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Group Performance and Leadership

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Outline

This chapter deals with the question how social interdependence and social interaction affect group performance. More specifically, we give answers to the following questions: How can we identify group-level influences on performance? What are the major pitfalls and opportunities for performance when people work together in a group? What can we do to systematically optimize group performance? Why is leadership so critical for group performance, and how can it contribute to the optimization of group performance? We will give answers to these questions by outlining the basic underlying principles, exemplarily applying them to specific group tasks and selectively illustrating them with empirical research.

Introduction

We all often work in groups. Some of these groups are informal as, for example, a group of students preparing for an exam. Other groups are more or less formal, for example, a work team on the production line, a personnel selection committee, or a sports team. Thus, work in groups is an essential part of our society. Whereas in some cases it is inevitable to have groups perform a specific task (e.g., you can only play volleyball in a team), in many other cases we use groups because we expect them to raise performance on a specific task. For example, personnel selection might also be done by a single person, but we often believe that a group of people will make better selection decisions. To see whether such assumptions are correct, we have to find out what determines group performance and how group performance compares with performance in an individual setting.

The comparison of group vs. individual performance is a fundamental question in social psychology and actually triggered some of the earliest experiments in our field (e.g., Ringelmann, 1913; Triplett, 1898). As it has turned out, the relation between group and individual performance strongly depends on the type of task: For example, all of us would expect that the more heads are involved in solving a problem, the greater the chances should be that the problem will be solved. However, most of us will hesitate to say that the more people are involved, the faster a roped party will climb a mountain.

In addition, simply comparing individual performance with group performance is often misleading: Imagine the following, purely fictitious situation: You investigate weight pulling and find that individuals pull an average weight of 100 kg, whereas four-person-groups pull an average weight of 105 kg. Here, group performance is superior to individual performance. Will this finding make you praise the benefits of group work? We suspect the answer is “no; instead, this result might make you think about what happened in these groups that their performance was only so slightly above that of individuals. Thus, what we need in

order to determine whether group performance is high or low is an appropriate standard against which we can compare this performance. As we will see, the appropriate baseline is again strongly dependent on the type of task. For example, you might expect the four-person-group to pull four times the weight of an individual, but you won't expect them to climb a mountain four times faster or four times slower than an individual.

With that in mind, we introduce the core concepts of actual group performance, **potential group performance** and different **task types** in the next section. In particular, we outline how potential group performance is defined for different types of tasks and how this potential changes with group size. In the third section, we deal with the psychological processes that determine how groups perform in comparison with their potential. In particular, we describe several process losses that make groups perform below their potential, and also outline several process gains that make them surpass their potential. As we further show, the relative prevalence of process losses vs. process gains in groups depends on how group performance is managed, that is, how groups are designed and how their process is being controlled. In the fourth section, we will describe three basic principles of group performance management, namely **group composition**, **group synchronization** and **group learning**, that facilitate process gains rather than process losses.

The extent to which these principles are realized depends on many factors. We highlight one factor – leadership – that is particularly important in this context. Therefore, in the fifth section we give a brief introduction to leadership concepts and leadership research, and in the sixth section we outline how leadership affects group performance via the principles of **group performance management**. In the final section we will summarize the core messages of this chapter.

Some core concepts: Actual group performance, group potential, and task type

What performance potential do groups have for different types of tasks?

How does group size affect this potential?

Actual and potential group performance

As outlined, a meaningful evaluation of group performance requires a baseline against which one can judge that performance. Naturally, group performance depends on individual performance: The better the group members are, the better – on average – group performance will be, and this also implies that what makes individual members better will – again on average – also make the group better. This individual component of group performance, however, is not what social psychologists are interested in. Instead, they are interested in the group component of group performance, that is, the question how this performance is affected by group members' awareness that common outcomes also depend on what other group members do (social interdependence), and by their interaction with these other group members (social interaction).

To determine this group-specific component, we have to know what performance would have occurred if the same members had worked independently of each other (i.e., not as a group). This latter performance will be labelled potential group performance or (more simply) group potential. The potential is contrasted with how the group actually performs, which is called actual group performance.

This group potential is determined in two steps. The first one is to measure how the same group members or similar persons perform individually. The second step is to combine these individual contributions into a (hypothetical) group product. As we will see, this second step depends strongly on the type of task under investigation.

Basic types of group tasks and their implications for group potential

Dimensions of group tasks according to Steiner (1972).

In his seminal classification of group tasks, Steiner (1972) distinguished three dimensions. The first dimension refers to whether the task is unitary or divisible: Divisible tasks allow for the assignment of different subtasks to different members, whereas in the case of unitary tasks all members have to perform the same task. The second dimension consists of whether the ultimate focus of task fulfilment is quantity (maximization tasks) or quality (optimization tasks). Finally, the third dimension classifies tasks by how group performance is related to the performances of individual members. Here, Steiner distinguished between additive, disjunctive, conjunctive and discretionary tasks. Since the first three of these categories have been in the focus of empirical research so far, we describe them in some detail and show how group potential is defined for them; an overview about this is given in Table 1. To further illustrate how group potential works for each task type, we also explain how group potential changes with group size.

Additive tasks.

We speak of additive tasks if the performance of a group is simply the sum of their members' individual performances. Additive tasks are usually maximization tasks. Weight-pulling is an example of such a task: The weight pulled by the whole group should be the sum of the weights that the individual members pull in this situation. Another example is **brainstorming**: If a group has the task of generating as many ideas as possible about a particular topic, group performance is the sum of the different ideas generated by the individual members.

Hence, potential group performance is defined by the sum of member performances measured in an individual situation. As a consequence, group potential is higher than the best group member's individual potential, and – for groups consisting of members with identical

individual performance – it increases linearly with group size. This means that if you double the number of members in a group, you get twice the group potential as before.

Disjunctive tasks. In a disjunctive task, a group has to choose one of several judgements or proposals. A good example is problem solving, where a group has to decide on one particular solution to a problem. Here, actual group performance solely depends on the quality of the one particular proposal which is chosen by the group. Due to this, disjunctive tasks are usually optimization tasks. Potential group performance in disjunctive tasks is determined by the best member's individual performance. As group size increases, group potential also increases, but the increase in potential that you gain if you add another member to the group becomes smaller the larger the group is. If, for example, the individual chances of solving a problem are 50%, you get a relatively large increase in potential if you have three instead of two members. In contrast, if you already have 20 members, adding another person changes hardly anything.

Disjunctive tasks are often differentiated into tasks with or without a so-called **eureka-effect**. Eureka effect means that the correct solution, once it is found, is immediately recognized as being correct. A eureka effect increases the chances that a group will realize its potential: If the best member in the group is able to solve the problem, but the group fails to realize the correctness of his or her solution (no eureka effect), the group might choose a different, suboptimal option.

Conjunctive tasks. Whereas in a disjunctive task one successful member can be enough to solve the task, a conjunctive task requires all group members to be successful for the group to solve the task. An example is climbing a mountain with a roped party. Suppose that in order to reach the peak the climbers have to pass a difficult overhang. The roped party will only reach the peak if all members are successful in passing the overhang. Or, if we use the speed of a roped party as a continuous measure of performance, we can say that the group

is only as fast as its slowest member. As a consequence, the group potential for conjunctive tasks is given by the individual performance of the group's weakest member. As a consequence, group potential decreases with increasing group size, because the larger the group gets, the more likely it is to have a very weak member in the group.

Hence, it can be ineffective to have large groups for conjunctive tasks. This problem is lessened if the conjunctive task is divisible and, thus, specific subtasks can be matched to group members' abilities. For example, the roped party might decide that for difficult passages it is useful to have the better members going ahead, fixing ropes and then helping the weaker members over these passages. In this case, potential group performance is higher than the individual performance of the weakest member.

Summary

To determine group-specific influences on the performance of groups, we have to determine what performance would have occurred in the absence of group processes. This is given by the so-called "group potential". The determination of the group potential depends on the type of group tasks. For example, in so-called "additive tasks" (e.g., brainstorming) the potential is given by the sum of the members' performances in an individual situation. The group potential in a so-called "disjunctive taks" (e.g., problem-solving) is determined by the quality of the best proposal individually generated by a group member. In a so-called "conjunctive task" (e.g,, mountain climbing), the group potential is given by the weakest member's individual performance.

Process losses vs. process gains in group performance

What processes influence whether actual group performance remains below potential group performance or surpasses this potential?

How does the occurrence of these processes depend on task type?

Types of process losses and process gains

Group potential and actual group performance often diverge. This divergence is due to so-called process losses and process gains, both of which occur due to social interdependence and social interaction in groups. This is expressed in a formula by Hackman and Morris (1975):

Actual group performance = Group potential – process losses + process gains

Thus, when actual group performance is below group potential, process losses must have occurred. If, in contrast, actual group performance exceeds group potential, process gains must have been present.

Different types of process losses and process gains can occur. For a group to perform, its members have to make individual contributions, and these contributions have to be coordinated. As a consequence, group processes can influence performance by either influencing the coordination of individual contributions or by influencing these individual contributions themselves. With regard to the latter, individual contributions depend on how much the person *can* contribute and how much the person is *motivated* to contribute. Hence, group processes can influence both group members' capability and motivation to contribute to the group product. In sum, we have three levels of process losses and gains, namely *coordination*, *motivation*, and *individual capability*.

Coordination losses

Per definition, coordination in groups can only lead to process losses, not to process gains. This is due to the fact that, as outlined, group potential is measured on the basis of an

optimal combination of individual contributions. (It is debatable whether this approach leads to on overestimation of group potential and, thus, disfavors groups in the evaluation of their actual performance. Some authors actually discuss the possibility of coordination gains on the basis of different conceptions group potential – however, this lies outside the scope of this introductory chapter.) Consequently, coordination losses are said to occur if a group fails to optimally coordinate its members' individual contributions. For example, in his classical investigations on group performance in physical tasks, Ringelmann (1913) found that the average individual weight that people pull when performing such a task in a group decreases as the size of the group increases. An illustration of one of his findings is given in Figure 1. Later investigations showed that this process loss is largely due to insufficient coordination (Ingham, Levinger, Graves & Peckham, 1974), that is, the members fail to exert their maximal effort at the same moment. If you are interested in how one can experimentally determine whether such a process loss is in fact due to insufficient coordination, take a look at the research close-up in Box 1.

Another well-known coordination loss occurs in brainstorming: Osborn (1957) proposed that brainstorming in a group would lead to the generation of far more and better ideas than would be obtained if the same persons generated ideas individually. Experiments testing this assumption contain at least two conditions: In one condition, the participants come together in a group and conduct a brainstorming session. For example, the task could be to generate as many ideas as possible with regard to how our environment could be protected. The other condition determines the group potential. This is done in so-called **nominal groups**. Nominal groups contain the same number of persons as the real groups do. However, each person is seated in a different room and asked to individually generate and write down ideas about the topic. The experimenter collects their lists and puts them together. Ideas that

are mentioned by more than one member (redundant ideas) enter the list only once, because in a group the same idea would also be generated and counted only once.

In all of these experiments, brainstorming groups hardly ever reached the number of ideas generated by nominal groups; in most cases they were significantly below this group potential (for an overview see Mullen, Johnson & Salas, 1991). This disadvantage is not compensated by increased quality of ideas: On average, interactive brainstorming groups do not generate better (i.e., more creative or more practicable) ideas than nominal groups. As Diehl and Stroebe (1987) have shown in a series of experiments, the most important reason for this suboptimal performance in interactive brainstorming groups is a coordination loss called **production blocking**: When people generate ideas in an interacting group, at any given time only one person can articulate her idea. During this time all other members are "blocked" and can not express their own ideas.

Coordination losses also occur in disjunctive or conjunctive tasks. For example, groups often fail to choose the best among their members' proposals, even if one member actually proposes the optimal solution. In a study by Torrance (1954), three-person groups were given a problem-solving task. The participants were members of the US Airforce; each group consisted of a pilot, a navigator, and a gunner. In a military aircrew, pilots have the highest status, whereas gunners are lowest in status. Torrance's results showed that if the pilot had found the correct solution prior to discussion, only in one out of ten cases the group failed to choose this option. In contrast, if the gunner had found the correct solution, one third of the groups did not decide for this solution. Hence, the group's choice for one of their members' proposals was influenced by member status. Similarly, groups often prefer an incorrect solution proposed by the majority over a correct solution proposed by a minority (Smith, Tindale & Steiner, 1998 – see also chapter 11 in the present volume). In both of these

examples the individual contributions would have allowed the groups to succeed, but the successful coordination (choosing the right proposal) often did not occur.

Motivation losses and gains

If actual group performance differs from group potential, this difference can be due to the fact that the group members' individual contributions become better or worse in a group setting compared to an individual situation. One reason for this is that working in a group can lower or increase people's motivation to contribute to task performance. We first turn to motivation losses, three of which have yet been identified in group performance research:

- **Social loafing** (Latané, Williams & Harkins, 1979): Social loafing occurs if group members reduce their effort due to the fact that their individual contribution to the group product is not identifiable.
- **Free-riding** (Kerr & Bruun, 1983): In the case of free-riding, group members reduce their effort because their individual contribution seems to have little impact on group performance.
- Sucker-effect (Kerr & Bruun, 1983): This effect occurs if group members perceive or anticipate that other group members lower their effort. To avoid being exploited (being the "sucker"), they reduce their effort themselves.

