Group performance: a confrontation of a proximate with an ultimate evaluation

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Small Group Performance:

Reinterpreting Proximate Evaluations from an Ultimate Perspective

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Abstract:

In this article, two scientific approaches are conjoined: Small group research and evolutionary theory. In the past 50 years, small group researchers have identified various deficits in group performance. Presently, how to improve group interaction is a focal point of their work. Meanwhile, social psychologists are paying more attention to evolutionary theory, and process losses in group performance may be evaluated differently from such a perspective. It appears that proximate performance losses could mean ultimate gains for the individual. A reduction in group performance should therefore be anticipated from a proximate perspective, because it represents an individual selection advantage from the ultimate view. As a means of intervention, group facilitation techniques are the key to proximate gains in group processes.

Keywords: evolutionary theory, group process, proximate evaluation, small group research, ultimate evaluation.

Small Group Performance:

Reinterpreting Proximate Evaluations from an Ultimate Perspective

In today's ever-changing world, group-level potential is indispensable for solving complex tasks. However, individual patterns of behavior may not be optimized to fulfill collective goals. Although small groups such as political cabinets, court juries, medical and marketing teams play a significant role in society's functioning, scientists evaluating group performance criticize their observable process losses. Over the past 50 years, small group research focused chiefly on the discovery of deficient group performance (Kerr & Tindale, 2004; Williams, Harkins & Karau, 2003). During the same period, contributions made in evolutionary social psychology (Kameda & Tindale, 2004; Simpson & Kenrick, 1997) revealed that the homo sapiens lives in conditions eminently affected by the group context (Kameda & Tindale, 2004, 2006). If groups actually perform so poorly although we need them to survive, extinction of humankind should have emerged long ago (cp. Wilson, 1997; Yeager, 2001; Caporael, Wilson, Hemelrijk & Sheldon, 2005).

Assessing Small Group Performance: The Proximate Evaluation Style

Until now, small group researchers have defined collective performance as the achievement of current, short-term goals. The present serves as the time dimension for observing performance, and group performance is therefore evaluated using results assessed in concrete situations. Subsequently, group success is predicted on the basis of statistical models (Witte & Davis, 1996). They were developed to compare individual to group performance, because these forms are characterized by different system levels. The key idea is to statistically predict a group's performance level by modeling it with average individual behavior for n group members. Then, this measure is compared to the behavioral results shown by real groups in concrete situations (Davis, 1973;

Steiner, 1972). A group's size influences performance estimation and it should be controlled in such models.

This evaluation style is similar to *proximate* causation, despite varying approaches to the latter term's definition (cp. Ariew, 2003). First introduced by Mayr (1961), proximate causation is an expression used when scientists describe *how* observed patterns of behavior operate (Tinbergen, 1963). For instance, researchers can evaluate a group on the basis of its structural elements, i.e. individuals, situation and organizational context, and the way they causally affect the group's resulting potential. In searching for proximate causes, the following questions can be asked from a social psychological perspective: How does a particular social phenomenon function? Which elements are identifiable? How do the latter interact? Is the interaction systematic? Proximate questions therefore address immediate causes of behavior, and as Wilson (1975, p. 23) states, such machinery operates "within the lifetimes of organisms, and sometimes even within milliseconds…" (see also Mayr, 1961; Tinbergen, 1963).

How is behavior evaluated from a proximate perspective? Firstly, immediate behavior is observed. Secondly, the outcome, e.g. group performance, is compared to optimally functioning machinery, i.e. statistical group performance. To avoid confusion, performance will be defined in terms of *input* and *output*. The term (O) stands for performance output. We will further distinguish between group output as a baseline (O_{gb}) and as an empirically estimated value (O_{ge}). Individual output will be addressed later in the text as required. See Figure 1 for more. In sum, scientists using this evaluation frame intend to assess how well a group *functions.*

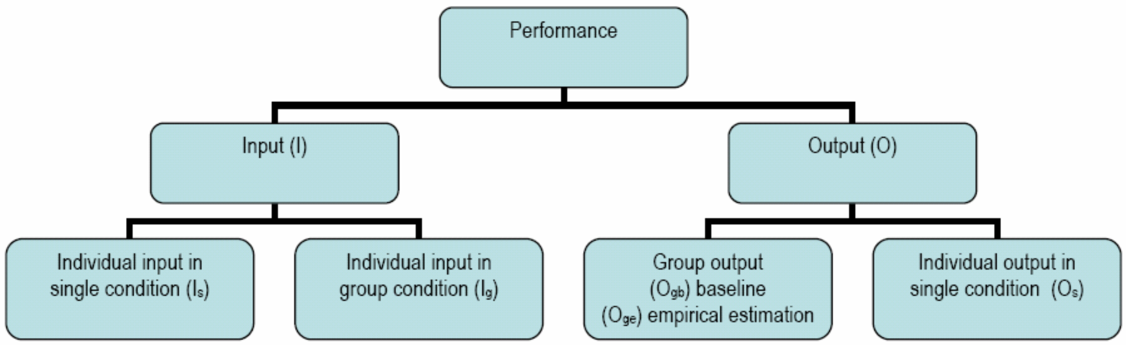

Figure 1: Human performance defined as input (I) and output (O). Individual input can be performed in either a single (s) or group (g) context. Output is defined on a group or individual basis, which simultaneously defines the context (group vs. single). Group output can further be assessed using different algorithms: baseline vs. empirical estimation.

Reassessing Small Group Performance: The Ultimate Evaluation Style

While the proximate evaluation style focuses on the mechanisms shaping behavior, i.e. how the group performs compared to expectations or ideals, broader explanations for group behavior are not given. In applying the ultimate evaluation style to group performance, researchers move from asking *how* behavior happens to *why* it occurs. This is a different kind of explanation, because instead of clarifying how interacting elements such as individuals, situation and context affect how behavior functions, scientists applying an ultimate evaluation style investigate a behavior's *purpose*. Moreover, we search for the reasons which lead behavioral machinery to function in a certain manner. Ultimate causation, i.e. why observed behavior occurs, operates via proximate causation (Wilson, 1975, p. 23). This relation is comparable to the distinction between genotype and phenotype.

