Toward Construct Validation of a Transfer Climate Instrument

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Despite general acknowledgment of the difficulty in transferring learning, no validated and generally accepted instrument exists to measure factors believed to affect its transfer. Rouiller and Goldstein (1993) developed an eight-factor structure for a transfer climate instrument but could not validate the structure because their sample size was inadequate. This study attempted to validate their hypothesized constructs using factor analysis and found a substantially different factor structure, suggesting a different direction for future transfer climate instrument research. The results suggest that trainees perceive climate according to referents in the organization rather than according to psychological cues, as Rouiller and Goldstein proposed. Consequently, a transfer climate instrument incorporating additional constructs was analyzed. The resulting nine-factor solution suggested additional constructs and indicated that transfer climate was perceived according to organizational referents.

The United States invests heavily in training activities aimed at improving employee performance on the job. In 1994 U.S. employers spent an estimated $52.4 billion on formal training (Lakewood Research, 1995). When indirect costs and expenses for informal on-the-job training are included, total annual expenditures are estimated to be in the $200 billion to $400 billion range (Broad and Newstrom, 1992). Yet as little as 10 percent of these expenditures is believed to pay off in on-the-job performance improvements resulting from the transfer of knowledge, skills, and abilities (Baldwin and Ford, 1988). Although the exact amount of transferred learning is unknown, the problem is so pervasive that there is rarely a learning-performance situation in which such a problem does not exist (Broad and Newstrom, 1992).

Note: We would like to thank I. Goldstein and J. Rouiller for giving us permission to use their instrument in this study, and for providing supporting documentation.

Transfer of training may be defined as the degree to which trainees apply to their jobs the knowledge, skills, behaviors, and attitudes they gained in training. Transfer of training is traditionally seen as a function of three factors: trainee characteristics, including ability, personality, and motivation; training design, including transfer design and content; and work environment, including support and opportunity to use learned material (Baldwin and Ford, 1988). Although a good deal of research has been done on design factors (Noe, 1986), significantly less has been done on work environment factors that influence transfer of training (Baldwin and Ford, 1988; Tannenbaum and Yukl, 1992).

The work environment can affect the transfer of learning to the job through its transfer of training climate. The transfer climate is a mediating variable in the relationship between the organizational context and an individual's attitude toward the job and behavior on the job. Even when learning occurs during training, the transfer climate may either support or inhibit its application on the job (Mathieu, Tannenbaum, and Salas, 1992). Several studies have established that transfer climate can significantly affect an individual's ability and motivation to transfer learning to the job (Huczynski and Lewis, 1980; Rouiller and Goldstein, 1993; Tracey, Tannenbaum, and Kavanaugh, 1995; Xiao, 1996). Although many authors support the importance of transfer climate, with some stating that it may even be as important as the training itself (Rouiller and Goldstein, 1993), there is no clear understanding of what an organizational transfer climate really is (Tannenbaum and Yukl, 1992).

As a result, we need to carefully consider how transfer climate is operationalized and how it may be measured reliably. Recent research has employed a wide variety of instruments with measures ranging from single-item scales to multiple-item, content-validated but situation-specific scales. The variety of methods raises several concerns. First, because custom-designed scales are used for each study, it is difficult to generalize findings across studies or draw conclusions about the latent construct structure of transfer climate. Second, because these studies often do not include factor analyses to validate hypothesized constructs, they lack an empirical determination of the number of constructs underlying a set of items. It is dangerous to assume that the items actually reflect the intended construct (DeVellis, 1991); it is equally plausible that the items reflect several more specific constructs or some other construct altogether. Third, some of the scales, particularly the single-item measures, have questionable psychometric qualities. Not surprisingly, the studies have come to different conclusions about the relationship between transfer climate and performance, perhaps because of instrumentation differences.

What HRD research needs to do is develop a valid and generalizable set of transfer climate scales. An established set of transfer climate scales with validated constructs and known psychometric qualities would facilitate cross-study comparisons and add significantly to our understanding of the transfer process. In addition, it would facilitate transfer research because it would reduce or eliminate redundant instrument design.

A general transfer climate instrument would not preclude the use of situation-specific scales. Rather, it would provide a foundation of validated constructs with established applicability across populations and settings. Research in the field of organizational behavior has produced a series of tested and generally accepted job attitude scales that provide good examples of the value of such instruments.