Both the extent and the type of motivation losses occurring depend on task type. Additive tasks allow for all of the above-mentioned losses. For example, some members of the weight-pulling group could pull less hard because they believe that it is almost impossible to determine how hard each member has tried to pull (social loafing) or because they feel that – given the large number of group members – it will hardly make a difference how hard they pull (free-riding). At the same time, other group members might be aware of such tendencies and, thus, reduce their effort to avoid being the "sucker". These losses are typically stronger the larger the group is (Latané et al., 1979). Why is this the case? The larger the group, the

more difficult it is to identify individual contributions, which gives rise to more social loafing and more suspicion that others will exploit one's performance. At the same time, the relative impact of each member's individual contribution becomes smaller with increasing group size.

In disjunctive and conjunctive tasks, social loafing is less of a problem because individual contributions in these tasks are normally visible: When a group solves a problem, it is more or less evident who came up with which proposal; and when a roped party climbs a mountain, it is evident who slows down the group. However, both free-riding and **sucker effects** can be a problem, especially if the group contains weaker and stronger members and the members are aware of these differences. In a disjunctive task, this awareness particularly pushes weak members towards free-riding, since they know that even if they invest much effort, it is not very likely that their contribution (e.g., their proposal) will be good enough to be chosen by the group. In contrast, the stronger members know that everybody expects them to take responsibility for good performance and, thus, are particularly prone to feel that they are the "sucker". In conjunctive tasks, the opposite happens: Here the stronger members are aware that their effort is not very important for group performance, because even if they invest less effort, they should be able to perform at the level of the weaker members. Hence, they tend to free-ride, which may cause problems if, by investing more effort, they could help the weaker members to perform better (Kerr & Bruun, 1983). If conjunctive tasks are divisible, such problems can be avoided by matching subtasks to members' abilities. However, since this means that stronger members get more to do than weaker members, this can also induce sucker-effects among the stronger members – especially if their acceptance for the division of labour is low.

Whereas most social psychological research on group performance has focused on motivation losses, more recent studies have also established three motivation gains in groups:

- **Social competition** (Stroebe, Diehl & Abakoumkin, 1996): If individual contributions are identifiable, group members can be more motivated during group performance compared to individual performance because they want to outperform other members. Social competition is particularly likely if group members have relatively equal abilities.
- **Social compensation** (Williams & Karau, 1991): Social compensation occurs if stronger members work harder in a group than they would do individually in order to compensate for a weaker member's suboptimal performance.
- **Köhler effect** (Köhler, 1926; Witte, 1989): This effect was discovered in the 1920s but remained largely unrecognized until Witte rediscovered it in 1989. A Köhler effect is said to occur if weaker members work harder than they would do individually in order to avoid being responsible for a weak group performance.

The occurrence of motivation gains also depends on the type of task. Social competition can operate within all task types as long as individual contributions are identifiable and comparable. As we have already pointed out, this is the case for most disjunctive and conjunctive tasks, but it is often not the case in additive tasks. Hence, social competition should be more likely to occur in disjunctive or conjunctive tasks than in additive tasks. In contrast, social compensation is almost restricted to additive tasks because only in additive tasks can stronger group members really compensate for another member's weak performance. Finally, the Köhler effect is more or less restricted to conjunctive tasks, since only in conjunctive tasks the weaker members can anticipate that other group members will attribute an inferior group performance to them (Hertel, Kerr & Messé, 2000). The effect is strongest if there are moderate discrepancies between group members' individual capabilities and they are aware of these differences (Messé, Hertel, Kerr, Lount & Park, 2002): If

individual capabilities are almost equal, it is less clear who is to blame for an inferior performance. If, however, the discrepancies are very large, the weaker members hardly have any hope of being able to match the stronger members' performance.

In sum, within the same task type both motivation gains and motivation losses can occur. Thus, one of the challenges for group performance research is to find variables that determine whether gains or losses dominate. One key variable that has been found so far is the importance of group goals: Social compensation is particularly likely to occur if the common group goal is highly valued by members; otherwise motivation losses are more likely. This is nicely demonstrated in a series of experiments by Williams and Karau (1991). Participants performed an idea-generation task and were informed that they did this together with a partner (supposedly sitting in another room) who did, in fact, not exist. The researchers manipulated whether participants expected their partner to show strong or weak performance and whether the performance goal (generation of as many ideas as possible) was meaningful for them or not. In addition, for half of the participants the task was labelled as a group task (i.e., the number of collectively generated ideas would be counted), whereas for the other half the task was an individual task being performed together with the other person. The results are shown in Figure 3. When participants expected to work with a strongly-performing partner, performance in the collective task was always below their potential (i.e. less than in the coactive situation) whether the task was relevant or irrelevant. In contrast, if they worked together with a weakly-performing partner, then the relevance of the task had an effect. They were willing to compensate if the group goal was relevant – in this condition, performance in the collective task was actually higher than in the coactive task; so they performed beyond their potential. If, however, the group goal was almost meaningless, there was a slight motivation loss instead of a motivation gain. Similar effects can also be expected for disjunctive and conjunctive tasks – for example, a Köhler effect should only occur if the

group goal is important and, thus, the weaker members do not want to feel responsible for inferior performance.

Individual capability losses and gains

If group members contribute more or less than they would do in an individual setting, this can be due to the motivation losses and gains described above. However, the same effect can be due to the fact that the group setting influences their *capability* to such contributions. Social interaction in a group may help them to make better contributions than they would have been capable of individually, for example, by providing intellectual stimulation from or effective strategies used by other group members. However, social interaction may also have a detrimental effect on their individual capability, for example, by restricting their attention or providing role models of ineffective strategies. Surprisingly, such individual capability gains and losses due to social interaction have so far been almost neglected in group performance research. As a consequence, compared to coordination and motivation losses or gains, less individual capability losses or gains have yet been documented as such.

However, individual capability losses and capability gains can be clearly illustrated in brainstorming tasks (e.g., Nijstad, Stroebe & Lodewijkx, 2002). If, for example, the task is to generate as many ideas as possible about how to promote environmental protection, then hearing an idea from another group member about reducing automobile traffic can make you focus on ideas about diminishing fuel consumption, whereas in the individual situation you would have also thought about sustainable development and other issues. Hence, if you do not come up with ideas about sustainable development in the group situation, this is not due to the fact that you do not try hard enough (motivation loss) – due to social influence, you simply are not capable of producing these ideas at that moment. This socially determined capability loss can be termed **cognitive restriction**. On the other hand, it is also possible that you would never have thought about diminishing fuel consumption – only after another group

member came with the idea of reducing individual traffic, you generate new ideas about this issue. Again, the reason for the difference between your individual contribution in an individual setting vs. in the group would not be motivational: You do not try harder in the group setting, you are more capable of producing diverse ideas due to stimulation from other group members. Thus, the corresponding socially determined capability gain can be termed **cognitive stimulation**.

Since both effects can occur, brainstorming in groups can lead to more uniformity (Ziegler, Diehl & Zijlstra, 2000) as well as greater variety (Paulus & Yang, 2000) in idea generation. However, to demonstrate individual capability gains (stimulation), many of the well-known process losses in brainstorming – particularly production blocking – have to be eliminated first, because otherwise they are so strong that individual capability gains get totally submerged. The elimination of such process losses can be done, for example, by using computer-mediated communication (Dennis & Valacich, 1993): Instead of brainstorming in face-to-face interaction, group members are linked together via a chat system. Since each member is free to type in ideas even if other members are doing the same at the same time, production blocking can not occur and, hence, better conditions for cognitive stimulation are given.

An overview of the different process losses and process gains discussed in this chapter can be found in Table 2.

Summary

If group performance is below group potential, process losses have occurred. If, instead, group performance exceeds group potential, than process gains have taken place. Process losses and gains are possible at three different theoretical levels, namely motivation, individual capability, and coordination. With regard to motivation, three types of motivation loss (namely social loafing, free-riding, and the sucker-effect) as well as three types of

motivation gain (social competition, social compensation, and the Köhler-effect) have been shown so far. Far less frequently it has been shown that individual capabilities can be restricted (capability loss) as well as stimulated (capability gain) in a group. With regard to coordination, (almost) only coordination losses have been discussed and investigated so far, which is due to the fact that group potential is usually defined on the basis of an optimal combination of group members' individual efforts.

Group Performance Management

Why do process losses seem to be more frequent than process gains?

How can we optimize group performance?

The three basic principles of group performance management

Over the last century, social psychological research on group performance has provided impressive evidence for process losses but far less evidence for process gains. This might suggest that negative aspects dominate if people work together in a group. In our view this conclusion is not warranted. Social psychological experiments on group performance predominantly use randomly composed ad-hoc groups, with no further means or techniques of support accompanying the group process. Furthermore, the experiments are usually restricted to one or, in some cases, two task trials. Whereas these restrictions are useful for certain types of research questions (and often also have pragmatic reasons), they systematically disfavor groups in the evaluation of group performance. If you compare a car with a unicycle with regard to speed or safety, you would hardly use a car with four randomly composed wheels and without any measures to synchronize these wheels. In addition, you would hardly restrict your comparison to the first 10 meters. Unfortunately, this is what usually happens in group performance research.

Gaining insight into such aspects disfavoring groups in group performance research is not only interesting for research purposes (e.g., for the development of new research

programs on group performance), it also provides a key to solving the problem of how one can optimize group performance: If group performance is underestimated due to the fact that no systematic group composition and support of group functioning takes place and that the time frame is too limited, then systematically optimizing these aspects should be a promising way to optimize group performance. In accordance with this, Schulz-Hardt, Hertel and Brodbeck (in press) label the sum of activities aimed at improving the group-specific component of group performance (i.e., maximizing process gains and minimizing process losses) as group performance management and propose three basic principles herefore:

1. Groups should be specifically composed in accordance with the requirements of task structure.
2. Group processes during performance should be specifically synchronized.
3. Groups should be given the opportunity to perform multiple similar tasks to allow for group learning to occur.

In the following section, we will briefly explain each of the three principles and give examples for how one can apply them to specific group tasks.

Group composition

Group performance depends on the kind of people who are brought together in a group. This is true in a trivial sense, meaning that the more capable the group members are of performing the task, the better the group will perform (in general). It is, however, also true in a nontrivial sense, meaning that certain group compositions make it more likely than others that a group will fully realize or even surpass its potential, thereby realizing process gains.

To illustrate this principle, we take a look at an important task in group decision making research, namely the so-called **hidden profile** task. Consider the following situation: A personnel selection committee consisting of group members X, Y and Z has to decide which of the three candidates A, B and C should be chosen for a sales management position.

The information about the candidates (advantages and disadvantages) and the way it is distributed among the committee is illustrated in Table 3.

If the full information (column "Whole group" in Table 3) is considered, Candidate A is the best choice, with three advantages and two disadvantages, compared to Candidates B and C (two advantages, three disadvantages). However, as becomes apparent from the first three columns, none of the committee members individually possesses this full information set. The advantages of Candidates B and C as well as the disadvantages of Candidate A are held by all group members prior to discussion; they are termed shared information. In contrast, each disadvantage of Candidates B and C as well as each advantage of Candidate A is held by only one group member; these items are termed unshared information. Due to this distribution, prior to discussion none of the group members can detect that A is the best choice – it is "hidden" from the group members, and this is why this situation is called a hidden profile. This task is particularly important for group decision making research, because it constitutes the prototype of situations where groups can make better decisions than the individual members can. If, in contrast, the committee in our example had representative individual information that already implied Candidate A to be the best choice (in this case we speak of a manifest profile), making the decision in a group could hardly yield any surplus in decision quality.

Unfortunately, research has shown that most groups fail to solve hidden profiles (Stasser & Birchmeier, 2003). As Brodbeck, Kerschreiter, Mojzisch and Schulz-Hardt (in press) as well as Mojzisch and Schulz-Hardt (2006) have outlined, this failure is caused by three different processes which are summarized in Figure 4. (Up to date, no solid evidence exists whether these processes constitute coordination losses, motivation losses, or individual capability losses, so we do not categorize them as such.)

1.) Negotiation focus: Groups tend to negotiate the decision on the basis of their members' pre-discussion preferences, rather than openly exchanging the relevant information (Gigone & Hastie, 1993). Because no member can individually detect the best alternative in a hidden profile prior to discussion, pre-discussion preferences are usually in favour of suboptimal alternatives (in our example: Candidates B or C). Thus, one of the suboptimal alternatives is chosen by the group.

2.) Discussion bias: Even if the relevant information is exchanged in the group, this discussion is typically biased. Groups discuss more about shared than about unshared information (Larson, Foster-Fishman & Keys, 1994), because shared information can be introduced by more members than unshared information. Furthermore, group members predominantly introduce or repeat information that is consistent with their initial preferences (Dennis, 1996; Schulz-Hardt, Brodbeck, Mojzisch, Kerschreiter & Frey, in press), which can be due to a perceived "advocacy role" (Stasser & Titus, 1985), that is, group members believe that their primary task in a discussion is to explain why they prefer a particular alternative. However, most of the critical information for solving the hidden profile is both unshared and inconsistent with the members' initial preferences (in our example: the advantages of Candidate A and the disadvantages of Candidates B and C). As a consequence, the group does not exchange enough of this critical information to detect the best alternative.

