

The Work Preference Inventory: Assessing Intrinsic and Extrinsic Motivational Orientations

Teresa M. Amabile, Karl G. Hill, Beth A. Hennessey, and Elizabeth M. Tighe

The Work Preference Inventory (WPI) is designed to assess individual differences in intrinsic and extrinsic motivational orientations. Both the college student and the working adult versions aim to capture the major elements of intrinsic motivation (self-determination, competence, task involvement, curiosity, enjoyment, and interest) and extrinsic motivation (concerns with competition, evaluation, recognition, money or other tangible incentives, and constraint by others). The instrument is scored on two primary scales, each subdivided into 2 secondary scales. The WPI has meaningful factor structures, adequate internal consistency, good short-term test-retest reliability, and good longer term stability. Moreover, WPI scores are related in meaningful ways to other questionnaire and behavioral measures of motivation, as well as personality characteristics, attitudes, and behaviors.

Some people seem to be driven by a passionate interest in their work, a deep level of enjoyment and involvement in what they do. In describing the difference between successful and unsuccessful scientists, the Nobel laureate Arthur Schawlow remarked, "The labor of love aspect is important. The successful scientists . . . are just impelled by curiosity" ("Going for the Gaps," 1982, p. 42). The novelist John Irving similarly explained his long, intense writing sessions: "The unspoken factor is love. The reason I can work so hard at my writing is that it's not work for me" (Amabile, 1989a, p. 56). Both the scientist and the writer describe their driving force as "love."

By contrast, some people seem to be motivated more by external inducements in their work. Writing in her private journal, the poet Sylvia Plath attempted to understand her writer's block: "Editors and publishers and critics and the world. . . . I want acceptance there, to feel my work good and well-taken, which ironically freezes me at my work, corrupts my nunnish labor of work-for-itself-as-its-own-reward" (Hughes & McCullough, 1982, p. 305).

Teresa M. Amabile and Elizabeth M. Tighe (now at Department of Psychology, Brown University), Department of Psychology, Brandeis University; Karl G. Hill and Beth A. Hennessey, Department of Psychology, Wellesley College.

This work was supported in part by a grant entitled "Mechanisms of Creativity" from the National Institute of Mental Health (R01 MH-44999) to Teresa M. Amabile and by a grant entitled "Creativity in the R&D Laboratory" from the Exxon Education Foundation to Teresa M. Amabile. Their support is gratefully acknowledged.

We thank Jonathan Cheek and Margie Lachman, who provided valuable suggestions at several stages of this research; Steven Kramer, Richard Hackman, Martha Picariello, Regina Conti, Mary Ann Collins, and Heather Coon, who made useful comments on an earlier draft; and several colleagues who contributed to data collection or analysis: Heather Coon, Helene Lefkowitz, Francine Esrig, and Sandra Teare at Brandeis University, and Stan Gryskiewicz, Bob Burnside, and Kathleen Holt at the Center for Creative Leadership.

Correspondence concerning this article should be addressed to Teresa M. Amabile, Department of Psychology, Brandeis University, Waltham, Massachusetts 02254.

The "labor of love aspect" driving human behavior is what psychologists have, for several decades, called *intrinsic motivation*: the motivation to engage in work primarily for its own sake, because the work itself is interesting, engaging, or in some way satisfying. The contrasting concern with "editors and publishers and critics and the world" fits the definition of *extrinsic motivation*: the motivation to work primarily in response to something apart from the work itself, such as reward or recognition or the dictates of other people.

Psychological theory has traditionally been more concerned with intrinsic than extrinsic motivation, in attempts to explain behaviors such as exploration and challenge seeking, which have no clear external reinforcements (e.g., Berlyne, 1971; Harlow, Harlow, & Meyer, 1950; Hunt, 1965; Montgomery, 1954; White, 1959). Contemporary views of intrinsic motivation include both cognitive and affective components. Deci and Ryan's (1985a) cognitive evaluation theory posits that self-determination and competence are the hallmarks of intrinsic motivation. Other theorists have proposed the affective components of interest and excitement (Izard, 1977); elation and the "flow" of deep task involvement (Csikszentmihalyi, 1975, 1978); and happiness, surprise, and fun (Pretty & Seligman, 1983; Reeve, Cole, & Olson, 1986). Although views of extrinsic motivation are less elaborated, they generally include a cognitive assessment of work as a means to some extrinsic end (e.g., Calder & Staw, 1975; Kruglanski, 1975; Lepper & Greene, 1978).

Investigation of individual differences in motivational orientation is potentially important for both personality and social psychology. In recent years, social psychological research has revealed that individuals' temporary motivational orientation toward activities can differ as a function of the social contexts in which they have engaged in those activities (e.g., Amabile, DeJong, & Lepper, 1976; Deci, 1971; Lepper, Greene, & Nisbett, 1973). Yet clearly, these studies also revealed substantial variability in the extent to which individuals are affected by social context. There is some recent evidence that such variability can be explained, in part, by individual differences in enduring motivational orientations (e.g., Deci & Ryan, 1985a).

The theoretical assumptions that led us to posit stable indi-

vidual differences in intrinsic and extrinsic motivation derive from the intersection of personality and social psychology. In recent years, a number of theorists have suggested that behaviors that have been traditionally studied from a social psychological perspective might profitably be viewed from an individual-differences perspective, as well. For example, Snyder's (1974, 1979) theory of self-monitoring proposed that people's self-presentation behavior was a function of both their social situation and their enduring orientation toward stability in self-presentation. This proposition has been borne out by empirical research. Although intrinsic and extrinsic motivation have primarily been studied as consequences of the social situation, recent theoretical statements suggest that they, too, may exist as relatively stable individual differences (Amabile, 1988, 1990).

Even earlier theoretical statements imply that it is worthwhile to search for individual differences in motivational orientation. Bem's self-perception theory (1967, 1972) proposed that, to the extent that internal states are weak, ambiguous, or uninterpretable, individuals must look to their own behavior and the situation in which it occurs to interpret their attitudes and motivations. This theory has been specifically applied to self-perceptions of intrinsic and extrinsic motivation (e.g., Lepper et al., 1973). Thus, if we can assess the extent to which individuals' intrinsic and extrinsic motivations are strong and salient to them and the extent to which people differ in those motivations, we should be able to better understand and predict motivational behavior in a variety of social situations.

Everyday observation and intuition, too, suggest that people differ systematically and reliably in their motivational orientations toward their work. Although some Wall Street financiers have recently become notorious for their extrinsic "greed" orientation, it is not unusual to hear academic researchers remark on their good fortune of actually making a living at something they love doing (and would want to do with no external inducement). Perhaps stereotypes of the extrinsically oriented businessperson and the intrinsically oriented scientist or "starving artist" have some kernel of psychological truth.

Investigation into stable intrinsic and extrinsic orientations can have important consequences for psychological research. A great deal of social psychological research has documented striking differences in task performance between intrinsically and extrinsically motivated individuals. In laboratory experiments, extrinsically motivated individuals tend to show more impatient, rigid behavior in task engagement (Garbarino, 1975); poorer concept attainment (McCullers & Martin, 1971); impaired complex problem solving (Glucksberg, 1962); poorer incidental learning (Baird, Fitts, & Rankin, 1952); increased functional fixedness on a set-breaking task (McGraw & McCullers, 1979); and lower levels of creativity in a variety of tasks (e.g., Amabile, 1979, 1982a, 1985, 1987a; Amabile & Gitomer, 1984; Amabile, Goldfarb, & Brackfield, 1990; Amabile, Hennessey, & Grossman, 1986; Bartis, Szymanski, & Harkins, 1988; Koestner, Ryan, Bernieri, & Holt, 1984; Kruglanski, Friedman, & Zeevi, 1971).

These differences were demonstrated under temporarily induced intrinsic-extrinsic motivational states. It will be important to determine whether such performance differences can be demonstrated as a function of stable motivational orientations as well. In addition, there may be other, as yet unexplored, be-

havioral consequences of intrinsic and extrinsic motivational orientations. For example, those who see themselves as strongly intrinsically motivated may strive to select work assignments that allow them to develop new skills, exercise creativity, and become deeply involved in their work. They may also tend to see their work environment in terms that support their intrinsic motivation, and they may seek occupations where intrinsic motivators are salient. On the other hand, individuals who are strongly extrinsically motivated may view their work environment in terms of its extrinsic controls, and they may seek occupations where extrinsic motivators are salient.

It will also be important to examine possible differences in the various components of intrinsic and extrinsic motivation. Conceptions of extrinsic motivation include orientations toward money, recognition, competition, and the dictates of other people. But there may be meaningful differences between these components. For example, being oriented toward the dictates of other people may be the only component of extrinsic motivation that relates negatively to involvement in creative activities; it is possible that being oriented toward money bears no relation to such involvement. Similarly, conceptions of intrinsic motivation include challenge, enjoyment, personal enrichment, interest, and self-determination. It is possible that some intrinsically motivated behaviors, such as seeking out complex, difficult tasks, are related only to certain components of intrinsic motivation, such as challenge. These possibilities have not been tested in previous research.

Research investigating such hypotheses requires a reliable instrument for assessing intrinsic and extrinsic motivational orientations. The Work Preference Inventory (WPI; Amabile, 1987b) is the first such instrument to be developed for adults.

