Dominance as Expressed and Inferred Through Speaking Time
A Meta-Analysis

MARIANNE SCHMID MAST
Northeastern University

Differences in speaking time during a group interaction are hypothesized to reflect differences in individual dominance. In order to test this assumption and to identify potential moderator variables influencing the strength of the predicted association, a meta-analysis was conducted. Whether speaking time is used to convey dominance to the same extent that it is used in inferring dominance was tested by contrasting studies concerned with dominance expressed in speaking time with studies of inferred dominance based on speaking time. Overall, and for the investigated subcategories of studies, the relationship between dominance and speaking time was significant. The strength of the associations, however, differed considerably due to the influence of moderator variables. The results showed that inferred dominance studies showed stronger associations between speaking time and dominance as opposed to the expressed dominance studies. Additionally, if dominance was expressed due to dominance-role assignments, the association between speaking time and dominance was stronger than if individuals with different levels of trait dominance interacted. For men, the association between speaking time and dominance was stronger than for women, and same-gender groups showed stronger associations than opposite-gender groups. Also, increasing group size intensified the strength of the association linearly.

Humans constantly form impressions about other people and these impressions shape the way we interact with others. When we draw inferences about other people's traits (e.g., how dominant they are) or states (e.g., whether they are someone's supervisor or someone's subordinate), we mostly base our judgment on verbal and nonverbal cues expressed by the sender. Our judgment, however, is not always accurate and inaccuracy may jeopardize the successful outcome

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Marianne Schmid Mast (Ph.D., University of Zurich, Switzerland, 1999) is a postdoctoral fellow at the Department of Psychology, Social and Personality Area, at Northeastern University, Boston. This research was supported by a Postdoctoral Fellowship of the Swiss National Science Foundation awarded to the author. I would like to thank Judith A. Hall for her guidance, advice, and support in conducting this meta-analysis and for her very helpful and valuable comments on earlier drafts of the manuscript. Additionally, I would like to thank Terrence G. Horgan for his comments on an earlier version of the paper as well as the three anonymous reviewers for their valuable suggestions to improve the manuscript. Requests for reprints should be addressed to: Marianne Schmid Mast, Northeastern University, Department of Psychology, 125 Nightingale Hall, Boston, MA 02115–5000; email: mmast@research.neu.edu.

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of an interaction. The prerequisite for an accurate judgment would be that the sender uses the same cues to express, say, dominance as the perceiver uses to infer dominance. The present meta-analysis addressed the question as to whether the perceiver infers dominance based on how much a sender speaks and whether the sender expresses dominance in speaking time. Also, an emphasis was put on investigating variables that potentially moderate the speaking time to dominance relationship for senders and perceivers (e.g., gender, gender composition of the group, competitiveness of the interaction, and group size).

One of the most important dimensions in social interactions is dominance (Wiggins, 1979). Dominance, power, and status have been defined in many different ways (Ellyson & Dovidio, 1985) and have often been used interchangeably. Dominance is usually referred to in two different ways. First, dominance is seen as a personality characteristic (trait) and, second, dominance might be used to indicate a person's hierarchical position within a group (state). In the present meta-analysis, dominance is understood as a broad concept comprising both of the aforementioned aspects of dominance, as well as status and power.

Building, maintaining, and changing dominance relationships or hierarchy structures involves communication. Bales and his colleagues (Bales, 1950; Bales, Strodtbeck, Mills, & Roseborough, 1951) reported that dominance hierarchies in adult groups are formed based on group members' unequal amounts of group participation. Accordingly, how much one talks has been shown to be related to emergent leadership in two meta-analyses (Mullen, Salas, & Driskell, 1989; Stein & Heller, 1979).

Accurately assessing our interaction partners is important for successful social interactions. In relying on speaking time in either assessing a person's dominance or selecting him or her as the leader of a group, people might simply use the expectation or lay theory, "high dominance or high status people talk more than low dominance or low status people." Applying this expectation produces accurate assessments only if trait dominance or high status is indeed expressed in the amount of floor holding. This is the reason why in the present meta-analysis, the relationship between dominance and speaking time was examined not only for the perceiver but also for the sender. It can be argued, though, that dominance is in the eye of the beholder, meaning that consensus in perceiving a person as dominant based on speaking time is functionally equivalent to this person being dominant. However, using consensus as the criterion to assess accuracy of inferred characteristics yields reliability of the judgments rather than their validity because no external criterion (e.g., the sender's perspective) is used.

The main goal of this meta-analysis was to test whether studies concerned with dominance expressed in speaking time (the sender's perspective) and studies dealing with inferred dominance based on speak-

ing time (the perceiver's perspective) both yield a strong relationship between speaking time and dominance as well as whether the strength of this relationship would be moderated by third variables (e.g., gender, gender composition of the group, competitiveness of the interaction, and group size).

THE PERCEIVER: INFERRED DOMINANCE BASED ON SPEAKING TIME

In two meta-analyses, judging other people's leadership ability yielded strong relationships between perceived dominance or leadership and how much the observed individuals talked during the interaction (Mullen et al., 1989; Stein & Heller, 1979). Stein and Heller (1979) found an average effect size of $r = .60$ ($k = 15$, N was not reported). Mullen et al. reported an average effect size of $r = .55$ ($k = 25$, $N = 3611$) based on 9 of the 15 studies Stein and Heller examined and 16 additional studies. Theoretically, the strong relationship between emergent leadership and speaking time is explained by expectation states theory (Berger, Conner, & Fisek, 1974; Berger, Fisek, Norman, & Zelditch, 1977) positing that in task-oriented groups, expectations about group members' ability to contribute to the task solution become self-fulfilling prophecies and form the basis for dominance or status differences within the groups. In initially homogeneous groups where external status differences among group members are minimal (which is the case for most of the studies included in the present meta-analysis), group members form performance expectations as soon as any sort of inequality develops. These expectations do not allow all group members to contribute to the same extent in the group interaction and therefore lead to differential dominance behavior. These dominance behavior cues in turn influence further performance expectations, which reinforce each other (Ridgeway & Berger, 1986; Ridgeway & Diekema, 1989; Ridgeway, Diekema, & Johnson, 1995). It has to be kept in mind, however, that the relationship between inferred dominance and speaking time is not perfect. Extended amounts of speaking time may not exclusively signify dominance but might indicate personal involvement or interest in the discussion topic.

If leaders emerge based on unequal amounts of speaking time, people are likely to use this relationship as a guideline when inferring any kind of interpersonal dominance, not only leadership. When people observe social interactions and are asked to judge the interaction partners on dominance, it is expected that they rely heavily on speaking time, resulting in a strong relationship between inferred dominance and speaking time (e.g., Schmid Mast, 2001). This nonleadership aspect of inferred dominance based on speaking time was not addressed by the two previous meta-analyses (Mullen et al., 1989; Stein & Heller, 1979). Another aspect neglected by the two previous meta-analyses is the sender's perspective.

Whether inferences drawn by perceivers are accurate depends on whether dominance is indeed expressed in different amounts of speaking time.