3.) Evaluation bias: The evaluation of information in the group is also biased in favour of shared and preference-consistent information: Group members judge shared information to be more credible and valid than unshared information, because shared information is owned by oneself (Chernyshenko, Miner, Baumann & Sniezek, 2003) – so one can be relatively sure that this information is correct – and shared information can also be socially validated by other group members (Wittenbaum, Hubbell & Zuckerman, 1999). Furthermore, they judge preference-consistent information to be more credible and important than preference-

inconsistent information (Greitemeyer & Schulz-Hardt, 2003), because the former is accepted at face value, whereas the latter is critically tested. As a consequence, even if all information is exchanged in the group, the group members often undervalue the critical information and, thus, fail to detect the best alternative.

As Brodbeck, Kerschreiter, Mojzisch, Frey and Schulz-Hardt (2002) as well as Schulz-Hardt, Brodbeck et al. (in press) have recently demonstrated, these processes and, thus, the chances of groups to solve hidden profiles substantially depend on a particular aspect of group composition, namely consent vs. dissent in group members' individual pre-discussion preferences. Suggest you had two three-person-groups in our personnel selection case: In one group, all three group members prefer Candidate B (consent group). In another group, two members prefer B, whereas one member prefers Candidate C (dissent group). With regard to group potential, both do not differ – in both groups, no member individually prefers the correct choice (Candidate A). However, the dissent group should be less likely than the consent group to reach a premature consensus via negotiation. Furthermore, due to minority influence, less bias in the gathering (Schulz-Hardt, Frey, Lüthgens & Moscovici, 2000) and evaluation of information (Nemeth, 1986) should be present in the dissent group. To test these ideas in an experiment, Schulz-Hardt et al. (in press) first gave participants individual information about a hidden profile case. Dependent on the participants' individual preferences, groups with pre-discussion consent or dissent were formed. Dissent groups were more likely to solve the hidden profile than consent groups were, even none of the dissenting opinions was correct (i.e., in favour of the best candidate). This facilitative effect of pre-discussion dissent was mediated by a more intensive discussion (less negotiation focus) with less discussion bias.

Whereas composing groups with pre-discussion dissent is facilitative for performance in decision-making tasks, other tasks require other methods of group composition. For

example, in a conjunctive task such as mountain-climbing, it should be facilitative to have groups with moderate discrepancies among their members' abilities, because this increases the likelihood of motivation gains among the weaker members (Messé et al., 2002) – and the weakest member determines group performance in a conjunctive task. Hence, whenever one is free to compose groups for particular tasks, one should first classify the type of task and then choose a group composition that counteracts process losses and facilitates process gains for this task type.

Group synchronization

Working together in a group requires us to generate or modify individual contributions (e.g., physical effort, thoughts and ideas) collaboratively and to integrate these different individual contributions in a way that is functional for high performance. For many tasks, we do not "naturally" know how to do this or might even hold misleading preconceptions. For instance, for many people making a group decision means that everybody offers their preferred solution, states the arguments as to why they do so, and finally the group chooses the solution with the most convincing arguments. As we have seen above, a group will hardly ever solve a hidden profile by doing so.

Hence, in the very same way as four wheels need a differential in the axis if the vehicle is to drive around corners, groups need synchronization to perform well. By group synchronization we mean the sum of activities aimed at optimizing the collaborative generation, modification and integration of individual contributions in a group. Means of group synchronization can vary from very simple tools (e.g., feedback about members' individual contributions) to rather complex procedures (e.g., group decision making techniques).

As in the case of group composition, optimal synchronization depends on the type of task at hand. However, some means of group synchronization can be applied across a wide

range of group tasks. One of these is the continuous visibility of individual contributions. In a physical task such as pulling a weight, this can simply mean providing the group members with feedback about their own as well as the other group members' individual performance. In a cognitive task such as brainstorming, or making a group decision based on distributed information, this can take the form of documenting group members' ideas and informational input on a 'documentation board' or, as often used for these and other purposes, on an 'information board' during computer-mediated group communication. In all cases, such permanent visibility of individual contributions counteracts motivation losses like social loafing or sucker effects and facilitates motivation gains due to social competition or Köhler effects (DeShon, Kozlowski, Schmidt, Milner, & Wiechmann, 2004; Hoeksema-van Orden, Gaillard & Buunk, 1998). It also facilitates coordination within the group, for instance, by making it easier to identify the best proposal in a disjunctive task (Henry, Strickland, Yorges & Ladd, 1996) or by helping group members to match their own contributions to the contributions of other group members. Finally, in cognitive tasks this continuous visibility promotes individual capability gains by facilitating cognitive stimulation (Brodbeck, Mojzisch, Kerschreiter & Schulz-Hardt, 2006).

In contrast, some means of group synchronization are highly unique for specific tasks such as group decision making. As already outlined, our "normal" preconceptions of how to make a decision in a group run counter to how high quality group decisions are actually made. Therefore, it can be useful to "guide" a group discussion on a decision problem by means of specific techniques. Some of these techniques are rather simple such as dividing the decision process into an 'information collection phase' and an 'information evaluation/decision making phase'. Even such simple guidance for the discussion process facilitates the solution of hidden profiles (Brodbeck et al., 2006). Other techniques are more complex. For example, so called "dialectical" techniques divide a decision-making group into

two subgroups that are given different roles. Based on these roles, they act out a controversial debate independent of the members' real opinions. This facilitates stimulation by arguments or information that hardly anyone in the group would have mentioned if the group members had, as they usually do, acted on their own preferences. Indeed, such dialectical techniques raise the quality of group decisions (see Katzenstein, 1996).

Group learning

The use of groups for a particular task is an investment, and the return on this investment often takes time to be realized. At the beginning, using groups has considerably high costs, for example, coordination losses due to the fact that group members are not used to working together on this particular task, or the effort of synchronizing the group adequately. If the group gains experience with the task over time, these costs should decrease, and the chances for process gains should increase. Of course, individuals also increase performance if they repeatedly perform similar tasks. However, repeatedly performing similar tasks in a group allows for several learning processes that can not occur if people perform individually.

That the group collaborative context can stimulate learning processes which result in improved performance, on the part of individual members and on the part of the whole group, has been demonstrated by Brodbeck and Greitemeyer (2000a,b, see Research Close Up Box 2). They identified four different learning processes within group collaborative settings:

Individual-to-Individual (I-I) transfer. By repeatedly and individually performing similar tasks individual learning occurs, that is, a relatively permanent change in individual behaviour or cognition, which usually results in performance increments. A performing group can profit from I-I transfer because the group potential increases when the individual group members improve their abilities and skills in a way that affects their individual performance within the group. For example, the level of potential performance of a climbing crew depends

on the crew members' training, which they perform individually in order to be physically and mentally up to speed with the challenges on their next mountain tour.

Group-to-Individual (G-I) transfer. When individual resources for performing a task individually improve as a function of social interaction between group members during repeated collective task performance we speak of "group-to-individual transfer" (cf. Laughlin & Sweeney, 1977). G-I transfer comes about when, for example, the effectiveness of a task performance strategy becomes evident (demonstrable to others) in the group collaborative context. The strategy can be adopted by other group members who are not using it already, and thus can be profitably transferred to later individual task performance contexts. Imagine our climbing crew again. Sometimes the climbers perform parts of their training together so that they can exchange their ideas about strategies to better "read the wall", that is, to identify grips and holes and potential slips. In doing so, they increase their repertoire of technical skills individually, which comes in handy when they are in the mountains as a team.

Group-to-Individual-in-Group (G-IG) transfer. G-IG transfer takes place if the individuals' resources for performing a task collectively improve as a function of prior collaborative task performance. Thus, with this type of transfer group-specific skills are learned that can be used in subsequent group performance situations. In the mountain climbing crew this could, for example, mean that the members learn to support each other in finding best possible grips and avoiding potential slips via communication, or to pro-actively correct each other's technical faults in climbing difficult overhangs. These individual skills for collaborative mountain climbing are transferable to large extent to climbing as part of other teams as well.

Group-level learning or Group-to-Group (G-G) transfer. Group level learning is a relatively permanent change of collective behaviour resulting in performance increments for a particular group. Although the term "group level learning" suggests that a group as a whole

learns, we do not believe that a "group mind" or something similar exists that would be capable of such learning. Instead, and in accordance with the previous terminology, one might also term group learning as a "Group-to-Individual-in-same-Group (G-IsG) transfer". By repeatedly performing similar tasks in the same group, group members learn how to optimally match subtasks to their specific capabilities and how to coordinate with the particular other group members.

Only one group level learning phenomenon in accordance with this criterion has been demonstrated so far. It is the so called **transactive memory** in groups (Moreland, Argote & Krishnan, 1996; Wegner, 1987). Transactive memory refers to a system of knowledge possessed by particular group members with shared awareness of each other's expertise, strengths and weaknesses ("knowing who knows what"). In the mountain climbing example, such group-to-group transfer would occur if the members had specialized in specific subtasks such as fixing ropes, helping weaker members during difficult passages, or finding passages in unknown terrain, and if each member were aware of this specialization.

Due to these four group-learning processes, group performance should benefit more from repeated trials than individual performance does. In addition, since the group potential is based on the group members' individual performance in an individual situation, over time it should become more likely that groups a) increase their potential, b) use their potential more optimally (reduce process losses), c) perform at the level of their potential (no process loss, or process losses and process gains balance out), or d) even surpass their potential (process gains are larger than process losses). Direct empirical evidence for a), b) and c) has been provided by Brodbeck and Greitemeyer (2000a, b). Solid replicable experimental evidence for d) is not yet available.

The described experiments on the dynamic model of group performance (see Research Close Up Box 2) capture individual capability gains and reduction of coordination

losses as a consequence of learning in groups. It is, however, plausible that the reduction of motivation losses and the development of motivation gains can also be "learned" in groups. If the same group repeatedly performs similar tasks, group members become more familiar with each other and develop interpersonal trust. Interpersonal trust facilitates the pursuit of collective instead of individual goals (Dirks, 1999). As a consequence, group members should be less prone to social loafing or sucker effects, and should be more likely to show social compensation. Indirect evidence for this comes from a study by Erez and Somech (1996), showing that hardly any social loafing occurs in groups whose members have known each other for at least six months.

Summary

In sum, our considerations about group performance and group learning show that effective group performance management requires an analysis of the task structure, followed by a careful composition of the group and the choice of adequate synchronization measures, both with regard to task structure. Furthermore, group learning should be facilitated by having the same group for a whole range of structurally similar tasks. As we have illustrated, these three basic principles affect all three categories of process losses and process gains by optimizing group coordination as well as stimulating individual motivation and capabilities during collective work. Figure 7 summarizes these effects.

So far we have investigated basic aspects of group performance, namely task types, group process gains and losses, and principles for the management of group performance, without referring to the structure of natural groups at work (i.e. work groups within their social settings, e.g., organisational hierarchies). Next, we therefore turn to a fundamental component of group structure, leadership.

Leadership

What makes leadership effective?

What are major approaches to the study of leadership?

Leadership is about "influencing others". This admittedly very short and broad definition is the only common denominator of the many definitions in the leadership literature (e.g., Bass, 1990; Yukl, 2005). We define leadership in accord with the researchers from Project GLOBE, an international research program of some 170 scholars from more than 60 different countries, who study leadership across cultures (House, Hanges, Javidan, Dorfman & Gupta, 2004; Chhokar, Brodbeck, House, in press). The GLOBE researchers developed a definition of leadership which specifies what is meant by "influencing" others within organizational settings: **Leadership** is influencing, motivating, or enabling others to contribute toward the effectiveness of work units and organisations.

Leadership effectiveness

The central questions that have received and continue to receive attention in leadership research are: How can we identify effective leaders? What makes leaders effective? How do leaders influence others? How are leaders perceived by others? How do leaders emerge and develop? Therefore, most leadership research focuses on at least one of the following criteria of **leadership effectiveness**, a) the impact leadership has on the accomplishment of group and organizational objectives (e.g., high quality decisions, solutions to problems), b) the extent of influence on followers that can be exerted via leadership (e.g., change in behaviour, attitudes, values, motivation, well-being), c) the perception of a person as a leader in the "eye of the beholder", and d) the emergence of a person as a leader and how quickly leaders are promoted to higher ranks in an organisation. The question we will focus in this chapter is a specific one: "How can leadership help to improve group performance?" It mainly relates to the first two classes of criteria of leadership effectiveness.

In this section we describe approaches to the study of leadership which cover major developments in the history of leadership research. For reasons of space, only a small selection of theories and research can be described. For a broader coverage see Brodbeck (in press) and Pierce and Newstrom (2003), and for comprehensive reviews, see Bass (1990) and Yukl (2005). Thereafter, we develop a group performance perspective of leadership that integrates the research about group functioning described in the first sections of this chapter with findings from leadership research.

Approaches to the study of leadership

The systematic study of leadership has been dominated by leader-oriented approaches, many of which have been developed in the first half of the last century. They focus on personality characteristics and behaviours of leaders in order to distinguish leaders from non-leaders and to identify effective leaders in organisations. From about the 1960s, contingency approaches were developed which focus on predicting the conditions under which certain leader characteristics and leadership behaviours are successful by incorporating relevant situational factors (e.g., characteristics of the organisation, the task, or the followers). The latest developments in leadership research emphasize the nature and the dynamics of leader-follower relationships (e.g., transformational-transactional leadership) as well as shared leadership within work groups. Apparently, the latter approach is closely related to the management of group performance. However, for effective leadership in groups there is something to learn from all approaches described here.