Motivational Orientation as a Trait

Three recent programs of research have treated intrinsic-extrinsic motivational orientation (or related constructs) as variables that are, to some extent, traitlike, that is, as enduring individual-differences characteristics that are relatively stable across time and across situations. Susan Harter's (1981) scale of intrinsic and extrinsic motivation in the classroom was designed for elementary school children. This self-report instrument is composed of five subscales: (a) Preference for Challenge vs. Preference for Easy Work, (b) Curiosity/Interest vs. Pleasing the Teacher/Getting Good Grades, (c) Independent Mastery vs. Dependence on the Teacher, (d) Independent Judgment vs. Reliance on the Teacher's Judgment, and (e) Internal Criteria for Evaluation vs. External Criteria for Evaluation.

Although Harter's (1981) scale was intended as an individual-differences measure, she did not present the assessed construct as a highly stable and enduring personality trait. (She demonstrated only modest test-retest reliabilities over periods of a few months.) Instead, Harter viewed motivational orientation as situation specific and alterable to some degree. Thus, Harter's position stands somewhere between a strong state view of motivational orientation and a strong trait view.

Richard deCharms (1968) drew parallels between motivational orientation and personal causation; extrinsically motivated persons often feel like pawns of authority or proffered rewards, but intrinsically motivated persons feel like origins who

behave out of freedom and self-investment. The Origin Climate Scale was developed on the basis of deCharms's theory, to assess the extent to which individuals feel like origins or pawns in a given situation (deCharms, 1976). Although this self-report scale is designed to identify differences between individuals, it, like Harter's (1981) scale, is equally oriented toward assessing the social environment's influence on self-perceptions of personal causation. Thus, it too is as much a state measure as a trait measure.

On the basis of their cognitive evaluation theory of human motivation, Deci and Ryan (1985b) developed a clearly trait-oriented measure of personal causation orientations. Their General Causality Orientations Scale, designed to assess adult respondents' views of the causation of behavior, contains three subscales that are scored independently. Individuals who score high on the autonomy orientation experience a high degree of choice concerning the initiation and regulation of their own behavior; these individuals would be origins in deCharms's (1968) system, which means they have an internal perceived locus of causality. Individuals who score high on the control orientation view the world in terms of controls on their behavior, either in the environment or inside themselves; they would be pawns in deCharms's system. Individuals who score high on the impersonal orientation experience their behavior as being beyond their intentional control; they, too, would feel like pawns. Deci and Ryan (1985b) proposed that these causality orientations are general organizing processes for people's experience and behavior in a variety of domains, including awareness of needs and emotions, self-related cognitions and affects, and the types and qualities of behaviors people engage in. As such, the orientations can be considered as enduring personality characteristics; indeed, Deci and Ryan (1985b) have demonstrated promising test-retest reliabilities for the subscales over a 2-month period.

Although Deci and Ryan (1985b) did not present their scale as a measure of intrinsic and extrinsic motivational orientations, they did predict a relationship between causality orientation and intrinsic-extrinsic motivation. They suggested that autonomy-oriented individuals will more often be intrinsically motivated and that control-oriented individuals will more often be extrinsically motivated. Predictions about impersonally oriented individuals are less clear, but it seems likely that they, too, will more often be extrinsically motivated; when they do anything at all, it may only be because they are compelled by external controls.

Relationship Between Intrinsic and Extrinsic Motivation

Clearly, for all of the theorists whose work has been reviewed here, intrinsic and extrinsic motivation represent distinct constructs. However, the nature of the relationship between the two constructs requires further clarification. Although that relationship may not always be explicit in contemporary theories, the common implication is that the two work in opposition. For example, Lepper and Greene's initial theorizing (1978) proposed that individuals' intrinsic motivation will decrease to the extent that their extrinsic motivation increases, a position implicitly held by other theorists. Indeed, many have operationally defined intrinsically motivated behaviors as those that occur in

the absence of extrinsic motivators (e.g., Deci, 1971; Lepper et al., 1973).

However, there are a few theorists (e.g., Deci & Ryan, 1985a) who have recently suggested that, under some circumstances, intrinsic and extrinsic motivation need not work in opposition. Our own research provides some suggestive evidence of additive effects of the two types of motivation. Children whose intrinsic motivation toward schoolwork was bolstered by training subsequently showed higher levels of creativity under external reward conditions, in contrast to nontrained children, who showed lower levels of creativity under reward (Hennessey, Amabile, & Martinage, 1989; Hennessey & Zbikowski, 1993).

Thus, although there are both theoretical and empirical foundations for the expectation that intrinsic and extrinsic motivation are distinct from each other, the empirical question about the relationship between them remains open. As stable personality characteristics, do intrinsic and extrinsic motivation represent relatively orthogonal entities, or are they opposite ends of one bipolar dimension? It is our belief that WPI data can do much to illuminate this issue. Data collected across a large number of respondents will reveal either (a) that people do, in fact, come in two types, that is that individuals do fall into one discrete class or another, or (b) that it is possible for individuals to simultaneously exhibit high levels of both intrinsic and extrinsic motivation.

Purpose of the Work Preference Inventory

The Work Preference Inventory (WPI) was designed as a direct, explicit assessment of individual differences in the degree to which adults perceive themselves to be intrinsically and extrinsically motivated toward what they do. Like Deci and Ryan (1985b), we set out to create scales that could be scored independently, guided by the underlying assumption that intrinsic and extrinsic motives might coexist. Unlike Deci and Ryan, who designed their scales to assess general causality orientations that might result in intrinsic or extrinsic motivations, we set out to directly assess intrinsic and extrinsic motivations. Moreover, we attempted to include not only self-perceptions of competence and self-determination needs, but also the entire range of cognitions and emotions that are proposed to be part of intrinsic or extrinsic motivation. Thus, as Harter (1981) did for children's intrinsic motivations, we attempted to discover whether adults' intrinsic motivations and extrinsic motivations could be subclassified in meaningful ways.

In our initial psychometric investigations of the WPI, we set out to address several major and very basic questions, as described in the next two paragraphs.

Clustering of Intrinsic and Extrinsic Items

Would it be possible to represent intrinsic and extrinsic motivation by meaningful, internally consistent primary scales that include all theoretically proposed cognitive and affective elements? Would it be possible to further divide the WPI items into more fine-grained aspects of intrinsic and extrinsic motivation, as meaningful and internally consistent secondary scales?

Relationship Between Intrinsic and Extrinsic Motivation

Would intrinsic and extrinsic motivation best be represented as opposite ends of a single bipolar dimension, or would they be relatively orthogonal? In other words, would the intrinsic and extrinsic scales be correlated or uncorrelated?

Once these questions were answered, we set out to test several theoretically based predictions.

Stability

We predicted that intrinsic and extrinsic motivation as assessed by the WPI would demonstrate good short-term test-retest reliability (for periods up to 6 months) and good longer term stability (for periods over 6 months and across major life transitions).

Discriminability

WPI scores should be discriminable from social desirability and sheer intelligence.

Relationship to Other Motivation Measures

WPI scores should be related to motivationally relevant questionnaire measures, such as the General Causality Orientations scales (Deci & Ryan, 1985b), and questionnaire measures of intrinsic interest in a variety of activities. WPI scores should also be related to behavioral measures of motivation, such as actual time spent voluntarily engaging in work-related tasks, willingness to volunteer for work-related activities, reported ongoing involvement in such activities, and commitment to such activities. Moreover, WPI scores should predict reactions to social-environmental contingencies. And there should be differences on WPI scores between individuals who have chosen careers that differ widely in their intrinsic and extrinsic rewards.

Relationship to Personality and Attitudes

College students' intrinsic motivation scores should be positively related to Need for Cognition, which is defined as an individual's tendency to engage in and enjoy effortful cognitive endeavors (Cacioppo & Petty, 1982), and to their Academic Comfort scores on the Strong Interest Inventory (SII; Hansen & Campbell, 1985; Strong, Hansen, & Campbell, 1985). Some vocational interest scales on the SII may also be related to WPI scores: Investigative (science oriented) and Artistic types should score high on intrinsic motivation, and Enterprising (leadership oriented) and Conventional (preference for structure) types should score high on extrinsic motivation.

On the Myers-Briggs Type Indicator (MBTI; Myers, 1962), we predicted that extrinsically motivated individuals will tend to be extraverted (focusing on the outer rather than the inner world), sensing (preferring to rely on simple, prescribed procedures), thinking (relying on objective external standards), and judging (oriented toward orderliness, rather than openness to experience)—or ESTJ in the Myers-Briggs typology. We predicted the opposite pattern (INFP) for intrinsically motivated individuals.

We also predicted that individuals' WPI scores, both intrinsic

and extrinsic, will to some extent match their perceptions of intrinsic and extrinsic elements in their social environments (as assessed by the Classroom Environment Inventory [CEI; Hill, 1991], the Work Environment Inventory [WEI; Amabile & Gryskiewicz, 1989], and the Work Environment Scale [WES; Moos, 1986]).

Additionally, because intrinsic motivation is hypothesized to contain elements of enjoyment and fun, we predicted that intrinsic motivation will be positively related to a pencil-and-paper measure of playfulness in adults (Glynn & Webster, 1992).

Relationship to Creativity

As predicted by the componential theory of creativity (Amabile, 1983a, 1983b, 1988), WPI motivation scores should be related to pencil-and-paper measures of creativity, such as the Kirton Adaption-Innovation Inventory (KAI; Kirton, 1976) and the Creative Personality Scale (CPS; Gough, 1979). WPI scores should also be related to behavioral measures of product creativity, as assessed by the standard consensual assessment technique (Amabile, 1982b; Hennessey & Amabile, in press). Specifically, as predicted by the intrinsic motivation hypothesis of creativity (Amabile, 1983a, 1983b), creativity should be positively related to intrinsic motivation and negatively related to extrinsic motivation.