Remember that the proximate evaluation style incorporates average individual performance to model group behavior. This perspective does not focus on the individual, but rather on n persons aggregated in one more or less optimally functioning group. Different, momentarily occurring influences are then held accountable for the quality of performance shown by the group as an entity (cp. Baron & Kerr, 2003; Forsyth, 2006; Wilke & Meertens, 1994). The ultimate evaluation style, on the contrary, focuses on individual behavior to facilitate broader causal interpretations. This perspective is more complex and it compares individual input to the output measured in single and group contexts. The relationship between input and output in a single context (O_s/I_s) *and* in a group context (O_g/I_g) is the comparison evaluated with the ultimate style. To understand why collective behavior occurs in the manner it does, small group researchers must ask themselves what advantages it has for the single member. Therefore, solely comparing group output (O_g) with a baseline model does not suffice. For broader causal interpretations, we propose comparing the relation between output and input in both single and group contexts.

In evolutionary biology, survivorship and fertility are the basis for ultimate causation (Wilson, 1975, p. 23; Schaller, Boyd & Richerson, 2005; Simpson & Kenrick, 2006). Specifically, this means behavior patterns which individually improve the chances of survival and reproduction, i.e. of genome transfer, will be genetically maintained via natural selection (cp. Bass, 1998, p. 100). On an individual level, behavior represents an individual advantage if group performance exceeds single performance. According to evolutionary theory, group behavior will be modified so that an individual gain in performance results. The concept of group selection (Sober & Wilson, 1998; Wilson, 1997; Wilson & Sober, 1994; Kameda & Tindale, 2006) is not necessary to demonstrate ultimate group advantages for individuals (Yeager, 2001), because not the group but rather the individual gains an advantage in selection. As Boyd & Richerson (2005) summarize:

> Thus, beliefs that are costly to the individual should diminish, while beliefs that are beneficial to individuals should spread. Extensive theoretical analysis suggests that group selection can counteract this process only if groups are very small and migration among groups is very limited. (p. 205)

In this contribution, the *ultimate* evaluation style will refer generally to interpretations of behavior which emphasize individual usefulness, i.e. supra-situational causation supporting evolution theory and its implications for genome transition. Small group researchers can ask themselves why a particular group behavior happens and if there is an advantage for individuals when they perform in a group context (O_g/I_g). The *proximate* evaluation style will refer to the immediate mechanisms of group behavior, i.e. how behavior functions. It focuses on specific and current group performance, e.g. the comparison of collective output with a baseline model (O_{ge}/O_{gb}). These evaluation styles incorporate different time spans and objectives (functionality vs. purposefulness). In our view, proximate and ultimate perspectives need to be distinguished when assessing group performance.

In this contribution, we will interpret social psychological phenomena, i.e. problem solving, social loafing, helping behavior, information sharing and creativity, from both proximate and ultimate perspectives. The present question is whether human beings interacting in natural groups are affected by their behavioral biology in such a way that proximate losses have to be expected. This question will become even more important once we demonstrate that group losses, proximately evaluated, may be interpreted as advantages for individual selection. Human beings normally behave in a way that supplies them with an individual advantage ($O_g/I_g > O_s/I_s$; Williams et. al., 2003). Such behavior may interfere with overall performance, resulting in a poorer team evaluation, because on a proximate level the group and not the individual is evaluated (ideally $O_{gb} < O_{ge}$).

In this article, theoretical descriptions of several group processes are presented. Firstly, we will illustrate them from the traditional, proximate perspective and subsequently complement them with an ultimate interpretation. Finally, we compare both approaches and draw conclusions for theory as well as for social practice. We will demonstrate that proximate and ultimate evaluations are not contradictory, but rather can be understood on the basis of differing theoretical backgrounds. With these intentions in mind, we hope social psychologists will develop a better understanding of group behavior as it is observed proximately (Kameda & Tindale, 2006).

Cognitive Group Performance

Proximate Evaluations of Cognitive Group Performance

According to small group researchers (Forsyth, 2006; Witte & Davis, 1996), groups master specific tasks better than the average person alone due to collective learning processes and group consensus. Generally, to evaluate cognitive group performance, either the value for the best individual or the well-known equation on group level is used (Lorge & Solomon, 1955; see the quadrant *proximate, estimated performance* in Table 1). The latter equation theoretically expresses that group members "optimally adapt to present conditions", meaning the correct solution is given by only one person and is accepted by the others ("truth wins"; Davis, 1973). This assumption only works with "eureka" problems in which solutions are instantly comprehensible (Steiner, 1972), and groups normally perform worse on other types of problem solving tasks (Kerr & Tindale, 2004). Moreover, groups often perform as well as their second best group member ("truth-supported wins"; Stasser, Kerr & Davis, 1989), and to a certain degree, they possess an advantage over individuals, because the collective compensates for individual errors (Kerr, MacCoun & Kramer, 1994). Laughlin, Bonner and Miner (2002) even hypothesized that groups perform better than the best individual due to mutual stimulation, i.e. groups make less mistakes and give more correct responses even if no member knows the correct solution. This is a classical, yet rare synergy effect on group level. Nevertheless, cognitive group performance is assessed as being highly deficient by researchers evaluating with a proximate style. Empirical groups, namely, do not achieve the performance quality expected by the above theoretical assumptions. Generally, cognitive group performance on non-eureka problems functions according to the majority rule (Davis, 1996). This leads to a decrease in the probability for task solution. See the quadrant *proximate, actual performance* in Table 1 for this equation; the table summarizes this section.