Leader-oriented approaches

The view of the leader as a "hero" or a "great person" has dominated leadership research, and thus the study of leadership has mainly been the study of leaders, that is, their characteristics, skills, and behaviours, on the one side, and their effects on followers, groups and organizations, on the other side.

Leader traits. Since the first systematic studies of leadership at the beginning of the last century, a major proportion of research focused on stable leader characteristics or traits (e.g., personality, intelligence, motivational dispositions) on the basis of which leader emergence and leadership effectiveness may be predicted - following the idea that "a leader is born - not made". Today, relatively small but consistent correlations between effective or emergent leaders and personality characteristics are reported (Judge, Bono, Ilies & Gerhard, 2002): for example, with Extraversion (r = .31), Openness to Experience (r = .24), Conscientiousness (r = .28), Neuroticism (r = -.24), and less with Agreeableness (r = .08). Intelligence was found to also relate positively with leader effectiveness (r = .27; Judge, Colbert & Ilies, 2004). However, only few empirical studies rigorously tested the assumption that personality traits have a causal impact on leader effectiveness or the emergence as a leader in an organisation.

The commonly used cross-sectional designs, by which measures of leader personality and performance are taken at about the same point in time, do not suffice to test causal assumptions. With such "correlative" designs, the possibility remains that the causal relationship between personality and leadership success may work the other way around. Individuals who may find themselves more often in leadership positions than others, by being pushed into them, by chance, or because of their technical expertise (in their families, at school, in higher education, at work) may learn and develop the sets of skills, attitudes, and behaviours necessary to succeed - or just to survive. By trying to satisfy respective role expectations and social norms typically applied to leaders, individuals are likely developing person characteristics that match expectations. A more general critique of leader-trait approaches is that they don't explain in sufficient detail how the link between person characteristics and leadership success is established: What are the variables that mediate this relationship?

Leadership behaviour. The search for variables that can predict leadership success better than leader traits (or mediate their effects) shifted the focus of interest towards what leaders actually do - their behaviours. During the late 1940s, two research programmes began to work in this area independently from each other. They have shaped our understanding of leadership behaviour until today. One was established at The Ohio State University (e.g., Hemphill, Stogdill) the other one at the University of Michigan (e.g., Likert, Katz). The two groups identified a large number of leader behaviours and came up with quite similar accompanying categorisation schemes.

The Ohio group sought to classify relevant aspects of leadership behaviours by assembling about 1800 leader behaviour descriptions which were subsequently reduced to about 150 items. In a preliminary questionnaire these were given to thousands of employees in civic and military organisations who indicated the extent to which their (formal) leaders display these behaviours. The final questionnaire used in this research, called the Leader Behaviour Description Questionnaire (LBDQ), is a hallmark in the history of leadership research. By using factor analytical methods to analyse the co-variances among all LBDQ items two independent dimensions emerged: Initiating Structure (IS, i.e., task oriented behaviours) and Consideration (C, i.e., people-oriented behaviours).

Judge, Picolo and Ilies (2004) showed in a quantitative review (a meta-analysis) of 200 studies with 300 samples and more than 400 different correlations, that both Consideration (r = .49) and Initiating Structure (r = .29) have moderately strong and non-zero relations with leadership outcomes. Consideration was more strongly related to leader effectiveness (r = .39), the followers' motivation (r = .40), satisfaction with their leaders (r = .68) and job satisfaction (r = .40) than Initiating Structure (r = .28, r = .26, r = .27, r = .19 respectively), and both were equally strongly (r = .23) related to group/organizational performance (see Judge, et al., 2004, p. 40, Table 3). From the literature published earlier to

this meta-analysis it appears that Initiating Structure is more susceptible to situational differences than Consideration, for example, in some situations task orientation is positively associated with satisfaction in others it has negative effects (cf. Pierce & Newstrom, 2003). This can explain why in the meta-analysis reported above, where correlations were sampled across a whole variety of different situations, correlations are weaker for Initiating Structure than for Consideration.

The Michigan group qualified the altogether four dimensions of leadership behaviour they identified (interaction facilitation, work facilitation, goal emphasis, and individual support) as the "basic structure of what one may term 'leadership'" (Bowers & Seashore, 1966, p. 247). Their understanding of "leadership" provides the foundation for a leadership perspective which differs considerably from leader-oriented approaches. While the Ohio group's research clearly focused the individual (formal) leader, the Michigan group stated that effective work groups require the presence of each of the four classes of behaviours they identified, but anyone in a group can provide them successfully. These behaviours need not to be infused by a (formal) leader as long as it is made sure that they are present in the work group to sufficient extent. Because this view is of particular interest to our chapter's focus on group performance, we elaborate on it later in this section.

Cross-sectional designs are also commonly used for the empirical study of leadership behaviour. As was noted above, from these designs causal inferences about the direction of relationships cannot be drawn. Again, the true causal pathways may go in the opposite direction. For example, leaders show more consideration behaviour because the followers are already motivated and high performing (Greene, 1975). Another threat to the correct interpretation of results from cross-sectional studies is the so called „third variable problem". For an example, mutual sympathy between leader and follower due to a match in their personal values or socio-cultural backgrounds may have a similar positive impact on both, the

leader behaviour and the follower behaviour: Mutual sympathy can lead to more consideration on the leader's part and to higher performance on the follower's part. Thus, an apparent co-variance between consideration on part of leaders and high performance on part followers can be caused by a third variable (mutual trust in our example) which makes the two variables appear to be directly linked with each other.

Problems with correctly interpreting results from cross-sectional studies are aggravated when relying on followers' self-report measures for leader behaviours (e.g., which LBDQ does) in conjunction with followers' perceptions of leadership effectiveness (e.g., their motivation, satisfaction with the leader or job satisfaction). In the worst case all these variables are evaluated by asking the same group of followers (common source effect) and by using the same questionnaire as measurement instrument (common method effect). Under these circumstances the strengths of relationships between leader behaviour and leader effectiveness are likely to be overestimated.

Contingency approaches

Leader-oriented approaches which focus solely on leaders' traits and behaviours have the tendency to look for simple answers to complex problems. They can predict only a limited proportion of the variance in leadership effectiveness, because the effects of leader traits and behaviours are likely to average out across different situations which may require different types of leaders or different leader behaviours. **Contingency approaches** emphasize the role of situational factors (other than the leader) and how these moderate the relationship between leadership traits or behaviours and leadership effectiveness, such as task characteristics (e.g., task structure, task complexity), followers' characteristics (e.g., their level of motivation, competencies, maturity), or characteristics of the social context (e.g., quality of social relationships, group cohesion, group size).

Many contingency theories have been proposed, each of which stresses the importance of a particular array of situational factors and different leadership characteristics (for reviews, see Bass 1990, Yukl 2005). One message contained in all contingency approaches is that leaders must be able to recognize, adapt, or cope with different situational circumstances: otherwise they may lose their influence on followers. Up to date, there is no unified theory from which the most critical situational factors in relation to leaders' characteristics and behaviours, on the one side, and leadership effectiveness, on the other side, can be derived. We therefore describe here only one of the more widely cited contingency theories, path-goal theory, which has been presented by Robert House and his colleagues (House, 1971; House, 1996; House & Mitchell, 1974).

Path-goal theory. Leaders are considered effective when their behaviour impacts on the subordinates' motivation, satisfaction, and ability to perform effectively. A major concern of path-goal theory is how a leader influences the followers' perceptions of their work goals, their personal goals, and the paths to goal attainment. For maximising their impact in these respects, leaders need to master a range of leadership behaviours and flexibly use them depending on certain situational contingencies. Five classes of leadership behaviours are distinguished in newer versions of path-goal theory (House, 1996): Clarifying behaviour (e.g., about rewards and punishments, performance goals, and means to achieve them) reduces role ambiguity and increases follower beliefs that effort in a certain direction will result in good performance and that performance will be rewarded. Work facilitation behaviour (e.g., planning, scheduling, co-ordinating, guiding, coaching, counselling, and giving feedback) eliminates roadblocks and bottlenecks, provides resources, stimulates self-development and helps to delegate authority to subordinates. Participative behaviour (e.g., consulting with subordinates, incorporating subordinate opinions in decision making) increases followers' self-confidence and the personal value of job-related effort. Supportive

behaviour (e.g., creating a friendly and psychologically supportive environment, displaying concern for subordinates' welfare) increases the followers' involvement with the work group and organization and goal commitment. Achievement oriented behaviour (e.g., setting high goals and seeking improvement, emphasizing excellence, showing confidence in subordinates, stressing pride in work) increases subordinate confidence and the personal value of goal-directed effort.

The extent to which the described leadership behaviours are successful depends on two classes of contingency factors: a) personal characteristics of the followers (e.g., internal versus external locus of control, self-efficacy beliefs, their knowledge, skills and abilities) influence the degree to which the followers' see the leadership behaviour shown to be a source of satisfaction or as instrumental to future satisfaction, and b) characteristics of the environment (e.g., task structure, formal authority system of the organisation, primary work group) are not within direct control of the followers, but are important to satisfy their needs or their ability to perform well. For an example, followers with an internal locus of control, high self-efficacy beliefs or high competency in their job respond more positively to participative leadership behaviour than followers with external locus of control (e.g., they need more work facilitation behaviour), low self-efficacy (e.g., needs more supportive behaviour), or low job competency (e.g., needs more clarifying behaviour). Examples for leadership behaviour contingencies with characteristics of the primary work group are described in detail in the last section about **group leadership**.

Despite inconclusive research results and some conceptual deficiencies (e.g., House, 1996; Wofford & Liska, 1993), path-goal theory is still in use because it provides a valuable conceptual framework for identifying situational factors relevant to leadership effectiveness. The theory's underlying idea, that certain leadership behaviours are helpful and successful under certain circumstances, has been adopted in several newer leadership theories (cf. Pierce

& Newstrom, 2003). Another idea that path-goal theory has infused into leadership research and practice is that the followers and their characteristics matter in the leadership process. Not only is their performance related behaviour important but also their perceptions, their cognitions, and their beliefs about work related issues.

Transactional, transformational, and charismatic leadership

In the past 25 years a substantial amount of research has been accumulated about what leaders and followers offer one another. **Transactional leaders** focus on the proper exchange of resources. They give followers something they want in exchange for something the leader wants (cf. Burns, 1978; Conger & Kanungo, 1998). **Transformational and charismatic leaders**, in contrast, develop an appealing vision and focus on the alignment of the group or organisational goals with the followers' needs and aspirations in order to influence followers to make sacrifices and put the needs of the organization above their self interests. **Laissez-faire leaders** offer not very much to followers ("non-leadership"). They avoid making decisions, hesitate in taking action, and are often absent when needed.

Bass (1985) has developed the concept of transformational leadership into four sub-dimensions (each labelled with an "I"-word): Idealized influence: leaders behave in admirable ways (e.g., display conviction, display role modelling behaviours consistent with the vision, appeal on an emotional level) so that followers tend to identify with them. Inspirational motivation: leaders articulate a vision (e.g., provide meaning for the work task, set high standards, communicate optimism about achievability of the vision) which is appealing and inspiring to followers. Intellectual stimulation: leaders stimulate and encourage creativity in their followers (e.g., challenge assumptions, take risks, ask followers for their ideas and to develop them into practice). Individualized consideration: leaders attend to each follower individually (e.g., act as a mentor or coach, listen to their concerns and needs). The concepts of transformational leadership and charismatic leadership (Conger &

Kanungo, 1987, 1998) have much in common (Judge & Piccolo, 2004). A charismatic leader can be described as a self-confident, enthusiastic leader able to win followers' respect and support for his or her vision by proper frame alignment (i.e. promotes visions and described events in a way that makes them organized, interpretable, and meaningful for followers to help guide their actions vis-à-vis these visions and events), by showing role modelling behaviours consistent with the vision, taking personal risks, and expressing confidence in followers. On part of the followers, charismatic leadership is described to result, for example, in internalisation (i.e. followers adopt the leader's ideals and goals and become inspired to attain them because the goals are inherently satisfying) and social identification (i.e. followers create a connection in their minds between their self-concepts and the shared values and identities of their group or organization). For ease of description, when we refer to transformational leadership, charismatic leadership is included, knowing that the different theories underlying each concept are making clearer distinction between each other (e.g., Conger & Canungo, 1998).

Transactional leadership consists of three dimensions: Contingent reward: leaders set up constructive transactions or exchanges with followers (e.g., clarify expectations, establish rewards for meeting expectations). Active management by exception: leaders monitor follower behaviour, anticipate problems, and take corrective actions before serious difficulties occur. Passive management by exception: leaders wait until the followers' behaviour has created problems before taking action (cf. Avolio, 1999). Laissez-faire leadership represents the absence of leadership, and thus, can be differentiated from passive management by exception, where at least some leadership influence is exerted, although often after the damage is done.

The research about theories of transformational, transactional and laissez-faire leadership combines and complements the above-described leadership-oriented and

contingency approaches in that, it a) proposes leadership to be a process that is partially determined by leader traits, trainable behaviours, and skills, b) identifies situational factors under which the different types of leadership vary in effectiveness, c) proposes a bi-directional influence between leader characteristics, on the one side, and attributions of followers and how they react to the leaders characteristics, on the other side, and d) proposes that followers' responses to leadership are moderated and mediated by their needs, self-concepts, interpretations of goals and events, motivations, and emotions - to name just a few. Emotions have not been looked at in previous approaches to the study of leadership.

