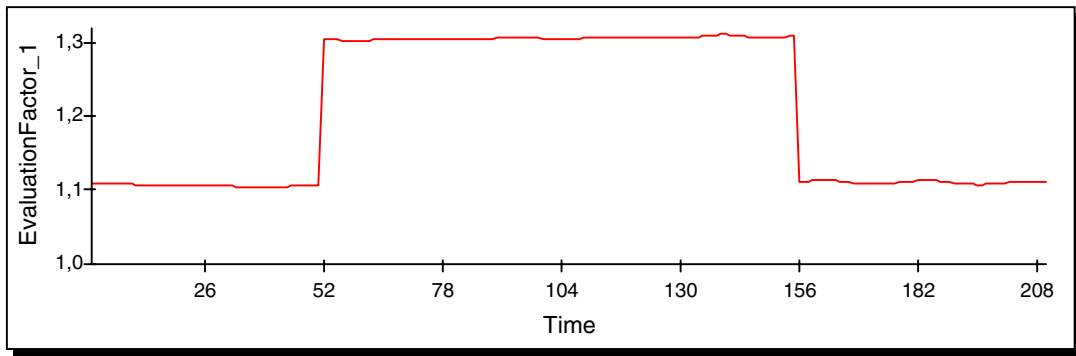


Fig. 12: The special evaluation interval of A (scenario S4)

The result can be seen three to four months after the special reward is given. The trust effect is growing and overcomes the distrust/trust barrier after the 78th week. The positive signals from B causes also a change in A's decrease of trust. Quite quickly A reaches his starting levels of sentiment and trust. Only the experience needs much more time to regain the starting level.

After the end of the special evaluation interval, the trust levels of both players or declining but stay on the trustful side. A is clearly trustful, B establishes a sort of hesitant behavior (see fig. 13 and 14). We expect that a slightly longer special evaluation interval would establish B clearly on the trustful side.

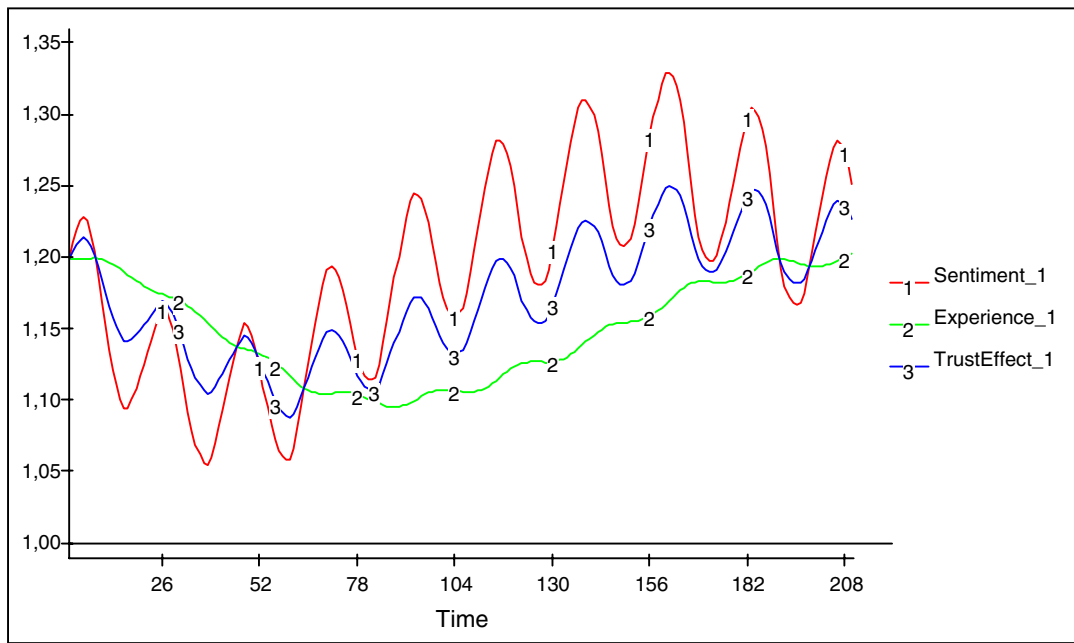


Fig. 13: The development of sentiment, experience and trust of A (scenario S4)