Initial Development of the WPI

Items for the WPI were written so as to capture the major elements of both intrinsic and extrinsic motivation as described by the theorists and researchers reviewed earlier. For intrinsic motivation, these elements include (a) self-determination (preference for choice and autonomy), (b) competence (mastery orientation and preference for challenge), (c) task involvement (task absorption and flow), (d) curiosity (preference for complexity), and (e) interest (enjoyment and fun). For extrinsic motivation, these elements include (a) evaluation concerns, (b) recognition concerns, (c) competition concerns, (d) a focus on money or other tangible incentives, and (e) a focus on the dictates of others.

Items are written in the first person, and respondents are asked to indicate the extent to which each item describes them (on a 4-point scale, from 1 = *never or almost never true of me* to 4 = *always or almost always true of me*). Although items were written to capture general motivational orientations, they were focused primarily on the respondents' work; the phrase "my work" appears in several of the items. An attempt was made to include approximately equal numbers of intrinsic and extrinsic items and to include statements that rejected each motivational orientation, as well as statements that endorsed it. This was done in an effort to avoid response sets.

On the basis of initial item analyses with data not reported here, items were discarded, rewritten, and added in an effort to clearly and adequately capture both intrinsic and extrinsic motivational orientations. The WPI is currently in its seventh version. It contains 30 items.

The original version of the WPI was written for working adults, with a number of extrinsically oriented items concern-

ing salary and promotions. These items (five total) were rewritten for the college student form of the WPI, with "grades and awards" being substituted for "salary and promotions." In all other respects, the student and working adult forms of the WPI are identical.¹

General Method

We report data collected over a period of 8 years from several samples of college students and working adults.

Instruments

In addition to a number of behavioral measures, we obtained several questionnaire measures from subjects. All subjects completed the WPI (student form or working adult form, as appropriate). Some of the samples also completed one or more of the following questionnaires:

Social desirability. To assess social desirability, we used the Crowne and Marlowe Social Desirability Scale (Crowne & Marlowe, 1964).

Motivation measures. Motivation was assessed using (a) the Causality Orientations Scale (Deci & Ryan, 1985b) and (b) the Student Interest and Experience Questionnaire (SIEQ; Amabile, 1989b). The SIEQ assesses students' self-perceived interest and self-reported current involvement in a number of activities, which statistically group into three categories: art (including drawing, painting, and collage making), writing (including poetry, stories, and letters), and problem solving (including solving logic problems, computer programming, and designing experiments). We also used (c) the Stanford Time Inventory (Zimbardo, 1990), which assesses orientation toward the past, the present, and the future in thinking about one's life. This instrument was completed only by our sample of adult professional artists.

Personality and attitude measures. We assessed personality and attitudes using (a) the Need for Cognition Scale (Cacioppo & Petty, 1982); (b) the SII (Hansen & Campbell, 1985; Strong, Hansen, & Campbell, 1985); (c) the MBTI (Myers, 1962); (d) the Adult Playfulness Scale (Glynn & Webster, 1993), which assesses an adult's propensity to define (or redefine) an activity in an imaginative, nonserious, or metaphoric manner so as to enhance intrinsic enjoyment, involvement, and satisfaction; and (e) the Cognitive Playfulness Scale (Webster & Martocchio, 1992), which assesses an additional aspect of adult playfulness: cognitive curiosity.

Environment perception measures. Environment perception was measured using (a) the CEI (Hill, 1991), which assesses college students' perceptions of their classroom environment. Built on the Classroom Environment Scale for high school students (Trickett & Moos, 1973), the CEI contains six scales: Innovative Teaching, Order and Organization, Competition, Peer Support, Student Involvement, and Teacher Support. We also used (b) the WEI (Amabile, 1987c; Amabile & Gryskiewicz, 1989),² which assesses respondents' perceptions of their work environment along eight dimensions. Six of these dimensions are hypothesized to support creativity: freedom (autonomy in doing one's work), challenging work (a sense of having to work hard on challenging tasks and important projects), sufficient resources, supervisory encouragement, work group supports (a supportive, skilled, constructively challenging group of co-workers), and organizational encouragement (an organizational culture that encourages creativity through a variety of means). Two of the WEI dimensions are hypothesized to undermine creativity: organizational impediments (an organizational culture that impedes creativity through a variety of means) and workload pressure (too much work to do in too little time). There are also two criterion scales designed to assess individuals' perceptions of the current levels of creativity and productivity in the organization. An additional environment perception measure used was (c) the WES (Moos, 1986). Like the WEI, this instrument is designed to assess respondents' perceptions of

their work environment. Rather than being oriented specifically toward creativity supports or impediments, the WES is intended as a broad assessment of work environment perceptions. There are 10 scales: Involvement, Peer Cohesion, Supervisor Support, Autonomy, Task Orientation, Work Pressure, Clarity, Control, Innovation, and Physical Comfort.

Creativity measures. Creativity was assessed with (a) the Creative Personality Scale (Gough, 1979) and (b) the KAI (Kirton, 1976).

Student Samples

Participants were 1,363 undergraduates (499 men and 864 women) enrolled in a small research university ($N = 1,308$) and a small women's liberal arts college ($N = 55$) in the northeastern United States. Data were gathered over 4 years from group administrations to students in sections of Introduction to Psychology classes ($N = 1,099$), from a mass mailing to new students on campus ($N = 91$), from students in several writing classes ($N = 98$), and from students in various advanced psychology seminars ($N = 71$). Participants ranged in age from 16 to 46 years ($M = 18.8$, $SD = 2.0$); 58% were freshmen, 24% were sophomores, 11% were juniors, and 7% were seniors.

Retest data were collected from subsamples of these students who were asked to complete an additional WPI either while they were still enrolled as students (after time periods of 6, 12, 24, or 30 months) or after they had graduated (after time periods of 24, 42, or 54 months). The alumni were all given the adult WPI to complete. These retest data were used to assess both short-term (6 months) test-retest reliability and longer term stability in motivational orientations over varying time periods and across the transition from college to the world of work.

We also report results from four recent student samples whose data were not used for scale development. One is a group of advanced student artists ($N = 29$); the second is a group of advanced student poets ($N = 38$); the third is a sample of students from three different introductory psychology courses ($N = 342$); and the fourth is a sample of introductory psychology students participating in the control group of an experiment ($N = 95$).

Adult Samples

Several samples of working adults totaled 1,055 individuals (825 men, 207 women, and 23 who did not report their gender). Working adult data were gathered over 8 years from more than 40 samples ranging from research and development scientists and business chief executive officers to railway workers, hospital workers, and secretaries. The age of participants ranged from 19 years to 73 years ($M = 38.14$, $SD = 8.52$). The number of years participants had been in their occupations at the time of completing the WPI ranged from less than 1 year to 40 years ($M = 10.84$, $SD = 7.85$).

These adult data came from three primary sources: employees of private companies ($N = 521$), participants in management-training seminars ($N = 262$), and participants in research studies that included a military organization and several random samples of working adults ($N = 245$). The private companies included a national printing and paper company ($N = 16$), a national camera company ($N = 82$), an insurance company ($N = 6$), an advertising company ($N = 34$), a national commercial bank ($N = 135$), a fabric mill ($N = 25$), and a railroad ($N = 217$). Most of the management-training seminars were conducted at the Center for Creative Leadership in Greensboro, North Carolina.

¹ A technical manual, including both forms of the WPI and scoring instructions, can be obtained by writing to Teresa M. Amabile.

² The initial psychometric report on the WEI (Amabile & Gryskiewicz, 1989) was based on an earlier version of that inventory (Version 3). In current analyses, we used a revised version (Version 4).

We also report data on three recent additional samples of adults whose data were not included in scale development. The first consisted of 547 members of Mensa, an organization of high-IQ individuals (Glynn & Webster, 1992). The second included 23 professional artists from across the United States, and the third included 47 top-level scientists from a large plastics company.

Analysis Overview

The WPI data analyses proceeded in several distinct stages. First, with the exceptions noted, all student data were subjected to exploratory factor analyses, as were all adult data. Exploratory factor analyses were used because we did not have strong predictions about how the items would group onto scales; the purpose was to determine the most meaningful groupings of the items. These analyses were done separately for the student and the adult data, because the two forms of the instrument are not identical; the five reward items are worded differently ("grades and awards" vs. "salary and promotions"). Nonetheless, we hoped to be able to identify a set of factors that would be comparable across both populations to facilitate comparisons across the transition from student to working adult status.

We began by attempting to identify basic *primary factors*. We also explored the possibility of more finely differentiated groupings of items within these primary factors. These would be called the *secondary factors*. It was our aim to discover both primary and secondary scales that would be conceptually meaningful.

After these scales were identified through exploratory factor analysis, we used covariance structure analyses for two purposes. First, confirmatory factor analyses were performed to examine the fit of the two-factor model and the four-factor model for both students and working adults. Second, the two-factor model was tested comparing the original student sample with a new sample to determine whether the model differed across student samples.

Scale development also included internal reliability analyses (Cronbach's alpha) and own scale–other scale correlations. These were carried out to examine the internal cohesion of the scales and the distinctiveness of each scale.

After we developed the scales, it was possible to examine a number of substantive issues with the data, including the relationship between the scales; the short-term test–retest reliability and longer term stability of WPI scores; the discriminability of WPI scores from measures of other, conceptually separable, constructs; the relation between WPI scores and motivation measures, both questionnaire and behavioral; the relation between WPI scores and measures of personality, attitudes, and perceptions; and the relation between WPI scores and creativity.