Transformational and transactional theories of leadership have been tested with a whole variety of methods, including longitudinal studies, field studies and even laboratory experiments. In a quantitative review (a meta-analysis) of 87 studies (total N > 38.000) reporting 626 correlations, Judge and Piccolo (2004) determined the contribution of transformational, transactional, and laissez-faire leadership to the prediction of organizational criteria relevant to leadership effectiveness (follower job satisfaction, satisfaction with leader, motivation, leader job performance, effectiveness, and group / organization performance). Overall, by combining the different effectiveness criteria, transformational leadership (r = .44), transactional – contingent reward leadership (r = .39), and transactional – active management by exception (r = .15) were positively related to outcome variables. In contrast, transactional – passive management by exception (r = -.15) and laissez-faire leadership (r = -.37) were negatively related with leadership outcome (p. 759, Table 1). Interestingly, the authors conclude that contingent reward (transactional) leadership predicts outcome variables to similar extent as transformational leadership does. This is troublesome considering that transformational–transactional leadership theory predicts contingent reward to be reasonably effective, but not as effective as any of the transformational leadership dimensions (Bass & Avolio, 1994, p. 6). The superiority of one relative to the other seems to depend on the

context. For example, Judge and Piccolo (2004) note that contingent reward leadership works best in business settings. Maybe it is resource dependent, that is, business leaders are better able to tangibly reward followers in exchange for their efforts than leaders in the other domains studied (universities/colleges, military settings, public sector). In situations in which leaders have access to fewer or no resources, contingent reward leadership may be less effective because it is more difficult for leaders to meet their end of the bargain. Thus, transformational leadership may be more robust in these settings than contingent reward leadership.

Another observation from Judge and Piccolo's (2004) quantitative review is that transformational and contingent reward leadership predicted leadership outcomes about equally strongly under weak research designs (leadership and outcomes were measured at the same time and with the same source). In contrast, under strong research designs (longitudinal designs and designs in which the leadership and the criterion were measured with different sources of data) transformational leadership predicted leadership outcomes more strongly than contingent reward leadership.

Summary

Social psychologists have conceptualised leadership as „a quality attributed to people as a result of their interrelations with others" (Smith, 1995, p. 358). This implies that leadership is neither solely inherent in people nor in the situational context. Instead, both categories of variables can be seen as conditions that facilitate or inhibit the expression of effective leadership processes. This view is in accord with Kurt Lewin's famous formula, b = ***f*** (P, E), which identifies human behaviour (b) as a function of person characteristics (P) and characteristics of the environment (E). Note that both, leaders and followers, are to be seen in Lewin's formula as person (P) and as part of the environment (E) within which they interact

with each other. This is part of the reason why leadership is a complex social phenomenon and the scientific study of it is a very complex task.

In our view, most of the approaches to the study of leadership focus on the leader as a person and less on "leadership" as a process. For an exemption, the "leadership" perspective taken by the Michigan group explicitly suggests that anyone in a work group can provide leadership functions. The more leadership behaviours are effectively provided by group members, the less a (formal) leader needs to infuse them into the work group (and the less harmful are passive or laissez-faire leaders). We believe that it is in an organization's interest that their leaders can develop employees and whole work groups such that the group members facilitate each others' performance by engaging in effective leadership behaviour. This comes very close to modern concepts of shared or team leadership which are discussed as part of the next section.

Leadership in Groups

Why is leadership critical for group performance?

How can leadership help to improve group performance?

The first researchers who turned attention to how leadership can affect groups as a whole were Kurt Lewin and his co-workers, Lippitt and White. In a series of experiments they observed in detail how different leadership behaviours of adult leaders affected the "social climates" in after-school clubs of 10-year-old boys (e.g., Lewin, Lippitt & White, 1939; White & Lippitt, 1976). They implemented three different **leadership style**s (i.e, a repeatedly shown pattern of leadership behaviour evident across a variety of situations): autocratic leadership (e.g., directive, non-participative, domineering behaviours), democratic leadership (e.g., participative, communicative, egalitarian), and laissez-faire leadership (few attempts are made to influence others). Some results were: Autocratic leadership resulted in either up to 30 times more frequent hostile behaviours than under democratic leadership, or

alternatively, in "apathetic" patterns of behaviour with no instances of smiling or joking. Once autocratic leadership was substituted by democratic or laissez-faire leadership, outbursts of aggressiveness and disorganized behaviour occurred. There was more friendliness, group-minded behaviour, motivation, and creativity under democratic leadership and the amount of work done was not substantially less than under autocratic leadership. Laissez-faire was not the same as democracy. There was less work done, and poorer work, and less satisfaction with the leader was expressed. The results of this classic study demonstrate that leadership has an impact on how groups function as a whole, that there are more or less effective ways to manage groups, and that absence of leadership (laissez-faire) can seriously disrupt group activity.

Because we focus on characteristics of group functioning and how these can be facilitated by leadership, we define group leadership as influencing, motivating, or enabling (oneself) and others to contribute toward the effectiveness and viability of work groups. This definition is meant also to comprise leaderless groups (e.g., self-managed work groups) which have no appointed leader but may be lead by agents external to the group, as well as shared or team leadership. The latter two concepts have recently been introduced into the leadership literature.

Shared or team leadership. It has been argued that the predominant conception of a "heroic leader" undermines the principally positive effects of shared responsibility for leadership functions and empowerment of followers on leadership effectiveness (Bradford & Cohen, 1984). In contrast both terms, shared leadership (e.g., Pearce & Sims, 2000) and team leadership (e.g., Sivasubramaniam, Murry, Avolio & Jung, 2002), denote group level leadership concepts that go beyond the commonly held concept of a single leader, in that the responsibility for leadership functions, the exercise of leadership behaviour, and the perceptions of leadership roles are shared among group members. These concepts

complement the view of a singular leader who is more informed and confident than others by the view that leadership is a mutual influence process (e.g., Smith, 1995).

Based on the propositions about group functioning and performance described in the first part of this chapter, we argue that for the effective management of work groups leadership needs to ensure that the functions critical to a) group and task design b) group synchronization, and c) group learning are adequately taken care of. Note that there are further tasks that need to be addressed by leadership in groups (Zaccaro, Rittman & Marks, 2001), which are not reviewed here. To our knowledge these have, however, not yet been explicitly linked to social psychological theorising and research about group performance and decision making.

Group and task design

According to the first principle of group performance management, group leadership requires leaders to design group composition in accordance with the requirements of the task structure. At the same time, group leaders can attempt to (re)structure tasks in accordance with group composition. We will label both processes group and task design.

Wageman (2001) demonstrated that effective group leadership is indeed a group and task design activity in her study about self-managed teams. She measured the extent to which group leaders made sure that their work group was a "real team" with clear membership, stable over time, and group members working in close physical proximity to each other. Furthermore, it was measured whether leaders infused a clear direction, with few memorable objectives which focused on the ends to be achieved rather than on the details of the means for achieving them. It was also measures to what extent leaders enabled an effective team structure with adequate group size, sufficient skill variety (not too much heterogeneity so that coordination problems remained manageable), high task interdependence, challenging task goals, challenging performance targets, and clearly articulated strategies and norms for

planning and decision making. Finally the degree to which organizational context factors supported effective group functioning was measured, for example, the quality of reward and feedback systems, the adequacy of trainings offered and the availability and immediacy of resources needed by the work groups.

The extent to which the desired leadership activities were linked with objective group performance criteria from company records was tested with a sample of 34 self-managed teams. The more leaders engaged in the above-described task / group design activities the higher was group performance and the more self-management was practiced within groups.

A similar point for the importance of a proactive team design in relation to team task objectives and leadership was made by Erez, Lepine and Elms (2002). The authors investigated self-managed learning groups of undergraduate students whose purpose it was to share information and views freely for group discussion and group task performance. They found that teams that rotated leadership among their members had higher levels of voice (participation), cooperation and performance relative to teams that relied on leader emergence (usually the most dominant group member emerges as a leader in such groups). This is an example of how the way that leadership comes about directly influences the manner in which group member's resources are used.

Group synchronisation

Group leadership implies the monitoring and management of ongoing group processes, that is, the exchange of information, views and opinions, and the social dynamics involved. This vital role of group leadership has been most extensively demonstrated for information management. Information management is a central function in group decision making in order to keep the group focused on the problem at hand, to facilitate communication, stimulate decision-relevant contributions, and to keep them alive during discussion (e.g., Larson & Christensen, 1993; Maier, 1967). In a study with medical

diagnostic teams, Larson, Christensen, Abbott and Franz (1996) investigated how designated leaders (the most experienced medical doctor per group) manage the processing of distributed information during group decision making. They observed that leaders repeated unshared information at a steadily increasing rate over time and raised more questions concerning concrete factual information than other group members did. In a follow-up study, again in the domain of medical decision making, Larson, Christensen, Franz and Abbott (1998) replicated the above results and found positive correlations between information management behaviour and group decision quality. This is an example of how information management behaviours can counteract "asymmetries" in the discussion and evaluation of information that were identified as a weakness of group decision making (see Figure 4).

Larson, Foster-Fishman and Franz (1998) explored the effects of leadership style on group decision making. They trained individuals to display either directive or participative leadership behaviours. Directive leadership groups outperformed participative leadership groups only when their leaders possessed sufficient information favouring the best decision alternative. In contrast, when directive leaders possessed information that favoured a suboptimal choice (as did the information held by other group members), group decision quality deteriorated considerably. This was not the case in groups with a participative leader who managed the group in a way that encouraged more (shared and unshared) information to surface. In contrast, directive leaders tend to "sell" their opinion by emphasizing their own unshared information that is consistent with their decision preference. Likewise, Cruz, Henningsen and Smith (1999) concluded from their hidden profile study that the quality of the group's choice depends on the quality of a directive leader's preferred decision alternative. Overall, these findings are in line with Vroom and Jago's (1988) notion that autocratic forms of decision making are feasible only when leaders possess sufficient information to make a high quality decision. Considering that in situations of a hidden profile

most or all group members (including the leader) are likely to hold information that does not imply the best possible decision alternative, a directive leadership style seems less functional for high quality decision making than does a participative leadership style. However, Larson, Foster-Fishman et al.'s (1998) study also demonstrates that a participative leadership style does not guarantee high quality decision making under all conditions of distributed knowledge. When the leader indeed knows best, directive leadership results in better group decisions than participative leadership does. Thus, wise leaders should know when they know best and when not and adjust their leadership style accordingly.

Group development and learning

Group leadership implies supporting group learning and development. For example, effective group leadership seeks to further the development of viable transactive memory systems by fostering a team learning orientation (Bunderson & Sutcliffe, 2003). This can be established by promoting mutual collaboration among group members and developing a decentralized communication structure instead of using directive leadership which is associated with a communication structure that centers around the leader. A decentralized transactive memory system where a large proportion of group members hold significant parts of the group knowledge is less subject to disruption when, for instance, a centrally positioned leader is over-loaded with work, cannot communicate with adequate frequency, and thus is not able to provide the knowledge for the group.

Interdependent work entails uncertainty about other's motivation, competency and behaviours: Will they do the work they said they would do? Will they perform to the standards set? Will they deliver their part in time? Especially in geographically distributed groups, the continuous communication essential for sharing the knowledge of the group and the information about individual activities related to the task is difficult to maintain. This leaves the group members to cope with high levels of uncertainty. Delays in remote

communication make feedback about others' activities difficult to obtain. Delayed or inaccurate feedback requires several iterations for clarification. In face-to-face groups feedback about others activities is more immediate and can be obtained more easily, for example, by observing who attends meetings or who participates in hallway communications. In contrast, members in distributed groups (sometimes called virtual groups because nowadays they communicate electronically) may go long periods during which they have no feedback about each other's activities.

Team awareness is the group members' understanding of the ongoing activities of others which provides a context for their own activity. It reduces the effort needed to coordinate tasks and resources by providing a context to interpret communications and other's actions more adequately (Weisband, 2002). Leadership can foster the development of team awareness by taking actions to monitor the progress of others and to include everyone by sharing the respective information and by considering workload constraints of individual group members for task allocation. Weisband (2002) studied leadership influence on team awareness with geographically dispersed student project teams working on a four-week project (writing a consensus policy document) via e-mail and a web-based conferencing system. The more the above-described leadership actions were shared (i.e. several group members engaged in the leadership awareness activities) the more team awareness individual group members developed and the better was overall project performance. Developing team awareness among group members takes effort and time. It is an investment that becomes profitable after longer or repeated group task performance and under certain conditions, for example, in distributed or virtual work teams.

In general, leadership for group learning not only means providing the training resources for each group member to learn to perform the job better individually (I-I transfer). It also involves developing a collaborative learning orientation where group members discuss

and improve each others' task performance strategies and behaviours (G-I transfer). Furthermore, the development of transactive memory systems and team awareness benefits from encouraging group members to reflect and constantly improve the ways they collaborate and interact with each other (G-IG transfer), and to learn about other group members' areas of expertise, strength, and weaknesses (G-G transfer). The more this knowledge and awareness is developed and leadership functions are shared within the group, the more likely it is that group members can support each other, fill gaps for each other, correct and manage each others' errors, and anticipate and cope with capacity shortages on the part of particular group members before problems arise. All this improves group performance over time.