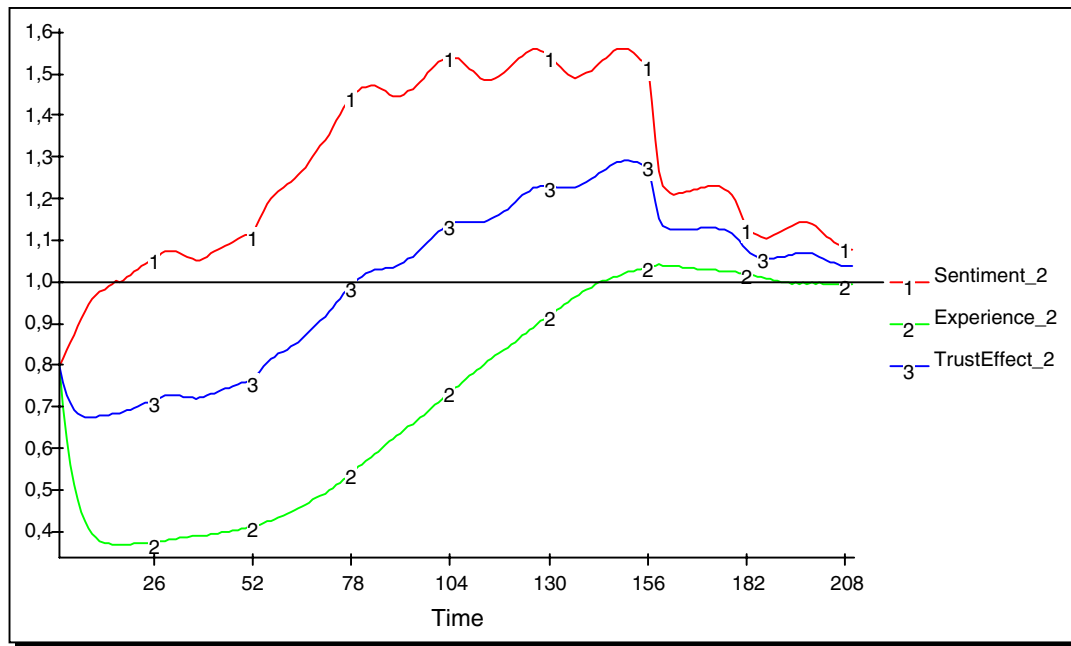


Fig. 14: The development of sentiment, experience and trust of B (scenario S4)

Simulation results of scenario S5:

In addition to the setting of scenario S4, A is now able to recognize the violation of B. In the first 80 weeks A's and B's development are identical to those of scenario S4. With B's breakthrough from distrust to trust the increasing violations of B are disturbing the further positive development of both actors (see fig. 15). Therefore, the stabilization processes end on a slightly lower level than in scenario S4.

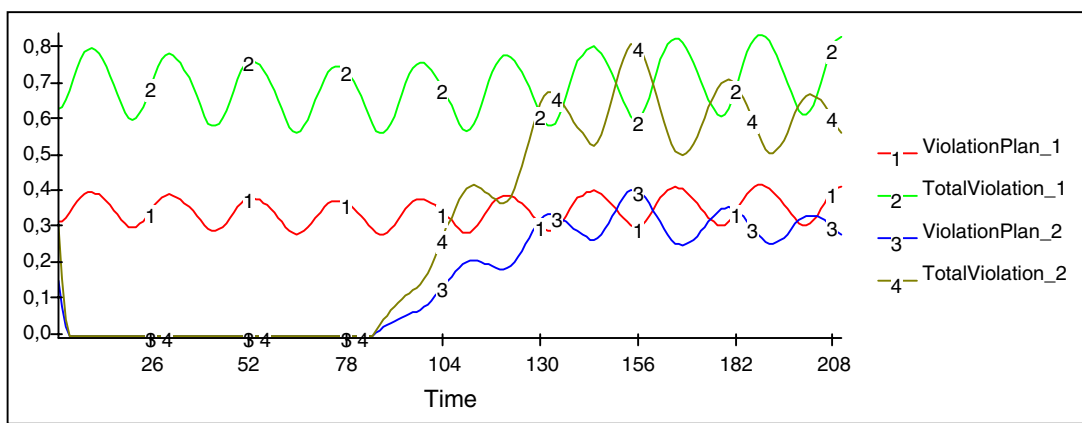


Fig. 15: The violation of A and B (scenario S5)

Simulation results of scenario S6:

Both actors start with distrust. The ongoing mistrust causes the destruction of trust on both actors sides. At the end of the simulation both parties have to face a situation of distrust much deeper than at the starting point.

The simulation results are based on a model of two actors with only one type of action and the violation of it. However they indicate the prospects of a promising research strategy. They show that the evolution of trust and distrust over time can be simulated and investigated with a system dynamics model in a quantitative manner. In this

model the rise (or fall) of trust and distrust depends on the predisposition's of two actors to trust or distrust, the decisions about the own action, long-term experience and short-term sentiment, and on some other factors. The behavior of the model is in accordance with some qualitative insights of the trust literature.

5 Outlook

In comparison to the results of our model experiments, the qualitative descriptions of trust in the literature are much richer (and vague to some extent). The attempt to bring in some operationalization and quantification required several strong assumptions, which restrict the possibilities of this system dynamics model to a small section of trust relationships. Future research could abolish some assumptions. A model which extends the number of actors or includes different types of actions has richer analytical possibilities.

Principally this model structure allows two different research strategies: the investigation of trust/distrust dynamics in

- a team setting with equal partners or in
- a power (principal-agent) setting.

Both strategies can be pursued by a multi-actor or a multi-action approach. This is rather a technical restriction: It seems that a system dynamics model incorporating multiple actors *and* multiple actions would be too complicate for interpretation, not to mention the trickiness in reaching stability for such a model.

We prefer as a next step the extension to multi-actor simulations because trust-building is strongly influenced by reputation (see DASGUPTA, 1988). Therefore our model incorporates the possibility for accumulation of reputation. At the moment we could not feed back this factor back on trust because the analysis of the influence of reputation on trust requires a multi-actor approach.

There are some further directions of research based on this type of model:

1. Trust is often regarded as an investment of an action in some period based on the expectation of beneficial reactions of the partner in future periods, or for a longer interval. The analysis in this paper was restricted to the reactions of the partner in the same period. So it is demanding to investigate delayed benefits of investments in trust.
2. The most interesting challenge is the exploration of the impact which trust in long-term business relationships has on the reduction of adaptation costs as compared to the effect of contracts. Here the formulation of a complex cost-benefit-framework is needed. We assumed it away because in the trust literature this is rarely the focus. Often trust is thought of to be embedded on the holy island of love, where cost-benefit-approaches are banned from, despite the century-old practice of marriage-contracts. In our opinion a complex understanding of the effects of trust in long-term business relationships can be reached only if the model incorporates violations costs as compared to monitoring costs. Trust-based transaction costs have to be differentiated form contract-based transaction costs if we strive to understand why trust is a calculable asset.

References

- Albach, H. (1997). Gutenberg und die Zukunft der Betriebswirtschaftslehre (Discussion Paper FS IV 97-16), Wissenschaftszentrum Berlin für Sozialforschung gGmbH, Berlin.
- Barber, B. (1983). *The Logic and Limits of Trust*. Rutgers University Press, New Brunswick.
- Bradach, J.L. and Eccles, R.G. (1989). Price, authority, and trust: From ideal types to plural forms. *Annual Review of Sociology*, 15, 97-118.
- Bromiley, P. and Cummings, L.L. (1992). Transactions cost in organizations with trust (discussion Paper #128). University of Minnesota, Strategic Management Research Center Minneapolis.
- Creed, W.E.D. and Miles, R. E. (1996). Trust in Organizations - A Conceptual Framework Linking Organizational Forms, Managerial Philosophies, and the Opportunity Costs of Control. In Kramer, R.M. and Tyler, T.R. (eds.), *Trust in Organizations - Frontiers of Theory and Research*, Sage Publications, Thousand Oaks, London, New Delhi, pp. 16-38.
- Etzioni, A. (1988). *The moral dimension: Towards a new economics*. Free Press, New York.
- Dasgupta, P. (1988). Trust as a Commodity. In Gambetta, D. (ed.), *Trust – Making and Breaking Cooperative Relations*, Basil Blackwell, New York, Oxford, pp. 49-72.
- Gambetta, D. (ed.), *Trust – Making and Breaking Cooperative Relations*, Basil Blackwell, New York, Oxford.
- Kramer, R.M. and Tyler, T.R. (eds.), *Trust in Organizations - Frontiers of Theory and Research*, Sage Publications, Thousand Oaks, London, New Delhi.
- Lewicki, R.J. and Bunker, B.B. (1996). Developing and Maintaining Trust in Work Relationships, In Kramer, R.M. and Tyler, T.R. (eds.), *Trust in Organizations - Frontiers of Theory and Research*, Sage Publications, Thousand Oaks, London, New Delhi, pp.114-139.
- Luhmann, N. (1988). Familiarity, confidence, Trust: Problems and Alternatives. In Gambetta, D. (ed.), *Trust – Making and Breaking Cooperative Relations*, Basil Blackwell, New York, Oxford, pp. 49-72.
- Luhmann, N. (1989). *Vertrauen: ein Mechanismus der Reduktion sozialer Komplexität*, 3th ed., Ferdinand Enke Verlag, Stuttgart 1989.
- Powell, W.W. (1990). Neither market nor hierarchy: Network forms of organization. In Staw, B.M. and Cummings, L.L. (Eds.), *Research in organizational behavior*, Greenwich, JAI, vol. 15, pp. 295-336.
- Sadowski, D. et al. (1998). *Vertrauen: Voraussetzung oder Ereignis effizienter Arbeitsbeziehungen? - Gutenbergs Solidaritätsaxiom und die institutionenökonomische Unternehmenstheorie*, University of Trier, Trier.
- Shapiro, D. et al. (1992). Business on a handshake. *Negotiation Journal*, 8(4), 365-377.

¹ See LUHMANN (1989); POWELL (1990)

² For an early analysis from a philosophical and sociological perspective see LUHMANN (1989); a review of the approach of different disciplines give LEWICKI and BUNKER (1996).

³ Note that all variables related to A end with “_1” respectively with “_2” related to B. The resting parameters are valid for both persons.