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THE ORGANIZATIONAL PERFORMANCE CYCLE: LONGITUDINAL ASSESSMENT OF KEY FACTORS

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ABSTRACT: The study's working model postulated static and temporal relationships among goal-setting variables, self-competence, and job performance. Two studies testing the working model are described. Study 1 involved administration of an employee survey to 225 employees of a military installation on two separate occasions. Self-report measures of ability, personal goals, and self-competence were used to predict self- and supervisory-performance ratings. Study 2 involved collection of comparable measures over three occasions from 191 employees of a U.S. Federal mint. Results of both studies indicated that a longitudinal path model fit the data better than a cross-sectional model.

KEY WORDS: job performance; motivation; competence.

A considerable portion of the research conducted in the organizational sciences focuses on a central problem—comprehending organizational and individual task performance. Common practice in organizational research involves collecting performance data at a single point in time. While this approach is often a practical necessity, it treats performance as if it were a discrete event. Real-world task performance is probably more accurately described as a continuous process which ebbs and flows through its own natural cycle.

There is a danger that the static approach to performance assessment may systematically omit important temporal aspects of the performance process from empirical review. Existing data argue that temporal

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mechanisms are important. For example, studies indicate that performance feedback can affect subsequent performance (Ilgen, Fisher, & Taylor, 1979; Kluger & DeNisi, 1996), but the mechanisms by which this occurs need further study (Kluger & DeNisi, 1996). Similarly, one of the central themes in self-efficacy research has been that self-efficacy is in part the result of a process of performance-feedback-change that can only occur over time (Bandura, 1982, 1986). Unfortunately, standard research practices are poorly-equipped to handle these kinds of temporal mechanisms. Although it is not the complete answer to this problem, longitudinal research featuring repeated performance assessments may be useful in understanding which temporal mechanisms are important in performance cycles. Longitudinal studies can estimate the contribution of evolutionary sources of variance to the prediction of performance outcomes—variance sources that are generally beyond the reach of static approaches. Toward this end, the current work focused on the episodic assessment and longitudinal prediction of employee job performance.

THEORIES OF JOB PERFORMANCE

Long overdue, theories of job performance have finally begun to make their way into the organizational literature (e.g., Campbell, 1990; Motowidlo, Borman, & Schmit, 1997). These models have considerable promise. They may facilitate the integration of diverse findings (e.g., Motowidlo et al., 1997). They may lead to improvements in the accuracy of prediction (e.g., Schmidt, Hunter, & Outerbridge, 1986). And, they may help by imposing some much needed order on an often chaotic and fragmented literature (e.g., Campbell, 1990).

Job performance theories focus on a shared subject-matter, but that does not necessarily mean that they are exact duplicates of one another. Some of the differences among them are due to differences in the conceptual approaches they take. For instance, some models focus on the components of the performance criterion (Borman & Motowidlo, 1993; Campbell, 1990; Campbell, McCloy, Oppler, & Sager, 1993; Motowidlo et al., 1997). Campbell's (1990) model epitomizes this approach. He decomposes job performance into eight dimensions (e.g., job-specific task proficiency, facilitating peer and team performance). Studies testing the viability of dimensional frameworks are just beginning to appear in the empirical literature (e.g., Motowidlo & Van Scotter, 1994; Van Scotter & Motowidlo, 1996; Viswesvaran, Schmidt, & Ones, 1997).

A somewhat different conceptual approach is suggested by models that focus on how job performance fits into a causal network (Hunter, 1983; Schmidt, Hunter, & Outerbridge, 1986). These approaches tend to be more process-oriented. The Hunter-Schmidt model, for instance, fo-

cuses on relationships between job performance and three key antecedents: mental ability, job knowledge, and experience. Models of this type acknowledge the influence of job experience on performance but stop short of specifying the mechanism by which it occurs.

There has been little research examining the possibility that post-performance outcomes are important determinants of subsequent performance. That is not to say, however, that the temporal qualities of job performance have been completely overlooked by performance theorists. The Borman-Motowidlo model (Motowidlo et al., 1997), for example, acknowledges that performance is episodic and suggests that it best be viewed as "a continuous stream that flows on seamlessly . . ." (Motowidlo et al., 1997, p. 73).

If, as Motowidlo et al. (1997) suggest, performance "flows on seamlessly" yet we persist in treating it as a static event, our attempts to create faithful representations of these behavioral systems will be consistently undermined. Consider, for example, the conceptual implications of performance episodes. If future performance depends on past experiences, then static representations of performance risk omitting important sources of causality.

Currently-available performance models (e.g., Campbell, 1990; Hunter, 1983) could be amended to convey the temporal nature of performance processes. Hunter and Schmidt's causal-network model (Hunter, 1983; Schmidt et al., 1986) represents a case in point. The Hunter-Schmidt model currently describes the performance process in terms of a single predictor-performance episode, but the model could easily be expanded to show the dynamic interplay among a series of antecedent-outcome episodes. These changes would augment the basic Hunter-Schmidt model by making it possible for the framework to reflect the kinds of dynamic attributes that other theorists (e.g., Motowidlo et al., 1997) associate with the performance process.