Ultimate Evaluation of Cognitive Group Performance

In using the proximate evaluation style, small group researchers assume maximum consensus on a suggested correct solution. Group-level performance is thereby assessed, and this aspect marks progress in research opposed to the initial comparison of group with individual performance (Davis, 1973**)**. However, to use an ultimate evaluation style, it is necessary to extract the individual advantage from overall group performance. Maximum agreement with other group members is defined by $P = p^n$ (P: probability of group performance; p: probability of average individual performance; n: group size). This equation means that a solution will only be found if all group members know it. In log-linear terms, there will be no individual gain in this case. The individual probability of finding a solution log p corresponds to the average probability of group performance (log P) / n.

The two extremes, i.e. either all or just one group member knows the correct solution, neither incorporate the potential faultiness of a given solution to a complex problem, implying that more than one person should know the “right” answer to ensure task success, nor the possibility of correcting an answer by integrating varying perspectives instead of just producing one single answer accepted by all group members.

Furthermore, the majority rule represents an advantage compared to the individual probability of finding the right solution only when $p > 0.50$, i.e. individual knowledge is available and the solution is not arbitrary. The increase in group performance is especially noticeable in groups of $3 < n < 7$ and when the individual solution has a probability of $0.66 < p < 0.87$ (Grofman, 1978). Hence, small groups encountering a problem which is neither too difficult nor too simple provide an individual advantage when a majority decision is used. Yet when proximately evaluated, overall group performance remarkably deviates from the maximum possible solution. However, from an ultimate view, the majority decision rule represents the optimal solution under these circumstances, because it provides the individual with a correct alternative and therewith a high guarantee for task success. In other words, one person alone is less likely to solve the problem than the group majority (Hastie & Kameda, 2005). In evaluating groups with this ultimate focus, an advantage for individuals clearly results. Individuals are more likely to reach the correct solution by performing in a group and the effort needed to do so is justified by this increase in performance. Please refer to Table 1 for a summary of this section.

Table1

Cognitive Performance from Proximate and Ultimate Perspectives

	Performance types compared	
Evaluation style	Empirical	Baseline
Proximate evaluation	[a] $O_{ge} = 1 – (1\text{-}p)^x$	$O_{gb} = 1 – (1\text{-}p)^n$
Ultimate evaluation	$O_s / I_s = p$	[b] $O_{ge} / I_g = 1 – (1\text{-}p)^x / n$

Note. O: Performance / output as a probability (O_{ge}: group output as an empirical estimation and O_{gb}: as a baseline measure; O_s: individual output in single context); p: Probability of correct average individual performance; n: Group size; I: Individual input in a group (I_g) and single (I_s) context. For example: p=0.70, n=5, x= 5-3 (the minimal majority for a group solution). The exponent x counts the members who do not know the solution. O_{ge} = 0.81; O_{gb} = 0.998;
O_s / I_s = 0.70; O_{ge} / I_g = 0.81.
[a]Majority rule: x = minority of false solvers and x < n/2.
[b]If the group solution is accepted by individuals.

Proximate Evaluations of Motivational Group Performance

Bringing people together in a group is expected enhance individual task motivation. Yet although this synergy effect is awaited, it very seldom occurs. For long-term or permanent tasks, effort rates decreases about 10% per additional group member (Moede, 1920; Latané, 1981). This reduction is less for maximum tasks, for which an asymptote of 75% is reached (Forsyth, 2006; Zysno, 1998). The shorter the interval is, the smaller the decrease in performance will be.

Under the simplest of circumstances, motivational group performance is expected equate $O_{gb} = E * n$ (Forsyth, 2006; Zysno, 1998; see quadrant II in, Table 2). However, individual motivation is subject to numerous context effects when single people perform in a group (Williams, Harkins & Karau, 2003). Generally, the following description holds for social loafing (Latané, 1981; Zysno, 1998): $O_{ge} = E * n^{w}$ (see quadrant I in Table 2). A reasonable estimation for the efficiency parameter is w = 0.74 (see Zysno, 1998). The fact that individuals working in groups reduce their effort (Williams, Harkins & Karau, 2003) is a well-known and stable effect. The explanation of this effect, however, is still unclear. The formula in quadrant I in Table 2 is only a description of the observed results when at least two people work together. The parameter w is less than 1 due to social loafing or the Ringelmann effect. Each new individual increases the group performance level, but does so less than under single conditions. Please refer to Table 2 for a summary of this section.

Ultimate Evaluation of Motivational Group Performance

The ultimate perspective does not focus on individual effort (input) in a group context, but rather on the average relation between individual input and output in group and single contexts. From an individual's point of view, less effort (input) needed for group (I_g) than for single performance (I_s). This subjective comparison between both contexts leads to a reduction in individual effort in a group situation (I_g), because the observed overall group performance (O_g) exceeds the level of individual performance in a single condition (O_s). Please refer to Table 2 for an overview. Group output is higher than individual output ($O_g > O_s$) and is achieved with less effort ($w < 1$). In using the ultimate evaluation style, the individual reduction of effort in a group context can be an advantage for a single person. By reducing performance motivation in a group context, the individual can avoid exerting strenuous effort otherwise necessary for single performance and conserve energy for other responsibilities. At the same time, overall group performance exceeds individual performance in a single condition. Contrary to comparisons made on the basis of the proximate evaluation style, the individual condition is the reference performance level for conclusions made using the ultimate evaluation style. In other words, the group performs better than an individual could alone, and the individual can even reduce effort while still profiting from group performance (Feuchter, 2001). For instance, a group can build a house much faster than a single person alone even if individual effort is reduced. Please refer to Table 2 for a summary of this section.