From a broader perspective, defining and accurately measuring transfer of training climate is important because it can help HRD move beyond the question of *whether* training works to *why* training works (Tannenbaum and Yukl, 1992). For example, without controlling for the influence of the transfer climate, evaluation results are likely to vary considerably and lead to erroneous conclusions about intervention outcomes (Holton, 1996). A valid and reliable measure of transfer climate would also have significant diagnostic potential. Such an instrument could help identify when an organization is ready for a training intervention and provide information to guide pretraining interventions aimed at increasing training's eventual effectiveness. In addition, if the dimensions of the workplace that affect the use of learned skills were identified and measured, we would gain a more complete conceptual framework of training effectiveness.

The purpose of this study is to move toward the goal of a general transfer climate instrument with known psychometric properties. As an initial step, a construct validation using factor analysis was conducted on the transfer climate constructs and instrument proposed by Rouiller and Goldstein (1993) and then on an expanded instrument that incorporated additional constructs. The study addressed two research questions:

Research question 1. Will exploratory factor analysis of items from the Rouiller and Goldstein instrument identify latent constructs consistent with their model?

Research question 2. Will exploratory factor analysis of an expanded transfer climate instrument result in an interpretable factor structure of latent transfer climate constructs?

Current Transfer Climate Research

Several critical assumptions accompany the use of climate as a variable that affects the transfer of training.

First, climate as a general construct is defined as a psychologically meaningful description of the work environment (James and Jones, 1976; Jones and James, 1979). In other words, the transfer climate is not the work environment per se or the way in which people respond to it; rather, it is the interpretative or "perceptual medium" (Kopelman, Brief, and Guzzo, 1990) through which the work environment affects job attitudes and behaviors. Transfer climate can be described as a "sense of imperative" (Schneider and Rentsch, 1988) that arises from a person's perceptions of his or her work

environment, and that influences the extent to which that person can use learned skills on the job.

Second, this cognitively based, individual-level variable is assumed to be generalizable across organizational groups and units based on (a) the similarity of objective structural characteristics from unit to unit or group to group within an organization; (b) the attraction, selection, and attrition of organizational members (see Schneider, 1987); and (c) the shared meaning that develops out of the social interaction among organizational members (Schneider and Reichers, 1983). These factors may justify the aggregation of transfer climate data for the purposes of analysis at higher levels, such as group, unit, or organization (James, Jones, and Ashe, 1990).

Finally, it is assumed that a limited number of factors form the transfer climate construct and that differences exist between specific climate factors (for example, social support) across organizational units as well as across organizations.

Rouiller and Goldstein (1993), following Rouiller (1989), offered a conceptual framework for operationalizing the transfer climate construct based on Luthans and Kreitner's (1985) organizational behavior modification model. They suggested that transfer climate consisted of two general types of workplace cues that included eight distinct dimensions (see Exhibit 1). The first set of workplace cues, situational cues, remind trainees of what they have learned or provide the opportunity for them to use what they have learned. There are four types of situational cues: goal cues, social cues, task cues, and self-control cues. The second set of workplace cues, consequence cues, are on-the-job outcomes that affect the extent to which training is transferred. There are four types of consequence cues as well: positive feedback, negative feedback, punishment, and no feedback.

Rouiller and Goldstein used this framework in a study of fast-food restaurant management trainees, and demonstrated that aggregated unit-level perceptions of transfer climate added significantly to the explained variance in posttraining job performance once learning and unit performance were controlled for. In a multiple regression analysis, learning accounted for 8 percent of the variance in transfer behavior, but learning and transfer climate together accounted for 54 percent of the variance. The two sets of workplace cues were each found to add significantly to the explained unique variance. However, the authors were unable to validate the construct structure of the scales, although they did conduct extensive content validation with a panel of experts. Thus the only construct validation data reported were the within-group interrater agreement estimates.

Tracey, Tannenbaum, and Kavanaugh (1995), following Tracey (1992), attempted to replicate and expand on Rouiller and Goldstein (1993) using items drawn from their instrument as well as an additional dimension termed "continuous-learning culture." To evaluate the transfer of training among managers in a supermarket chain, this study used thirty-three items from Rouiller

Exhibit 1. Definitions of Transfer Climate Constructs

Situational cues. Cues that serve to remind trainees of their training or provide them with an opportunity to use their training once they return to their jobs.

Goal cues. These cues serve to remind trainees to use their training when they return to their jobs; for example, existing managers set goals for new managers that encourage them to apply their training on the job.

Social cues. These cues arise from group membership and include the behavior and influence processes exhibited by supervisors, peers and/or subordinates; for example, new managers who use their training supervise differently from the existing managers. (This is reverse-scored.)