Results and Discussion

Exploratory Factor Analyses

Principal-components factor analyses were performed separately on the student data and the adult data.³ Because we wished to determine the extent to which the factors were orthogonal (rather than forcing them to be so), the extractions were followed by an oblique (OBLIMIN) rotation. Initial factor analyses yielded six factors with eigenvalues greater than 1. However, after we examined the variance accounted for by each factor, performed a scree test, and considered the traditional theoretical distinction between two motivational types (intrinsic and extrinsic), we performed subsequent factor analyses that limited the total number of factors to two. Final scales were formed by examining the clarity and meaningfulness of the resulting two factors.

These two-factor solutions for the student data and the adult data yielded virtually identical and conceptually interpretable scales. These we labeled *Intrinsic Motivation* and *Extrinsic Motivation*, which we refer to as the primary scales.

Next, each of the primary scales was itself factor analyzed to determine whether there were meaningful subfactors that could serve as more fine-grained breakdowns of the elements of intrinsic and extrinsic motivation (i.e., secondary scales). For each primary scale, the two-factor solution yielded the most meaningful results. The two intrinsic subfactors were interpretable as Challenge (5 items) and Enjoyment (10 items), and the two extrinsic subfactors were interpretable as Compensation (5 items) and Outward (oriented toward the recognition and the dictates of others, 10 items). These secondary factor analyses yielded almost identical groupings of items into subfactors for students and adults. Two items that loaded strongly as Outward items for students loaded equally on Outward and Compensation for adults. We placed them on the adult Outward secondary scale to keep the student and adult scales identical in item content. Moreover, although these items do not add to the internal reliability of the adult Compensation scale, they do add to the reliability of the adult Outward scale. Similarly, two items that loaded strongly on the Enjoyment scale for adults loaded somewhat higher on Challenge for students. We placed them on the student Enjoyment secondary scale to keep the student and adult scales identical in item content. Moreover, although these items do not add substantially to the internal reliability of the student Challenge scale, they do add substantially to the reliability of the student Enjoyment scale.

Table 1 presents the items of the WPI, with indications of each item's placement on the student and adult scales. Table 2 presents factor eigenvalues and loadings for the student data, and Table 3 presents parallel information for the adult data.

Covariance Structure Analyses

Covariance structure analyses were performed to address questions regarding the fit of the scales to the data: How well does the two-factor model of the primary scales fit the student and adult data? What is the fit of the four-factor model of the subscales? How well does the model estimated for the students fit for a new sample of students? To answer the first question, the two-factor model was evaluated using maximum likelihood confirmatory factor analyses. As recommended by Bollen (1989), we followed several procedures for all covariance structure analyses presented here: LISREL VI (Jöreskog & Sörbom, 1986) was used to conduct the analysis; the input data was a variance–covariance matrix; one item per concept was fixed at 1.0; a simple structure was maintained (i.e., no item was allowed to load on more than one latent variable); the phi matrix (factor variance–covariance matrix) was set as a free symmetric matrix; and theta delta (variance–covariance matrix of measurement errors) was a diagonal free matrix (models did not contain correlated error terms).⁴

³ Maximum likelihood factor analyses yielded virtually identical results.

⁴ The *N*s for confirmatory factor analyses are somewhat different from those reported in Tables 2 and 3 because of casewise deletion of missing data to form the variance–covariance matrices.

Table 1
Work Preference Inventory Items and Scale Placement

Item no.	Item	Primary		Secondary				Primary factor loading rank	
		IM	EM	E	Ch	O	C	Students	Working adults
13	I enjoy tackling problems that are completely new to me.	X			X			1	3
26	I enjoy trying to solve complex problems.	X			X			2	1
3	The more difficult the problem, the more I enjoy trying to solve it.	X			X			3	2
5	I want my work to provide me with opportunities for increasing my knowledge and skills.	X			X			4	12
11	Curiosity is the driving force behind much of what I do.	X			X			5	5
28	I want to find out how good I really can be at my work.	X		X				6	7
7	I prefer to figure things out for myself.	X		X				7	10
30	What matters most to me is enjoying what I do.	X		X				8	13
27	It is important for me to have an outlet for self-expression.	X		X				9	4
14	I prefer work I know I can do well over work that stretches my abilities.	R			R			10	6
8	No matter what the outcome of a project, I am satisfied if I feel I gained a new experience.	X		X				11	15
17	I'm more comfortable when I can set my own goals.	X		X				12	9
23	I enjoy doing work that is so absorbing that I forget about everything else.	X		X				13	11
20	It is important for me to be able to do what I most enjoy.	X		X				14	14
9	I enjoy relatively simple, straightforward tasks.	R			R			15	8
19	I am strongly motivated by the [grades] [money] I can earn.		X				X	1	2
10	I am keenly aware of the [GPA (grade point average)] [promotion] goals I have for myself.		X				X	2	3
24	I am strongly motivated by the recognition I can earn from other people.		X			X		3	5
29	I want other people to find out how good I really can be at my work.		X			X		4	4
16	I seldom think about [grades and awards.] [salary and promotions.]		R				R	5	12
4	I am keenly aware of the [goals I have for getting good grades.] [income goals I have for myself.]		X				X	6	1
6	To me, success means doing better than other people.		X			X		7	7
25	I have to feel that I'm earning something for what I do.		X			X		8	6
22	As long as I can do what I enjoy, I'm not that concerned about exactly [what grades or awards I can earn.] [what I'm paid.]		R				R	9	13
18	I believe that there is no point in doing a good job if nobody else knows about it.		X			X		10	14
15	I'm concerned about how other people are going to react to my ideas.		X			X		11	8
21	I prefer working on projects with clearly specified procedures.		X			X		12	9
12	I'm less concerned with what work I do than what I get for it.		X			X		13	11
1	I am not that concerned about what other people think of my work.		R			R		14	15
2	I prefer having someone set clear goals for me in my work.		X			X		15	10

Note. Items 4, 10, 16, 19, and 22 are worded differently for students and adults. Both are presented here, in brackets. An X indicates that the item falls on that particular scale. An R indicates that it is reverse scored. IM = Intrinsic Motivation Scale; EM = Extrinsic Motivation Scale; E = Enjoyment Scale; Ch = Challenge Scale; O = Outward Scale; C = Compensation Scale.

An examination of the overall fit measures indicates that the two-factor model provides a moderate fit to the data, with room for improvement (see Table 4). Turning to the component fit measures, we get a sense of which aspects of the model work well. For both students and adults, the items loaded significantly

onto their proposed factors at the .001 level or better. An examination of the modification indices, however, showed several large values (approximately 40–70) where the loadings of items on the alternative factor were constrained to be 0. Examination of the residuals provided information that was in agreement

Table 2
Student Work Preference Inventory (WPI) Scales

Measure	Primary		Secondary			
	Intrinsic motivation (IM)	Extrinsic motivation (EM)	Challenge (IM)	Enjoyment (IM)	Outward (EM)	Compensation (EM)
No. of items	15	15	5	10	10	5
Factor eigenvalue	4.72	3.57	3.91	1.70	3.79	1.88
Factor loadings						
Range	.29-.70	.25-.76	.36-.79	.36-.79	.20-.70	.56-.84
Mdn	.44	.52	.71	.58	.50	.75
Item-total correlations ^a						
Range	.22-.60	.22-.59	.34-.62	.29-.45	.18-.51	.44-.65
Mdn	.39	.43	.60	.38	.37	.56
M	.35	.38	.50	.37	.32	.55
Cronbach's α	.79	.78	.74	.71	.71	.78
Population ($N = 1,323$)						
M	2.99	2.56	2.63	3.17	2.37	2.95
SD	0.37	0.41	0.53	0.38	0.42	0.63
Men ($n = 492$)						
M	2.99	2.57	2.71	3.13	2.41	2.89
SD	0.37	0.43	0.52	0.38	0.43	0.67
Women ($n = 831$)						
M	2.99	2.56	2.58	3.19	2.35	2.98
SD	0.37	0.40	0.53	0.37	0.42	0.60
Test-retest reliability						
6 months ($n = 18$)	.84	.94	.92	.84	.88	.85
Stability						
12 months ($n = 71$)	.79	.84	.83	.64	.81	.86
24 months ($n = 54$)	.76	.76 ^b	.56	.78 ^b	.72	.77
24 months ($n = 17$) ^c	.85	.81	.75	.85	.73	.75
30 months ($n = 62$)	.67	.74	.61	.73	.56	.73
42 months ($n = 28$) ^c	.82	.78	.83	.69	.71	.74
54 months ($n = 89$) ^c	.70	.73	.57	.73	.64	.67

^a Corrected item-total correlations. ^b $n = 48$. ^c These participants first completed the WPI as students and did the retest as alumni (adult WPI).

with conclusions drawn from the modification indices: Many of the WPI items had large positive residuals with items composing an alternate factor, thus indicating that the relationship between the item and the alternate factor had been underestimated when it was fixed at 0. In other words, several items do load on more than one factor.

Such findings for the component fit indicators suggest (a) that item responses are not simply determined by only intrinsic or only extrinsic orientations or (b) that models with more than two factors might better describe the data. In fact, moving to the four-factor model (Enjoyment, Challenge, Outward, and Compensation) significantly improved the model fit, students' difference $\chi^2(5, N = 1,442) = 636, p < .001$; adults' difference $\chi^2(6, N = 749) = 512, p < .001$ (see Table 4).