Table 2

Motivational Performance from Proximate and Ultimate Perspectives

	Performance types compared	
Evaluation style	Empirical	Baseline
Proximate evaluation	[a]$O_{ge} = E * n^w$	$O_{gb} = E * n$
Ultimate evaluation	$O_s / I_s = E$	$O_{ge} / I_g = O_{ge} / n^w$

Note. O: Performance / output as a probability (O_{ge}: group output as an empirical estimation and O_{gb}: as a baseline measure; O_s: individual output in single context); E: Probability of Individual Performance (Effort); n: Group size; w : Efficiency parameter; w<1; I: Individual input in a group (I_g) and single (I_s) context**;** O_s / I_s: Relationship between individual effort (input) and individual output (performance) in a single condition**;** O_{ge} / I_g: Relationship between individual input (effort) and group output in a group situation. For example: If w=0.74 (Zysno, 1998) and #
n = 5, then O_e= 3.29 E. Thus, O/I = 1.43E with $n/n^w = 1.43$. If w =1, then there is no ultimate advantage because no reduction in effort occurs. If w = 0, then there is a disadvantage of being in a group, because individual input is reduced.
[a] w < 1.

Proximate Evaluations of Helping Behavior

According to the well-known bystander effect, individuals are less likely to help in an emergency if they are in a group. The following equation denotes this relation (Grofman, 1974): $O_{ge} = 1 – (1\text{-}p)^{1/n}$ (see quadrant I in Table 3). In a classical experiment by Latané & Darley (1968), a reaction probability of p = 0.75 was found for individuals and P = 0.38 for a three-member group. The relation between the failure to render assistance in a group (1-P) and the individual failure to do so $(1\text{-}p)^{1/n}$ is constant when expressed in log-linear terms:

log(1-0.38) = -0.21 and log(1-0.75)/3 = -0.20.

Please refer to Table 3 for a summary of this section.

Ultimate Evaluation of Helping Behavior

Rendering help in an emergency represents an individual threat and can reduce the helper's probability of survival. From a victim's point of view, however, receiving help increases the chance of survival. At this point, the question is whether groups can offer individuals an ultimate advantage (Grofman, 1978):

$$P = 1 – (1\text{-}p)^{1/n} \quad \rightarrow \quad \log (1\text{-} P) = \log (1\text{-}p)/ n$$

log (1-p)/ n

Log (1-0.38) = -0.21

Log (1-0.75)/3 = -0.20

If rendering help can be reduced without a decrease in the help received, the group poses an advantage for the individual. According to the values mentioned above, the victim's chance of survival in a group condition remains constant, but the individual's helping behavior can be reduced according to the number of potential helpers. This decreases the threat for the individual helper and denotes an ultimate advantage for each single one. Quadrant III in Table 3 illustrates this phenomenon; refer the table for a summary of this section.

Table 3

Helping Behavior from Proximate and Ultimate Perspectives

	Performance types compared	
Evaluation style	Empirical	Baseline
Proximate evaluation	$O_{ge} = 1 – (1-p)^{1/n}$	$O_{gb} = 1 – (1-p)^n$
Ultimate evaluation	$O_s / I_s = p$	[a] $O_{ge} / I_g = \log(1-p) / n$

Note. O: Performance / output as a probability (O_{ge}: group output as an empirical estimation and O_{gb}: as a baseline measure; O_s: individual output in single context); p: Probability of average individual helping behavior; n: Group size; I : Individual input in a group (I_g) and single (I_s) context; O_s / I_s: Relationship between individual input and individual output in a single condition; O_{ge} / I_g: Relationship between individual input and group output in a group situation.
[a] If the probability of getting help is constant in a group context**.**

Information Sharing

Proximate Evaluations of Group Performance in Sharing Information

According to the shared-view effect, topics familiar to all participants are especially likely to be mentioned during a discussion (Forsyth, 2006). The following equation denotes the probability of information being mentioned during a conversation (Stasser, 1992):

$D(I) = 1- (1- d)^{n}$. See Table 4 for more on this formula.

For d = 0.50, the probability in a five-person group with all members having knowledge of the information is D(I) = 0.97. Shared information will therefore become salient even if it is only coincidently mentioned by individual members. This advantage results from the fact that any member can produce the information. Contrarily, this finding indicates rare expert knowledge will seldom be mentioned in a discussion limited by time. Yet precisely this specific information is the reason for forming expert groups. Researchers evaluating group performance with the proximate evaluation style assess information sharing in groups as deficient (Forsyth, 2006, pp. 342-345). To date, however, no generally accepted baseline model exists. In deriving a simple method for a baseline model, the bystander effect can be reconsidered. Help reduction is described by a model which can represent a theoretical baseline for the expected reduction of shared information in a discussion: $D(I) = 1-(1-d)^{1/n}$. If d = 0.50 and n = 5, then $D(I) = 1-(1-0.50)^{1/5} = 1-0.87= 0.13$. In other terms, if the group discussion concentrates on new, unshared information (1- D(I)), it depends on individual unshared information (1-d) and the latter's probability is further reduced by the number of group members, because each one contributes further unshared information.

Ultimate Evaluation of Group Performance in Sharing Information

In a relatively stationary surrounding, group members are expected to share relevant information (Hastie & Kameda, 2005; Kameda & Tindale, 2006). Using common information for decision-making represents an ultimate advantage, because it is probably more statistically valid and reliable than unshared information is (Kameda & Tindale, 2006). Groups attain information with a higher probability than individuals, because knowledge is more likely to emerge in a discussion than during solitary reflection (Wittenbaum, Hubbell & Zuckerman, 1999). Thus, information exchange during a limited discussion depends on two parameters: individual knowledge (d) and group size (n). Information exchange during a discussion can be empirically described by the formula used for baseline group problem solving on cognitive tasks. In the present case, however, the parameters do not characterize problem solving, but rather the mentioning of information. In an individual context, a person can only use experience as information, and it might be unreliable and less valid than information shared with and corrected by others. How salient information in a group discussion becomes also depends on the experiences other subjects share. For example: In a five-person group, individual use of information is d = 0.30. That means the chance the information is not used equates

$0.70 = \text{antilog}(1-0.30) = 10^{-0.15}$. In a five person group, $0.18 = 10^{5(-0.15)} = 10^{-0.75}$. Obviously, the relevant, shared information becomes much more salient in a group discussion (1-0.18=0.82) than in a single context (1-0.70=0.30), which denotes an ultimate advantage.