THE SENDER: DOMINANCE EXPRESSED IN SPEAKING TIME

It remains to be seen whether high dominant or high status individuals express their dominance in extended amounts of talk time compared to low dominant or low status individuals. There is indirect support for dominance expressed in speaking time stemming from a meta-analysis by Allen and Bourhis (1996). The authors found a negative relationship between communication apprehension (i.e., the level of experienced anxiety while communicating) and speaking time, $r = -.28$ ($k = 29$, $N = 1448$). It is assumed that experienced anxiety affects behavioral outcomes, for instance how much one talks (Patterson & Ritts, 1997). Communication apprehension is related to shyness (Allen & Bourhis, 1996) and shyness can be viewed as the opposite of dominance. If, as reported by Allen and Bourhis, the correlation between communication apprehension and speaking time is negative, it is reasonable to expect speaking time and dominance to be positively related.

Factors that can weaken the relationship of expressed dominance to speaking time are the sender's ignorance about what cue to exhibit or the lack of motivation to show a specific behavior. In impression management, people want to convey a certain image and may choose to exhibit specific behavioral cues, sometimes in order to conceal aspects of their personality or their motives. For example, a dominant person might want to hide being dominant in a certain situation by choosing to talk less. The manifestation of dominance in amount of speaking time depends on skills and motivational factors, but situational factors play a role as well. As an example of a situation where dominance differences do not necessarily translate into corresponding speaking time differences, consider a job interview situation, where speaking more is most likely characteristic of the subordinate person. The interviewer asks questions and the potential employee, trying to make a good impression, eagerly tries to answer those questions thoroughly. This would result in a speaking time difference exactly opposite to the status difference.

High dominance or high status can be operationalized or defined in different ways. It is therefore possible that different types of dominance show differences in the strength of their relationship to speaking time. First, the personality characteristic of dominance (trait dominance) can be associated with a range of dominance behaviors including taking up most of the talking time. Second, the experimental assignment of roles varying in status or power can produce differences in emitted dominance behavior (assigned dominance roles). Third, instead of being arbitrarily

assigned, such roles can reflect actual status differences, like those of teacher and student, or boss and employee (actual dominance). Assigned and actual dominance both can be regarded as state dominance. The present meta-analysis also addressed the question of whether the magnitude of the relationships of state and trait dominance to speaking time are equivalent.

OUTCOME DOMINANCE

Besides expressed and inferred dominance, the level of influence a group member exerts during an interaction can be measured based on an "objective" criterion considering the outcome of the interaction. Comparing an individual's a priori solution to an ambiguous problem to the final group decision may provide an objective criterion of interpersonal influence. Mostly, this kind of study used the NASA moon survival problem (Bottger, 1984) or the desert survival situation (Littlepage, Schmidt, Whisler, & Frost, 1995). For the NASA moon survival problem, people indicated the importance of certain objects for survival on the moon and were subsequently asked to reach a consensus decision about this same question in a group setting. The closer the match between individual and group solution, the more influential the respective individual is said to have been during the interaction. Other studies not directly using this paradigm did, however, apply the same logic. In Strodtbeck (1951) for instance, participants had to make a decision on their own about a specific problem or question and, in case of disagreement with the dyadic interaction partner, a joint opinion was requested. The comparison between the initial decision and the joint decision would allow determining who won the interaction.

Due to the different nature of this kind of dominance assessment, studies dealing with outcome dominance were analyzed as a separate category and its effect size estimate was compared to the effect sizes for dominance expressed in speaking time and inferred dominance based on speaking time.

THE SEARCH FOR MODERATORS

The present meta-analysis sought to compare the strength of the relationship of speaking time to dominance in 3 ways: (a) if dominance is expressed in speaking time, (b) if dominance is inferred based on speaking time, and (c) if outcome dominance is assessed objectively. Two previous meta-analyses showed a strong relationship between emergent leadership and speaking time (Mullen et al., 1989; Stein & Heller, 1979). It was therefore expected that in the present meta-analysis, speaking time and

inferred dominance would be strongly related as well. People seem to rely on the belief that dominance is expressed through speaking time. In order to test whether this belief is valid, this meta-analysis investigated whether dominance (state or trait) is expressed in speaking time.

Additional moderators were also investigated to provide a more thorough and detailed account of the speaking time to dominance relationship. For dominance expressed in speaking time, studies based on trait dominance and state dominance (assigned dominance roles or actual dominance) were contrasted. For inferred dominance based on speaking time, studies in which group members assessed dominance of the interaction partner (including or excluding self-assessment) and studies in which third observers judged dominance were compared. Additionally, gender, gender composition of the group, competitiveness of the interaction, and group size were tested as potential moderators of the relationship between dominance and speaking time.

METHOD

Literature Search Procedure

Online literature searches of the following databases were conducted: ERIC (Educational Resources Information Center, 1982–April 2001), ComIndex (Communication Institute for Online Scholarship, 1970–April 2001), PsycINFO (American Psychological Association, 1887–April 2001), Sociological Abstracts (1963–April 2001), and Social Science Abstracts (1983–April 2001). Many articles did not focus on speaking time and dominance but rather assessed speaking time together with other variables of interest. Therefore, whenever possible, I searched not only keywords and titles but also abstracts, with the following pairwise combination of two categories of search terms: dominance, status, power, influence, and leadership were each paired with speaking time, speech, talking time, talkativeness, participation, floor holding, and air time. In a second step, articles were located by using the bibliographies of the articles already found and by reviewing personal reprint files.

Inclusion and Exclusion Criteria

In this meta-analysis, dominance is understood as a relational concept, manifested in real face-to-face social interactions. Due to this relational approach, only studies with interactions among two or more social interaction partners were included and monologue situations were excluded. Only studies carried out within the frame of face-to-face interactions (with participants as either interaction partners or observers of an interaction)

were included in the analysis. The face-to-face requirement was introduced to increase ecological validity of the meta-analytic findings and led to the exclusion of studies in which participants exchanged written messages while being in two separate rooms as well as studies in which participants only imagined a social interaction.

Studies providing information about the relation of speaking time to dominance were included in the analysis if they allowed the calculation of an effect size or if the direction of the association could be retrieved. Although some studies measured dominance and speaking time, they were excluded because they did not yield any information about the direction or strength of the relationship between the two variables (e.g., Porter, Geis, Cooper, & Newman, 1985; Zdep & Oakes, 1967). Studies treating the amount of talk time as the dominance measure could not be incorporated if no further dominance measure was provided (e.g., Buller, LePoire, Aune, & Eloy, 1992). Case studies were excluded as well because they do not allow calculation of an effect size (Coleman & Burton, 1985).

In two studies, the relationship between dominance and speaking time was not directly addressed but the design made it possible to infer such a relationship. These two studies were not included in the calculation of the overall effect size but are reported separately. In both studies, a person was paired either with an equal status or a high status individual. Talk time in both conditions was reported. In one study (Thimm & Kruse, 1993), the means indicated that a person paired with a high status individual talked less than when paired with a status equal. This result does not fit exactly into the overall question of interest in this meta-analysis; it indicates that being lower status is associated with speaking less than being equal status. Although low status individuals were not directly compared to high status individuals, the result could be seen as indirect evidence for a nondominant position being associated with speaking less. In a similar study by Bond and Shiraishi (1974), the effects were in the opposite direction. The effect size resulting from combining the two studies is reported in a footnote.[1]

Dominance measures. Dominance is defined as having control or influence over a social interaction partner or over the outcome of a social interaction, and is an attribute of the person interacting and not of the interaction itself. Dominance measures included in the present investigation were self-report measures of dominance, leadership, or assertiveness; peer or observer ratings of dominance, leadership, or assertiveness; dominance role assignment (e.g., teacher and student, manager and employee, or instruction to be dominant); actual status differences (e.g., differences in occupational status); and influence or persuasion in the interaction.