Task cues. These cues concern the design and nature of the job itself; for example, equipment is available in this unit that allows new managers to use the skills they gained in training.

Self-control cues. These cues concern various self-control processes that permit trainees to use what has been learned; for example, "I was allowed to practice handling real and job-relevant problems."

Consequences. As employees return to their jobs and begin applying their learned behavior, they will encounter consequences that will affect their further use of what they have learned. A number of different types of consequences exist.

Positive feedback. In this instance, the trainees are given positive information about their use of the trained behavior; for example, new managers who successfully use their training will receive a salary increase.

Negative feedback. Here, trainees are informed of the negative consequences of not using their learned behavior; for example, area managers are made aware of new managers who are not following operating procedures.

Punishment. Trainees are punished for using trained behaviors; for example, more experienced workers ridicule the use of techniques learned in training. (This is reverse-scored.)

No feedback. No information is given to the trainees about the use or importance of the learned behavior; for example, existing managers are too busy to note whether trainees use learned behavior. (This is reverse-scored.)

Source: Rouiller and Goldstein, 1993, p. 383. Used by permission of Jossey-Bass Inc., Publishers.

and Goldstein's instrument and twenty-four others designed to measure continuous-learning culture. The authors did not include Rouiller and Goldstein's hypothesized self-control scale in their instrument, reasoning that it was not a measure of transfer climate because it referred to "personal experiences relating to the use of training on the job, rather than perceptions about the transfer of training climate" (Tracey, 1992, p. 69).

A series of LISREL analyses revealed that both the climate and culture constructs explained a significant amount of variance in posttraining job behavior. A confirmatory factor analysis yielded a two-factor model with six transfer climate scales factoring into a single scale and three proposed continuous-

learning culture scales factoring into a single scale. Tracey's exploratory factor analysis (1992) to clarify the underlying factor structure of both the climate and culture constructs retained nine interpretable factors. The transfer climate scales that this analysis produced were similar but not identical to those proposed by Rouiller and Goldstein (1993). As Tracey, Tannenbaum, and Kavanaugh (1995) noted, this was not surprising because the two studies used different analytical methods to derive scales.

Taken together, these studies make it difficult to determine with any certainty the degree to which the transfer climate constructs and corresponding scales hypothesized by Rouiller and Goldstein are valid. However, they strongly indicate the presence of an interpretable transfer climate structure and suggest the need for further research to establish and clarify its nature.

Others (Baldwin and Ford, 1988; Wexley and Latham, 1991) have suggested that "opportunity to perform" is an important transfer climate construct. This construct refers to the extent to which trainees "are provided with or obtain work experiences relevant to the tasks for which they were trained" (Ford, Quinones, Sego, and Sorra, 1992, p. 512). The limited research done with this construct indicates that opportunity to perform reflects factors that are organizational (for example, departmental goals and values), individual (confidence to use new skills), and contextual (pace of work). The research also indicates that practicing skills immediately upon return to the job can have a major impact on skill retention (Pentland, 1989, cited in Tannenbaum and Yukl, 1992) and that significant differences exist between trainees in their opportunity to apply training on the job (Ford, Quinones, Sego, and Sorra, 1992). In general, however, research on training effectiveness has not explored opportunity to perform as an influential variable in training transfer, with most studies making the untested assumption that trainees have relatively similar opportunities to practice and perform learned tasks on the job (Ford, Quinones, Sego, and Sorra, 1992).

Method

The present study was conducted as part of a larger evaluation of a computer-based plant operator training program, which was mandated by the Occupational Safety and Health Administration (OSHA). A variety of instruments were administered to participants in addition to the transfer climate instrument reported on here.

Sample. The study participants were 189 operating technicians from four production units at a petrochemical manufacturing facility. All of the technicians were expected to complete the operator training program in order to meet the federal regulations. They all participated in the study in order to allow us to obtain an adequate number of respondents for this and other instrument development efforts.

Measures. We developed an instrument for this study because no generally accepted transfer climate instrument could be located. On the basis of the results of their 1993 study and the extensive work they had done to develop a theoretical framework for the instrument, we contacted Rouiller and Goldstein to obtain the items they had used. Their instrument contained sixty-three items drawn from a pool of over three hundred possible items that they had developed through a rigorous content validation process.

After reviewing the sixty-three items, we eliminated fourteen as inappropriate for this organization but kept forty-nine for our instrument. Eight of the eliminated items were among the self-control items. The training in this study was for operational procedures written by the trainees for which application was mandatory. Therefore, items such as "I was prepared for the reactions of colleagues in my present unit to my use of training on the job" or "I used techniques and methods that are different from those used in my present unit" would not make sense in this environment. Six other items were deleted for similar reasons, including two from the negative feedback set, two from the social cue set, one from the positive reinforcement set, and one punishment item. The number of items per scale in the final instrument ranged from three (negative feedback) to eighteen (social cues). All items used a five-point Likert-type scale ranging from strongly disagree (1) to strongly agree (5). We used the items verbatim where possible, but revised some to reflect appropriate terminology for the organization and the type of training conducted. We do not believe our changes altered the underlying constructs that the items measured.

We added seventeen items to complete the final sixty-six item instrument. Seven of these items were designed to represent the "opportunity to perform" construct that was not included in Rouiller and Goldstein's instrument. Other items added to strengthen certain scales included transfer design (two items), involvement in needs assessment (one item), and content validity of training (one item). Finally, we added four social cue items from Rouiller and Goldstein's original pool and two new social support items because they were particularly appropriate for this work environment.

Analysis. Construct validation has traditionally consisted of establishing convergent and discriminate validity with other constructs through correlational studies. More recently, factor analysis has been recognized as "a powerful and indispensable method of construct validation" (Kerlinger, 1986, p. 427) that "is at the heart of the measurement of psychological constructs" (Nunnally and Bernstein, 1994, p. 111).

In the present study, we conducted exploratory common factor analysis to identify the underlying latent structure of the data. Common factor analysis is more appropriate than principal components analysis when the objective is for identification of latent structures rather than for predictive purposes (Nunnally and Bernstein, 1994). An oblique rotation was used because of its suitability

for latent variable investigation when latent variables are expected to have some correlation.

We conducted two sets of factor analyses. First, the forty-nine items from the original Rouiller and Goldstein (1993) instrument were factor analyzed in order to examine the latent constructs of their instrument alone (research question 1). Then, the entire sixty-six item instrument, including the new items added to this study, was examined (research question 2).

The initial criteria used to determine the number of factors to retain was an eigenvalue greater than or equal to one. However, when exploratory common factor analysis is used for theory building, the eigenvalue-equal-to-one criteria for determining the number of factors to retain may not be correct. Unlike principal components analysis, accounting for the proportion of variance is not as important as identifying the latent structure of the data. It may be appropriate to retain factors with eigenvalues less than one or to eliminate those with eigenvalues greater than one if supported by theory (Hair, Anderson, Tatham, and Black, 1995). Therefore, we conducted additional analyses to evaluate alternate structures with fewer and more factors retained.

Results

Research question 1: Will exploratory factor analysis of items from the Rouiller and Goldstein (1993) instrument identify latent constructs consistent with their model?

Kaiser's measure of sampling adequacy (MSA) for the entire data set, a measure of the data set's appropriateness for factor analysis, was .908. Values above .90 are considered very appropriate for factor analysis (Hair, Anderson, Tatham, and Black, 1995). One item had an MSA below .50, indicating it was not appropriate for factor analysis, and was dropped from further analysis. Five factors emerged with eigenvalues greater than one, explaining 81.6 percent of the common variance. Of the forty-eight remaining items, forty loaded .40 or higher on these five factors. This is a conservative cutoff for factor loadings and more items could have been retained if the cutoff had been .30. However, reliability analysis including items loading slightly below .40 showed that the reliability would have been reduced by including them.

Loadings reported in Table 1 were characterized by interpretable simple structures. Importantly, items yielded exceptionally clean loadings with average loading greater than .50 on the major factor and less than .15 on all factors for all scales. We further examined the stability of the factor structure across different factor analysis methods. The factor structure was identical when the common factor analysis was repeated with an orthogonal (varimax) rotation.

Analysis of the item content led to identification of the five factors shown in the table: supervisor support, peer/task support, transfer design, personal outcomes—positive, and personal outcomes—negative. These factors were not consistent with those proposed by Rouiller and Goldstein (1993).

Table 1. Factor Loadings for Transfer Climate Items from Rouiller and Goldstein

Item Number	*1*	*2*	*3*	*4*	*5*
Supervisor Support (avg. loading, major factor = .62; other factors = .10)					
8	.82	−.01	.09	.10	.02
4	.79	.04	.14	−.03	.11
12	.78	.04	.06	−.09	−.18
1	.78	−.03	.14	.06	.09
13	.76	.01	−.05	−.01	−.07
2	.75	.04	.10	−.04	.18
27	.66	−.04	−.18	.00	−.06
10	.65	−.06	−.08	.15	.03
26	.65	−.21	−.07	.19	.10
15	.64	−.05	−.32	.02	−.21
5	.63	.11	.08	−.09	.12
11	.61	.14	−.14	−.10	−.20
14	.57	.08	−.05	.08	−.03
9	.55	.12	.08	.13	−.02
25	.48	.01	−.12	.21	.12
23	.47	.08	.04	.23	−.22
38	.47	.21	−.08	.16	.03
24	.47	.01	−.16	.06	.17
16	.45	−.01	−.39	.12	.01
3	.44	.16	−.11	−.05	.07
Transfer Design (avg. loading, major factor = .58; other factors = .12)					
66	.15	.72	.09	−.13	.10
63	.19	.68	.04	−.03	.01
65	.26	.67	.04	−.08	.04
64	.14	.65	.12	−.36	.04
44	−.05	.64	.10	.23	.06
37	.12	.50	−.15	.11	−.24
41	−.05	.48	−.16	.21	.06
31	−.03	.47	−.31	.18	.06
42	.13	.45	.03	.09	.04
45	.14	−.54	−.02	−.25	.07
Peer/Task Support (avg. loading, major factor = .58; other factors = .10)					
29	−.01	.03	.66	.18	−.01
21	−.29	−.02	.59	.10	−.09
18	−.01	.14	.56	.11	−.13
22	−.29	−.01	.51	.08	−.07
Personal Outcomes—Negative (avg. loading, major factor = .59; other factors = .14)					
53	.24	−.02	.19	.60	.17
54	.13	.10	.28	.59	.03
Personal Outcomes—Positive (avg. loading, major factor = .61; other factors = .07)					
52	.06	.07	−.18	.00	.64
51	.02	.09	.04	.11	.58
EIGENVALUES	15.0084	2.623	1.753	1.418	1.073
% VARIANCE EXPLAINED	13.01	9.57	7.42	3.33	3.43

Research question 2: Will exploratory factor analysis of an expanded transfer climate instrument result in an interpretable factor structure of latent transfer climate constructs?

Kaiser's measure of sampling adequacy (MSA) was .891. All individual items had adequate MSA values. Nine factors emerged with eigenvalues greater than one, explaining 80.6 percent of the common variance. Of the sixty-six items on the instrument, sixty-two loaded .40 or higher on these nine factors and were retained for further analysis.

Loadings reported in Table 2 were characterized by interpretable simple structures. For eight of the nine factors, items yielded exceptionally clean loadings with average loading greater than .50 on the major factor and less than .14 on all factors for all scales. Analysis of the item content and the original proposed theoretical framework led to identification of the nine factors shown in Table 2: supervisor support, opportunity to use, transfer design, peer support, supervisor sanction, personal outcomes—positive, personal outcomes—negative, resistance, and content validity.

As Table 3 indicates, the interfactor correlations were generally low, with the average intercorrelation .27.

For the content validity factor, two items had substantial cross-loadings with the transfer design scale. But when analyses were repeated with eight and ten factors to check for alternate structures that might eliminate the cross-loading, the factor structures that emerged were not as theoretically sound as the nine-factor structure. Furthermore, Cronbach's alpha for both scales was greater than .70, suggesting that the cross-loading items should not be deleted. Thus, the nine-factor structure was retained.

Table 4 contains means, standard deviations, and internal consistency reliability estimates for unit weighted combinations of items loading dominantly on each factor. Eight of the nine scales exceeded Nunnally and Bernstein's (1994) suggested minimum reliability of at least .70 for instruments in early stages of development and the ninth scale was only slightly below this level. Reliabilities ranged from .68 to .95 with an average alpha of .79. Thus, an interpretable factor structure of latent constructs with acceptable reliability was obtained.

Discussion

Rouiller and Goldstein's (1993) hypothesized structure of transfer constructs was generally not supported. As noted earlier, their structure suggested that people perceive transfer climate by psychological cues (that is, goal cues, social cues, and so on). But this analysis suggests they perceive transfer climate according to organizational referents (for example, supervisor, peer/task, or self).