Table 4

Information Sharing from Proximate and Ultimate Perspectives

	Performance types compared	
Evaluation style	Empirical	Baseline
Proximate evaluation	$O_{ge} = D(I) = 1 - (1-d)^n$	$O_{gb} = 1 - (1-d)^{1/n}$
Ultimate evaluation	$O_s / I_s = \log(1-d)$	$O_{ge} / I_g = n(\log(1-d))$

Note. O: Information sharing / output as a probability (O_{ge}: group output as an empirical estimation and O_{gb}: as a baseline measure; O_s: individual output in single context); d: Probability of information being mentioned during discussion; n: Group size; I: Individual input (salient information) in a group (I_g) and single (I_s) context; O_s/I_s: Relationship between individual input (salience before discussion) and individual output (salience without discussion) in a single condition; O_{ge}/I_g: Relationship between individual input (salience before discussion) and group output in a group situation (individual salience after group discussion).

Creativity

Proximate Evaluations of Group Creativity

In this section, considerations will depart from idea generation as a manifest of creative behavior. Numerous findings (Paulus & Nijstad, 2003) convincingly illustrate that performance on creative tasks moderated by the brainstorming method, lags behind idea-generating behavior exhibited by simulated groups of the same size. These findings can best be explained by the blocking effect (Stroebe & Diehl, 1994).

Analogously, the model used for group motivation can also be applied to group creativity (Zysno, 1998): Under the simplest of circumstances, creative group performance should equate $O_{gb} = C * n$ (see quadrant II, Table 5). However, individual motivation and production are subject to numerous group context effects. Members cease their productivity if they feel group creativity is higher than their individual potential (Nijstad, Stroebe & Lodewijkx, 2003). That is why creative group output is preferably estimated as $O_{ge} = C * n^w$ (see quadrant I in Table 5)

Ultimate Evaluation of Group Creativity

The ultimate perspective does not focus on individual creative input in a group context, but rather on the average relation between individual input (production of ideas) and individual output (quality and quantity of new ideas) in both group and single contexts. If the group is creative to an extent the individual considers appropriate, individual group members will reduce their productivity (Nijstad, Stroebe & Lodewijkx, 2003). This subjective comparison between both contexts leads to a reduction in individual effort in a group situation, because the observed overall group performance (O_{ge}) exceeds the level of individual performance in a single condition (I_s; see quadrant IV in Table 5). Group output is higher than individual output

($O_{ge} > O_s$) and is achieved with less effort ($w < 1$). The creative contributions made in a group may not have emerged if an individual worked alone. The subjective frame of reference is therefore the evaluation of individual performance compared to total (individual vs. group) output. Note that evaluation on a group level is only available to the researcher, i.e. from an external perspective both group and individual conditions can be analyzed regarding total creative performance. From an individual perspective, however, group process losses will not be recognized in everyday life (Stroebe, Diehl & Abakoumkin, 1996). Conversely, group performance gains will be noticed from a subjective frame of reference.

Proximate Evaluations of Solving Complex Problems

The actual complexities underlying most real-life problems arise when an "eigendynamic" or idiosyncratic dynamism is experienced among a large number of connected variables (Funke, 1992). Naturally, the complexity experienced when working on such a task is often greatly increased when variables remain unknown or ambiguous. Computer simulations can provide such problems for use in group-task studies. Such methods model reality, i.e. a world of variables with pre-defined relationships, and this model may be accessed and altered by participants in a multitude of ways (Frensch & Funke, 1995). In using simulated realities, small group researchers bring problems into the lab, which are comparable with highly complex problems in everyday life (Badke-Schaub, 1994). Groups work several hours in two or more sessions on such problems (Witte & Sack, 1999). According to findings in experimental research, groups do not differ from randomly selected persons on these tasks (Witte & Sack, 1999). Moreover, the quality of group performance is roughly the same to that of an average individual, thereby implying costs of group interaction seem to lead to a disadvantage, because error compensation does not occur.

Ultimate Evaluations of Solving Complex Problems

Is there an analogy for this group phenomenon within the evolution of mankind? The task of hunting in groups represents one example. Group hunting is a very complex activity affected by manifold influences. It can be compared to solving complex tasks, which are often characterized by a lack of transparency, inherent dynamics, long-term effects and complex, delayed feedback loops (Kelly, 1995).

Even if there is no significant average increase in prey compared to hunting alone, a group advantage is nevertheless observable: The standard deviation and not the mean is the relevant parameter in ultimate evaluations. It is reduced by $(n)^{½}$ in accordance with group size, if we compare the standard deviation of individual results with that of group averages. This statistical prediction was empirically confirmed by Badke-Schaub (1994). Several persons hunting collectively may catch greater animals, thereby heightening average individual outcomes. Yet at the same time, a large prey could also escape and by doing so, absorb the energy spent by these cooperating individuals. Even if each hunter did not catch more prey on average than if alone, the risk of not being provided with enough food within a specific time period would still decrease. Furthermore, the risk of hunting more animals than necessary is also reduced. The extreme values are eliminated in a group context if the prey is divided equally among members. Statistically, the distribution of meat per hunter surrounds the group mean more narrowly than the distribution of meat per hunter over n single hunters. As a consequence, the mean value does not adequately describe group performance on complex tasks from an ultimate perspective. Instead, it is more meaningful to investigate the standard deviation, because it better represents group advantages from the individual perspective. In groups with the same average, namely, the standard deviation is lower (Badke-Schaub, 1994). This is a statistical finding, but it has been confirmed in studies comparing individual and group performance on problem-solving tasks. Even if an average gain in performance is not achieved in extremely complex conditions, reducing the standard deviation through group behavior is crucial for individual survival, because it increases the mean probability for survival by more consistently supplying food or in modern times, other resources. Solely interpreting mean performance values, therefore, results in false estimations. A group advantage will only become apparent through the standard deviation of performance in complex situations.