Based on the definition of dominance used in this meta-analysis, expertise,[2] competence, aggression, verbal aggressiveness, and argumen-

tativeness (Infante & Rancer, 1996) were not included because these behaviors do not directly aim to control or influence a social interaction partner. Dominance is seen as a characteristic of a person and not of the emitted verbal or nonverbal behavior. Discussion content coded as dominant (e.g., powerful or powerless language) as well as behavior usually reported as being linked to dominance (initial eye gaze, seating position, territorial dominance[3]) were excluded from the present meta-analysis.

According to expectation states theory, both diffuse (e.g., age or gender) and specific (e.g., occupation) external status characteristics influence dominance hierarchy formation in groups. Diffuse external status characteristics are not a direct measure of the dominance construct as defined above. They are at best potential indicators of dominance manifestation. Therefore external status indicators were not subsumed as measures of dominance but were introduced as moderators. Age as a potential moderator of the association between speaking time and dominance could not be pursued in this meta-analysis because almost all studies were conducted on college students, thus lacking variance.[4] Gender, however, could be treated as a moderator variable.

Speaking time measures. The present meta-analysis focused on the duration a person spoke during an interaction. Speaking time measures across studies included, total duration of talk within the observation period, percentage of talk, total talk, and (in one case) a rating about the amount of talk time (Littlepage et al., 1995).[5] Focusing on duration of time talked led to the exclusion of studies measuring frequency of speech acts, speech turns, and length of speech turns.

Determination of Effect Sizes

As can be seen in Tables 1, 2, and 3, a total of 40 articles could be identified which fit the inclusion criteria, three of them reporting only the direction of the association. Based on the results reported in 37 articles, 72 effect sizes could be extracted. From some articles, more than one independent effect size could be retrieved if, for instance, the results were reported for men and women separately. However, many of the effect sizes were nonindependent because they were gathered from the same sample. This was the case if various measures of dominance were assessed on the same individuals (e.g., leadership and toughness) and were then each related to speaking time or if results for repeated trials were each reported separately. In both cases, the separate effect sizes were transformed into Fisher's z, averaged, and then transformed back into a Pearson's r to represent the study in the overall effect size calculation (Rosenthal, 1994). A total of 45 independent effect sizes based on a total of 2,850 participants were finally entered in the calculation of the overall combined effect size (Rosenthal, 1991; Rosenthal & Rubin, 1982).

In this meta-analysis, the product-moment correlation coefficient (r) was used as the effect size estimate because most of the studies reported correlations. Effect sizes were given positive signs if a positive association between the talk time and the dominance measure could be retrieved. A negative sign was allocated to the effect size if the association between speaking time and dominance was negative.

The conversion of individual study results into effect size estimates was performed according to the procedures suggested by Rosenthal (1991). When only the significance level of the result was reported, together with the number of participants, effect sizes could still be calculated because Z equals the effect size correlation multiplied by the square root of the sample size (Rosenthal, 1991). The same procedure was used if only Z values were reported together with the sample size. If only the approximate significance level was reported, a conservative approach was chosen: for $p < .05$, $Z = 1.96$; for $p < .01$, $Z = 2.58$; for $p < .001$, $Z = 3.30$; two-tailed testing was assumed if no other information was given. In one study, the result was reported as nonsignificant without any indication of the p-value (Kalma, 1991). In this case, a $Z = .00$ was assumed according to a conservative approach suggested by Rosenthal (1991, p. 105). In one study (Butler & Geis, 1990) with an omnibus F value, the procedure outlined in Rosenthal and Rosnow (1985, pp. 74–77) was applied to calculate the effect size.[6]

Some studies reported averaged correlation coefficients (Bottger, 1984; Gustafson, 1970; Rosa & Mazur, 1979; Ruback, Dabbs, & Hopper, 1984), when for instance, within each group, correlations between dominance and speaking time were calculated and then only the averaged correlation coefficient (between groups) was reported. If such pooled within-group Pearson's rs were reported, the question arises as to whether the total number of participants, the number of members within groups, or the number of groups would be the N corresponding to the effect size. Kenny and Winquist (2001) suggested a formula to use in this case.[7] However, this formula can only be applied if the group size is more than three. In one study (Rosa & Mazur, 1979), triads were investigated, therefore the total N served as the basis for the calculation of the Z-value, slightly overestimating this value.

After the transformation of rs into Fisher's z coefficients (Rosenthal, 1994; Shadish & Haddock, 1994),[8] combined weighted (by sample size) and unweighted effect sizes were computed (Rosenthal, 1991; Rosenthal & Rubin, 1982)[9] as well as combined probabilities according to the Stouffer method (Mosteller & Bush, 1954; Rosenthal, 1978, 1995; Stouffer, Suchman, DeVinney, Star, & Williams, 1949). For all categories and subcategories of results, 95% confidence intervals (two-tailed) were calculated as well (Shadish & Haddock, 1994, p. 266).

Moderators and Tests of Homogeneity

Moderators are variables that account for differences in effect sizes within different subgroups of studies. In the present meta-analysis, the standard contrast equation (Rosenthal, 1991; Rosenthal & Rubin, 1982) was used to test for moderators. For nonindependent effect sizes, only one effect size was used for the contrast calculation in order to satisfy the requirement of independence. For instance, in Kalma's (1991) study, an effect size pertaining to dominance expressed in speaking time and an effect size indicating inferred dominance based on speaking time were reported. Both results were based on the same sample. In this case only the effect size describing dominance expressed in speaking time was taken into consideration for the contrast calculation. As a rule, I selected the effect size pertaining to the category of studies where fewer effect sizes were available for the contrast analyses.

Testing for homogeneity indicates whether studies differ from each other more than could be expected due to sampling error. If the chi-square test turns out to be significant, the studies are said to be heterogeneous, meaning that there exist moderator variables. Following Hall and Rosenthal (1991), looking for moderators should not be restricted to effect sizes that proved to be heterogeneous. Accordingly, planned contrasts were calculated for all the aforementioned moderators and each subsample was tested for homogeneity.

Coding of Studies

Tables 1, 2, and 3 present the information about how the various studies were coded. For dominance expressed in speaking time (Table 1), dominance was measured as (a) trait dominance, (b) assigned dominance or (c) actual dominance. Studies that looked at *trait dominance* used self-report measures of dominance (e.g., FIRO-B, CPI dominance). In some studies, people were paired according to their level of trait dominance whereas in other studies, groups were composed randomly. Because behavior of extreme groups could differ from behavior of groups where members were selected randomly, trait dominance studies were coded according to this characteristic. In studies dealing with *assigned dominance*, participants either had to take on roles differing in dominance or were told to behave dominantly. In Johnson's (1994) study, the role-play situation involved an owner of a videoshop with two employees, and in Leffler, Gillespie, and Conaty's (1982) study, one participant was assigned the teacher role and the other participant the student role. In two studies (Butler & Geis, 1990; Ridgeway & Diekema, 1989), confederates were assigned to behave in a dominant manner and the manipulation check revealed that dominance was associated positively with speaking time. Only two

studies looked at speaking time in dyads with *actual dominance* differences. In Hall and Friedman's (1999) study, employees of different organizational status were paired, and Moore and Porter's (1988) study included a leadership assessment of each student by his or her teacher. Assuming that teachers' ratings are more objective than self-report measures, this effect size was included in the category of actual dominance.

Inferred dominance based on speaking time (Table 2) included studies that calculated the relationship between speaking time and emergent leadership, as well as studies where participants were asked to rate stimulus people's dominance (other dominance assessments, Table 2). Inferred dominance was assessed either as group members' ratings or as independent observer ratings. If group members' assessments included self-assessments, each group member not only judged all other group members but also him- or herself with regard to dominance. Many studies, however, excluded self-assessments. If there was no indication about whether people had reported their own dominance, it was assumed that self-assessments were possible.

Table 3 shows that only three studies included outcome dominance measures (Bottger, 1984; Littlepage et al., 1995; Strodtbeck, 1951). Bottger's study used the NASA moon survival problem to capture outcome dominance whereas in Littlepage et al.'s investigation, the desert survival situation was used. Strodtbeck counted the number of decisions won by each dyadic interaction partner as the outcome dominance measure.

The studies were also coded with regard to potential moderators such as gender, gender composition of the groups, competitiveness of the interaction, and group size (Tables 1, 2, and 3). The gender for which the result was reported was either women, men, or women and men combined. The gender composition of the groups was coded as well. In studies where the gender composition of the groups was unknown, it was assumed that same- and opposite-gender groups occurred.

In some studies the competitiveness of the situation was increased by asking group members to come to a consensus decision about the solution of a problem, or to select a group representative or leader. Those studies were considered competitive. In other studies, the interaction was discussion-like without any pressure to reach an agreement and was therefore considered noncompetitive. Due to their different nature, two studies (Johnson, 1994; Leffler et al., 1982) could not be subsumed under the labels competitive or noncompetitive. These studies were concerned with imposing dominant and subordinate roles in a role-play setting.

In terms of group size, studies with dyadic interactions were allocated the value 1; if triads were the interaction unit, studies were coded with the value 2; four-person groups received the value 3; and five-person groups were allocated the value 4. Groups larger than five participants

TABLE 1
Dominance Expressed in Speaking Time: Studies Included in the Meta-Analysis With Their Specific Characteristics

Study	*Dominance measure*	*N*	*Retrieved effect size*	*Z*	*Gender*	*Gender composition*	*Compet.*	*Group size*	*Random/ extreme*
Trait dominance									
Aries et al. (1983)	CPI dominance	25	.33	1.65	f	sa	comp	4	rand
	CPI dominance	37	.35	2.13	m	sa	comp	4	rand
	CPI dominance	20	-.13	-0.58	m	mix	comp	4	rand
	CPI dominance	19	-.18	-0.78	f	mix	comp	4	rand
Davis & Gilbert (1989)	CPI dominance	122	.31	3.42	both	mix	comp	1	extr
Exline & Messick (1967)	FIRO-B	34	.34	1.96	m	sa	n-comp	1	rand
Kalma (1991)	CPI dominance, FIRO-B	97	.18, .00 .09*	0.89	both	sa	comp	2	rand
Kendon & Cook (1969)	FIRO-B	15	.46	1.78	both	sa/mix	n-comp	1	rand
Kimble & Musgrove (1988)	Assertiveness	64	.38	3.04	both	mix	comp	1	extr
Linkey & Firestone (1990)	FIRO-B	64	.26	2.08	m	sa	comp	1	extr
Littlepage et al. (1995)	FIRO-B	156	.31	3.87	both	sa/mix	comp	4	rand
Martindale (1971)	CPI dominance	60	.23	1.78	m	sa	n-comp	1	rand
Nyquist & Spence (1986)	Leadership	160	pos.		both	sa/mix	n-comp	1	extr
Rogers & Jones (1975)	Dominance	8	.86	2.43	m	sa	comp	1	extr
	Dominance	10	.65	2.05	f	sa	comp	1	extr

TABLE 1 Continued
Dominance Expressed in Speaking Time: Studies Included in the Meta-Analysis With Their Specific Characteristics

Study	*Dominance measure*	*N*	*Retrieved effect size*	*Z*	*Gender*	*Gender composition*	*Compet.*	*Group size*	*Random/ extreme*
Assigned dominance									
Butler & Geis (1990)	Assigned solo-, co-, and nonleader	84	.76	6.97	both	mix	n-comp	3	n/a
Johnson (1994)	Manager/employee	120	.30	3.30	both	sa/mix	rp	2	n/a
Leffler et al. (1982)	Teacher/student	112	.66	6.99	both	sa/mix	rp	1	n/a
Ridgeway & Diekema (1989)	Dominant/neutral confederate	21	.56	2.58	m	sa	comp	3	n/a
	Dominant/neutral confederate	21	.18	0.84	f	sa	comp	3	n/a
Actual dominance									
Hall & Friedman (1999)	Organizational status	46	.31	2.10	both	sa/mix	n-comp	1	n/a
Moore & Porter (1988)	Teacher's leadership ratings	202	.18	2.52	both	sa	n-comp	5	n/a

NOTES: Gender composition: sa = same-gender, mix = opposite-gender, sa/mix = same- and opposite-gender pooled; Compet. = competitiveness of the situation (comp = competitive, n-comp = noncompetitive, rp = role play); Group size: 1 = dyad, 2 = triad, 3 = four-person groups, 4 = five-person groups, 5 = more than five-person groups.
*combined ES if more than one nonindependent ES was retrieved.

TABLE 2
Inferred Dominance Based on Speaking Time: Studies Included in the Meta-Analysis With Their Specific Characteristics

Study	*Dominance measure*	*N*	*Retrieved effect size*	*Z*	*Gender*	*Gender composition*	*Compet.*	*Group size*	*Involv.*
Emergent leadership									
Bass (1949)	Leadership	20	.93	4.16	both	sa/mix	comp	5	G/O
Bavelas et al. (1965)	Leadership ability	36	.84	5.04	m	sa	n-comp	3	Gs
Buban (1976)	Group representative	120	.30	3.30	both	sa/mix	comp	2	Gs
Burroughs & Jaffee (1969)	Leadership votes	45	.39, .45, .13, .30, .24, .31*	2.05	f	sa	comp	2	Gs
Cashdan (1998)	Toughness, leadership	29	.64, .77, .63, .63, .67*	3.62	m	sa+mix	comp	5	G
	Toughness, leadership	50	.33, .39, .43, .52, .45*	2.97	f	sa+mix	comp	5	G
Ginter & Lindskold (1975)	Leadership choice	24	.65, .76, .71*	3.46	f	sa	comp	3	G
Gustafson (1970)	Leadership, guidance	60	.87, .89, .80, .77, .84*	6.51	m	sa	comp	4	Gs
	Leadership, guidance	60	.69, .77, .71, .79, .74*	5.73	m	sa	comp	4	Gs
Jaffee & Lucas (1969)	Leadership choice	60	.63	4.88	f	sa	comp	3	Gs
Juola (1957)	Leadership ranking	159	.89, .81, .86*	10.78	both	sa/mix	n-comp	5	G+O
Kirscht et al. (1959)	Group representative	66	.54	4.41	both	sa/mix	comp	2	Gs
Kremer & Mack (1983)	Task leader, socioemotional leader	45	.44, .34, .39*	2.61	f	sa	comp	4	Gs
	Task leader, socioemotional leader	40	.56, .53, .54*	3.44	m	sa	comp	4	Gs

TABLE 2 Continued
Inferred Dominance Based on Speaking Time: Studies Included in the Meta-Analysis With Their Specific Characteristics

Study	*Dominance measure*	*N*	*Retrieved effect size*	*Z*	*Gender*	*Gender composition*	*Compet.*	*Group size*	*Involv.*
Moore & Porter (1988)	Leadership	202	.59, .46, .53*	7.48	both	sa	n-comp	5	O
Reynolds (1984)	Leadership	133	pos.		both	sa/mix	comp	3	Gs
Ruback et al. (1984)	Leadership ratings	100	.74	7.40	both	sa/mix	n-comp	4	G
Ruback & Dabbs (1986)	Leadership score	59	.69	5.30	both	sa/mix	comp	4	G
Stang (1973)	Leading group, leadership ability	30	.48, .54, .51*	2.81	f	sa	n-comp	2	O
Other dominance assessments									
Brandt (1980)	Dominance	6	.90	2.20	both	sa/mix	n-comp	1	O
Bottger (1984)	Influence	157	.61	7.64	both	sa/mix	comp	4	G
Folger (1980)	Dominance	102	pos.		both	sa	n-comp	1	O
Kalma (1991)	Dominance	97	.37	3.67	both	sa	comp	2	G
Palmer (1989)	Control of conversation	25	.39	1.96	both	sa	n-comp	1	O
Regula & Julian (1973)	Influence others	94	.49	4.79	both	sa	comp	1	O
Rosa & Mazur (1979)	Guidance	120	.25	2.74	both	sa	n-comp	2	Gs
van de Sande (1980)	Dominance	40	.71	4.49	both	sa/mix	n-comp	1	O

NOTE: Gender composition: sa = same gender, mix = opposite gender, sa+mix = same and opposite gender separately, sa/mix = same and opposite gender pooled); Compet. = competitiveness of the situation (comp = competitive, n-comp = noncompetitive, rp = role play); Group size: 1 = dyad, 2 = triad, 3 = four-person groups, 4 = five-person groups, 5 = more than five-person groups; Involv. = involvement of the group members in the interaction (O = independent observers assess dominance, G = group members assess dominance, excluding self-assessments, Gs = group members assess dominance, including self-assessments).
*combined ES if more than one nonindependent ES was retrieved.

TABLE 3
Outcome Dominance and Speaking Time:
Studies Included in the Meta-Analysis With Their Specific Characteristics

Study	*Dominance measure*	*N*	*Retrieved effect size*	*Z*	*Gender composition*	*Group size*
Bottger (1984)	NASA moon survival	157	.33	4.12	sa/mix	4
Littlepage et al. (1995)	Desert survival	156	.33	4.13	sa/mix	4
Strodtbeck (1951)	Winning decisions	68	.34	2.80	mix	1

NOTES: Effect sizes of all three studies are based on males and females in competitive settings. Group size: 1 = Dyad, 4 = Five-person groups.

received the value 5. In studies where group sizes varied, the average group size was calculated and served as the basis for coding.

RESULTS

Table 4 reports the magnitude of the relationship between dominance and speaking time for all categories and subcategories of studies analyzed, as well as the 95% confidence intervals and the homogeneity chi-square tests. Overall, the duration a person talked during a face-to-face interaction was highly associated with dominance. The combined unweighted mean *r* was .54, and the combined weighted (by sample size) mean *r* was .51. These results are based on 45 independent effect sizes, representing 2850 participants. As can be seen in Table 4, the combined effect size for each category and subcategory of studies was significant; none of the confidence intervals included 0 (the same information can also be drawn from the *Z*- and *p(Z)*-values in Table 4). All significance tests were two-tailed. If only the direction of the association was taken into consideration, 43 out of 45 independent effect sizes indicated a positive association.

Speaking Time as Related to Expressed, Inferred, and Outcome Dominance

Inferred dominance based on speaking time yielded a stronger association than dominance expressed in speaking time (contrast $Z = 6.45$, $p < .0000001$). Compared to expressed and inferred dominance, outcome dominance studies yielded the weakest association to speaking time (lin-

TABLE 4
Combined Unweighted and Weighted Effect Sizes, Tests of Heterogeneity, and Confidence Intervals for Subgroups

Categories and subcategories of studies	*# ES*	*r*	r_w	*Z*	*p(Z)*	χ^2	*df*	$p(\chi^2)$	*95% CI*
Overall	45	.54	.51	23.72	.0000001	307.97	44	.001	.48 – .54
Dominance expressed in speaking time	21	.38	.35	11.13	.0000001	88.17	20	.001	.30 – .39
trait dominance	14	.34	.27	6.87	.0000001	18.89	13	n.s.	.20 – .34
CPI	7	.16	.23	3.55	.0005	7.02	6	n.s.	.13 – .32
FIRO-B	5	.28	.23	4.33	.00002	7.60	4	n.s.	.13 – .32
random	9	.21	.23	4.23	.00002	10.19	8	n.s.	.14 – .32
extreme	5	.54	.34	5.82	.0000001	6.28	4	n.s.	.23 – .45
assigned dominance	5	.53	.56	9.24	.0000001	29.24	4	.001	.49 – .63
actual dominance	2	.24	.20	3.27	.0014	1.58	1	n.s.	.08 – .32
Inferred dominance based on speaking time	25	.64	.60	22.69	.0000001	181.28	24	.001	.57 – .63
emergent leadership	18	.66	.65	20.27	.0000001	133.33	17	.001	.62 – .68
other dominance assessments	7	.58	.48	10.38	.0000001	23.30	6	.001	.41 – .54
group members' assessments	18	.62	.62	20.27	.0000001	180.05	17	.001	.59 – .66
including self-assessments	10	.58	.53	12.88	.0000001	71.53	9	.001	.47 – .58
excluding self-assessments	8	.67	.70	16.00	.0000001	82.43	7	.001	.66 – .74
independent observers' assessments	7	.67	.66	13.15	.0000001	33.73	6	.001	.61 – .70

TABLE 4 Continued
Combined Unweighted and Weighted Effect Sizes, Tests of Heterogeneity, and Confidence Intervals for Subgroups

Categories and subcategories of studies	*# ES*	*r*	r_w	*Z*	*p(Z)*	χ^2	*df*	$p(\chi^2)$	*95% CI*
Outcome dominance and speaking time	3	.33	.33	6.39	.0000001	0.01	2	n.s.	.24 – .42
Women	10	.42	.44	7.13	.0000001	18.37	9	.10	.35 – .52
Men	12	.57	.56	10.60	.0000001	72.21	11	.001	.50 – .62
Both	23	.56	.51	20.81	.0000001	215.15	22	.001	.48 – .54
Same sex groups	25	.52	.46	15.50	.0000001	103.73	24	.001	.42 – .51
Mixed sex groups	8	.36	.44	7.59	.0000001	42.32	7	.001	.36 – .51
Same and mixed sex groups	14	.65	.58	17.71	.0000001	145.06	13	.001	.54 – .62
Competitive setting	29	.50	.45	16.86	.0000001	131.01	28	.001	.42 – .49
Noncompetitive setting	14	.61	.60	15.50	.0000001	138.48	13	.001	.56 – .64

NOTE: # *ES* means number of independent effect sizes; *r* indicates unweighted mean *r*s; r_w stands for weighted mean *r*s; *p(Z)* is the combined two-tailed significance level; χ^2 is the heterogeneity test with its degrees of freedom *df*; $p(\chi^2)$ is the two-tailed significance level of the χ^2 (n.s. means nonsignificant); 95% CI stands for 95% confidence interval based on weighted mean *r*s.

ear contrast $Z = 7.34$, $p < .0000001$). Whereas outcome dominance studies were homogeneous, the other two categories of studies were heterogeneous (Table 4).