We next examined how well the two-factor model estimated for the students fit for a new sample of student data. For this we used sequential chi-square difference tests (Bentler & Bonett, 1980), examining nested models with progressively restricted equality constraints between old and new student groups. These tests indicated that there were no significant differences between the two student samples for factor loadings (λ), errors (δ), or the factor variances and covariances (ϕ).⁵

In sum, although the scales that we chose on the basis of the exploratory factor analyses are not statistically "pure," they do

appear to be appropriate ones. Confirmatory factor analyses indicate that the motivational structure is probably more complex than the simple intrinsic-extrinsic distinction suggested by the literature. However, because that distinction is so frequently relied on, we have maintained it with our primary scales. The secondary scales, with their significantly better fit to the data, seem to do a better job of capturing the complexities of motivational orientation.

We suggest that, for three reasons, it is reasonable to proceed with using these primary and secondary scales. First, and most important, the grouping of items on the scales is conceptually meaningful and, as we shall show, the scales relate to other measures in useful and interpretable ways. Second, the fit is within a range generally considered satisfactory for scales of this type. (For example, see Lim & Carnevale, 1990; Vallerand & Richer, 1988.) Third, in addition to these confirmatory factor analyses, we examined the distinctness of each scale by determining whether any of the items on a scale correlated higher with another scale than it did with its own. In fact, not a single item correlated higher with another scale than with its own scale.

⁵ These confirmatory factor analyses have not yet been conducted on the adult data because a sufficiently large second sample has yet to be collected.

Table 3
Adult Work Preference Inventory Scales

Measure	Primary		Secondary			
	Intrinsic motivation (IM)	Extrinsic motivation (EM)	Challenge (IM)	Enjoyment (IM)	Outward (EM)	Compensation (EM)
No. of items	15	15	5	10	10	5
Factor eigenvalue	3.72	3.40	1.75	3.41	3.16	1.63
Factor loadings						
Range	.15-.74	.17-.63	.64-.71	.28-.67	.16-.64	.59-.70
Mdn	.44	.40	.66	.48	.45	.63
Item-total correlations ^a						
Range	.16-.57	.10-.46	.41-.60	.24-.43	.11-.49	.28-.53
Mdn	.33	.30	.53	.33	.29	.34
M	.35	.30	.50	.34	.30	.38
Cronbach's α	.75	.70	.73	.67	.63	.62
Population ($n = 1,027$)						
M	3.16	2.42	3.26	3.11	2.29	2.67
SD	0.34	0.39	0.50	0.38	0.40	0.63
Men ($n = 815$)						
M	3.14	2.44	3.25	3.08	2.29	2.63
SD	0.35	0.40	0.50	0.38	0.40	0.61
Women ($n = 206$)						
M	3.26	2.41	3.28	3.25	2.27	2.68
SD	0.32	0.41	0.47	0.34	0.41	0.68
Test-retest reliability ($n = 38$) 6 months	.89	.80	.89	.83	.79	.73

^a Corrected item-total correlations.

This held true for both the adult scales and the student scales and for analyses of both the primary scales and the secondary scales. Thus, although we cannot argue that each item belongs uniquely to its own scale, each does fit on its own scale better than it does on the other scales. These three considerations, taken together, provide reason to proceed with using these scales as developed.

Scale Reliabilities

Corrected item-total correlations and Cronbach's alphas for the primary and secondary scales are presented in Table 2 for the student samples and Table 3 for the adult samples. The reliabilities for the primary scales were satisfactory for both students and adults. A separate analysis on the adult sample of 500 Mensa members yielded good reliabilities within that group, as well (.82 for Intrinsic and .76 for Extrinsic Motivation). The reliabilities for the four student secondary scales were also satisfactory. Two of the four adult secondary scales, however, displayed reliabilities that were marginal (.62 for Compensation and .63 for Outward).

Overall, then, the internal consistencies of the scales are acceptable. Nonetheless, further development of the adult secondary extrinsic scales is desirable.

Scale Norms

WPI scale scores were computed as simple means of the relevant scale items. Normative scale data on men, women, and the entire population are presented in Table 2 (students) and Table

3 (adults). For students, there were no significant differences between men's and women's scores on either of the primary scales. However, men had slightly higher Challenge, $t(1321) = 4.44$, $p < .001$, and Outward scores, $t(1317) = 2.81$, $p < .005$, whereas women had slightly higher Enjoyment, $t(1318) = 2.74$, $p < .006$, and Compensation scores, $t(1318) = 2.61$, $p < .009$. For adults, women scored higher than men on the Intrinsic primary scale, $t(1015) = 4.48$, $p < .001$, and on the intrinsic Enjoyment scale, $t(1017) = 5.87$, $p < .001$. There were no significant sex differences on the other adult scales.

An examination of the moments of the distributions (mean, variance, skew, and kurtosis) of the student and adult primary and secondary scale scores showed them to be reasonably normal, with no substantial skew or kurtosis.

Relationship Between Scales

The Intrinsic and Extrinsic Motivation scales are essentially orthogonal. For adults, the Intrinsic and Extrinsic primary scales correlated $-.08$. The two intrinsic secondary scales were moderately correlated ($r = .34$), as were the two extrinsic secondary scales ($r = .34$). The two intrinsic secondary scales (Challenge and Enjoyment) were essentially uncorrelated with the two extrinsic secondary scales (Compensation and Outward), except for a modest correlation between Challenge and Outward ($r = -.22$). For students, the Intrinsic and Extrinsic primary scales correlated $-.21$. The two intrinsic secondary scales were moderately correlated ($r = .44$), as were the two extrinsic secondary scales ($r = .36$). The intrinsic secondary scale Enjoyment correlated $-.17$ and $-.08$ with the extrinsic second-

Table 4
Confirmatory Factor Analysis

Sample	χ^2	df	GFI	AGFI	Δ_1^a	Δ_2^b	N
Fit of the two-factor model							
Students	3,681	404	.77	.73	.62	.65	1,442
Adults	4,728	404	.80	.77	.49	.51	749
Fit of the four-factor model							
Students	3,045	399	.85	.83	.69	.72	1,442
Adults	1,897	399	.85	.82	.60	.65	749

Note. GFI = goodness-of-fit index; AGFI = adjusted goodness-of-fit index.

^a Δ_1 = Bentler and Bonett's (1980) normed fit index with a null-factor baseline model. ^b Δ_2 = Bollen's (1989) measure adjusting for sample size, again using a null-factor baseline model.

ary scales (Outward and Compensation, respectively). The intrinsic secondary scale Challenge correlated $-.29$ with the extrinsic Outward scale and $-.03$ with the extrinsic Compensation scale.

Thus, as would be expected, the secondary intrinsic scales relate to each other, as do the secondary extrinsic scales, for both students and adults. Moreover, the intrinsic and extrinsic scales are relatively independent, except for the extrinsic secondary Outward scale, which appears to bear a weak negative relation to intrinsic motivation (especially Challenge motivation).

The relative independence of the Intrinsic and Extrinsic Motivation primary scales is further demonstrated by examining the number of individuals who score high on both of these scales. In the student sample, 19 scored more than one standard deviation above the mean on both primary scales (compared with 31 expected by random probability). In the adult sample, 27 scored high on both scales (compared with 30 expected by random probability). These data clearly indicate that individuals can simultaneously hold strong intrinsic and extrinsic orientations. In other words, there is little support for the assumption that intrinsic and extrinsic motivation are polar opposites, with people falling into one discrete category or the other.

This common assumption most likely stems from reliance on the inner-outer metaphor, which has been particularly influential in personality and social psychology. Hogan and Cheek (1983) argued that, because individuals differ in their sensitivity to inner and outer influences, researchers have typically allowed this difference to dictate the manner in which they investigate a variety of phenomena. Using forced-choice questionnaires, investigators have often insisted on mapping what would be better conceptualized as two separate dimensions onto one, single bipolar dimension. Studies of self-presentation, identity, and the determination of values have all fallen prey to this serious bias; psychometric evidence in each of these areas has failed to support a bipolar conceptualization (Hogan & Cheek, 1983). As evidenced by the present data on the WPI, it would seem that intrinsic and extrinsic motivational orientations are also best understood as two unipolar constructs.

Stability

Short-term (6 month) test-retest reliability and longer term (up to 4 years) stability of WPI scores was calculated using Cronbach's equal halves method, where the first half consisted of the items for each scale from the first administration and the second half consisted of the same items from the second administration. These results are presented in Tables 2 and 3. Some of the student samples completed the WPI twice as students (6, 12, 24, or 30 months after initial administration). Although decreasing over time, these reliabilities are generally very good. Other retest samples presented in Table 2 completed the WPI first as students and later as alumni (adult WPI), after intervals of 24, 42, or 54 months. Here, too, the stabilities are quite strong, even though many of these individuals went through the major transition from college to the working world during the interim. The retest data available on adults (6 months) also yield strongly supportive results (see Table 3).

Thus, intrinsic and extrinsic motivational orientations can, indeed, be considered as stable, enduring individual-differences characteristics.

Age, Experience, and Discriminant Data

As can be seen in Table 5, there was a weak negative correlation between adults' intrinsic motivation (especially Enjoyment) and years of experience in their occupation. Interestingly, there were also modest negative correlations between extrinsic motivation and work experience. It appears that, as people spend more years in their occupations, they become less strongly motivated by enjoyment in their work and by the desires for recognition and compensation. It may be that some people tend to be less focused on personal enjoyment in their work as they mature in their careers. Perhaps they become a bit stale or "burned out" as they approach retirement, or perhaps they become more generative, that is, more focused on younger workers than on themselves. It may be that the extrinsic motives no longer operate so strongly because recognition and satisfactory levels of compensation have already been attained. However, because these data were collected on cross-sectional samples, it is also possible that the younger cohort is more oriented toward personal enjoyment, recognition, and compensation than the older cohort is (or perhaps ever was).