Further, the group context does not only smooth performance variations on a single occasion, but also over a broader time span. From a proximate perspective, the lack of growth in performance quality appears to be a disadvantage, especially when a specific group is confronted only once with a particular task. If groups repeatedly have to solve problems of similar complexity, the standard deviation for performance is noticeably reduced, thereby decreasing the risk of, in the instance of hunting, starvation. Theoretically considered, the question is *under which conditions* each parameter, i.e. mean and standard deviation, best describes group performance? If the group context offers members a performance gain on average, it helps single members to survive. If there is no such average individual gain, the second moment of the distribution, i.e. the standard deviation, must be inspected to decide whether this parameter indicates an individual advantage. Therefore, only after inspecting the first moment, i.e. the mean, will the second moment become relevant for ultimately evaluating advantages.

Table 5

Creative Performance from Proximate and Ultimate Perspectives

	Performance types compared	
Evaluation style	Empirical	Baseline
Proximate evaluation	$^{a}O_{ge} = C * n^{w}$	$O_{gb} = C * n$
Ultimate evaluation	$O_s / I_s = C$	$O_{ge} / I_g = O_{ge} / n^{w}$

Note. O: Performance / output as a probability (O_{ge}: group output as an empirical estimation and O_{gb}: as a baseline measure; O_s: individual output in single context); C: Probability of individual performance (creativity); n: Group size; w: Efficiency parameter; w<1; I: Individual input in a group (I_g) and single (I_s) context; O_s / I_s: Relationship between individual input (creativity) and individual output in a single condition; O_{ge}/I_g: Relationship between individual input (creativity) and group output in a group situation. For example: If w=0.61 (Zysno, 1998) and n = 5, then
O_e= 2.67 C . Thus, O/I = 1.64 C with n/n^{w} =1.64.
[a] w < 1.

Proximate and Ultimate Evaluation Styles: A General Comparison

The proximate evaluation style represents optimal criteria for judging group performance and, as Steiner (1972) states, refers to potential group performance (O_{gb}). Such evaluations compare empirical (O_{ge}) to potential (O_{gb}) group output. They neglect the relation between individual input and output, solely drawing on the group level for performance assessment. These statistical models (O_{gb}) and empirical results (O_{ge}) on a group level constitute a method to proximately evaluate results for groups as a whole

Considerable research was necessary to enable theoretical predictions on expected group results, investigating simple assumptions such as group size, specific modes of information-sharing as well as the acceptance of correct solutions. Such models indicate what magnitude of performance expected when individual parameters are statistically aggregated. Here, the group always represents a theoretical basis, because comparing group with individual performance is considered unjustified and logically inadequate (Tindale & Larson, 1992a, b). What is lacking is a transposition of these group results back to the individual, thereby demonstrating that the group condition can lead to an individual advantage. Comparing single to group performance reveals an increase in relative output for individuals working in a group. When focusing on individual survival and reproduction,

group-level evaluations are not appropriate to assess performance from an ultimate perspective, especially if the concept of group selection is explicitly refused. Group level is primarily qualified for judging the tightly-focused achievement of team goals. Individual behavior patterns in groups, adapted by evolution, need readjustment, because they are seldom optimal for proximately evaluated tasks, i.e. ones in which group output must succeed. In comparison with statistical models for proximately evaluating performance, evolutionary theory demands the concurrent consideration of *two* aspects to evaluate group performance: (a) the individual must represent the level of evaluation, and (b) the focus must be on the relation between input and output. From an evolutionary perspective, individual behavior strategies and a long-term perspective for individual behavior in a group need to considered. If an individual is able to achieve a better result performing in a group (O_g/I_g) than alone (O_s/I_s), these behavior patterns will increasingly occur due to their reproductive value. In analogy to the Hamilton criterion for evaluating altruistic behavior (Hamilton, 1964; 1964a), the *ultimate evaluation style* can be formulated as follows: If (O_g/I_g) **>** (O_s/I_s), the group situation represents an individual advantage, thereby optimizing reproduction probability. There is no need for the concept of group selection (Williams, 1966; Yeager, 2001) as Wilson claims (1997; Wilson & Sober, 1994; see also Sober & Wilson, 1998; Kameda & Tindale, 2006).

The proximate evaluation of group performance mostly focused on comparisons between empirical (O_{ge}) and potential results (O_{gb}) on a group level. Here, the group is often less successful than predicted $O_{ge} < O_{gb}$. From the perspective of evolutionary theory, this evaluation style is fragmentary and lacks complexity, because the individual's perspective is not considered. More extensive consideration would yield a comparison of individual results regarding individual input in a group (O_g/I_g) and in a single (O_s/I_s) condition. Such a comparison would reveal a higher relative output in group contexts than in a single one: $(O_g/I_g) > (O_s/I_s)$.

This can be due to the fact that individuals are capable of reducing their effort (input) in a group (I_g), but will achieve a better output (O_g) than in a single context (O_s) due to the effort exerted by other members. Note that individual input (I_g) should only be reduced maximally to $(O_g/I_g) = (O_s/I_s)$. Otherwise, a loss in total group output results and there is no individual benefit of performing in a group. However, this was not the case in the tasks discussed here. Most of them are one-dimensional in their influence on group members and they have a short duration. It also is conceivable that performance tasks of longer duration may affect individual input without the members' control. In this case, the equation $(O_g/I_g) = (O_s/I_s)$ holds, but a second criterion generates the ultimate advantage, i.e. the reduction of the (O_g/I_g) standard deviation in a group condition. Group hunting, for example, represents an ultimate advantage, because individual food supply in a group is less dependent on complex influences than in an individual context.

Implications for Evaluating Group Processes

Both evaluation styles, proximate and ultimate, are not comparable. Proximate evaluations refer to an optimal criterion describing group performance, i.e. O_{ge} compared to O_{gb}. Ultimate evaluations refer to a combination of individual effort and individual performance in a group context, and draw on the individual context as a comparison level, i.e. O_g/I_g compared to O_s/I_s. Assuming that group behavior has adapted due to evolution, the empirically observed results can be expected in naturally interacting groups, because they represent a selection advantage (Kameda & Tindale, 2006).

To optimize individual behavior patterns in group contexts, inherited interaction processes must be “invalidated”. Group interaction requires facilitation with appropriate techniques (Witte, 2001; 2007), and the innate reduction of individual effort in a group context (I_g) must be compensated. The conditions assumed in statistical models of proximate group behavior can be established by external intervention, suppressing genetically evoked automatic reactions. The usefulness of these techniques requires careful revision. For example, the brainstorming technique as proposed by Osborne (1957) did not prove successful (Stroebe & Diehl, 1994). The general idea of facilitation, however, is unbeaten (Nijstadt, Stroebe & Lodewijkx, 2002; Nijstadt, Stroebe & Lodewijkx, 2003; Witte, 2007). Proximately evaluated disadvantages of group interaction do not conflict with ultimate advantages; they merely depend on different evaluation criteria. Moreover, small group researchers should expect these performance losses from an ultimate perspective. As experts for group dynamics, our task is to develop techniques leading to proximate advantages in groups, thereby enabling the use of group potential as desired.

References

Ariew, A. (2003). Ernst Mayr's 'ultimate / proximate' distinction reconsidered and reconstructed. *Biology and Philosophy*, *18*, 553-565.

Badke-Schaub, P. (1994). *Gruppen und komplexe Probleme* [Groups and complex problems]. Bern, Switzerland: Peter Lang.

Baron, R., & Kerr, N.L. (2003). *Group process, group decision, group action*. Buckingham, UK: Open University Press.

Bass, A. (1998). Behavioral and evolutionary neurobiology: A pluralistic approach. *American Zoologist, 38*, 97-107.

Boyd, R. & Richerson, P.J. (2005). The origin and evolution of cultures. Oxford, UK: Oxford University Press.

Caporael, L., Wilson, D.S., Hemelrijk, C. & Sheldon, K.M. (2005). Small groups from an evolutionary perspective. In M.S. Poole & A.B. Hollingshead (Eds.), Theories of small groups (p. 369-396). Thousand Oaks, CA: Sage.

Davis, J.H. (1973). Group decision and social interaction: A theory of social decision schemes. *Psychological Review, 80*, 97-125.

Davis, J.H. (1996). Group decision making and quantitative judgments: A consensus model. In E.H. Witte & J.H. Davis (Eds.), *Understanding group behavior. Consensual action by small groups* (Vol. 1, p. 35-60). Mahwah, NJ: Erlbaum.

Feuchter, A. (2001). *Lob des sozialen Faulenzens* [Praising social loafing]. Lengerich, Germany: Pabst.

Forsyth, D.R. (2006). *Group dynamics*. Belmont, CA: Wadsworth.

Frensch, P.A., & Funke, J. (Eds.). (1995). *Complex problem solving: The European perspective.* Hillsdale, NJ: Erlbaum.

Funke, J. (1992). *Wissen über dynamische Systeme: Erwerb, Repräsentation und Anwendung* [Knowledge of dynamic systems: Acquisition, representation and application]. Berlin, Germany: Springer.

Grofman, B. (1974). Helping behavior and group size: Some exploratory stochastic models. *Behavioral Science, 19*, 210-224.

Grofman, B. (1978). Judgmental competence of individuals and groups in a dichotomous choice situation: Is a majority of heads better than one? *Journal of Mathematical Sociology, 6*, 47-60.

Hamilton, W. D. (1964). The genetical evolution of social behaviour. I . *Journal of Theoretical Biology, 7,* 1-16.

Hamilton, W. D. (1964a). The genetical evolution of social behaviour. II. *Journal of Theoretical Biology, 7,* 17-52.

Hastie, R., & Kameda, T. (2005). The robust beauty of the majority rule in group decisions. *Psychological Review, 112,* 494-508.

Kameda, T., & Tindale, R.S. (Eds.). (2004). Evolutionary Approaches to Group Research [Special Issue]. *Group Processes & Intergroup Relations, 7*, 299-416.

Kameda, T., & Tindale, R.S. (2006). Groups as adaptive devices: Human docility and group aggregation mechanisms in evolutionary context. In M. Schaller, J. Simpson, & D. Kenrick (Eds.), *Evolution and Social Psychology* (pp. 317-341). New York: Psychology Press.

Kelly, R. L. (1995). *The foraging-spectrum: Diversity in hunter-gatherer lifeways*. Washinton, D.C.: Smithsonian Institution Press.

Kerr, N. L., & Tindale, R. S. (2004). Group performance and decision making. *Annual Review of Psychology, 55*, 623-655.

Kerr, N. L., MacCoun, R. J., & Kramer, G. P. (1996). Bias in judgment: Comparing individuals and groups. *Psychological Review, 103*, 687-719.

Latané, B. (1981). The psychology of social impact. *American Psychologist, 36,* 343-356.
Latané, B., & Darley, J.M. (1968). Groups inhibition of bystander intervention in emergencies. *Journal of Personality and Social Psychology, 10,* 215-221.
Laughlin, P.R., Bonner, B.L., & Miner, A.G. (2002). Groups perform better than the best individuals on letters-to-numbers problems. *Organizational Behavior and Human Decision Processes, 88*, 605-620.
Lorge, J., & Solomon, H. (1955). Two modes of group behavior in the solution of Heureka-type problems. *Psychometrica, 20*, 139-148.
Mayr E. (1961). Cause and effect in biology. *Science, 131*, 1501–1506.
Moede, W. (1920). *Experimentelle Massenpsychologie: Beiträge zur Experimentalpsychologie von Gruppen* [Crowd psychology: Contributions to experimental psychology with groups]. Leipzig, Germany: Hirzel.
Nijstadt, B. A., Stroebe, W., & Lodewijkx, H. F. M. (2002). Cognitive stimulation and interference in groups. Exposure effects in an idea generating task. *Journal of Experimental Social Psychology,38*(6), 535-544.
Nijstadt, B. A., Stroebe, W., & Lodewijkx, H. F. M. (2003). Production blocking and idea generation: Does blocking interfere with cognitive processes? *Journal of Experimental Social Psychology, 39*(6)*,* 531-548.
Paulus, P., & Nijstad, B. (Eds.). (2003). *Group creativity. Innovation through collaboration.* New York: Oxford Univ. Press.
Schaller, M., Simpson, J., & Kenrick, D. (Eds.). (2006). *Evolution and Social Psychology*. New York: Psychology Press.
Schradin, C. (2002). Die vier Fragen Tinbergens und väterliches Verhalten [Tinbergen's four questions and paternal behavior]. In U. Gansloßer (Ed.), *Gruppenmechanismen* [Group mechanisms] (pp. 29-47). Fürth, Germany: Filander Verlag.
Simpson, J.A., & Kenrick, D.T. (Eds.). (1997). *Evolutionary Social Psychology*. Mahwah, N.J.: Erlbaum.
Sober, E., & Wilson, D. D. (1998). *Unto others: The evolution and psychology of unselfish behaviour*. Cambridge, MA: Harvard Univ. Press.
Stasser, G. (1992). Pooling of unshared information during group discussion. In: S. Worchel, W. Wood & A. Simpson (Eds.), *Group process and productivity* (pp. 48-67). Newbury Park, CA: Sage.
Stasser, G., Kerr, N.L., & Davis, J.H. (1989). Influence processes and consensus models in decision-making groups. In P. Paulus (Ed.), *Psychology of group influence* (2nd ed., pp. 431-477).
Steiner, I. D. (1972). *Group process and productivity*. New York: Academic Press.
Stroebe, W., & Diehl, M. (1994). Why groups are less effective than their members: On productivity losses of in idea-generating groups. *European Review of Social Psychology, 2,* 271-303.
Stroebe, W., Diehl, M., & Abakoumkin, G. (1996). Social compensation and the Köhler effect: Toward a theoretical explanation of motivation gains in group productivity. In: E.H. Witte & J.H. Davis (Eds.), *Understanding group behaviour (Vol. 2). Small group processes and interpersonal relations* (pp.37-65). Mawah, NJ: Erlbaum.
Tinbergen, N. (1963). On aims and methods of ethology. *Zeitschrift für Tierpsychololgie, 20*, 410-433.
Tindale, R. S., & Larson, J. R. (1992a). Assembly bonus effect or typical group performance: A comment on Michaelson, Watson & Black (1989). *Journal of Applied Psychology, 77*, 102-105.
Tindale, R. S., & Larson, J. R.(1992b). It's not how you frame the question, it's how you interpret the results. *Journal of Applied Psychology, 77*, 109-110.
Wilke, H.M., & Meertens, R.W. (1994). *Group performance*. London: Routledge.

Williams, K., Harkins, S., & Karau, S. (2003). Social performance. In M. Hogg & J. Cooper (Eds.), *The SAGE handbook of social psychology* (pp. 327-346). London: Sage.
Williams, G. C. (1966). *Adaptation and natural selection: A critique of some current evolutionary thought.* NJ: Princeton University Press.
Wilson, D. S. (1997). Incorporating group selection into the adaptionist program: A case study involving human decision making. In J. A. Simpson & D. T. Kenrick (Eds.), *Evolutionary Social Psychology* (pp. 345-386). Mahwah, N. J.: Erlbaum.
Wilson, D. S., & Sober, E. (1994). Reintroducing group selection to the human behavioral sciences. *Behavioral and Brain Sciences, 17*, 585-654.
Wilson, E.O. (1975). *Sociobiology.* Cambridge, MA.: Harvard Univ. Press.
Witte, E.H., & Davis, J.H. (Eds.). (1996). *Understanding group behaviour: Consensual actions by small groups (Vol.1).* NJ: Lawrence Erlbaum Associates
Witte, E. H. (1989). Koehler rediscovered: The anti-Ringelmann effect. *European Journal of Social Psychology, 19,* 147-154.
Witte, E. H. (2001). Die Entwicklung einer Gruppenmoderationstheorie für Projektgruppen und ihre empirische Prüfung [The development of a group facilitation technique for project teams and its empirical testing]. In: E.H. Witte (Ed.), *Leistungsverbesserungen in aufgabenorientierten Kleingruppen* [Performance improvements in task-oriented small groups] (pp.217-235). Lengerich Germany: Pabst.
Witte, E. H. (2007). Towards a group facilitation technique for project teams. *Group Processes & Intergroup Relations*, 10, 299-309.
Witte, E. H., & Sack, P. M. (1999). Die Entwicklung der Gruppenmoderation PROMOD zur Lösung komplexer Probleme in Projektteams [PROMOD: Developing a group facilitation technique to solve complex problems in teams]. *Psychologische Beiträge, 41,* 113-213.
Wittenbaum, G.M., Hubbell,A.P., & Zuckerman,C. (1999). Mutual enhancement: Toward an understanding of the collective preference for shared information. *Journal of Personality and Social Psychology, 77,* 967-978.
Yeager, L. (2001). *Ethics as a social science: The moral philosophy of social cooperation.* Cheltenham, Glos, UK: Elgar.
Zysno, P. (1998). Von Seilzug bis Brainstorming: Die Effizienz der Gruppe [Group efficiency]. In: E.H. Witte (Ed.), *Sozialpsychologie der Gruppenleistung* [Social psychology of group performance] (pp.184-210). Lengerich, Germany: Pabst.

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