Dominance expressed in speaking time. For dominance expressed in speaking time, a potential moderator variable was state (assigned dominance roles and actual dominance) versus trait dominance. No significant difference, however, emerged (contrast $Z = 1.61$, $p = .11$). This nonsignificant result can be explained by the fact that, within state dominance studies, assigned dominance role studies, and actual dominance studies differed significantly from each other (contrast $Z = 2.97$, $p = .003$), with the former showing a more pronounced and the latter showing a less pronounced effect size than trait dominance studies (Table 4). The relationship between actual dominance and speaking was the weakest of all three subcategories (linear contrast $Z = 3.12$, $p = .0018$). Without considering actual dominance studies (there were only two of them), results showed that assigned dominance roles produced a stronger relationship between speaking time and dominance than trait dominance (contrast $Z = 2.40$, $p = .016$).

Although the trait dominance subcategory was homogeneous (Table 4), moderator variables were still searched for (Hall & Rosenthal, 1991). Studies concerned with personality dominance used different measures to assess dominance. Two widely used measures of trait dominance are the CPI dominance scale (Gough, 1975) and the FIRO-B expressed control scale (Schutz, 1967). Contrasting studies using either one of these measures did not yield a significant difference (contrast $Z = 0.97$, $p = .33$). Another methodological aspect that might influence the strength of the association between trait dominance and speaking time is whether the group has been composed randomly or whether extreme groups have been selected for the interaction (e.g., select the most and least dominant individuals and pair them for the interaction). Extreme group pairings showed significantly stronger associations between dominance and speaking time than randomly composed groups (contrast $Z = 3.42$, $p = .0006$).

Unlike the trait dominance and actual dominance subcategories, the assigned dominance role subcategory was not homogenous (Table 4). Potential moderators explaining some of the variance among the assigned dominance role studies are gender, gender composition of the group, competitiveness of the interaction, and group size. The effect of these potential moderators on the speaking time to dominance relationship was tested for all studies together rather than separately for each category and subcategory. This is the reason why many of the categories and subcategories remained heterogeneous (Table 4).

Inferred dominance based on speaking time. For inferred dominance based on speaking time, whether emergent leadership or other kinds of dominance assessments were investigated did not significantly affect the speak-

ing time to dominance relationship (contrast $Z = 1.32$, $p = .19$). Comparison of studies that used independent observers versus those that used group members to judge dominance was not significant (contrast $Z = 0.25$, $p = .80$). However, it was shown that if group members assessed dominance, including their self-assessments, it yielded weaker associations between speaking time and dominance than excluding them (contrast $Z = 2.45$, $p = .014$).

Additional Moderators

Gender. Men showed significantly stronger associations between speaking time and dominance than women (contrast $Z = 2.21$, $p = .027$). The effect size for studies reporting results based on men and women without distinguishing gender lay in between (Table 4). As far as gender composition of the group is concerned, same-gender groups showed stronger associations between speaking time and dominance than opposite-gender groups (contrast $Z = 2.07$, $p = .038$).

Competitiveness of the setting. If the interaction occurred in a noncompetitive setting, the relationship between speaking time and dominance was stronger than when the interaction took place in a competitive setting (contrast $Z = 2.24$, $p = .025$).

Group size. Testing whether the relationship between dominance and speaking time increased if the group size increased showed a significant linear effect (linear contrast $Z = 2.11$, $p = .035$).

DISCUSSION

The present meta-analysis sought whether a relationship between dominance and speaking time could be found, not only for studies concerned with inferred dominance based on speaking time but also for studies dealing with dominance expressed in speaking time, and whether the magnitude of the two effects differed. Moreover, potential moderators such as gender, gender composition of the group, competitiveness of the interaction, and group size were investigated.

Based on the results of two previous meta-analyses showing a strong relationship between emergent leadership and speaking time (Mullen et al., 1989; Stein & Heller, 1979), it comes as no surprise that when making inferences about individual dominance based on behavior in an interaction, strong associations between speaking time and inferred dominance emerged. A mean r of .64 confirmed that speaking time and inferred dominance were strongly related. The strength of this relationship was even more pronounced than the mean r reported by Mullen et al. (1989), $r = .55$, and Stein and Heller (1979), $r = .60$, in their examinations of emergent

leadership based on speaking time. There was no difference in the speaking time to dominance association if emergent leadership studies were compared to studies in which other types of dominance assessments were used. Of the 14 emergent leadership studies included in the present meta-analysis, 12 were used in Mullen et al.'s or Stein and Heller's meta-analysis (11 of the 25 studies included in Mullen et al. and 5 of the 15 studies included in Stein and Heller add up to 16 studies; 4 of these 16, however, overlapped both meta-analyses, reulting in 12 studies). Since no other communication variable besides speaking time was tested it cannot be concluded, however, that speaking time is the most salient cue used in inferring dominance. It should also be noted that the result is only correlational and no causal inferences can be drawn. The association could be due to some third variable that is correlated with speaking time (e.g., loudness).

The question arises as to whether dominance assessments based on speaking time are accurate, meaning whether high dominant or high status individuals indeed talk more than low dominant or low status individuals. Although it was not possible to assess accuracy, a prerequisite for accuracy would be a significant relationship between dominance (trait or state) and emitted speaking time. A mean *r* of .38 indicated that dominance is expressed in speaking time (Table 4). However, the magnitude of the speaking time to dominance relationship was significantly weaker for dominance expressed in speaking time than for inferred dominance based on speaking time. Despite the fact that high dominant individuals talk more than low dominant ones, this relationship is weaker than people generally assume when they observe interactions and infer dominance based on speaking time. In terms of accuracy we can speculate that relying on speaking time to gauge dominance is generally adequate, however people tend to be overconfident in their view because the relationship between speaking time and dominance for the actual sender is considerably weaker.

Why is the relationship between dominance and speaking time for the sender weaker than for the perceiver? Expressed dominance and inferred dominance might rely on different psychological processes and hence produce different associations. Expressed dominance may reflect motivation processes while inferred dominance may reflect stereotypes. More specifically for expressed dominance, different motives can drive the reasons for talking during an interaction. Dominance may be one of the most important motives to claim much of the floor time, however, establishing intimacy, being social, or simply showing off are other possible motives. It could likewise be the case that dominance is conveyed in forms other than large amounts of talk time. Successful interruptions, for instance, would be another means to express dominance (Linkey & Firestone, 1990; Ng, Brooke, & Dunne, 1995; Schmid Mast, 2002). Last but not least, situ-

ational constraints, such as the previously discussed job interview situation, may also weaken the association between dominance and speaking time (Bond & Shiraishi, 1974). When inferring dominance, however, it is possible that people use stereotypical expectations such as "dominant individuals talk more than nondominant individuals." Adherence to this rule would result in a very strong relationship between inferred dominance and speaking time. This might explain why the speaking time to dominance relationship is stronger for inferred dominance than for expressed dominance.

Studies measuring outcome dominance and speaking time showed the two variables to be related, mean $r = .33$ (Table 4). This relationship, however, was weaker than those for dominance expressed in speaking time and for inferred dominance based on speaking time. Probably, outcome dominance studies measure only one *aspect* of dominance—influence. To be influential one does not necessarily have to talk most of the time, rather one might simply have the best ideas. One also has to keep in mind that only three studies of this type could be identified and the results should therefore not be overinterpreted.

All in all, speaking time appears to be a reliable indicator of dominance, regardless of whether dominance is understood as an expressed characteristic, an inferred quality, or an objective measure of influence or decision-making power. The overall effect size estimate was $r = .54$ (Table 4), considered a large effect size (Cohen, 1988). It is also quite impressive that for each category and subcategory the combined effect sizes were significant and that only two studies yielded a negative relationship between speaking time and dominance.

Trait Dominance, Assigned Dominance, and Actual Dominance

Assigned dominance studies yielded a stronger association between speaking time and dominance than trait dominance studies. An explanation of this finding could be that because participants are usually not familiar with the roles they are asked to play, they might enact what they stereotypically think dominance involves. Also, the dominance differences in assigned role play situations are more salient to the interaction partners (than if dominance is assessed in a self-report questionnaire). Interaction partners might hold stereotypical expectations about how much each group member should talk based on the salient dominance role assignment (expectation states theory; Berger, Conner, & Fisek, 1974; Berger, Fisek, Norman, & Zelditch, 1977). Such expectations become self-fulfilling prophecies, intensifying the relationship between dominance and speaking time.

On a more methodological level, it should be noted that the strength of the relationship between assigned dominance roles and speaking time is most likely influenced by the strength of the role-play manipulation. For

example, telling confederates to behave dominantly towards a participant may evoke stronger associations with dominance behavior than assigning participants the roles of boss versus employee. The limited number of studies available in this category did not allow testing of this specific question.

Methodological practices in the studies examined here also had an influence on the strength of the association between trait dominance and speaking time. Selection of extreme groups as opposed to random pairing enhanced the strength of the relationship between dominance and speaking time. The specific dominance trait measure used (CPI as compared to FIRO-B), showed no influence on the strength of the association investigated.

The relationship between dominance and speaking time in studies of actual dominance yielded the weakest association between dominance and speaking time of all the subgroups. Interactions of people with actual status differences are potentially more influenced by situational factors, and the observation of one specific interaction might not always reflect existing dominance differences. It should, however, be kept in mind that only two studies could be found to represent actual dominance differences. More studies of this nature are needed in order to obtain conclusive results.

Inferred Dominance Based on Speaking Time: Involvement

Within the subgroup of inferred dominance studies, both independent observers' and group members' dominance assessments showed strong relationships with speaking time (Table 4). Contrary to the finding reported by Mullen et al. (1989), dominance and speaking time were not more strongly related for independent observers than for group members. However, within the category of member-assessed dominance, the speaking time to dominance association was stronger if self-assessments were excluded than if self-assessments were allowed. Perhaps, when people judge themselves on dominance, as compared to judging others on dominance, they rely less on the amount of talk time during the interaction. For self-assessments, people have many more sources of information about their dominance on hand. They might rate themselves according to how they usually behave in such situations, (e.g., more according to trait dominance). Or they might have a desire to be seen as more (or less) dominant than they actually behaved and rate themselves accordingly. All these factors can weaken the relationship between speaking time and dominance.

Gender Differences

In the present meta-analysis, the relationship between dominance and speaking time was more pronounced for men than for women. This re-

sult is comparable to the one concerning a subgroup of studies in Stein and Heller's (1979) meta-analysis, revealing that being male appeared to strengthen the relationship between leadership emergence and participation. If speaking time is used as a means to convey power or dominance, different amounts of talk time directly reflect differences in dominance, resulting in a strong relationship. On the other hand, if speaking time is used to express interest or concern, the results would be a weaker relationship between dominance and speaking time. In a meta-analysis done by Timmerman (in press), men were found to use more powerful language than women, although the overall effect size was relatively small (mean $r = .11$, $k = 30$, $N = 3012$). Also, women seem to use talk time not only to convey dominance but also to establish and maintain relationships (Carli, 1990). In the same vein, a meta-analysis about gender differences in conflict strategies (Gayle, Preiss, & Allen, 1994) reported women to engage in more avoidance, accommodation, compromise, and collaboration strategies than men, who use more competitive strategies. Although the reported gender differences generally are relatively small (Goldsmith & Fulfs, 1999), these studies seem to suggest that speaking time is used more exclusively to convey dominance by men than by women. Therefore, the association between speaking time and dominance might be more pronounced for men than for women.

There is increasing evidence that gender composition of the interaction partners affects behavior. For instance, Mulac, Wiemann, Widenmann, and Gibson (1988) found that differences in gender-linked language were more pronounced in same-gender as compared to opposite-gender dyads. In the present meta-analysis, strong associations between dominance and talk time emerged in same-gender as compared to opposite-gender groups. This finding stands in contrast to the reports of Mullen et al. (1989) and Stein and Heller (1979), who both found stronger associations between participation and leadership emergence in opposite-gender groups. Expectation states theory posits that the creation of informal dominance hierarchies in initially homogenous groups, such as same-gender groups, is mediated to a large extent by dominance behavior cues because there are fewer external status characteristics group members can build their performance expectations on (Ridgeway & Berger, 1986; Ridgeway & Diekema, 1989; Ridgeway, Diekema, & Johnson, 1995). As soon as there appears to be minimal task-relevant differences among group members, the expectation-building process starts and subsequently influences behavior. People who talk more are expected to perform well and will be given even more chances to contribute, strengthening the dominance to speaking time relationship. In opposite-gender groups (heterogeneous), men might just talk more than women (Hall, 1984; James & Drakich, 1993) without being more dominant or being perceived as more dominant, weak-

ening the speaking time to dominance relationship. This might explain why the strength of the association between dominance and speaking time is more pronounced in same-gender as compared to opposite-gender groups. Another explanation for this result might be that speaking time works as a flirting signal in opposite-gender interactions. Maybe speaking time is less exclusively related to dominance in opposite-gender interactions but is used to try to attract the attention of the opposite-gender interaction partners. This, however, is a highly speculative interpretation.

Competitiveness of the Setting and Group Size

The relationship between speaking time and dominance was more pronounced in a noncompetitive setting than in a competitive one. In competitive settings, speaking much is eventually not seen as the only effective and straightforward behavior with which to convey dominance or to base one's dominance perception on. Other dominance-related behaviors such as interruptions or the forcefulness of the speech content may be equally (or even more) effective. In noncompetitive interactions, speaking time might serve as a socially accepted form of dominance, explaining why the association was stronger for noncompetitive than for competitive settings.

Group size was linearly related to the magnitude of the effect size: the larger the group, the stronger the association between dominance and speaking time. For inferred dominance based on speaking time, this effect can perhaps be explained by the idea that if one group member talks a lot in a larger group he or she is more salient and therefore has higher chances of being elected as a leader or being perceived as dominant (Mullen et al., 1989). With more listeners, the speaker is more the focus of attention. Many eyes are directed towards him or her. Being the focus of attention has been proposed to be related to dominance (Chance, 1967). For dominance expressed in speaking time, the degree of intimacy of the situation, defined by the number of people present, might be responsible for the linear increase of the effect size with group size. Generally, people are more nervous about speaking in front of a larger group compared to speaking in a more intimate setting. It might be the case that in public situations (with many people present) only high dominant individuals dare speak up whereas in intimate situations (with fewer people present) both high and low dominant people make contributions. In the more intimate setting, therefore, the relationship between expressed dominance and speaking time would be weaker than in the more public setting. Also, if this is what observers believe, intimacy of the situation can explain the effect for inferred dominance as well.

Limitations of the Present Meta-Analysis

One aspect of the relation between dominance and speaking time that could not be explored in the present meta-analysis is the familiarity of the group members with each other.[10] It is possible that the association between speaking time and dominance is especially pronounced in interactions between strangers. Such a situation could be comparable to the formation of a rank order where everybody has to establish his or her dominance position. An effective way to do so might be to let the others know what one thinks by trying to convince them with what one says. Therefore, speaking time is likely to be highly linked to the desire to dominate. If, however, a rank order has been established, there is perhaps less need to convey one's rank position by talking much. The dominant person can lean back and let the others do the talking as long as it is clear that his or her dominance position is not in jeopardy. In the present meta-analysis, this could explain why studies concerned with actual dominance yielded such weak associations between dominance and speaking time. Besides the two actual dominance studies in which people might have been familiar with each other's status, only two other studies looked at interaction partners who knew each other. Cashdan (1998) investigated housemates interacting with each other and with strangers and another study dealt with husbands and wives (Strodtbeck, 1951). All other studies were based on unacquainted strangers. Indeed, for studies investigating interactions among strangers, the relationship between dominance and speaking time was more pronounced than for studies with interactions among familiar or potentially familiar group members (contrast $Z = 2.68$, $p = .01$). Note, however, that only four studies of this kind could be retrieved.

The studies included in the present meta-analysis remain, for the most part, heterogeneous even after breaking them down in subcategories (Table 4), meaning that the variance among effect sizes is not only due to sampling error but that the existence of moderators can be assumed. For many of the subcategories of expressed and inferred dominance, gender, gender composition of the group, and competitiveness of the setting would be potential moderators. Likewise, for the subcategories of gender, gender composition of the group, and competitiveness of the setting, expressed and inferred dominance could act as moderators. Because the main focus of this meta-analysis lay in testing whether certain moderator variables can be found to influence all different types of studies, the moderator analysis included all the studies, leaving many resulting subcategories heterogeneous.

Speaking time is usually not the only source of information about dominance, and judgments regarding dominance are usually based on multiple informative cues including linguistic, visual, and vocal (Tusing &

Dillard, 2000). The strong relationship between speaking time and dominance seems to suggest that speaking time may be the most important factor in expressing and inferring dominance. This conclusion can only be drawn, however, if the average effect size found in this meta-analysis is larger than the effect sizes of the relationship between dominance and other dominance-relevant communication behaviors (e.g., interruptions, loudness of speech). To date, however, no such meta-analyses exist.

All in all, the present meta-analysis confirmed the strong association between speaking time and dominance regardless of any moderating variables. It has to be kept in mind, however, that speaking time does not necessarily reflect dominance in every situation. Talkative people in a group can be very nondominant, even annoying, and group members let them talk only out of sympathy or exasperation rather than out of respect for their dominant position. The influence of situational factors should not be underestimated because many variables moderated the strength of the association between dominance and speaking time.

NOTES

1. Two effect sizes (r = -.44 and r = .28) could be retrieved from the two studies (Bond & Shiraishi, 1974; Thimm & Kruse, 1993) and yielded a combined effect size of r = -.09 (Z = 0.025). The significance level of the speaking time difference between the two conditions (together with the information about the number of participants) served as the information for calculating the effect size in each study.

2. Differences in expertise, however, might be related to differences in dominance. Therefore, expertise was intended to be examined as a moderator variable in the present meta-analysis. Due to a lack of studies assessing or varying the degree of expertise (only two studies varied the degree of expertise: Bottger, 1984; Ginter & Lindskold, 1975), this moderator variable could not be investigated further.

3. Territorial dominance means that a person who is familiar with the environment in which the interaction takes place has a dominance advantage and is so-called territorially dominant. The two studies (Conroy & Sundstrom, 1977; Martindale, 1971) that treated territorial dominance as the dominance measure yielded three independent effect sizes (r = -.35, r = .29, r = .43). The combined effect size was r = .13 (Z = 1.72, p = .086).

4. According to the age of the majority of the participants, studies were coded as either "college students," "adults," or "children." With four exceptions, all studies were conducted with mainly college students. Strodtbeck's (1951) study dealt with noncollege student husbands and wives. In Bottger's (1984) study, managers and graduate management students interacted, and in Hall and Friedman's (1999) study, employees of different organizational rank were studied. In only one study (Moore & Porter, 1988) were elementary school students examined.

5. The total number of words spoken would have been another measure of speaking time. However, none of the studies in the present meta-analysis used this measure.

6. In this study, solo leaders, coleaders, and nonleaders were compared. The means were reported for women and men separately, and therefore they were averaged within each of the three conditions. Solo leaders were allocated the weight 3, coleaders the weight 2, and nonleaders the weight 1. According to the procedure suggested by Rosenthal and Rosnow (1985, pp. 74–77), these weights were correlated with their respective means. The calculated r was squared and then multiplied by the "maximum possible contrast F" (Rosenthal &

Rosnow, 1985, p. 74). The maximum possible contrast *F* is calculated by the multiplication of the reported omnibus *F* by its numerator *df*.

7. $Z\,pooled = \text{mean}\,Fisher\,z \sqrt{(k-3)*N}$, where k refers to the number of group members and N to the number of groups (Kenny & Winquist, 2001, p. 296).

8. Performing the Fisher's *z* transformation slightly overestimates the actual size of the correlation, especially for large effect sizes. The magnitude of the overestimation, however, is very small.

9. No corrections for artifacts (e.g., measurement error due to attenuation) were performed, resulting in smaller average estimates than if the corrections would have been performed.

10. Mullen et al. (1989) did not directly address this question but one of the moderator variables they examined was related to familiarity among group members. They investigated whether the relation between participation and leadership emergence differed if groups were real, meaning that they had some contact with each other outside the laboratory, as opposed to artificial groups with no outside contact. The authors found that the association between leadership emergence and participation was stronger for real groups than for artificial groups.

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