Exhibit 2 illustrates how items loaded in this analysis. If Rouiller and Goldstein's structure had been supported, the highlighted blocks would be horizontal by row. Instead, the items loaded by referent, suggesting that climate

Table 2. Factor Loadings for Transfer Climate Items from Expanded Instrument

Item Number	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
1–Supervisor Support (avg. loading, major factor = .63; other factors = .10)									
12	.86	−.07	.18	.06	−.13	.11	−.10	.01	.01
8	.79	.04	−.09	−.01	−.05	.01	.13	.04	−.10
4	.77	−.23	.08	.17	−.04	.16	.06	.14	−.14
1	.74	−.01	−.07	.04	.05	.08	.13	.11	−.05
27	.73	.05	−.04	−.14	−.02	−.11	−.09	.10	.13
13	.71	−.06	−.09	.15	.03	−.10	.06	−.06	.06
15	.69	.07	−.03	−.14	−.01	−.25	−.10	−.09	.19
2	.68	−.06	.12	.16	.11	.08	.02	.14	−.10
11	.64	−.01	−.12	.20	−.13	−.11	−.10	−.16	.01
14	.64	.01	.17	−.01	.07	.07	.00	.01	.18
5	.60	−.01	−.05	.23	.08	.05	.03	.07	−.03
9	.54	.08	.01	.03	−.16	.08	.14	−.03	−.08
6	.52	.23	.24	−.17	.02	.24	.12	−.01	−.07
23	.50	.21	.01	−.08	.02	.02	.10	−.26	.12
10	.50	−.06	.01	.13	.07	−.23	.33	−.15	−.03
26	.49	.11	−.08	−.11	.04	−.26	.34	−.02	−.11
38	.46	.29	.22	−.06	−.03	−.01	.00	.01	−.08
16	.44	.00	.09	−.07	−.05	−.36	.10	−.02	.14
24	.44	.02	.30	−.04	.22	−.13	−.02	.11	.05
25	.42	.01	.22	−.06	.01	−.14	.21	.00	.08
20	.42	.14	−.16	.06	.01	−.20	.16	.13	−.08
19	−.43	.12	−.02	−.12	.03	.37	.15	−.05	−.15
3	.40	−.06	.00	.23	−.18	−.11	.03	.02	−.12
2–Opportunity to Use (avg. loading, major factor = .59; other factors = .09)									
49	−.07	.78	−.03	.03	.08	−.11	.09	−.06	.16
43	−.01	.72	.08	.08	−.05	−.08	−.06	−.01	−.05

Table 2. (*continued*)

Item Number	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
47	.01	.59	−.06	−.03	.06	−.04	−.03	.19	.31
42	.12	.59	.03	.15	.07	.05	−.06	−.05	−.06
46	−.02	.50	.06	.19	.06	−.15	.07	.04	−.08
44	−.02	.49	−.08	.21	−.12	.13	.11	.11	.35
48	.10	.46	−.06	−.01	−.28	.00	.18	.06	−.02
3–*Peer Support* (avg. loading, major factor = .57; other factors = .09)									
30	−.06	.18	.76	−.05	−.02	−.03	.01	−.09	−.01
32	.01	−.12	.72	.06	−.13	.06	.14	.01	.06
39	−.03	.14	.58	.13	.02	−.02	.13	−.06	−.02
31	.05	.02	.58	.10	−.17	−.05	.01	.00	.11
36	.20	.24	.50	−.07	−.07	.00	−.27	.11	.01
35	.07	.20	−.44	.09	.19	.06	−.02	−.03	−.19
33	.10	.04	−.44	.01	.37	.28	.12	−.02	−.06
4–*Transfer Design* (avg. loading, major factor = .70; other factors = .08)									
64	.03	.07	−.06	.82	.10	.02	−.31	−.05	.08
62	.19	−.01	.01	.70	−.01	−.01	.06	−.05	.22
66	.09	.19	.00	.68	.04	.02	−.13	.03	.17
63	.12	.14	.02	.65	−.20	.00	.00	−.10	−.01
65	.23	.09	.03	.64	−.06	.01	−.11	.00	.13
5–*Resistance* (avg. loading, major factor = .51; other factors = .10)									
55	−.04	.02	−.09	.13	.69	.10	−.14	.13	.05
57	.03	.02	−.09	−.17	.55	.06	−.25	−.06	−.06
58	.00	−.12	−.04	−.12	.47	.24	.00	−.03	.02
40	.18	.05	−.06	−.09	.44	.31	−.25	−.11	−.09
34	.06	.01	.22	.08	−.38	.09	−.07	.12	−.26

Table 2. (*continued*)

Item Number	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
6–Supervisor Sanction (avg. loading major factor = .50; other factors = .10)									
21	−.21	.00	−.16	−.10	.04	.56	.09	.05	.10
18	.06	−.05	.03	.07	.16	.56	.06	−.03	.27
22	−.25	−.06	−.01	−.01	.04	.54	.05	−.02	−.02
29	−.08	.16	.13	.01	.12	.50	.21	.00	.02
28	.03	−.23	.05	.05	−.05	.43	.13	.02	−.06
50	.14	−.26	.11	−.05	.27	.40	−.05	−.14	.05
7–Personal Outcomes—Negative (avg. loading major factor = .66; other factors = .13)									
54	.11	.01	−.02	−.06	−.30	.23	.73	−.07	.17
53	.22	.09	.10	−.25	−.06	.15	.59	.09	.20
8–Personal Outcomes—Positive (avg. loading major factor = .64; other factors = .07)									
51	.07	.07	−.06	−.11	.04	.06	.04	.75	.10
52	.10	−.04	.04	−.02	.03	−.15	−.01	.71	.08
59	.01	−.14	−.04	−.07	.16	.03	.18	−.45	.02
9–Content Validity (avg. loading major factor = .56; other factors = .14)									
60	−.10	.04	.19	.37	.10	.14	.15	.04	.63
61	−.01	.04	.14	.50	.08	.10	.20	.04	.58
45	.07	−.19	.06	.10	.34	−.02	−.19	−.07	−.46
EIGENVALUES	19.574	4.109	2.459	1.685	1.571	1.391	1.273	1.253	1.081
%VARIANCE EXPLAINED	46.37	9.74	5.83	3.99	3.72	3.30	3.02	2.97	2.56

Table 3. Interfactor Correlations

Scale	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1	1.00							
2	.41							
3	.44	.46						
4	.43	.44	.46					
5	−.18	−.26	−.29	−.22				
6	−.43	−.31	−.38	−.34	.23			
7	.19	.26	.23	.37	.18	−.23		
8	.29	.31	.33	.44	−.11	−.19	.29	
9	.09	.13	.12	−.06	−.24	−.13	−.21	.02

Table 4. Descriptive Statistics for Expanded Instrument Scales

Scale	*Number of Items*	*Alpha*	*Mean*	*SD*
Supervisor Support	23	.95	3.48	.56
Opportunity to Use	7	.86	3.54	.56
Transfer Design	5	.89	3.72	.58
Peer Support	7	.83	3.69	.54
Resistance	5	.72	3.70	.59
Supervisor Sanction (reversed)	6	.74	3.57	.55
Personal Outcomes—Positive	3	.70	3.16	.79
Personal Outcomes—Negative (reversed)	2	.68	3.06	.82
Content Validity	3	.74	3.47	.67

perceptions are structured by whether the construct pertains to their supervisor, their peer/task, or themselves. In both the first analysis and the expanded instrument, the factors that emerged blended the various psychological cues proposed by Rouiller and Goldstein.

Support for the macro structure of situational cues and consequences was also weak. For example, the loading patterns for items referring to supervisors were inconsistent. Whereas items referring to negative supervisor consequences loaded together, positive feedback items loaded with goal and social cues, indicating that they were not perceived as a consequence but as another form of support. In addition, items referring to the immediate work environment (peers and task) all loaded together, indicating respondents perceived no distinction between situational cues and consequences. Items that were self-referent loaded into two factors reflecting positive and negative consequences.

Exhibit 2. Conceptual Factor Structure

	Referent/Number of Items			
Construct	*Supervisor*	*Peer/Task*	*Self*	*Not Load*
CLIMATE				
Goal	4	0		1
Social	13	1		3
Task		4		0
Self-Control		4		0
Positive Feedback	3	1	2	0
No Feedback	2			2
Punishment	2			3
Social	1			
Negative Feedback			2	1

Thus, one cannot conclude from this analysis that the situational-consequence macro structure is valid.

In sum, although Rouiller and Goldstein's structure provides a valuable starting point, these analyses suggest that future scale development needs to take a different direction. The study had several limitations that dictate caution when drawing general conclusions about all of its scales. The limitations included our dropping items from Rouiller and Goldstein's original instrument, using a somewhat homogeneous sample in terms of their job roles, and using an adequate but not large sample.

Nonetheless, the study so strongly suggests a very different conceptual structure for transfer climate measurement that we believe the general conclusion is valid. This belief is further supported by the expanded instrument analysis, where psychological cues continued to be combined in factors. We do not suggest that we found the definitive factor structure for transfer climate, but we believe that our results indicate that future research should take a different conceptual approach than that of Rouiller and Goldstein.

The second phase of this analysis involved the sixty-six item transfer climate instrument, which included the opportunity to perform scale and other items added to the original scales proposed by Rouiller and Goldstein. The resulting nine-factor solution also loaded by referent and was generally clean and consistent with established theory. Still, the presence of cross-loadings on the content validity and transfer design scales clearly suggests that further instrument development work is needed to develop these scales.

A new scale that emerged in this analysis—the resistance scale—was composed of items that suggest general group resistance to introducing new learning from training. Although this construct has not received much research attention, a study of transfer reported by Hastings, Sheckley, and Nichols (1995) found that one environmental constraint to transfer was participants' belief that training would disrupt the functioning of current work groups. Based on this finding, the authors suggested that work group beliefs about the organization, group members' social roles, and work group members' beliefs about themselves may combine to dictate the degree to which training is accepted and transferred. Tracey (1992) explored similar constructs by including continuous-learning culture in his study. Although his constructs were not limited to the resistance scale, he too found that some cultural dimensions need to be included when measuring transfer climate. The present study's findings similarly suggest that additional work is needed to clarify the exact nature of culture and climate measures that should be included in transfer climate measurement.

The only set of items that loaded as expected were the self-control items. However, we agree with Tracey (1992) that these are not true climate items. The self-control items address the extent to which the training gives the trainee the skills and ability to transfer learning to the job. What these items really measure is the adequacy of the training design, or the "transfer design" (Holton, 1996). Although this transfer construct is very important, it is not part of the transfer climate.

Our analysis therefore suggests the following transfer climate constructs:

1. *Supervisor support* refers to the extent to which supervisors reinforce and support use of learning on the job. Item content included setting goals to use learning, giving assistance, and offering positive feedback.
2. *Opportunity to use* is the extent to which trainees are provided with or obtain resources and tasks that enable them to use their new skills on the job. Items covered availability of equipment, financial resources, materials and supplies, and other information necessary to use their training on the job.
3. *Peer support* measures the extent to which peers reinforce and support use of learning on the job. Item content included setting goals to use learning, giving assistance, offering positive feedback, and having equipment similar to that used in training.
4. *Supervisor sanctions* refers to the negative responses of the supervisor if training is not used on the job. Items addressed indifference to use of training, negative feedback, active opposition to use of training, and no feedback at all.
5. *Personal outcomes—positive* refers to the degree to which application of training on the job leads to positive outcomes or payoffs for the individual. Items included raises, career development, and advancement.

6. *Personal outcomes—negative* refers to the degree to which application of training on the job leads to negative outcomes for the individual. Items included reprimands, being overlooked for raises, and so on.
7. *Resistance* refers to the extent to which prevailing group norms are perceived to discourage use of new skills. Items included the degree to which colleagues ridicule employees for use of training or resist new skills.

The data further suggest two important transfer design factors:

1. *Content validity* is the extent to which the trainees judge the content of the training to accurately reflect job requirements. Items addressed the degree to which skills, instructional aids, and content matched the job.
2. *Transfer design* is the extent to which training gives trainees the ability to transfer their learning to job applications and the extent to which training instructions match the job requirements. Items included practice, experiential activities, and real world applications.

Conclusions

We consider this study to be only an intermediate step in the development of a validated, generally applicable transfer climate instrument. Continued research is needed to develop and validate the psychometric integrity of this and other useful transfer climate scales.

Although the development of a valid and generalizable transfer climate instrument is an ambitious research goal, we argue that it is necessary in order to define the relationships between transfer climate, learning, and performance. Based on the experiences of other fields of study, we know that such an instrument can be developed and that its use can offer a substantial payoff. With psychometrically strong instrumentation, HRD will be in a position to provide more definitive answers to questions about the nature of training transfer and about barriers and enablers to transfer in the work environment. In contrast, continued use of psychometrically inadequate instruments and measures can only lead to more confusion and uncertainty.

Key next steps in this research agenda should include the following:

1. Improving the short scales in this instrument by adding items and conducting construct validation analyses on the new scales.
2. Identifying and testing other possible transfer constructs. Possible constructs include performance self-efficacy, motivation to transfer, general expectancy about the transfer-effort-to-performance linkage, feedback, and personal capacity for transfer.
3. Conducting construct validity studies across various work groups and settings to test the stability of these constructs. These studies should include not only factor analysis but also convergent and divergent validity tests.

4. Conducting criterion validity studies to establish the relationship of these constructs with performance.
5. Applying the new instrument repeatedly in different settings, including cross-cultural application, to test its validity and reliability across settings.

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