The Hunter-Schmidt model treats skills and abilities as the main determinants of job performance. Classical models of job performance (e.g., Campbell & Pritchard, 1976; Viteles, 1932) agree in principle with this position, but they also accord an equally-prominent role to motivational mechanisms (e.g., goal setting mechanisms; achievement motives, etc.). Extending the Hunter-Schmidt model to include motivational mechanisms would help to reconcile the framework with the classical writings on performance processes.

KEY FACTORS IN THE PERFORMANCE CYCLE

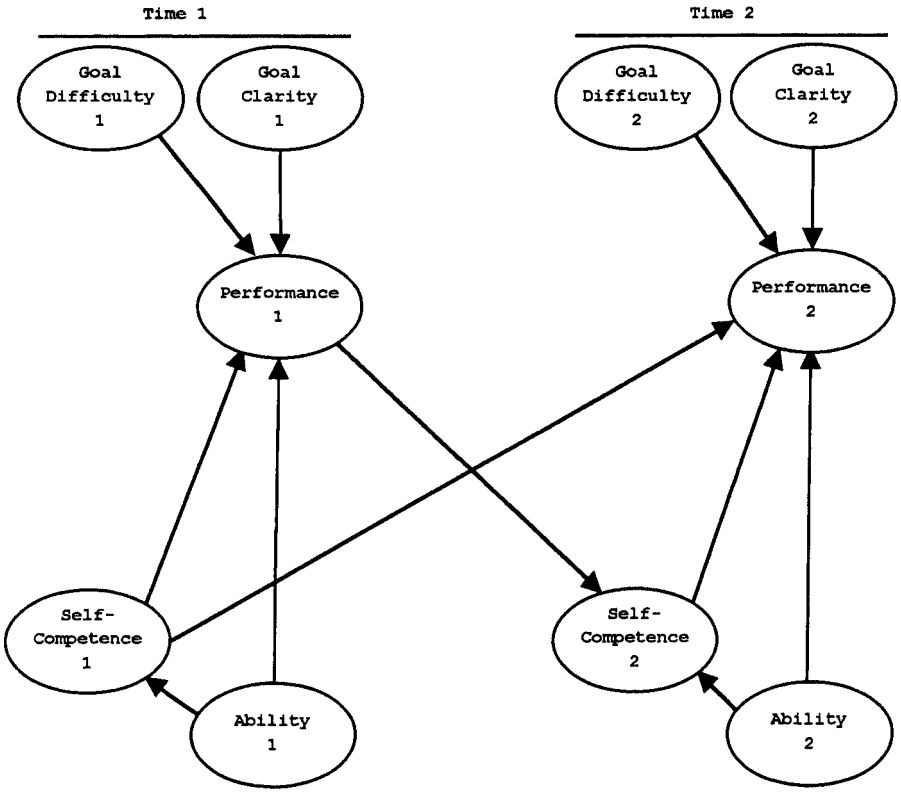
A working model depicting relationships among a number of important antecedents of job performance was synthesized from existing liter-

ature. This model is shown in Figure 1. The model summarizes predictor-performance relationships evaluated in the current study. The model also shows predicted temporal relationships among the study's variables.

The working model posits that work performance is a dynamic outcome resulting from the conjoint impact of motivational agencies (i.e., goal setting, self-competence) and ability mechanisms. What's more, prior episodes of performance have a deterministic effect on subsequent episodes. Hence, effective performance is conceptualized as an evolutionary, motive-driven process.

The current working model makes a basic assumption that goal setting mechanisms (Locke, 1968) and self-competence mechanisms (Wagner & Morse, 1975; White, 1959) have joint effects on job performance. A sizable body of empirical evidence already shows that goal setting

Figure 1
Hypothesized Longitudinal Model of Self-Competence and Performance



Note: Paths indicate hypothesized relationships between variables.

mechanisms impact performance (e.g., Locke, Frederick, Bobko, & Lee, 1984; Mento, Locke, & Klein, 1992; Mento, Steel, & Karren, 1987; Taylor, Locke, Lee, & Gist, 1984). Much of this work details the reliable effects that clear, specific, and difficult goals have on task performance.

Many goal setting studies have made use of experimental settings and goal setting manipulations (e.g., Locke et al., 1984; Mento et al., 1992). In contrast, field studies are a distinct minority in this literature. Studies focusing on goal setting practices in field settings may supplement the experimental literature by showing how these techniques can be integrated into everyday work activities. Ivancevich and McMahan (1977) developed goal setting instruments for use in survey-based applications. We used Ivancevich and McMahon's (1977) instruments to measure the goal specificity and goal difficulty dimensions shown in the working model.

Much recent work has attempted to integrate goal setting frameworks and self-efficacy theory (e.g., Locke et al., 1984; Early & Lituchy, 1991; Locke & Latham, 1990; Stevens, Bavetta, & Gist, 1993). This work suggests that self-evaluative constructs may have important influences on task performance.

One such self-evaluative construct, self-competence, has long been thought to be a determinant of job performance. Self-competence may be defined as "an individual's feelings and confidence about his [or her] abilities in mastering an organizational and work setting" (Wagner & Morse, 1975, p. 451). Early conceptual arguments (White, 1959) envisioned a role for self evaluations of competence in task performance.

The concepts of self-competence and self-efficacy bear a phenomenological resemblance (i.e., they are both self-referential evaluations of performance capability), but they are rooted in differing conceptual traditions (e.g., Bandura, 1982; White, 1959) and they differ markedly in terms of reference-domain scope. Narrow-scope self-efficacy percepts (e.g., self-evaluated computational skill) are most-appropriately linked to equally-narrow performance referents (e.g., performance in solving mathematical problems). Bandura (1982, p. 124) emphasizes this point when he speaks of ". . . *particularized* [emphasis added] self-percepts of efficacy . . ."

In contrast, self-competence's task referent is the constellation of skills and abilities contributing to the successful performance of an occupational or work role (Steel, Mento, Davis, and Wilson, 1989). Because self-competence embraces the complete set of skills necessary to perform a job, it is suitable for use as a predictor of overall job performance. Empirical applications (e.g., Morse, 1976; Steel et al., 1989; Tharenou & Harker, 1984) have treated Wagner and Morse's (1975) self-competence instrument as an omnibus measure, and studies have successfully used it as a performance predictor. Tharenou and Harker (1984) found that a

survey measure of self-competence predicted performance ratings ($r = .31$, $p < .01$) collected 20 months after their survey had been administered. A later study by Steel et al. (1989) found that self-competence predicted performance ratings on three groups of U.S. Department of Defense employees. Steel et al.'s significant competence-performance correlations ranged in size from .18 to .45.

Studies suggest that self-competence may be useful as a predictor of performance (Steel et al., 1989; Tharenou & Harker, 1984), but there has been no research evaluating the possibility of cyclical relationships among a series of competence-performance episodes. However, conceptual work in other domains suggests that these types of relationships may exist. Conceptual work on self-efficacy, a construct related to self-competence (Steel et al., 1989), has suggested that previous performance has considerable—and lasting—influence on subsequent self-efficacy judgments (Bandura, 1982). Similarly, conceptual arguments put forth by Lindsey, Brass, and Thomas (1995) envision a sequence of efficacy-performance "spirals." If self-competence and self-efficacy relate to performance in similar ways, then temporal dependencies among competence-performance episodes are to be expected.

The current study used survey-based measures of self-competence (Steel et al., 1989) and goal setting (Ivancevich & McMahon, 1977) as predictors of job performance. Self- and supervisory-performance ratings served as criteria. Two studies were performed. Study 1 focused on a sample of military installation personnel. Study 2 focused on a group of employees from a U. S. federal mint.

Measures were collected on multiple occasions in both studies making it possible to evaluate a number of temporal aspects of the performance cycle. In particular, the working model predicts that performance will positively influence subsequent self-competence and that self-competence will affect future performance. On the other hand, it seems less likely that judgments of self-competence will persist once new performance information becomes available.

STUDY 1

LISREL 8 (Joreskog & Sorbom, 1993) was used to examine the fit of the data to the model shown in Figure 1. We also compared the fit of this longitudinal model to a model representing a more limited—and more typical—cross-sectional approach. The cross-sectional model does not permit previous performance to affect self-competence in the present, nor does it allow present self-competence to influence future performance. From a purely statistical perspective, it also seems likely that

omitting the longitudinal paths has the potential of leading to erroneous conclusions by failing to take into account important sources of variance (Reichardt & Gollub, 1986; 1987).

Method

Sample. Study 1's sample consisted of 225 employees of a U.S. Air Force installation located in the western United States. The typical respondent was a man (90%) between the ages of 26 and 30. The sample contained 182 military service members and 43 civilian employees. Participants were drawn from three military units, missile maintenance, technical training, and facilities maintenance. A variety of white collar (e.g., classroom instructors) and blue collar (e.g., missile maintenance technicians) jobs were represented in the sample.

Measures. Reliability coefficients (i.e., coefficient alpha) for the Study 1 measures may be found in the main diagonal of Table 1.[1]

Two measures of goal characteristics were based on the work of Ivancevich and McMahon (1977). Four of their survey items were used to measure goal clarity. A sample item from the *goal clarity* measure stated, "what I am expected to do at work is clear and unambiguous." Five items were used to measure goal difficulty. A sample item from the *goal difficulty* scale stated, "results expected in my job are very difficult to achieve." Both instruments employed conventional 7-point agree-disagree rating scales.

Self-competence was measured by Wagner and Morse's (1975) Sense of Competence Questionnaire. Thirteen items comprise this instrument. The statements "No one knows this job better than I do" and "I honestly believe I have all the skills necessary to perform this task well" are typical of the kinds of items found in this instrument. Responses were recorded on a 7-point agree-disagree rating scale. Reliability and validity information on this measure is reported in Steel et al. (1989). Additional evidence relating to the predictive validity of this scale is contained in Tharenou and Harker (1984).

A single item was used to obtain an individual's *self-ratings of ability*. The item asked, "Compared to others whose job is similar to yours, how would you rate your ability to perform the work?" Response choices ranged from (1) "*much less* ability than others" to (5) "*much more* ability than others."

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[1]The self-rated ability measure was a one-item measure. Hence, internal consistency estimation was not technically feasible. Six- and eight-month test-retest estimates derived from Study 2 were averaged, and the result (i.e., .50) was used as an omnibus estimate of the reliability of this measure in all data analyses.