Summary

In sum, group leadership means the proactive design of task structures, careful composition of the work group and the management of synchronization for group decision making and task execution. Apart from an active coaching of individual group members, leadership functions in groups also comprise the development of effective transactive memory systems and team awareness among group members (which may take some time). All these leadership functions do not need to be infused into work groups by just one (formal) leader. Especially when high task interdependence and geographically distributed or virtual teamwork is involved, the shared performance of leadership functions seems to work best.

Conclusions

In this chapter, we have reviewed basic group processes and leadership that influence group performance. With regard to the specific questions outlined in the introduction, the following conclusions can be derived from this review:

- *How can we identify group-level effects on performance?* Group performance is, first and foremost, influenced by individual performance. The group members' individual performances (or abilities) constitute the basis for the

definition of potential group performance. Potential group performance differs based on task type (e.g., additive, disjunctive and conjunctive tasks) because individual contributions are differently related to group performance for these different task types.

- *What are the major pitfalls and opportunities when people work together in a group?* Actual group performance diverges from potential group performance due to process losses and process gains. Process losses are coordination losses, motivation losses and individual capability losses; process gains are motivation gains and individual capability gains. These processes constitute the group-level influences on group performance.
- *What can we do to systematically optimize group performance?* Process losses can be reduced and process gains can be facilitated if three basic principles of group leadership are applied: Composing groups in accordance with task requirements, synchronizing group members' efforts during collective performance, and allowing for group learning across multiple task trials.
- *What makes leadership effective?* Leadership effectiveness depends on many factors: leader traits, leadership behaviour, situational factors (e.g., task, followers, social context), or whether leader-follower relationships are transformational, transactional, or non-existent (laissez-faire leadership). Note that focusing solely on the leader as the focal point of leadership limits our understanding of the complex nature of leadership, which is a mutual influence process that can be shared among group members.
- *Why is leadership so critical for group performance, and how can it contribute to the optimization of group performance?* Leadership, be it in the form of an individual leader or in the form of shared leadership, is about influencing

others for the benefit of individual, group, and organisational goals. Group leadership helps (or hinders) groups to optimize their performance.

- *How can leadership help to improve group performance?* Derived from the basic principles of group leadership, we identified three categories of situational contingencies that are important: Composition (e.g., align group and task structure), synchronisation (e.g., manage information and activity for reducing process loss and increasing process gain) and group learning (e.g., foster individual and group development by supporting all learning processes within groups).

As we mentioned at the beginning of this chapter, research on group performance was one of the very first topics that social psychology dealt with. Some of the most intriguing present directions in this field include the systematic detection of process gains, the analysis of collective information processing in groups, the optimization of group performance via basic principles of group and shared leadership. We are confident that group performance and leadership will remain central topics of social psychology at the interface between basic research, applied research, and the application of social psychology in organisations.

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Table 1:

Important types of unitary group tasks and their implications for group potential

Task type	*Examples*	*Group potential*
Additive	Pulling a rope; brainstorming; shovelling snow	Sum of members' individual performance
Disjunctive	Problem solving; decision making; mathematical calculations	Best member's individual performance
Conjunctive	Mountain climbing; precision work; keeping something confidential	Weakest member's individual performance

Table 2:

An overview about the process losses and process gains in group performance that have been documented in the literature so far

Level of process	*Process losses*	*Process gains*
Coordination	Ringelmann effect Production blocking	–
Motivation	Social loafing Free-riding Sucker effect	Social compensation Social competition Köhler effect
Individual capability	Cognitive restriction	Cognitive stimulation

Table 3: Information distribution in a hidden profile task ("+" indicates advantages of the candidate and "-" indicates disadvantages of the candidate; shared information is indicated by grey background)

	Group member X	**Group member Y**	**Group member Z**	**Whole group (X ∪ Y ∪ Z)**
Candidate A	Has good analytical expertise (+)	Stays calm under pressure (+)	Works well with the team (+)	Has good analytic expertise (+) Stays calm under pressure (+) Works well with the team (+)
	Lacks humour (-) Is not very creative (-)	Lacks humour (-) Is not very creative (-)	Lacks humour (-) Is not very creative (-)	Lacks humour (-) Is not very creative (-)
Candidate B	Has good communicative skills (+) Is known to be very reliable (+)	Has good communicative skills (+) Is known to be very reliable (+)	Has good communicative skills (+) Is known to be very reliable (+)	Has good communicative skills (+) Is known to be very reliable (+)
	Tends to be short-tempered (-)	Is often resentful in conflicts (-)	Refuses doing overtime (-)	Tends to be short-tempered (-) Is often resentful in conflicts (-) Refuses doing overtime (-)
Candidate C	Knows the market inside out (+) Works well with the team (+)	Knows the market inside out (+) Works well with the team (+)	Knows the market inside out (+) Works well with the team (+)	Knows the market inside out (+) Works well with the team (+)
	Is inattentive in meetings (-)	Delays uncomfortable tasks (-)	Is said to be arrogant (-)	Is inattentive in meetings (-) Delays uncomfortable tasks (-) Is said to be arrogant (-)
Implied choice	**Either B or C**	**Either B or C**	**Either B or C**	**A**

Figure 1: Average individual weight pulled dependent on the number of persons pulling together (Ringelmann, 1913)

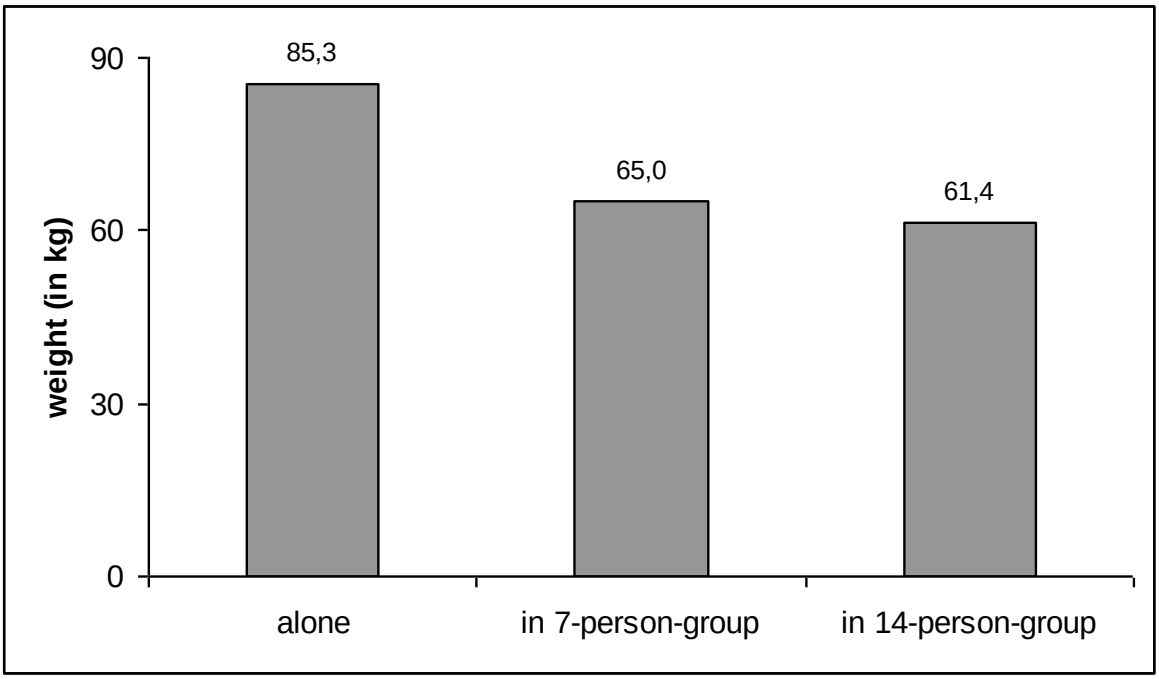


Figure 2: Intensity of sound produced per person when cheering alone vs. in actual or pseudo-groups of two or six persons (Latané, Williams & Harkins, 1979, p. 827)

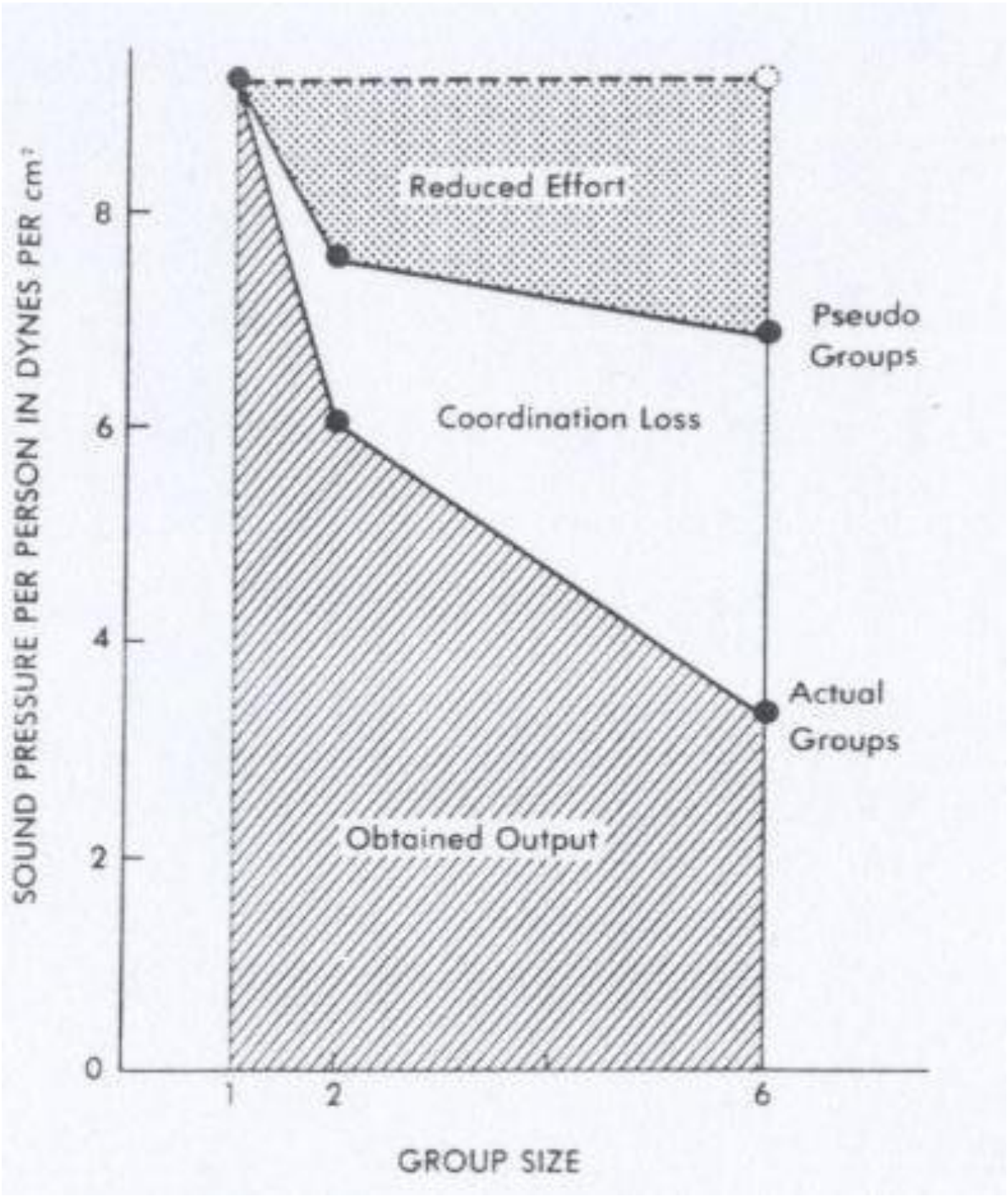


Figure 3: Social loafing and social compensation as a function of task relevance and partner ability (Williams & Karau, 1991, Exp. 1)

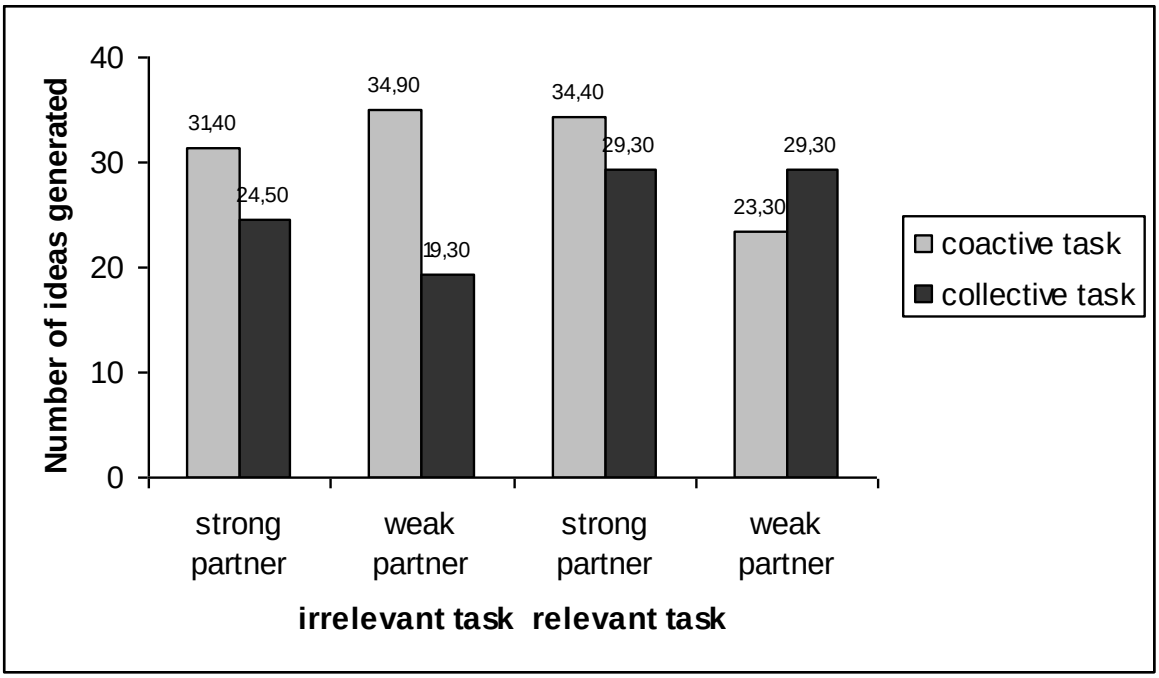


Figure 4: Explanations for the failure of groups to discover hidden profiles (adapted from Brodbeck et al., in press, and Mojzisch & Schulz-Hardt, 2006)

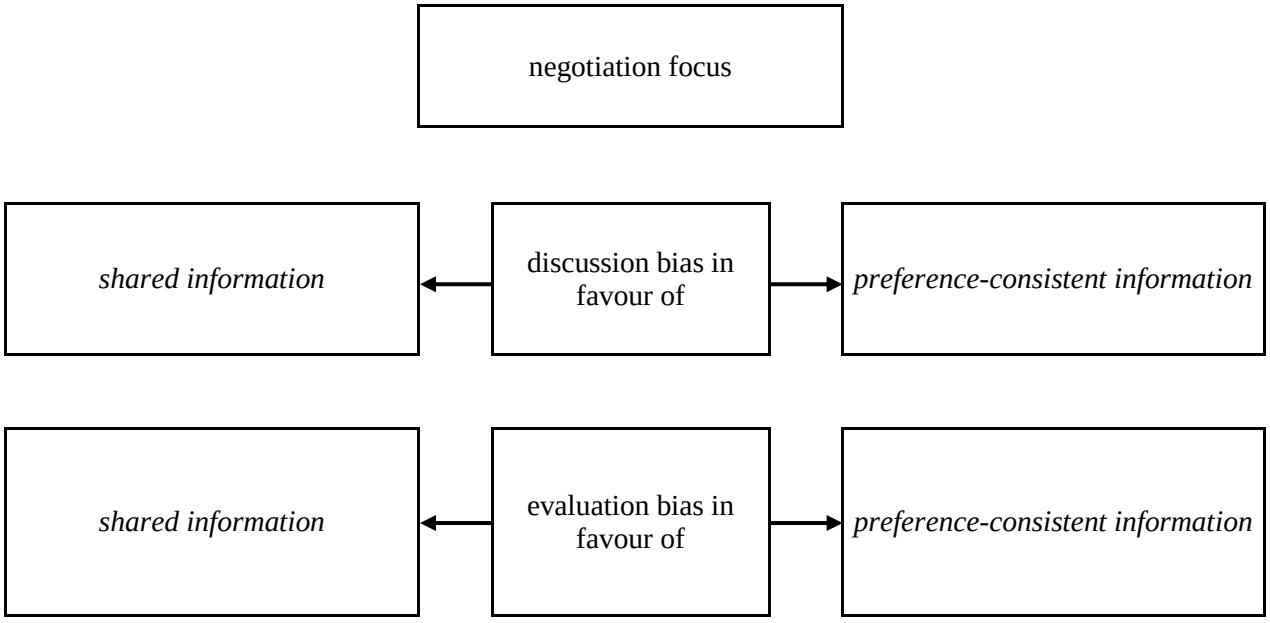


Figure 5: Development of Potential and Actual Group Performance over Consecutive Task Trials (Brodbeck & Greitemeyer, 2000a, Experiment 1: Simple Rule Induction Tasks)

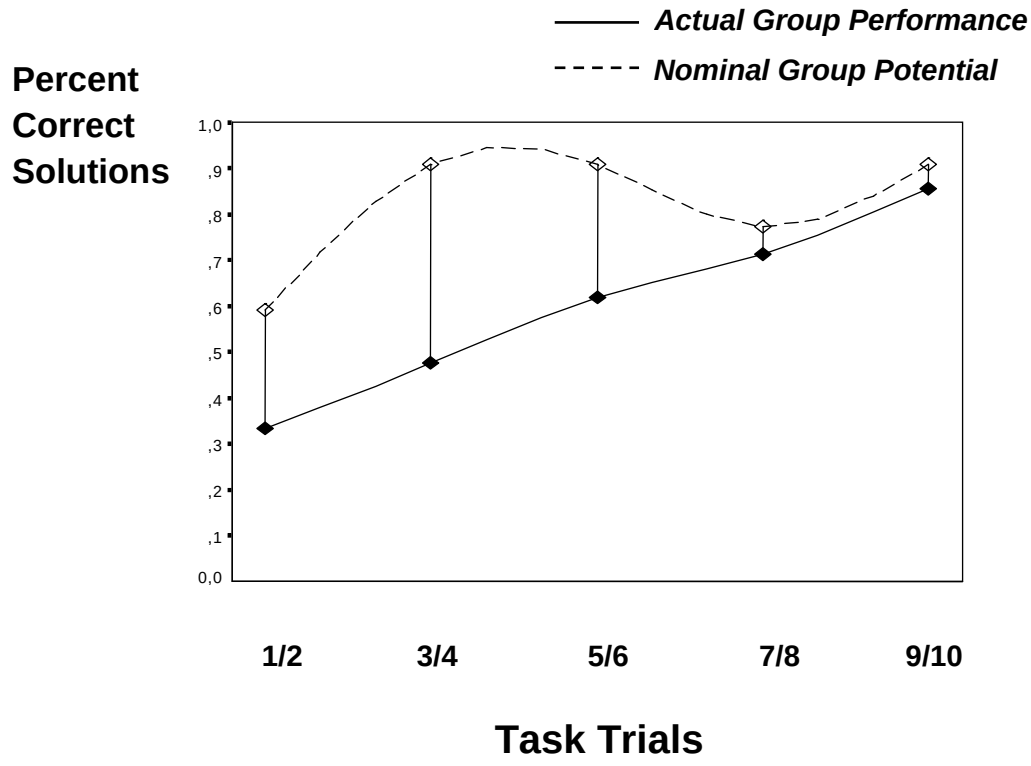


Figure 6: Development of Potential and Actual Group Performance over Consecutive Task Trials (Brodbeck & Greitemeyer, 2000a, Experiment 2: Difficult Rule Induction Tasks)

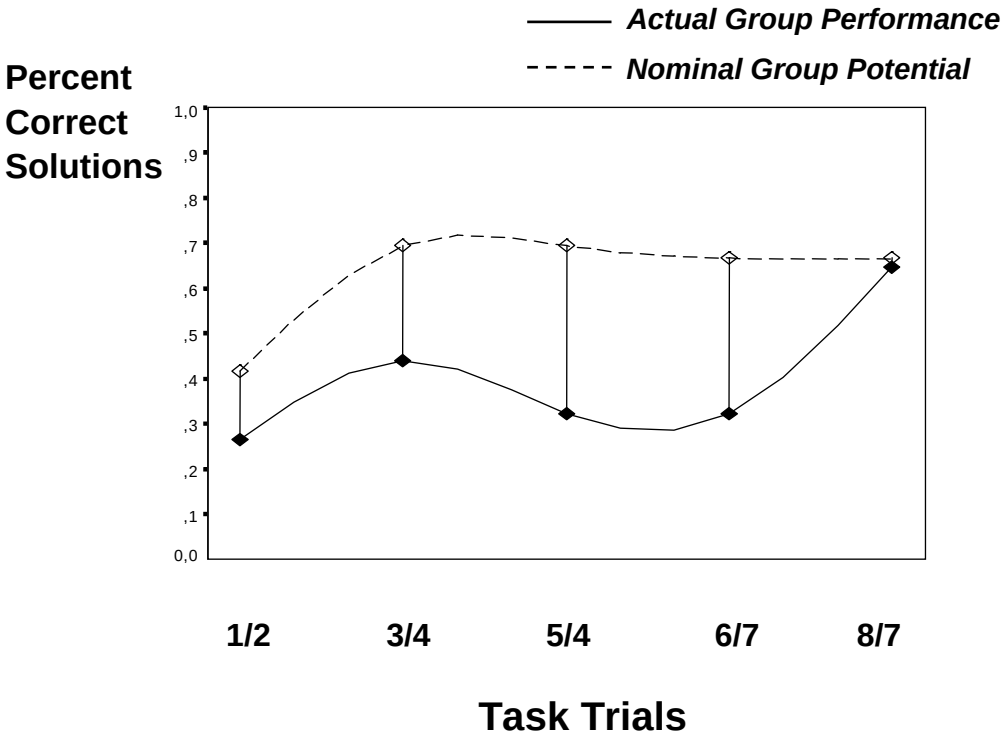
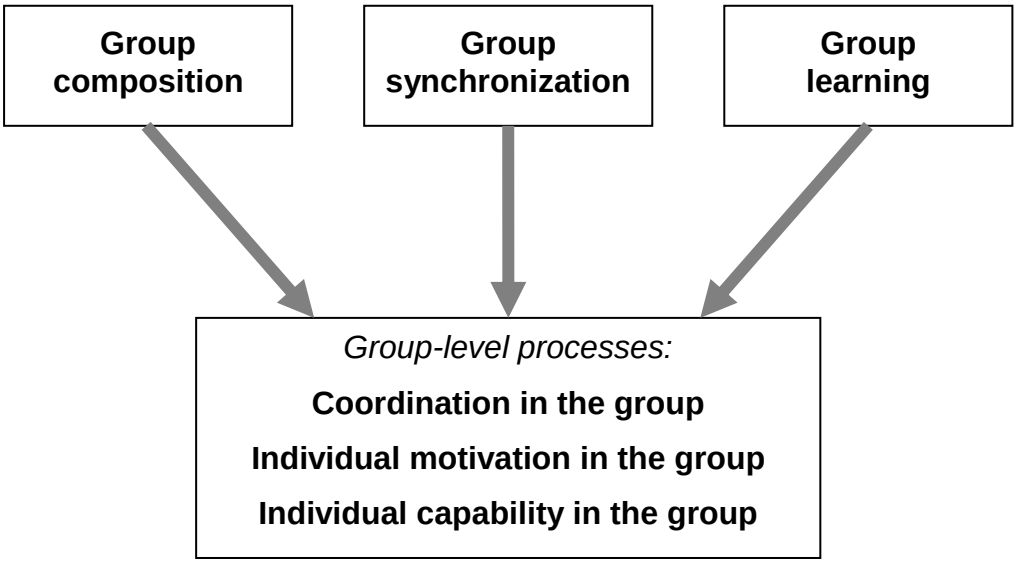


Figure 7: The three basic elements of group performance management as affecting all three levels of performance-related group processes



Further readings

Baron, R., Kerr, N. & Miller, N. (1992). Group process, group decision, group action. Buckingham: Open University Press. The book is one of the best and most comprehensive introductions into the diverse facets of performance and performance-related processes in groups.

Pierce, J. L. & Newstrom, J. W. (2003). Leaders and the leadership process: Readings, self-assessments and applications. Boston: McGraw-Hill Irwin. In addition to concise descriptions of leadership theory and practice, this textbook contains many excerpts of classic theoretical and research oriented papers, as well as self-assessments, practical applications and useful further readings in the domain of leadership.

Steiner, I. D. (1972). Group processes and productivity. New York: Academic Press. Steiner's book remains the classic and pioneering analysis of group performance on various tasks. Although more than 30 years old, many insights from this book are still highly relevant, and some of them still await their realization in group performance research.

Turner, M. E. (2001). Groups at work: Theory and research. Mahwah, NJ: Erlbaum. This book's social psychological and organizational perspectives on the fundamental topics of group performance research is a useful tool for students and researchers who are interested in the organizational application of group performance research, and for practitioners who want to learn more about the theoretical basis of groups and group performance.

Witte, E. H. & Davis, J. H. (eds.) (1996). Understanding group behavior (Vol. I and II). Mahwah, NJ: Erlbaum. The two volumes contain a series of insightful papers from well-known group researchers. They are particularly valuable to readers who would like to broaden the scope from "pure" group performance research to many other facets of intragroup and intergroup behavior that are nevertheless relevant for group performance.

Yukl, G. (2005). Leadership in organizations (6th Edition). Upper Saddle River NJ: Prentice Hall. This classic book contains a comprehensive review of leadership theories and research. New editions appear regularly.

Pioneers

Max Ringelmann (1861-1931) was professor of agricultural engineering at the French National Institute of Agronomy and director of the Machine Testing Station. His main field of research lay in determining the efficiency of work in agricultural applications. In what may be considered the first experiment in social psychology he discovered a decrease in individual effort that occurs when the individual works in a group rather than alone. As well, the individual contribution to group performance for each member of the group decreases as group size increases. These findings are referred to as *Ringelmann Effect*.

Ivan D. Steiner (1917-2001) graduated from Central Michigan University before receiving a master's degree and a doctorate from the University of Michigan. He was a PhD student of Ted Newcomb, and later on he also taught social psychology at the University of Illinois. He spent the last ten years of his academic career at the University of Massachusetts (Amherst). Steiner contributed greatly to the research on group performance and became famous for his classification of group tasks. Depending on how the individual's effort contributes to the overall performance of the group he distinguished between *additive*, *conjunctive* and *disjunctive tasks*, each of which are affected differently by process losses and process gains.

Websites and other sources

GLOBE home page [http://mgmt3.ucalgary.ca/web/globe.nsf/index]

Interdisciplinary Network for Group Research (INGRoup) [http://www.msu.edu/~gwittenb/ingroup.html]

International Leadership Association [http://www.academy.umd.edu/ila/]

Research Close Up [Box 1]

Latané, B., Williams, K. & Harkins, S. (1979). Many hands make light the work: The causes and consequences of social loafing. Journal of Personality and Social Psychology, 37, 822-832.

Introduction

The authors intended to replicate Ringelmann's findings of process losses in collective work with a different task and demonstrate to what extent the process losses are due to insufficient coordination vs. motivation losses in groups. Therefore, they conducted two experiments with a "cheering and hand clapping" task (see below). In the first, experiment, they successfully replicated the **Ringelmann effect** by showing that the more people were in a group, the less noise was produced per person. To be able to distinguish between motivation and coordination in Experiment 2, which we will take a closer look at in the following, Latané et al. used an elegant strategy, namely introduction of so-called "pseudo groups". In a pseudo-group, participants are led to believe that they were working in a group, while actually working alone. Since no coordination losses are possible in this situation, all process losses found in pseudo-group would have to be due to motivation losses.

Method

Participants. 36 male undergraduates participated in the experiment, with 6 participants per experimental session.

Design and procedure. The experimental design was a within-subjects-design with five conditions. Each participant made several trials a) alone, b) in actual two-person groups, c) in actual six-person groups, d) in two-person pseudo-groups and e) in six-person pseudo-groups. The participants' task was to shout as loud as possible when the experimenter gave a signal. They were blindfolded and wearing headsets on which constant noise was played. This manipulation allowed to suggest to participants during the pseudo-group-trials that they

were shouting together with one or five other persons respectively, while actually shouting alone.

Results

The data were analyzed with two separate ANOVAs, one comparing the individual trials with the actual two-person group and six-person group trials, the other doing the same for the pseudo-groups. Both analyses showed that the average noise produced per person decreased with increasing number of persons: People shouted less loud in the two-person groups than alone, and they shouted less loud in six-person groups than in two-person groups. This was true for actual groups as well as for pseudo-groups. However, the decrement in individual performance was about twice as high in the actual groups than in the pseudo-groups (no statistical comparisons between these conditions were made). This relationship is illustrated in Figure 2: The decrements in sound intensity between shouting alone and shouting in a pseudo-group can be traced back to reduced effort, since no differences in coordination requirements exist between these conditions. In contrast, the differences between pseudo-groups and real groups can be attributed to coordination losses like, for example, group members not reaching their maximum sound intensity synchronously.

Discussion

The results demonstrate that, in accordance with the authors' hypotheses, coordination losses are not the only source of process losses when people perform a task collectively instead of individually or coactively. Instead, reduced effort also contributes to this effect. Although one might object that no direct measures of motivation and coordination losses existed, it has to be conceded that the arrangement of the experimental setting and conditions hardly leaves room for alternative explanations of the observed performance decrements (e.g., cognitive interferences among members are implausible). In sum, the study successfully demonstrates two reasons for why groups may fail to realize their full potential.

Research Close Up [Box 2]

Brodbeck, F. C. & Greitemeyer, T. (2000a). A dynamic model of group performance: Considering the group members' capacity to learn. Group Processes & Intergroup Relations, 3, 159-182.

Introduction

In two experimental studies the authors investigated the effects of individual experience versus mixed individual and group experience on individual and group learning (performance increments) in rule induction tasks. Rule induction is the search for descriptive, predictive, and explanatory generalizations, rules, or principles. Individuals or members of a group observe patterns and regularities in a particular domain and propose hypotheses to account for them. They then evaluate the hypotheses by observation and experiment and revise them accordingly. Research teams or medical diagnostic teams, for example, use collective rule induction (cf. Laughlin & Hollingshead, 1995). The experimental design allowed for the measurement of change in individual and group performance over consecutive task trials and various related variables, such as the exchange of hypotheses, error detection and error correction, the use of strategies for testing hypotheses, and so on. The level of task difficulty was manipulated across the two experiments in order to account for potential ceiling effects (i.e. maximum performance levels have been reached and thus no improvement in performance is possible).

Method

Participants: 132 students (44 three-person groups) in the first experiment and 174 students (58 three-person groups) in the second experiment from universities in Munich.

Design and procedure. Random series of eight and ten rule induction tasks were performed by sets of three participants randomly assigned to either individual training (performing all tasks in a nominal group), or to mixed training (alternating nominal and collaborative group

task performance). Individual and group performance measures were taken across all tasks. A rule had to be induced that partitioned a deck of 52 playing cards with four suits (clubs = C, diamonds = D, hearts = H, spades = S) of 13 cards (ace = 1, two = 2, ..., jacks = 11, queens = 12, kings = 13) into examples and non-examples of the rule. The instructions indicated that the rule could be based on suit, number, colour (red = r, black = b), or any combination of numerical and logical operations on these attributes (e.g., odd = o, even = e). The rule sequence length consisted of either three or four cards. There were four types of rules: (a) combination of suits (e.g., S-S-H-C), (b) combination of colours (e.g., r-r-b), (c) combination of odd and even numbers (e.g., e-o-e), and (d) combination of colour and odd versus even numbers (e.g., ro-bo-re). The most difficult rule was S-S-H-C (32% solution rate) and the easiest rule was r-r-b-b (71% solution rate).

Results

As predicted, in both experiments nominal group performance improved as a function of improved individual resources for performing the task individually and (with some time lag) collective group performance improved as a function of collaboratively working in groups, thereby reducing or even eliminating process losses completely (see Figures 5 and 6, the last two task trials). Note that in Experiment 1 a ceiling effect could have caused group performance to catch up with respective levels of individual performance in later trials. Thus, in the second experiment, more difficult tasks were given. A ceiling effect due to nominal group performance reaching 100% solution rates is not discernible (see Figure 6).

The formation of hypotheses about rules and the employment of error checking strategies and their success was analysed in more detail by Brodbeck and Greitemeyer (2000b). In individual post-tests, mixed training participants performed error checking more promptly and as a result generated fewer non-plausible hypotheses than did individual training participants. In the group post-test, mixed training groups were superior in collective

error checking and more effective in collective truth detection than were individual training groups.

Conclusion

The results demonstrated that group learning is a function of various sources of learning: a) improvements in individual resources for performing the task individually (Individual-to-Individual (I-I) transfer), b) improvements in individual resources as a consequence of prior collaboration (Group-to-Individual (G-I) transfer), and c) individual learning to collaborate more smoothly and more effectively during collective task performance (Group-to-Individual-in-Group (G-IG) transfer). Furthermore, it demonstrated that process loss can be reduced or even eliminated when a considerable amount of task trials ($\underline{n} = 5$) is performed in a group collaborative context. The altogether four different learning processes identified by these experiments are further described and illustrated by examples in the chapter's text.

Glossary „group performance and leadership“:

brainstorming subsumes all organized approaches for producing ideas about a particular topic. The classic brainstorming rules put forward by Osborn (1957) invite freewheeling (mentioning any idea that comes to mind) as well as building on the ideas of others and forbid criticism of ideas mentioned in the group (during the brainstorming phase). Brainstorming is a means to facilitate problem solving through the principle of *quantity breeds quality*.

cognitive restriction describes a capability loss in group tasks that involve idea generation. Cognitive restriction occurs if an idea mentioned by another group member makes one focus on the particular category that this idea belongs to, at the expense of generating ideas from other categories.

cognitive stimulation is a capability gain in group tasks that involve idea generation. It occurs when an idea mentioned by another group member stimulates a cognitive category one would otherwise not have thought of.

contingency approaches to the study of leadership emphasize the role of situational factors (e.g., characteristics of the task, the followers or the social context) and how these moderate the relationship between leader traits↑ or leadership behaviours↑ and leadership effectiveness↑.

coordination losses describe diminished performance of a group if it fails to optimally coordinate its members' individual contributions.

eureka effect means that the correct solution to a problem, once it is found, is immediately recognized as being correct by group members.

free-riding is a motivation-based reduction in group members' task-related effort because their individual contribution seems to have little impact on group performance.

group composition specifies what people are brought together in a group.

group leadership is influencing, motivating, or enabling oneself and others to contribute toward the effectiveness and viability of work groups.

group learning is a generic term for several learning processes that can only occur if several people co-actively or cooperatively work on the same task.

group performance management is the sum of activities aimed at maximizing (or improving) the group-specific component of group performance.

group synchronization is the sum of activities aimed at optimizing the collaborative generation, modification and integration of individual contributions in a group.

group task type distinguishes group tasks depending on whether the task is divisible upon group members, whether the quality or quantity of the output is relevant, and how individual contributions are related to the group's performance.

group-to-individual (G-I) transfer denotes a group learning process whereby a group member's ability to perform a task on his own improves as result of social interaction between group members during repeated collective task performance.

group-to-individual-in-group (G-IG) transfer denotes a group learning process whereby a group member's ability to perform a task within groups improves as result of social interaction between group members during repeated collective task performance.

group-level-learning or (G-G transfer) denotes a group learning process whereby a particular whole group's capability to perform a group task improves as result of social interaction between its group members during repeated collective task performance.

hidden profile describes a group decision situation where task relevant information is distributed among group members in a way that no individual group member can detect the best solution based on his or her own information. Only by sharing information within the group, the optimal solution to the task may become evident.

individual capability losses vs. gains are improvements or impairments of individual group members' ability to successfully perform a task due to social interaction with the group.

individual-to-individual (I-I) transfer denotes individual learning processes whereby a group member's ability to perform a task on its own improves as a result of repeated individual task performance.

Köhler effect is a motivation gain in groups and denotes weaker group members' working harder than they would do individually in order to avoid being responsible for a weak group performance.

laissez-faire leaders engage in "non-leadership", e.g, they avoid making decisions, hesitate in taking action, and are often absent when needed.

leaderless groups have no appointed leader (e.g., self-managed work groups) but may be lead by agents external to the group and by shared or team leadership↑.

leadership (in organizations) means influencing others (motivating, or enabling others to contribute toward the effectiveness of work units and organisations).

leadership behaviour refers to observable human acts that are meant to influence, motivate, or enabling others to contribute toward the effectiveness of a work unit or organisation.

leadership effectiveness means the impact leadership has on the accomplishment of group and organizational objectives, on the behaviour, perceptions, attitudes, values, motivation, or well-being of followers and peers, and on the accomplishments of those who lead.

leadership style is a pattern of leadership behaviour↑ which is repeatedly shown and evident across a variety of situations.

leader traits are relatively stable person characteristics (e.g., personality, intelligence, motivational dispositions) on the basis of which leader emergence and leadership effectiveness↑ are sought to be predicted.

motivation losses vs. motivation gains resemble increases or decreases in group members' motivation to contribute to group task performance.

nominal group is a number of individuals who perform on a task individually and work independently of each other. Nominal groups are used to determine a group's potential performance.

potential group performance, also referred to as group potential, is the performance that would have occurred if the members of a group had worked independently of each other and not as a group. It is a common benchmark to evaluate actual group performance.

production blocking describes a process loss typical for brainstorming tasks in face-to-face groups. Since in a group only one person can speak at a time, the other group members can not express their own ideas during that time.

Ringelmann effect describes the finding that in physical tasks as, for example, weight-pulling the average performance of individual group members decreases with increasing group size. Later studies have shown that this effect is largely due to coordination losses.

shared or team leadership means that the responsibility for leadership functions, the exercise of leadership behaviour↑, and the perceptions about leadership roles are shared among group members.

social compensation is a motivation gain in groups that occurs if stronger group members increase their effort in order to compensate for weaker members' suboptimal performance.

social competition is a motivation gain in groups that occurs if the group members want to outperform each other during group tasks in which the individual contributions are identifiable.

social loafing is a motivation loss in groups occurring if group members reduce their effort due to the fact that individual contributions to group performance are not identifiable.

sucker effect is a motivation loss in groups occurring if group members perceive or anticipate that other group members will lower their effort. To avoid being exploited they reduce their effort themselves.

t**eam awareness** is the understanding of the ongoing activities of others which provides a context for your own activity.

transactional leaders focus on the proper exchange of resources. They give followers something they want in exchange for something the leader wants.

transactive memory refers to a system of knowledge possessed by group members with shared awareness of each other's expertise, strengths and weaknesses.

t**ransformational/charismatic leaders** focus on the alignment of the group or organisational goals with the followers' needs and aspirations by developing an appealing vision. The goal is to influence followers to make sacrifices and put the needs of the organization above their self interests.