Table 5 also presents discriminant data (for student samples) on intelligence and social desirability. Correlations between social desirability and the two primary scales were nonsignificant, but the Outward secondary scale did correlate significantly with social desirability. Apparently, respondents with a tendency to give socially desirable responses are less likely to endorse the Outward items. Overall, the Outward scale has a lower mean than any of the other scales, supporting the possible interpretation that this orientation is generally seen as less desirable. It could be, therefore, that some individuals with relatively strong Outward orientations do not obtain high scores on this scale, leading to some false negatives. This possibility must be taken into account in interpretations of results obtained on the Outward scale, and future scale development will attempt to eliminate this problem.

Although WPI scores did not correlate significantly with final

Table 5
Work Preference Inventory Correlations With Age, Experience, Intelligence, and Social Desirability

Measure	Primary		Secondary			
	Intrinsic motivation (IM)	Extrinsic motivation (EM)	Challenge (IM)	Enjoyment (IM)	Outward (EM)	Compensation (EM)
Adult samples						
Age ($n = 1,019$)	-.05	-.04	.00	-.05	.00	-.04
Years in occupation ($n = 616$)	-.07*	-.13***	.00	-.10**	-.09**	-.13***
Years considered self to be artist ($n = 23$ professional artists)	.02	-.14	-.04	.08	-.32	.07
Student samples						
Introduction to Psychology midterm grades ($n = 462$)	.22***	-.02	.24****	.14***	-.03	-.05
Scholastic Achievement Test Verbal ($n = 314$)	.11*	-.07	.09	.09	-.04	-.09
Math ($n = 127$)	.23***	-.09	.19**	.20	-.05	-.11
Marlowe-Crowne ($n = 193$)	.13*	-.14*	.12*	.11	-.26***	.08

* $p < .10$. ** $p < .05$. *** $p < .01$. **** $p < .001$.

exam scores in a course or with verbal Scholastic Achievement Test (SAT) scores (which can both be considered measures of intelligence), Intrinsic scores did correlate modestly with a midterm exam score and with math SAT scores. It appears that, to some degree, more highly intelligent students may be more intrinsically oriented toward their schoolwork.

Thus, WPI scores are largely discriminable from social desirability and from intelligence, but not completely so.

Motivation Measures

To establish the validity of the constructs assessed by the WPI scales, several questionnaire and behavioral measures of motivation were correlated with WPI scores. Correlations between these measures and the WPI scales largely support the validity of the instrument. As may be seen in Table 6, both the primary and the secondary scales of the WPI were clearly related in the predicted directions to other questionnaire motivational measures. Intrinsic Motivation (including both Challenge and Enjoyment) was positively correlated with the Deci and Ryan (1985b) autonomy orientation; with expressed interest in writing, art, and problem-solving activities from the SIEQ; with experiment participants' ratings of interest in such activities after engaging in them; and with a measure of interest in writing taken in a college writing program. Moreover, these intrinsic scales were negatively correlated with the Deci and Ryan (1985b) control and impersonal orientations.

As expected, Extrinsic Motivation (including the Outward and Compensation scales) was positively correlated with the Deci and Ryan (1985b) control and impersonal orientations. In addition, the Outward scale was negatively correlated with the Deci and Ryan (1985b) autonomy orientation.

The correlations with the Deci and Ryan (1985b) Causality Orientations scale fit well with the propositions of cognitive

evaluation theory (Deci & Ryan, 1985a). In particular, the lack of relationship between the Autonomy causality orientation and the WPI Compensation scale is interesting. As Deci and Ryan (1985a, 1985b) have suggested, individuals can perceive themselves as freely choosing to respond to extrinsic incentives in their work.

For professional artists, Extrinsic motivation correlated positively with future orientation and negatively with past orientation. The future orientation correlation is due primarily to a focus on compensation, but the past orientation correlation is due primarily to a focus on recognition. It appears that, as might be expected, a concern with money goes hand in hand with a drive toward the future, and a concern with recognition leads one to be less focused on the past (perhaps before any degree of recognition was achieved).

The Outward scale was negatively correlated with the art interest measure and with one writing interest measure. These were the only correlations (2 of a possible 10) between an interest measure and an extrinsic motivation scale, suggesting that, although the intrinsic scales do, in fact, indicate a tendency to be interested in a variety of activities, the extrinsic scales do not necessarily indicate a lack of interest. In other words, rather than simply signifying an absence of motivation, these extrinsic scales do appear to signify the presence of particular types of motivation that are distinct from interest in the work itself. This can be taken as further evidence that intrinsic and extrinsic motivation are not simply opposites.

Both the primary and the secondary scales of the WPI were related in the predicted directions to behavioral measures of motivation. The intrinsic scales were positively correlated with current involvement in writing, art, and problem-solving activities. Interestingly, Challenge orientation was related to problem-solving involvement but not writing or art, whereas Enjoy-

Table 6
Work Preference Inventory Correlations With Motivation Measures

Measure	Primary		Secondary			
	Intrinsic motivation (IM)	Extrinsic motivation (EM)	Challenge (IM)	Enjoyment (IM)	Outward (EM)	Compensation (EM)
Student samples						
Causality orientations (n = 500)						
Autonomy	.36****	—	.22****	.37****	-.13***	—
Control	-.15****	.39****	-.16***	-.11**	.39****	.22****
Impersonal	-.26****	.31****	-.32****	-.16****	.38****	.09*
SIEQ interest (n = 645)						
Writing	.26****	—	.26****	.31****	—	—
Art	.23****	-.09**	.23****	.27****	-.10***	—
Problem solving	.35****	—	.34****	.17****	—	—
Postexperimental task rating (n = 55)						
Interesting	.29**	—	—	.33***	—	—
Enjoyable	.25*	—	—	.31**	—	—
Writing interest field measure (n = 95)						
	.29***	—	.31***	.23**	-.23**	—
SIEQ involvement (n = 645)						
Writing	.17****	-.10***	—	.21****	-.11***	—
Art	.14****	-.09**	—	.16****	-.09**	-.06*
Problem solving	.16****	.13****	.25****	—	—	.21****
Delay to do requirement (n = 339)						
	—	-.14***	—	—	-.14**	-.09*
Hours/week doing art (n = 29 student artists)						
	.52***	—	.55***	.33*	—	—
Number of artworks (n = 29 student artists)						
	.36**	-.38**	.39**	—	-.50****	—
Hours/week painting or drawing (n = 29 student artists)						
	.71****	—	.74****	.45**	—	—
Number of paintings or drawings						
	.43**	-.44**	.39**	—	-.50****	—
Hours/week discussing poetry (n = 38 student poets)						
	.32**	—	—	.32**	—	—
Instructor ratings (n = 29 student artists)						
Commitment to art	.53**	—	.56**	—	—	—
Potential as artist	.52**	—	.58***	—	—	—
Professional artists (n = 23)						
Time perspective						
Future	—	.63***	—	—	.37**	.61***
Past	—	-.42**	—	—	-.58***	—
Percentage time doing art						
	.40*	—	—	—	-.52**	—

Note. Correlations with $p > .10$ are not printed (—). SIEQ = Student Interest and Experience Questionnaire.
* $p < .10$. ** $p < .05$. *** $p < .01$. **** $p < .001$.

ment orientation was related to writing and art involvement but not problem solving. Extrinsic Motivation and the Outward and Compensation Orientations were negatively correlated with the lag time before introductory psychology students started fulfilling their experiment-participation course requirement. In other words, as expected, students who were more highly extrinsically oriented tended to start fulfilling the requirement sooner in the semester; those who were more extrinsically motivated were more responsive to this extrinsic constraint.

Perhaps the most intriguing finding from these behavioral data comes from the correlations with extrinsic motivation. As was found for the interest measures, there were no substantial correlations between the extrinsic scales and involvement in writing or involvement in art. However, these involvement data held a surprise: Current involvement in problem-solving activities (such as computer programming, solving logic problems, and designing experiments) correlated positively and significantly with both intrinsic and extrinsic motivation. If we examine the secondary scales, we see that there were no correlations

with the Enjoyment or Outward scales; the significant intrinsic correlation came solely from the Challenge scale, and the significant extrinsic correlation came solely from the Compensation scale. These data provide further support for the exciting possibility that intrinsic and extrinsic motivational orientations can co-occur and can, in fact, both be significantly related to subjects' tendency to seek out challenging, complex activities.

Correlations with behavioral measures from the student artists, student poets, and professional adult artists provide additional evidence that strongly supports the WPI's validity. As shown in Table 6, Intrinsic Motivation correlated with the hours per week that the student artists devote to doing their art (especially to painting and drawing), the number of artworks that the student artists have completed in the past 2 years, the hours per week that the student poets devote to discussing poetry, and the percentage of waking time that the professional artists devote to doing their art.

Importantly, WPI intrinsic scores correlated significantly with behavioral measures as reported by independent observers of the respondents. Student artists' Intrinsic (Challenge) scores were strongly correlated with confidential ratings their art instructors made of the student's commitment to art, as well as the student's overall potential for a lifelong involvement in art.

The extrinsic scores from these artist and poet groups also showed some intriguing correlations with behavioral motivation measures. Student artists' Extrinsic (and Outward) scores correlated negatively with the number of works they had done in the previous 2 years, especially paintings and drawings. Similarly, student poets' Extrinsic scores correlated negatively with the number of poems they had completed in the previous 2 years. Recognition motivation (Outward orientation) correlated negatively with the percentage of time the professional artists spend on their art.

Finally, the career choice behavior of our special groups can be taken as a metalevel indication of their motivations. Earlier, we speculated that, compared with the general population, artists, poets, and scientists would be more highly intrinsically motivated and less highly extrinsically motivated. These expectations are borne out whether we examine the student or the adult groups. The professional artists, student artists, student poets, and senior scientists scored significantly higher than their respective population norms on intrinsic motivation and significantly lower on extrinsic motivation. The only exceptions were the student artist Challenge scores and the senior scientist Outward scores, which were not significantly different from their population norms. On all of the other primary and secondary scale comparisons, however, the differences held, and in most cases, they were quite strong ($p < .01$).

Taken together, these data provide strong initial confirmation of the validity of the WPI as a measure of motivational orientations. Moreover, the somewhat different patterns of results for the secondary intrinsic scales, as well as those for the secondary extrinsic scales, support the utility of these subcategorizations of the more global motivational orientations.

Personality, Attitudes, and Perceptions

Measures of personality, attitudes, and perceptions were obtained from some of our student samples; measures of playful-

ness and work environment perceptions were obtained from some of our adult samples. The WPI primary and secondary scales correlated in the predicted directions with several of these nonmotivational but theoretically related measures.

As expected, Intrinsic scores were positively related, and Extrinsic scores were negatively related, to students' Need for Cognition (Cacioppo & Petty, 1982; see Table 7). Although both correlations were significant, the correlation with Intrinsic scores was particularly strong. The significant correlation with extrinsic motivation appears to be due primarily to the Outward scale; Compensation orientation did not relate strongly to the enjoyment of effortful cognitive endeavors.

A conceptually similar positive correlation was found between Intrinsic scores and Academic Comfort on the SII (Hansen & Campbell, 1985; Strong, Hansen, & Campbell, 1985; see Table 7). This, too, indicates that intrinsically oriented students are more likely to feel comfortable doing academic activities. Other findings from the SII generally fit the expected patterns. It appears that students showing general interest in scientific pursuits (investigative theme) are more likely to be intrinsically motivated and that students showing general interest in leadership (particularly public speaking and law or politics) are more likely to be motivated by the recognition and approval of others. Interestingly, however, those oriented toward law or politics are also motivated by challenge, an intrinsic orientation.

Also as seen in Table 7, extrinsically oriented individuals tend to be ESTJ types (Extraverted, Sensing, Thinking, and Judging) on the Myers-Briggs Type Inventory, as predicted. This corresponds with our picture of the extrinsically motivated individual who is outwardly oriented, toward the structures, rewards, and goals established by others. In other research, ESTJ types have been found to prefer business marketing and management careers, emphasize economic values, and describe themselves as conscientious with a preference for order (Myers & McCaulley, 1988, pp. 177-205). These findings support the construct validity of the WPI extrinsic scales. Interestingly, we did not find that highly intrinsically motivated individuals tend to be INFPs, as we had predicted. (Although the correlations were in the predicted direction, they were not strong.) This serves as further evidence of the separate processes of intrinsic and extrinsic motivation.

As predicted, questionnaire measures of adult playfulness (Glynn & Webster, 1993) and cognitive curiosity (Webster & Martocchio, 1992) correlated positively with intrinsic scores on both the primary and the secondary scales⁶ (see Table 7). These results provide some validation of the enjoyment (or fun) and challenge aspects of the intrinsic scales.

Data on perceptions of the environment are presented in Table 8. With adults, we found some tentative support for our predicted relationship between motivational orientation and perceptions of the work environment. The results suggest that intrinsically motivated adults may tend to be oriented toward aspects of the work environment that support intrinsic motivation, and extrinsically motivated adults may tend to be oriented

⁶ We are grateful to Mary Ann Glynn and Jane Webster for supplying these data.

Table 7
 Work Preference Inventory Correlations With Personality and Attitude Measures

Measure	Primary		Secondary			
	Intrinsic motivation (IM)	Extrinsic motivation (EM)	Challenge (IM)	Enjoyment (IM)	Outward (EM)	Compensation (EM)
Student samples						
Need for Cognition ($n = 207$)	.69****	-.27****	.71****	.49****	-.31****	-.13*
SII ($n = 55$)						
Academic Comfort	.23*	—	.25*	—	—	—
Realistic	.38****	-.34**	.38****	.28**	—	-.46****
Investigative	.32**	—	.38****	—	—	-.22*
Enterprising	—	—	—	—	.25*	—
Public Speaking	—	—	—	—	.29**	—
Law/Politics	—	—	.27**	—	.23*	—
MBTI ($n = 60$)						
I-E	—	.32*	—	—	.29**	.25*
N-S	—	.38**	—	—	.34***	.30**
F-T	—	.36**	—	—	.32**	.29**
P-J	—	.37**	—	—	.34***	.30**
Adult samples						
Playfulness Scale ($n = 547$)	.29***	-.09**	.19***	.29***	-.11***	-.04
Cognitive Playfulness ($n = 547$)	.21***	-.02	.19***	.18***	-.03	-.01

Note. Correlations with $p > .10$ are not printed (—). SII = Strong Interest Inventory; MBTI = Myers-Briggs Type Indicator, with the second pole of each dimension being scored in the positive direction. I-E = introverted-extraverted; N-S = intuitive-sensing; F-T = feeling-thinking; P-J = perceiving-judging.

* $p < .10$. ** $p < .05$. *** $p < .01$. **** $p < .001$.

toward aspects of the work environment that support extrinsic motivation.

The student classroom environment data roughly parallel the adult work environment data, but there are several inconsistencies. Overall, the data on perceptions of the environment only weakly support the hypothesis that intrinsically motivated individuals will be more attuned to intrinsically motivating aspects of their environments, and extrinsically motivated individuals will be more attuned to extrinsically motivating aspects. Of all the scales on all of the environment inventories used, there were relatively few significant correlations, and none of these were large in magnitude. It must be noted, however, that the instruments used (the WEI, WES, and CEI) are all intended as assessments of the environment—not as assessments of the individual respondents. It may be that most of the variance in responses on these instruments is accounted for by characteristics of the environment itself and not by characteristics of the perceivers.

Creativity

We predicted that creativity would be positively related to intrinsic motivation scores on the WPI and negatively related to extrinsic scores. This was borne out by several measures (see Table 9). Intrinsic scores were positively correlated with pencil-and-paper measures of creativity, including the KAI (Kirton, 1976) and the CPS (Gough, 1979). Extrinsic scores correlated negatively with KAI scores.

Correlations between WPI scores and behavioral creativity

measures were particularly encouraging. For our general student sample, on several writing measures and one artistic measure, Intrinsic scores correlated positively with creativity, and Extrinsic scores correlated negatively with creativity. Although many of these correlations were not statistically significant (because of small sample size), the overall pattern is quite consistent. Measures of real-world creativity in our artist samples yielded even stronger results. Not only did student artists' Intrinsic and Challenge scores correlate significantly with judge-rated creativity of the students' portfolios, but they also correlated with creativity ratings of the students made by their art instructors. Professional artists' creativity correlated positively with their Challenge scores and, interestingly, it also correlated positively with the artists' Outward scores. This latter result, if it can be replicated with other samples, may point to a modification of the theoretical links between creativity and motivational orientations.

Conclusions

Overall, this initial work on the WPI demonstrates that the instrument does assess stable motivational orientations in individuals. Most of the WPI scales appear to be cohesive, including both cognitive and affective elements. Moreover, the different WPI orientations are quite separable; much of our data suggests that intrinsic and extrinsic motivation are distinct processes. Harter (1981) has suggested the possible additivity of intrinsic and extrinsic motivation for school children and has speculated

Table 8
Work Preference Inventory Correlations With Perceptions of Environment

Measure	Primary		Secondary			
	Intrinsic motivation (IM)	Extrinsic motivation (EM)	Challenge (IM)	Enjoyment (IM)	Outward (EM)	Compensation (EM)
Adult samples						
WEI ^a						
Freedom						
Current ^a	—	-.23****	.15***	—	-.25****	—
Ideal ^a	.18*	-.26**	.30***	—	-.19*	-.22**
Challenge						
Current	.13**	—	—	.14***	—	—
Ideal	—	—	.19*	—	—	—
Resources						
Current	—	—	—	—	—	.12**
Ideal	—	—	—	.21**	—	—
Supervisory encouragement	—	—	—	—	—	—
Workgroup supports	.13**	-.09*	.10*	.12**	-.15***	—
Organizational encouragement	.09*	—	—	.12**	—	—
Organizational impediments	.11**	—	.11**	—	—	—
Work pressure						
Current	.17***	-.10**	.12**	.16***	-.15***	—
Ideal	—	-.30***	—	—	-.29***	—
Creativity	.15***	—	.13**	.12**	-.15***	—
Productivity	.12**	—	—	.18****	—	—
WES (<i>n</i> = 59)						
Involvement	—	-.31**	—	—	-.40****	—
Innovation	—	-.22*	—	—	-.32**	—
Work pressure	—	—	—	—	—	-.24*
Peer cohesion	—	-.38***	—	—	-.35***	-.24*
Supervisor support	—	—	—	—	-.27**	—
Autonomy	—	-.31**	—	—	-.36***	—
Control	—	.33**	—	—	—	.43***
Student samples						
CEI (<i>n</i> = 97)						
Competition for grades	—	.22**	—	—	.20**	—
Peer support	—	.19*	—	—	—	—
Teacher support	—	—	—	—	—	.28***
Involvement	—	.20**	—	—	—	.19*

Note. Correlations with $p > .10$ are not printed (—). WEI = Work Environment Inventory; WES = Work Environment Scale; CEI = Classroom Environment Inventory.

^a All WEI correlations are for perceptions of current work environment ($n = 380$), except where significant correlations were found for perceptions of the ideal work environment for creativity ($n = 100$).

* $p < .10$. ** $p < .05$. *** $p < .01$. **** $p < .001$.

that such motivational combinations might lead to enhanced learning and performance. We can expect to see similar patterns in high-performing adults. Creative artists, for example, may be strongly intrinsically interested in the artistic problem before them and, at the same time, be strongly motivated to win the recognition of their peers and the public. One type of motivation does not necessarily undermine the other. This is, in fact, the pattern of correlations we saw between WPI scores and creativity in our professional artist sample. We have seen similar patterns in three separate instances: in our experimental studies, where we presented subjects with uncontracted-for reward (Amabile, Hennessey, & Grossman, 1986); in our experimental studies, where we trained children to focus on their own intrinsic motives (Hennessey, Amabile, & Martinage, 1989; Hennes-

sey & Zbikowski, 1993); and in our WPI studies, where we have found that students who pursue complex problem-solving activities exhibit high levels of both intrinsic and extrinsic motivation.

We find it particularly interesting that the WPI apparently assesses an aspect of extrinsic motivation that is relatively unrelated to an individual's causality orientation. Students' Compensation scores were only modestly correlated with Deci and Ryan's (1985b) control orientation and were unrelated to the autonomy orientation or the impersonal orientation. As Deci and Ryan (1985a) have suggested, external compensation will only sometimes be interpreted as controlling. Indeed, some highly autonomous individuals, while retaining high levels of intrinsic motivation toward their work, might also be highly

Table 9
Work Preference Inventory Correlations With Creativity

Measure	Primary		Secondary			
	Intrinsic motivation (IM)	Extrinsic motivation (EM)	Challenge (IM)	Enjoyment (IM)	Outward (EM)	Compensation (EM)
Student samples						
KAI (n = 284)	.38****	-.39****	.34****	.29****	-.37****	-.25****
CPS (n = 35)	.25	-.15	-.01	.37**	-.14	-.10
Prose						
Sample 1 (n = 81)	.29***	-.18	.10	.25*	-.07	-.22*
Sample 2 (n = 67)	.45***	-.15	.30*	.42***	-.06	-.21
Sample 3 (n = 108)	.29***	-.18*	.30***	.22**	-.07	-.23**
Sample 4 (n = 29)	.12	-.30*	.11	.12	-.23	-.31*
Sample 5 (n = 95)	.31***	-.23**	.29***	.20**	-.32****	.01
Collage (n = 40)	.45***	-.15	.30*	.42***	-.05	-.21
Standardized product creativity (n = 450)	.18****	-.19***	.12**	.18****	-.13***	-.20****
Judge-rated creativity (n = 29 student artists)	.58****	-.07	.58****	.40**	-.20	.14
Instructor-rated creativity (n = 18 student artists)	.59***	-.33	.68***	.32	-.39	-.04
Adult samples						
KAI (n = 268)	.41****	-.18***	.55****	.18****	-.21***	-.02
Judge-rated creativity (n = 23 professional artists)	.23	.26	.40**	-.02	.32	.12

Note. KAI = Kirton Adaptation-Innovation Inventory; CPS = Creative Personality Scale.
* p < .10. ** p < .05. *** p < .01. **** p < .001.

motivated to achieve compensation for that work. The poet Anne Sexton, in a letter to her agent, once remarked, "I am in love with money, so don't be mistaken. But first I want to write good poems" (Sexton & Ames, 1977).

Future Research

We have made several suggestions about directions for future research, primarily focused on enhancing the internal reliabilities of the adult scales, resolving some puzzling findings we obtained, and working with larger samples to test the reliability of some suggestive—but not statistically significant—results. At a more general level, however, we believe that future research should be oriented toward gathering more behavioral data, both to continue the validation of the WPI and to contribute to theories of human motivation and performance. On the basis of the theories of motivation reviewed earlier, we can make several predictions about such research. For example, compared with students who score low on Intrinsic Motivation, students who score high should be more likely to voluntarily undertake challenging courses and course assignments; enroll in courses that will allow them autonomy; choose professions that will allow them active, self-reliant involvement in their work; continue their educations (formally or informally) beyond college; become more deeply involved in the activities they undertake; perform more creatively in their work after college; evidence more curiosity toward new or unusual

things; and express higher levels of positive affect when engaged in complex, challenging activities. Compared with students who score low on Outward orientation, those who score high should be more likely to seek guidance from others and enroll voluntarily in courses with well-defined structures and procedures. Compared with students who score low on Compensation orientation, students who score high should be less likely to enroll in courses that offer only pass-fail grades, more likely to seek information about grading, more likely to accurately remember the grades they have received, and more likely to complain about low grades they are given. Similar predictions can be made for adults. For example, those who score higher on Compensation orientation should be more likely to seek jobs and promotions that increase their salary, more likely to accurately remember the various salaries they have received, more likely to ask for salary increases, and more likely to complain about inadequate raises.

Potential Uses

The WPI was developed primarily as a research tool, and that is the area where we see the greatest potential utility in the near future. The WPI should be useful for research on intrinsic motivation, extrinsic motivation, and motivation in general. In this capacity, it may serve the development of theories of motivation as well as theories of creativity and other qualitative aspects of

performance. It may also be useful in integrating concepts of motivational orientation into more general personality theories.

Although the WPI scales are most properly viewed as continuous variables, it is possible to consider the broad types of individuals along these personality constructs. Most simply, individuals could be divided into four types: dually motivated, intrinsically motivated, extrinsically motivated, and unmotivated. Theoretically interesting possibilities arise, particularly when we consider dually motivated individuals. Unlike people who are primarily intrinsically or primarily extrinsically motivated, those strongly motivated by both should experience synergistic effects on performance and satisfaction when working on tasks where both types of motivators are salient. On the other hand, dually motivated individuals might be the only ones to experience conflict when faced with a choice between a strongly intrinsically motivated activity and a strongly extrinsically motivated one. Thus, motivational orientation identification with the WPI might help to illuminate some of the motivational boosts and conflicts that people experience in their work.

Because of its ability to assess stable motivational orientations, the WPI may prove useful in predicting a wide range of attitudes and behaviors, including the choices students make in their college educations, the choices adults make in their career moves, and the reactions that both students and adults have to various environmental events. If this proves true, it may eventually be possible to use WPI scores to aid in the placement of students in courses and the placement of employees in job assignments, as well as the counseling of students and employees in the choices they must make. To the extent that significant life course decisions depend on understanding individual motivational orientations, any tools that clarify that understanding can make an important contribution.

References

- Amabile, T. M. (1979). Effects of external evaluation on artistic creativity. *Journal of Personality and Social Psychology, 37*, 221-233.
- Amabile, T. M. (1982a). Children's artistic creativity: Detrimental effects of competition in a field setting. *Personality and Social Psychology Bulletin, 8*, 573-578.
- Amabile, T. M. (1982b). Social psychology of creativity: A consensual assessment technique. *Journal of Personality and Social Psychology, 43*, 997-1013.
- Amabile, T. M. (1983a). Social psychology of creativity: A componential conceptualization. *Journal of Personality and Social Psychology, 45*, 357-377.
- Amabile, T. M. (1983b). *The social psychology of creativity*. New York: Springer-Verlag.
- Amabile, T. M. (1985). Motivation and creativity: Effects of motivational orientation on creative writers. *Journal of Personality and Social Psychology, 48*, 393-399.
- Amabile, T. M. (1987a). The motivation to be creative. In S. Isaksen (Ed.), *Frontiers in creativity: Beyond the basics* (pp. 223-254). Buffalo, NY: Bearly Limited.
- Amabile, T. M. (1987b). *The Work Preference Inventory*. Unpublished instrument, Brandeis University, Waltham, MA.
- Amabile, T. M. (1987c). *Work Environment Inventory*. Unpublished instrument, Brandeis University and Center for Creative Leadership, Waltham, MA.
- Amabile, T. M. (1988). A model of creativity and innovation in organizations. In B. M. Staw & L. L. Cummings (Eds.), *Research in organizational behavior* (Vol. 10, pp. 123-167). Greenwich, CT: JAI Press.
- Amabile, T. M. (1989a). *Growing up creative: Nurturing a lifetime of creativity*. New York: Crown.
- Amabile, T. M. (1989b). *The Student Interest and Experience Questionnaire*. Unpublished instrument, Brandeis University, Waltham, MA.
- Amabile, T. M. (1990). Within you, without you: The social psychology of creativity, and beyond. In M. A. Runco & R. S. Albert (Eds.), *Theories of creativity* (pp. 61-91). Newbury Park, CA: Sage.
- Amabile, T. M., DeJong, W., & Lepper, M. (1976). Effects of externally imposed deadlines on subsequent intrinsic motivation. *Journal of Personality and Social Psychology, 34*, 92-98.
- Amabile, T. M., & Gitomer, J. (1984). Children's artistic creativity: Effects of choice in task materials. *Personality and Social Psychology Bulletin, 10*, 209-215.
- Amabile, T. M., Goldfarb, P., & Brackfield, S. (1990). Social influences on creativity: Evaluation, coercion, and surveillance. *Creativity Research Journal, 3*, 6-21.
- Amabile, T. M., & Gryskiewicz, N. (1989). The Creative Environment Scales: Work Environment Inventory. *Creativity Research Journal, 2*, 231-253.
- Amabile, T. M., Hennessey, B., & Grossman, B. (1986). Social influences on creativity: The effects of contracted-for reward. *Journal of Personality and Social Psychology, 50*, 14-23.
- