STRATEGIES OF A LEADER AND EMPLOYEES IN ORGANISATIONAL DEVELOPMENT AND THEIR OUTCOMES: A GAME APPROACH

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Abstract. *Facing change interventions members of organization may behave in a different way depending on their individual economic incentives or trade-offs to be received participating in a change process and, as a result of it, projected growth of productivity or change objectives may not be met in full capacity. This happens when corporate management and employees do not cooperate in change process or no consensus is met between management and employees during the change implementation. The aim of this paper is to examine with the game theory approach the economic nature of behavioral transactions in change process in order to demonstrate the benefit of a mutual cooperation or consensus that all change participants have balanced their interests to achieve their change objectives.*

Keywords: *game theory, change management, organizational development, mathematical modelling.*

Introduction

The contemporary environment of unpredictable uncertainty surrounding organisations sets multifarious criteria for organisational development practitioners. The external factors are interrelated and changing rapidly, making the environment for all kinds of organizations highly uncertain and chaotic (Peters, 1987). Within such complex environment the organisational development – change became a continuous process that determines organizational life today. Management guru Peter Drucker advised that the choice of a change is a systematic and purposeful abandonment of organization's theory of the business or be over taken over by events. Prior to the decision on which strategic change to implement in an organization, one needs to ***know how to implement change***! (Drucker, 1994)

Outcome of any business process is measured economically so is a change process. Overall economic performance of change depends on transaction costs of organizational members, and these primarily mirror the level of trust in an organization – between corporate management and employees. The level of trust is predetermined by organizational culture. An effective organizational culture has a strong moral content. Morality tends to resolve complex change problems that formal procedures cannot. A strong organizational culture, therefore, helps to overcome change resistance, consequently reduces change transaction costs and improves overall organizational performance. Thus the organizational success depends on the quality of its culture.

The aim of this paper is to examine the transactions between the change agent, usually a corporate leader or the leader, and organization members, employees or the followers, and the outcomes of their economic activity, especially, when a mutual consensus is met within a certain set of change parameters – motivations/incentives, level of the leader's manipulation and other organization's cultural parameters.

The Conceptualization - Change Management as a Game

The people in an organization, i.e. management (leader(s)) and employees (followers), plan and implement organizational change. The success of a change process depends on the management of relationships between the change leader and the followers, and what kind of behavioral climate is established in an organization. Irrelevant settings of a change climate may lead to a failure of any superiorly designed change intervention process as the change agents may ignore change needs and the resistance to change of the organizational members – the employees as well as the managers. Therefore, a thorough understanding of transactional economics between parties involved in process, anticipating possible problems of the change management and establishing the most cooperative climate are principal factors of a change intervention success.

Planned change process can be considered as the game where two parties are involved – the leader establishes new rules and motivations to accept these rules, the followers evaluate these rules and incentives and, consequently, prefer a certain behavioral strategy – to reciprocate, cheat/slack or avoid. We assume that participating in a change game, both parties are governed by economic considerations, and they exchange material and emotional values as a result of a certain behavioral preference. In this context, a primary objective of the leader is to achieve the highest economic benefit implementing a change.

Implementing a change, the leader has a dilemma to motivate the followers spending on their monetary and non-monetary incentives and increase the net growth of organizational productivity. How to establish an organizational equilibrium or win-win situation?

A successful altruistic leader weighs up an organization's benefits and the followers pay-offs from change implementation in order to make everyone 'satisfied' with change outcomes or, in game theory expressions, establish an organizational equilibrium by the means of optimum consensus. The leader establishes certain new work norms and also certain incentives to motivate the followers to cooperate in this game honestly accepting new work requirements. Some followers tend to overestimate their own performance level, and accordingly overprice own cost of effort. Thus, some followers in organization may find established change incentives undervalued, and behave as 'free-riders' demonstrating solidarity but providing no effort, even cheating to gain some extra incentives. The 'free-riders' problem creates certain problems for followers' voluntary cooperation (Collard, 1981). As followers may have their an estimated cost of their own effort and hope for a certain level of incentives, their decision whether or not to cooperate depends on exposed level of incentives or pay-offs. A simplified game of cooperation in change process can be modeled with well-known 'prisoner's dilemma' (Rasmusen, 2001) with two available strategies – confess and not confess or, in our case, cooperate and not cooperate.

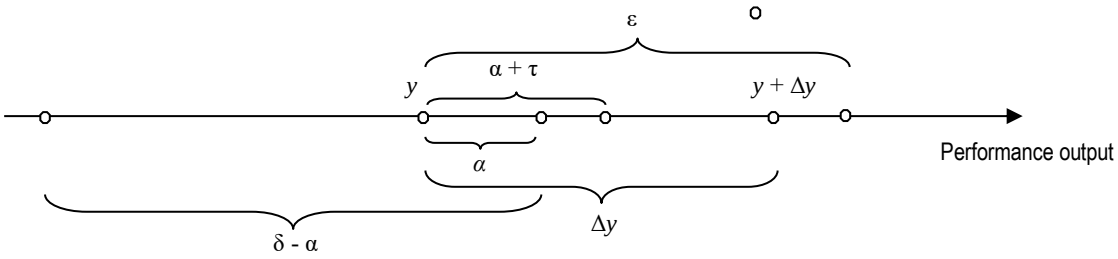
A similar but related mostly to case of a trade was elaborated by Mark Casson (Casson, 1991). We will use this approach with some changes to describe the organizational change. We assume that a change costs at the amount of $C > 0$. The change cost may consist of expenses for diagnosing an organization, planning and implementation of the change intervention, i.e. all possible cost borne to implement a change. Implementing a successful change, the leader expects to gain a growth in organizational output, $\Delta y > 0$. As any planned change, this change implementation also requires the organization members - followers, making an extra effort with the perceived cost of $\varepsilon > 0$. The cost of this effort as a rule, exceeds projected growth $\varepsilon > \Delta y$.

To encourage the followers the leader establishes additional motivation consisting of monetary incentives - α, and non-monetary/intrinsic incentives with the perceived cost of - τ, such as promotions, empowerment, recognitions, improved quality of the work life etc. Obviously, $\alpha + \tau > 0$. Nevertheless negative aspects also exist - diagnosis of an organization reveals the fact that

corporate disobedience rate, $0 \leq \chi \leq 1$, is associated with incentives to cheat, $\beta > 0$, and the case of mutual cheating may reduce incentives of the followers to the amount of δ which is usually more than legally offered monetary incentives, i.e. $\delta - \alpha > 0$.

In this context, parameters of this game can be illustrated as in the following Figure 1. However it must be noted that these parameters may have a various relationship different than the illustrated ones.

Figure 1. The disposition of parameters in the change implementation game.



The followers honest cooperating in change process may gain an additional incentive paying an effort with a certain perceived cost if the leader cooperates honestly in the change. The followers they get only material incentive whilst paying an effort and lose the amount of cheating because of the leader's cheat/dishonest cooperation, i.e. the leader is reluctant to motivate the followers morally. When the followers cooperate in change honestly, a cooperative leader acquires performance growth, the followers' effort and moral satisfaction and pays material incentives for these gains to motivate the followers for further cooperation. If the followers are honest, a non-cooperative leader, who is inactive in the game or, more precisely, does not transfer planned incentives to the followers, also achieves only a growth of performance. Furthermore, such leader gains additional incentives to cheat since the leader is not over-performing whilst the followers do.

Some followers may prefer the status of 'free-riders' gaining both material reward for participation, and additional incentive for cheating the cooperative/honest leader - such behavior can be derived from a behavioral character of the followers - a lower sense of quilt, σ ($0 \leq \sigma \leq 1$). If the cooperative leader is cheated an expected organizational outcome is reduced at the amount of cheat incentive plus material incentives paid for the followers.

Cheating a non-cooperative leader, the followers do not acquire a moral discomfort but material loss. In this case, a non-cooperative leader will also lose the amount, presumably exceeding expected growth, but retains material incentives not rewarding the followers' dishonesty.

Voluntary participation in a change process was a precondition of our game situation, i.e. there is no strict legal enforcement for honest cooperation. If the followers decide not to be involved in the change implementation game they receive a zero pay-off or quit the organization and, consequently, the organizational performance growth is not met. In this situation, a cooperative leader loses the cost of the followers' effort while such non-cooperation does not involve such real economic cost.

Individual perceptions of the followers within organization are not homogeneous or their behavior is not perfect collectivistic that they all without exception may not follow a common strategy. To determine the probability of a choice, game theorists deploy so called 'perceived probability' or 'assigned value' coefficients for estimating the probability of a certain strategy choice. In our case, it would be more appropriate to link such probability of choice to the

organization's disobedience rate, $0 \le \chi \le 1$, or as other authors use as a crime rate. It belongs to an individual follower as well as a group of followers. In the former case, disobedience rate can be considered as an approximated probability of randomly sampled individual's choice of dishonesty or, in the latter case, as an estimated part of the group members tend to disobey.

It should be noted that in all situations except mutual cheating the leader, despite of his behavior, bears an initial cost of change development. In the light of these discussions, pay-offs matrix of the change implementation game can be obtained as illustrated in Table 1.

Table 1. Change implementation game pay-offs matrix.*

		Leader	
	Strategy	**Cooperative**	**Not cooperative**
Followers	**Honest cooperation**	$\alpha + \tau - \varepsilon$; $\Delta y + \tau + \varepsilon - \alpha - C$	$\alpha - \varepsilon - \beta$; $\Delta y - \alpha + \beta - \gamma - C$
	Dishonest cooperation	$\alpha + \beta - \gamma$; $\Delta y - \alpha - \beta - C$	$\alpha - \delta$; $\Delta y + \alpha - \delta$
	Non-cooperation / Avoidance	0; $-C - \varepsilon$	0; $-C$
Perceived probability of the leader's strategy		$1 - \chi$	χ

* Pay-offs (Followers; Leader)

To convert this game from 'prisoner's dilemma' to 'assurance' game the leader has to understand game outcomes, and to manage the inputs. To do this 'the change process game' has to be analyzed from the viewpoint of the followers.

From economic considerations if an overall reward for honest cooperation of the followers is higher than possible incentive for cheating, $\alpha + \tau - \varepsilon > \beta$, the followers preferred strategies can be determined from the following inequality:

$$(1-\chi)(\alpha + \beta - \gamma) > (1-\chi)(\alpha + \tau - \varepsilon) > 0 > \chi(\alpha - \delta) > \chi(\alpha - \varepsilon - \beta) \quad (1)$$

or

'free-rider' while the leader is honest > ***mutual honest cooperation*** > ***mutual non-cooperation*** > ***mutual cheating*** > ***simpleton***

The above inequality (1) states that if the reward exceeds the cheating incentive, all followers would cooperate in the game honestly or cheat if the leader is cooperative/honest, otherwise the game can stick in a mutual avoidance as the followers, having economic considerations, do not prefer a mutual cheating or being simpletons. However, on the other hand, perceived probability of the leader's honesty or say trust in the leader's honesty and the guilt factor of individuals may dramatically change preferred strategies of the followers. High trust in the leader may stimulate the followers' honest cooperation even if the leader decides not to cooperate. This is usually true in the first move and the trust may change if the game is repeated with the leader's same strategy.

Thus the game or, in this case, the change intervention outcome is positive if

$$\begin{cases} \gamma \ge E - \Delta y; & (2) \\ \Delta y \ge E. & (3) \end{cases}$$

Referring to (3) it is can be stated that

- an honest cooperation is preferred instead of non-cooperation if $\chi \le \frac{(\alpha+\tau-\varepsilon)}{(\tau+\beta)}$; (4)
- a non-cooperation is preferred instead of cheating if the guilt factor is

$$\gamma \ge \beta+\delta+\frac{(\alpha-\delta)}{(1-\chi)}; \quad (5)$$

It must be noted that an honest cooperation is chosen instead of cheating if the guilt factor improved to

$$\gamma \ge \delta-\tau+\frac{(\delta-\beta-\varepsilon)}{(1-\chi)}.$$

Let assume that the altruistic leader increasing intensity of manipulations wants to minimize disobedience rate, i.e. improve the followers' morale, and as a result to maximize the expected growth rate. The leader's extensive manipulations may positively influence the moral climate of an organization reducing disobedience rate of the followers and, consequently, the number of followers deciding to slack lessens, and the organization's performance growth approximates a projected level of output. The leader's objective function for this case will be to increase the growth reducing disobedience rate, i.e.

$\omega_1 = \Delta y\,(1-\chi) - C.$ (6)

Optimal Strategy of the Altruistic Leader in Organizational Development: Organizational Equilibrium through Mutual Consensus

The previous part considered change implementation game from the standpoint of the followers, i.e. employees needing to change their work attitudes accepting new norms. It would be a naïve way of gaming if the organization management - the leader, on one side, and employees - the followers, on the other side, were guided by their own objectives expecting the maximum incentive. However it may happen that the owner(s) of the company but not an employed manager and employees have their own expectations concerning change outcomes and both are reluctant to understand each other's objectives.

Unlike it, an altruistic leader is recommended to maximize the amount of trade incentives improving the followers' morale in order to encourage them in a fair trade. In this case, an altruistic game leader expects the reciprocity of a trade partner offering more incentives [Casson, 1991]. However the change process is a different game in which an organizational equilibrium is more important.

Also the leader adopting utilitarianism may try to achieve the growth of the both parties' incentives as well as the followers' effort and a better moral climate in the organization. Therefore, there is an economic rationale for the leader to develop the organizational change objectives reducing expected incentives of the owner(s) and the followers to a common denominator. The leader maximizes common incentive settings with a condition that honest cooperation is economically attractive than cheating. In this case, the objective function is

Organizational Equilibrium Gain = $\boldsymbol{max}_{\mu\to\infty}$(*Leader's incentives* + *Followers' incentives*), where μ - the leader's manipulation intensity or cost of the leader's manipulations.

In the case of the organizational equilibrium, the leader's objective function will be

$$\varpi_e = 2\tau+\varepsilon-\Delta y-\frac{\varepsilon-\Delta y}{\mu}\left[3\varepsilon+2(\alpha+\tau)-2(\Delta y+\delta)+C\right], \quad (7)$$

or

$$\varpi_e = 2\tau+\varepsilon-\Delta y-\chi_e\left[3\varepsilon+2(\alpha+\tau)-2(\Delta y+\delta)+C\right]. \quad (7a)$$

Here we have to note that manipulating the followers the leader does not produce but contrarily consumes financial resources delivering manipulations. In general, such kind of expenses can be projected as the following linear function

$$\xi = \xi_f + \xi_v \mu \quad \mu > 0, \tag{8}$$

and if μ=0 then ξ=0, where ξ_f – fixed cost of manipulations (say fixed cost of the leader's remuneration), and ξ_v – variable cost of manipulations per period of time (say cost of activities associated with the leader's manipulations).

In this case, the utility function for the case of an organizational equilibrium is

$$\upsilon_e = \varpi_e - \xi. \tag{9}$$

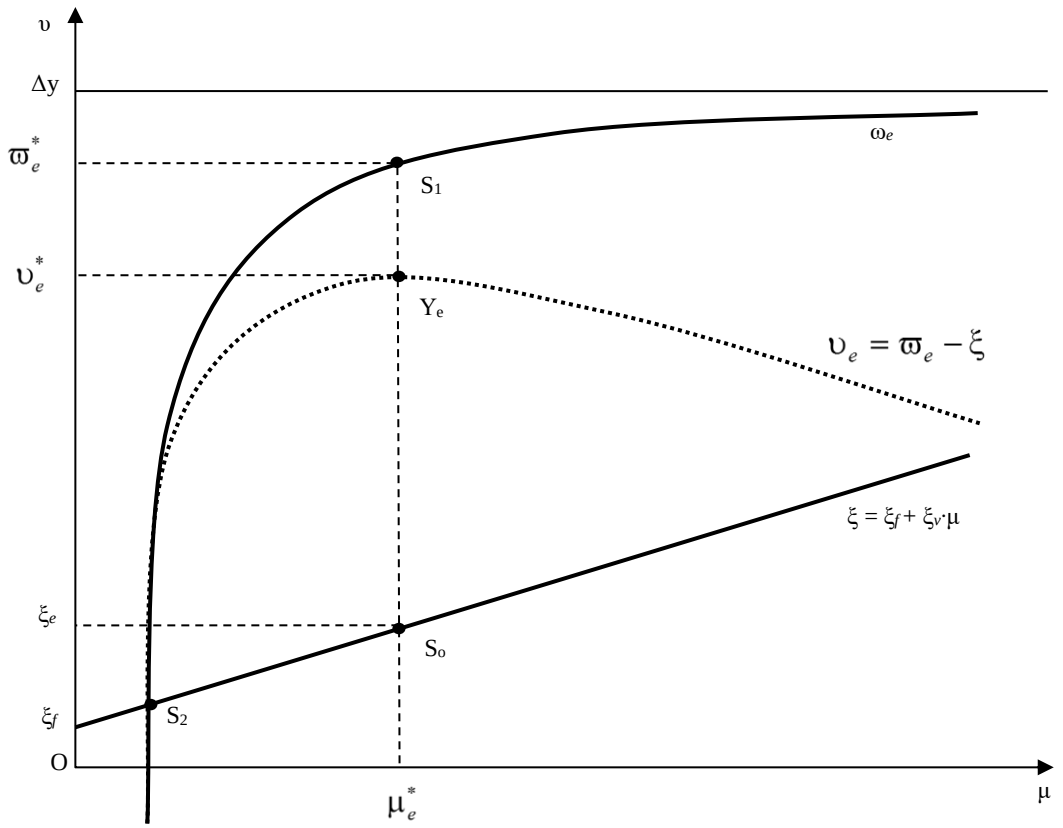
Considering (7), the formulas (8) and (9) can be re-written as

$$\upsilon_e = 2\tau + \varepsilon - \Delta y - \frac{\varepsilon - \Delta y}{\mu}\left[3\varepsilon + 2(\alpha + \tau) - 2(\Delta y + \delta) + C\right] - \xi_f - \xi_v \mu, \tag{10}$$

whereas ε – Δy >0, and $\delta \geq \alpha + \tau \geq \beta \geq \varepsilon \geq \Delta y \geq \alpha \geq \tau \geq 0$.

Following a simple mathematical technique, i.e. equaling the first derivative of (10) to zero, the optimal point of the leader's manipulation can be obtained, see the Figure 2.

Figure 2. Optimal manipulation under an organizational equilibrium of the altruistic leader.



The negative value of the second derivative of (10) proves that υ_e^* is global optimum of the organizational equilibrium in the given space, $\mu \geq 0$.

Maximization of the utility function (7) in behavioral zero-sum game between the leader and the followers can be considered as a duopoly welfare game model with a Stakelberg leader and a Cournot follower (Rasmusen, 2001) - the leader moves first and commits first gaining some net value whilst the followers with continuous strategy space are not involved in cooperative game as they are not aware of the leader's utility function and strategy pay-offs; however they are

inclined towards establishing Pareto optimality perceiving the best response function in terms of disobedience rate

$$\chi = \begin{cases} 1 & E - \Delta y > \mu \geq 0 \\ (E - \Delta y)/\mu & \mu \geq E - \Delta y > 0. \end{cases} \quad (11)$$

Based on (11), (7a), (8), and (10) the following state parameters of the optimal organizational equilibrium for the game can be found:

$$\mu_e^* = \left[\frac{(\varepsilon - \Delta y)[3\varepsilon + 2(\alpha + \tau) - 2(\Delta y + \delta) + C]}{\xi_v} \right]^{1/2}; \quad (12)$$

$$\chi_e^* = \left[\frac{(\varepsilon - \Delta y) \cdot \xi_v}{3\varepsilon + 2(\alpha + \tau) - 2(\Delta y + \delta) + C} \right]^{1/2}; \quad (13)$$

$$\varpi_e^* = 2\tau + \varepsilon - \Delta y - \{(\varepsilon - \Delta y)[3\varepsilon + 2(\alpha + \tau) - 2(\Delta y + \delta) + C] \cdot \xi_v\}^{1/2}; \quad (14)$$

$$\upsilon_e^* = 2\tau + \varepsilon - \Delta y - 2 \cdot \{(\varepsilon - \Delta y)[3\varepsilon + 2(\alpha + \tau) - 2(\Delta y + \delta) + C] \cdot \xi_v\}^{1/2} - \xi_f. \quad (15)$$

What is a real gain of having the organizational equilibrium in a change process?

In a normal case, i.e. no organizational equilibrium is sought, taking into account (6), (8), (9) and (11), utility function of the altruistic 'narrow materialistic' leader's objective function can be as

$$\upsilon_1 = \Delta y \left[1 - \frac{E - \Delta y}{\mu} \right] - C - \xi_f - \xi_v \mu. \quad (16)$$

Equaling the first derivative of the utility function in manipulation space to zero, $d\upsilon_1/d\mu = 0$, the parameters of the maximum utility value (μ^*, χ^*, ϖ_1^* and υ_1^*) for the normal case can be obtained.

It is interesting to learn that the best compromise between an organization and its employees is met if the organizational equilibrium is established. It is somehow acceptable if the organizational effort, *E*, is equal to the followers effort, ε, (E = ε). Then a difference of the values (μ^*, χ^*, ϖ_1^* and υ_1^*) and (12-15) accordingly will give us a value of the perceived cost of a compromise of the narrowly materialistic leader in case of the organizational equilibrium. So the cost of the concession is seen in the following expressions:

$$\Delta\mu_e^* = \mu_1^* - \mu_e^* = \frac{\varepsilon - \Delta y}{\xi_v} \cdot \left\{ \Delta y^{1/2} - [(\varepsilon - \Delta y)[3\varepsilon + 2(\alpha + \tau) - 2(\Delta y + \delta) + C]]^{1/2} \right\} < 0; \quad (17)$$

$$\Delta\chi_e^* = \chi_1^* - \chi_e^* = \sqrt{(\varepsilon - \Delta y) \cdot \xi_v} \cdot \left\{ \Delta y^{-1/2} - [3\varepsilon + 2(\alpha + \tau) - 2(\Delta y + \delta) + C]^{-1/2} \right\} > 0; \quad (18)$$

$$\Delta\varpi_e^* = \varpi_1^* - \varpi_e^* = \Delta y - (\varepsilon - \Delta y) - 2\tau - C - \\ - \sqrt{(\varepsilon - \Delta y) \cdot \xi_v} \cdot \left\{ [3\varepsilon + 2(\alpha + \tau) - 2(\Delta y + \delta) + C]^{1/2} - \Delta y^{1/2} \right\}; \quad (19)$$

$$\Delta\upsilon_e^* = \upsilon_1^* - \upsilon_e^* = \Delta y - (\varepsilon - \Delta y) - 2\tau - C - \\ - 2\sqrt{(\varepsilon - \Delta y) \cdot \xi_v} \cdot \left\{ [3\varepsilon + 2(\alpha + \tau) - 2(\Delta y + \delta) + C]^{1/2} - \Delta y^{1/2} \right\} < 0. \quad (20)$$

It is seen that

$$\Delta y < (\varepsilon - \Delta y) + 2\tau + C + 2\sqrt{(\varepsilon - \Delta y) \cdot \xi_v} \cdot \left\{ [3\varepsilon + 2(\alpha + \tau) - 2(\Delta y + \delta) + C]^{1/2} - \Delta y^{1/2} \right\},$$

whereas $\Delta y < [3\varepsilon + 2(\alpha + \tau) - 2(\Delta y + \delta) + C]$.

Thus the negative value of (20) proves the idea that the organizational equilibrium, once the management and employees' expectations are optimized or balanced, brings higher growth of an organizational performance. Thus, the cooperation of parties increases the net organizational performance growth.

On the other hand, the negative value of (17) means that the organizational equilibrium requires a higher intensity of manipulations from the leader that leads to the evidence of (18), i.e. a clear demonstration of the reduced followers' disobedience rate. Even though it is difficult to judge about gains or losses of the leader's objective function (19), we can assume that an increased intensity of the leader's manipulations obviously increases the leader's consumption, hence the gain in the utility is incurred due to a better moral of the followers.

Particularly, such results reveal again the advantage of mutual altruistic cooperation over an egoistic behavior or mutual competition.

Conclusion

The game simulation to research the organizational change process and predict its outcomes in the case of mutual consensus between the leader and followers proved that proactive leadership with maintaining the trust in organization through appropriate reward management can achieve higher than planned net growth in organization due to the improved followers' culture. Clear communication of the change objectives and fulfillment of commitments by the leader during the organizational development process improve the employees' moral and level of their reciprocal honest cooperation minimizing the resistance to change.

Given formulas can be used to forecast to a certain extent the economic and behavioral outcomes of a planned change though as the next stage of research it is advised to organize a game simulation with a group of participants in order to test the suitability of the behavioral assumptions made in the article.

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