Table 1
Intercorrelations Among Variables in Study 1

Variables	1	2	3	4	5	6	7	8	9	10	11	12	*N*	*M*	*SD*
Performance ratings															
1. Supervisor 1	(.93)												193	22.77	5.14
2. Supervisor 2	.14	(.95)											179	26.94	5.51
3. Self-reported 1	.28	.19	(.93)										221	20.32	5.27
4. Self-reported 2	.15	.17	.40	(.93)									224	21.02	5.27
Self-competence															
5. Self-competence 1	.24	.27	.39	.28	(.78)								222	47.28	11.65
6. Self-competence 2	.13	.24	.24	.38	.58	(.79)							221	49.13	11.45
Goal-Setting															
7. Goal clarity 1	.16	–.09	.22	.02	.22	.16	(.88)						222	16.96	5.95
8. Goal clarity 2	.17	.15	.18	.35	.09	.37	.20	(.87)					222	17.04	5.75
9. Goal difficulty 1	.11	.02	.12	.19	.35	.26	.27	.10	(.86)				217	18.09	7.01
10. Goal difficulty 2	.02	.17	–.02	.17	.20	.34	.06	.13	.30	(.87)			223	17.90	7.05
11. Ability 1	.05	.08	.29	.23	.26	.30	.21	.10	.20	.02	—		224	2.93	0.99
12. Ability 2	.02	.01	.17	.23	.22	.30	.09	.00	.14	.00	.26	—	225	3.10	1.11

Notes: $N = 179–225$ for all correlations. When $r > .12$, $p < .05$, and when $r > .17$, $p < .01$ (one-tailed). Cronbach's alphas are shown on the diagonal. A lag of 14 months separated the two data collections.

Two measures of *job performance* were used, a self-rating and a supervisory rating. Each rating instrument contained the same five performance items: quantity of work, quality of work, efficiency, problem-solving capacity, and adaptability. Supervisory performance ratings were computed as the sum of the supervisor's ratings on the five items. Employees rated their own performance using similar items. The self-ratings were also summed to form a total score. All performance ratings were made on 7-point verbally-anchored rating scales. Data relating to the psychometric properties of these instruments were reported by Steel and Ovalle (1984). Steel and Ovalle found that the self- and supervisory ratings converged (rs = .26–.35, ps < .01) and that both instruments predicted such objective performance criteria as branch-office profitability and bad-debt control (rs = .10–.23, ps < .05).

Procedure. Survey data were collected onsite in group meetings. Employees were notified that participation in the study was voluntary and that their responses would remain confidential. The response rate was 93%. Supervisory performance ratings were collected in tandem with each survey administration. Supervisors were told that the performance ratings would be used for research purposes only. Two waves of survey and appraisal data were collected over the course of the study. A lag of 14 months separated the two data collections.

To preserve sample size, the analysis was based on pairwise correlations. On the average, correlations were based on an adequate (Tanaka, Panter, Winborne, & Huba, 1990) sample size (average N = 216). Procedures for analyzing single-indicator latent variable models described by Joreskog and Sorbom (1993) were used in the analysis. Reliability estimates obtained for the observed variables were used to adjust for the effects of measurement errors on the relationships in the model. Factor loadings or lambdas (λ) describing the relationship between each latent variable and the corresponding observed variable were set equal to the square root of the reliability estimate for the observed variable (i.e., $\lambda_{11} = \sqrt{r_{11}}$). Theta delta ($\Theta_\delta$) and theta epsilon ($\Theta_\varepsilon$) variables representing random error in the observed measures were set equal to the variance of the observed variable times one minus the reliability of the observed variable [i.e., $\Theta_\delta = \sigma^2(1 - r_{11})$].

The true-score model of classical test theory suggests that an individual's responses to survey items contain at least three components: true score variance associated with the object being judged, variance associated with the individual's unique response pattern, and random error variance. By definition, random errors do not correlate. When independent response measures are obtained at a single time period there is no way to distinguish between random error and respondent-specific error. Both are unique to the respondent. However, when the same per-

son's responses are measured on different occasions, respondent-specific variance at Time 1 and Time 2 are not independent. The presence of correlated errors caused by repeatedly measuring the same subjects with the same instruments distorts LISREL parameter estimates and fit indices. To reduce the effects of correlated errors caused by repeatedly measuring the same subjects with the same instruments, each variable's error variance at Time 1 was allowed to correlate with its error variance in Time 2 (Joreskog & Sorbom, 1993; Reddy, 1992; Reichardt & Gollob, 1987).

As shown in the working model, unidirectional positive relationships among goal difficulty, goal clarity, ability, past and present self-competence, and past and present job performance were expected. The effects of goal clarity, goal difficulty, and ability were conceptualized as being concurrent with actual performance. These relationships were integrated into the LISREL analyses of a model which also specifies that self-competence (Time 1) influences both concurrent (Time 1) and later performance (Time 2). It also specifies that performance in Time 1 influences self-competence in Time 2. Following procedures demonstrated by Mayer and Carroll (1987), this longitudinal model was compared with an alternative model in which relationships among performance and self-competence variables were limited to intraperiod paths only.

Results

The pattern of correlations in Table 1 suggested that self-competence was related to self- and supervisory performance ratings, both for the current time period (i.e., Time 1) and in Time 2. The LISREL path analysis results in Figure 2 show that the three paths from self-competence to performance were significant for the supervisor's performance ratings (i.e., first coefficient in each pair of values). Two of the three paths were also significant for the self-ratings (i.e., coefficients enclosed in parentheses). These results provide evidence of a self-competence effect on job performance.

Goodness of fit statistics for the model using supervisory performance ratings ($\chi^2_{13} = 50.58$, GFI = .95) and self-ratings ($\chi^2_{13} = 59.0$, GFI = .93) as dependent measures indicated acceptable fits.

To further examine the longitudinal relationships, we compared the fit of the current model to a model restricting the relationships between self-competence and performance to within-period paths exclusively. This alternate model represents the type of situation that occurs in cross-sectional research when all measures are collected at the same time. Because these two models are nested, the difference between their chi square values is distributed as a chi-square statistic with $\Delta df = df_2 - df_1$ (Bollen, 1989). Finding the chi-square value for the longitudinal

model to be significantly smaller would indicate that the longitudinal paths account for a significant portion of the criterion variance. Hence, a difference value (i.e., $\Delta\chi^2$) large enough to be significant would suggest that competence-performance episodes impact one another over time in a manner similar to the temporal self-efficacy→performance→self-efficacy impacts specified by Bandura (1982).

A chi-square difference test comparing the cross-sectional model's overall test statistic [$\chi^2_{15} = 71.62$ (for supervisory performance ratings) and $\chi^2_{15} = 70.26$ (for self-ratings)] with those for the model described above (i.e., the longitudinal model) showed that removing the longitudinal paths substantially worsened both the supervisory-ratings model ($\Delta\chi^2_2 = 21.04,\ p < .01$) and the self-ratings model ($\Delta\chi^2_2 = 11.26,\ p < .01$). This finding was consistent with the position that longitudinal effects are an important feature of self-competence-performance and performance-self-competence linkages.

Multiple Rs for the equations predicting performance at Times 1 and 2 ranged from R = .40 to R = .51. The set of predictors explained substantial variance in the self-ratings ($R^2_{Time1} = .26$; $R^2_{Time2} = .16$) and in the supervisory ratings ($R^2_{Time1} = .21$; $R^2_{Time2} = .19$). Results pertaining to the linkages between the goal-setting variables and performance were mixed. Figure 2 shows that the path from goal clarity to self-rated job performance was significant on both occasions ($\Gamma_{Time1} = .16$; $\Gamma_{Time2} = .19$, both $p < .01$, one-tailed), but identical paths to the supervisory ratings were not significant on either occasion. Surprisingly, the goal difficulty measure failed to produce a significant relationship with either measure of performance.

STUDY 2

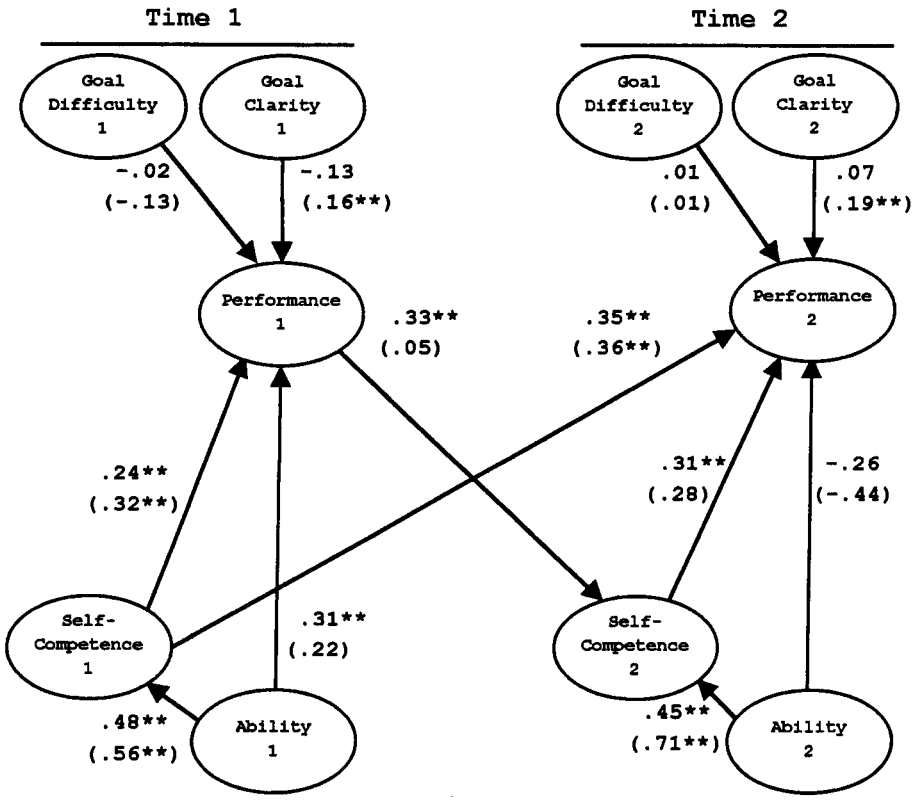
Study 2 replicated and extended the findings of the initial study by testing a model featuring three discrete time periods and three panels of survey data. All predicted paths in the three-wave model were simple extensions of the two-period case.

Method

Sample. Data for the study were provided by 191 employees of a United States federal mint. A profile of the typical respondent would describe a man (92%), between the ages of 41 and 50, working in a blue collar job (e.g., printing press operator).

Procedure. Measures and procedures were much the same as those for Study 1. Three waves of survey and appraisal data were collected during

Figure 2
Completely Standardized Path Coefficients for Two Waves of Self-Competence and Performance



Notes: Results for two analyses are shown. Path coefficients computed for supervisor-rated performance are on top. Coefficients below (enclosed in parentheses) were computed for self-rated performance. Observed variables, loadings, and error terms omitted for readability.

$^{**}p < .01$, $^{*}p < .05$ (one-tailed).

the course of Study 2. Initial data were collected at the outset of the study (Time 1). A second wave of measures was collected after six months had elapsed (Time 2). A final set of measures was collected fourteen months after the study had begun (Time 3). The response rate was 83%. As was the case with Study 1, the analysis was based on pairwise correlations (average N = 106). Reliability estimates (i.e., coefficient alpha) for all of the multi-item measures may be found in the main diagonal of Table 2.

Table 2
Intercorrelations Among Variables in Study 2

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	*N*	*M*	*SD*
Performance ratings																					
1. Supervisor 1	(.93)																		166	20.52	5.14
2. Supervisor 2	.53	(.92)																	128	20.37	4.64
3. Supervisor 3	.36	.51	(.93)																159	21.63	4.94
4. Self-reported 1	.39	.27	.21	(.92)															189	19.74	5.15
5. Self-reported 2	.42	.40	.32	.43	(.93)														113	19.38	5.21
6. Self-reported 3	.27	.18	.18	.42	.46	(.90)													97	19.34	4.65
Self-competence																					
7. Self-competence 1	.09	.31	.23	.36	.25	.32	(.66)												188	44.91	10.58
8. Self-competence 2	.14	.30	.23	.24	.21	.08	.72	(.74)											111	42.65	11.73
9. Self-competence 3	.21	.27	.24	.32	.08	.18	.69	.85	(.76)										95	44.18	11.91
Goal Setting																					
10. Goal clarity 1	.20	.08	.23	.24	.07	.09	.26	.12	.30	(.90)									183	17.66	6.13
11. Goal clarity 2	.13	.07	.06	.03	.14	−.10	.13	.19	.25	.45	(.92)								109	16.80	5.63
12. Goal clarity 3	.05	−.03	.09	.11	.05	−.01	.23	.21	.17	.52	.70	(.91)							93	16.80	6.19
13. Goal difficulty 1	−.04	.01	.03	.03	−.02	−.01	.29	.29	.32	.05	−.06	.09	(.86)						180	17.16	7.40
14. Goal difficulty 2	−.06	−.06	−.17	.07	−.15	−.11	.14	.25	.19	−.01	−.06	−.13	.54	(.85)					107	16.91	6.66
15. Goal difficulty 3	−.12	.13	.16	−.08	−.25	−.12	.29	.29	.24	−.05	−.05	−.11	.57	.61	(.88)				94	17.73	7.39
16. Ability 1	.04	.02	.01	.14	.12	.03	.06	.03	−.10	.01	.00	.07	−.09	−.13	−.03	—			185	2.96	0.77
17. Ability 2	.09	−.07	.06	.12	.05	.20	.13	.16	.11	.22	.08	−.06	.13	−.08	−.03	.46	—		108	2.92	0.75
18. Ability 3	.12	.10	.10	.04	.04	.16	.26	.30	.23	.21	.09	.06	.14	.00	.16	.22	.58	—	93	3.05	0.85

Notes: $N = 62–188$ for all correlations. When $r > .21$, $p < .05$, and when $r > .29$, $p < .01$ (one-tailed). Cronbach's alphas are shown on the diagonal. Longitudinal data were collected 6 months and 14 months after the initial data were collected.

Results

The correlations in Table 2 again suggest that self-competence scores are significantly related to subsequent self- and supervisory-performance ratings. Results of LISREL (Joreskog & Sorbom, 1989) path models predicting supervisory performance ratings and self-ratings of performance over 14 months are shown in Figure 3. Given the nature of the data and the sample size, overall model-fit indices for the supervisory performance ratings ($\chi^2_{37} = 81.19$, GFI = .91) and self-ratings ($\chi^2_{37} = 96.72$, GFI = .90) represent an acceptable fit.

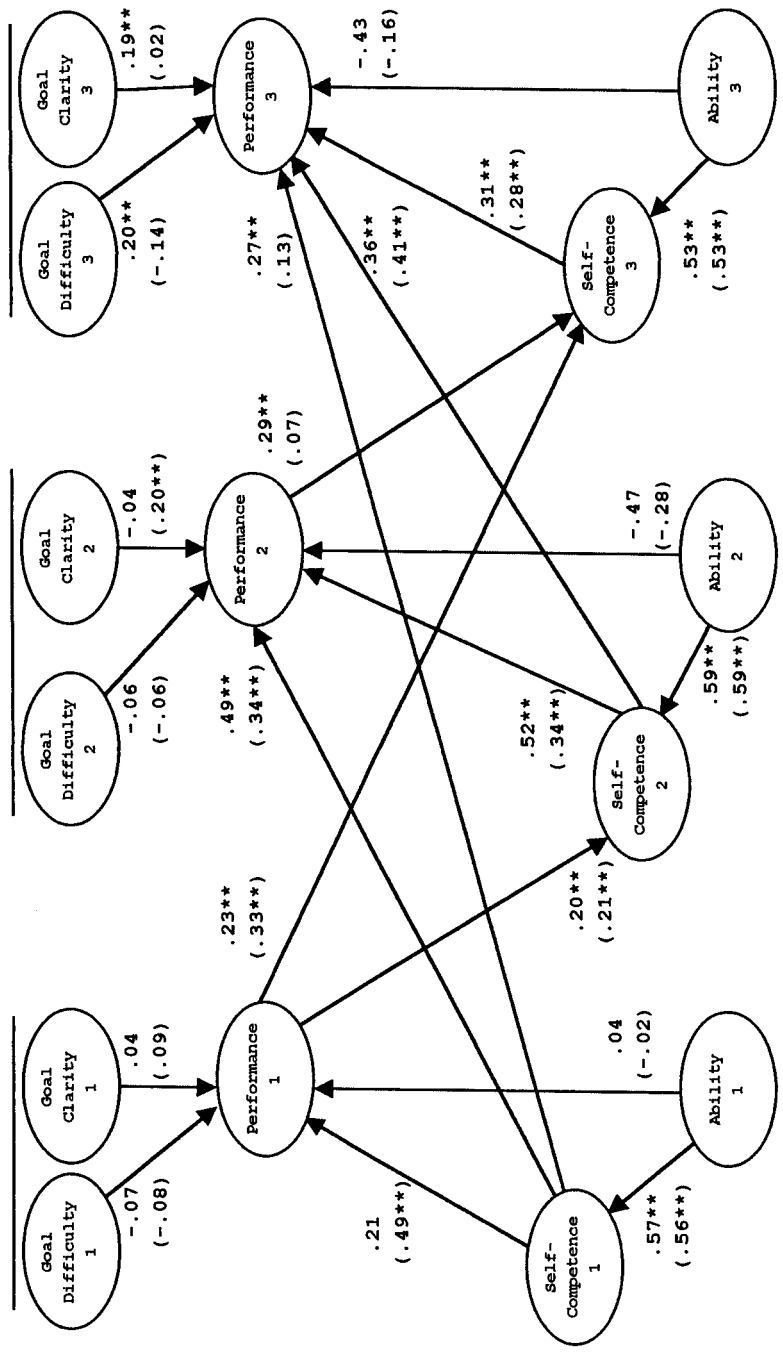
All but two of the standardized path coefficients for the hypothesized longitudinal self-competence→performance or performance→self-competence paths were significant between Time 1 and Time 2, between Time 1 and Time 3, and between Time 2 and Time 3. The two nonsignificant coefficients occurred in the self-rated performance analysis. Significant intraperiod self-competence→performance relationships were also in evidence at all three periods for the self-rating data and at Times 2 and 3 for the supervisory ratings. Thus, 10 of 12 longitudinal self-competence →performance or performance→self-competence paths, and 5 of 6 intraperiod self-competence→performance paths were significant.

Problems with missing data (actual ns ranged between 62–188) affected the significance levels of path coefficients in the model. On occasion coefficients of apparently equal size had different significance levels because our tests were based on fluctuating sample sizes.

An alternative model restricting the relationship between performance and self-competence to within-period paths was also estimated in Study 2. A chi-square difference comparing the overall statistics for this model [$\chi^2_{43} = 97.17$ (for supervisory rating criteria) and $\chi^2_{43} = 131.58$ (for self-rating criteria)] with those for the longitudinal model described above indicated that the fit would be substantially worse if longitudinal effects were deleted from either the supervisory-ratings model ($\Delta\chi^2_6 = 15.98$, $p < .05$) or the self-ratings model ($\Delta\chi^2_6 = 34.86$, $p < .01$). Thus, results for the three-wave data provide further support for the conclusion that self-competence and performance share important longitudinal relationships.

Multiple Rs from the equations predicting performance at Times 1–3 ranged from R = .24 to R = .63. The predictors explained significant variance in self-rated performance ($R^2_{Time1} = .25$; $R^2_{Time2} = .25$; $R^2_{Time3} = .34$) and in the supervisory ratings ($R^2_{Time1} = .06$; $R^2_{Time2} = .39$; $R^2_{Time3} = .40$). Figure 3 offers mixed support for the goal-setting variables. Much like Study 1, the current analysis yielded a paucity of significant goal difficulty-performance relationships. In addition, two of the six paths from goal clarity to performance were large enough to attain statistical significance ($p < .01$, one-tailed).

Figure 3
Completely Standardized Path Coefficients for Three Waves of Self-Competence and Performance



Notes: Results for two analyses are shown. Path coefficients computed for supervisor-rated performance are on top. Coefficients below (enclosed in parentheses) were computed for self-rated performance. Observed variables, loadings, and error terms omitted for readability.

$^{**}p < .01$, $^{*}p < .05$ (one-tailed).

INTEGRATIVE DISCUSSION

Recent attempts to model job performance (e.g., Borman and Motowidlo, 1993; Campbell, 1990; Hunter, 1983) have paid scant attention to the temporal implications of the performance process. Because temporal mechanisms may have a role to play, the current study tested for significant longitudinal paths among a series of competence-performance episodes. The study's findings indicated that temporal mechanisms affect performance outcomes.

Self-ratings of job competence produced direct effects on current performance and residual effects on temporally-distal performance episodes. These data indicate that the effects of self-competence on job performance are pervasive and lasting. Individuals were able to evaluate their own capabilities, and this self-knowledge tapped into sustaining factors in the performance process itself.

Self-competence scores predicted job performance ratings accurately up to eight months after survey data were collected. Predictive accuracy declined when lag periods were extended beyond an eight-month window. Apparently, the relationship between self-competence and performance is temporally robust, but it decreases over time, perhaps as new performance feedback information becomes available.

Observed temporal impacts on the competence-performance relationships are analogous to findings in the testing literature. Studies in the testing literature (e.g., Henry & Hulin, 1987) have repeatedly found that predictive fidelity decreases as prediction lags are lengthened. Routine findings of this type have sparked an ongoing debate in this literature over the stability of outcome criteria (Ackerman, 1992; Barrett, Caldwell & Alexander, 1985; Hulin, Henry, & Noon, 1990).

Significant competence→performance paths may help to explain why self-competence evaluations undergo change. These linkages imply that performance feedback shapes subsequent feelings of competence. As individuals perform their jobs, they are given the opportunity to evaluate personal resources (i.e., skills and abilities) against the demands of the job situation. Successful performance provides assurance that one's skill-mix is suitable for the job at hand.

Feedback linkages also suggest that dynamic learning may be occurring. As a sequence of competence→performance episodes unfolds, competence percepts may evolve from uncertain beliefs to strongly-held convictions. The current data were consistent with a learning effect of this type.

In addition to their conceptual implications, the current findings have implications for personnel practice. They make a strong case for careful, painstaking employee placement. Sound placement not only optimizes resource utilization, it has important ramifications for employee

motivation (i.e., competence motivation). According to White (1959), individuals will be motivated by jobs that make consistent use of their skills and competencies. On the other hand, placing individuals on jobs for which they are poorly-suited may be a recipe for failure. Early job failures may undermine employee confidence and make successful performance appear to be an unattainable goal.

The current data appear to make the case for temporal dependencies among competence-performance episodes. Although the present findings have major importance for self-competence research, there may also be implications for related areas of study. Viewed in conjunction with previous research and theory on self-efficacy (Bandura, 1982; Locke et al., 1984), the current findings suggest that self-efficacy researchers might consider testing for the possibility of efficacy-performance cycles. These kinds of tests might show that self-efficacy percepts are shaped by performance feedback in much the same way that competence appeared to be shaped by previous performance in the study at hand. In fact, self-efficacy's narrow focus may make it especially responsive to the kind of performance feedback it is likely to elicit.

Our analysis also considered a number of cross-sectional paths. Like the longitudinal results, most of the cross-sectional competence-performance paths were significant. Two exceptions involved a Time 2 competence→self-rated performance path in Figure 2 and a Time 1 competence→self-rated performance path in Figure 3. Earlier research (Steel et al., 1989; Tharenou & Harker, 1984) showed that self-competence ratings predict performance. The current findings added to this emerging literature and suggested that self-evaluations of competence may have important, albeit complex relationships with job performance over time.

The paths involving competence and performance linkages were, for the most part, as large or larger than expected. In addition, virtually all were significant. Many studies have already shown that ability levels affect job performance (Schmidt et al., 1986). The current results indicate that self-evaluations of competence may also have a bearing on performance outcomes. Our findings suggest that individuals who have confidence in their abilities outperform individuals who lack such confidence. What remains to be seen is whether competence-performance linkages are more a product of genuine ability or self-esteem mechanisms (Tharenou & Harker, 1984).

The survey-based goal setting variables (Ivancevich & McMahon, 1977) performed worse than expected when employed in our study as predictors of job performance. Goal clarity yielded some significant relationships with performance, but the goal difficulty measure evidenced little predictive utility of any kind. Wright (1990, 1992) criticized survey-based operationalizations of goal difficulty like the one used in the current research. He raised concerns about their construct overlap with

more-conventional goal-difficulty manipulations, and he showed that they performed poorly when used as predictors of task performance (Wright, 1990).

Cross-sectional results involving the self-rated ability variable were also somewhat spotty. This measure performed poorly in predicting job performance criteria.

There was considerable multicolinearity among self-rated ability, self-competence, and the performance variables. The negative path coefficients leading from self-rated ability to performance occurred because the LISREL analysis treated self-rated ability as a suppressor variable. The size of the negative path coefficients suggests that using stability correlations to estimate measurement error in the ability variable may have resulted in underestimating its reliability and overestimating its influence on performance. Unfortunately, no other estimate of reliability was available. The negative ability-performance paths tended to accentuate the competence-performance linkages contained in the model in a way that is not interpretable in terms of the hypothesized model. These results also provide some evidence of the methodological problems that come into play in longitudinal research.

Research comparing self-competence, self-efficacy, and actual ability would bring to light the differences and similarities among these three important constructs. Also, future studies of the effects of these kinds of factors on performance outcomes should use a longitudinal approach and evaluate static and dynamic linkages among the variables.

Our conclusions are tempered by a recognition of the study's limitations. Missing data had a detrimental impact on the study. We settled for a pairwise deletion strategy as a way of compensating for gaps in the dataset. Vacations, absences, turnover, and so forth made it difficult to secure three waves of measures on each and every individual in the target group. Also, we did not have direct estimates of the internal consistency of our self-rated ability measure. Steps should be taken to circumvent these kinds of problems in future studies of the temporal nature of performance outcomes.

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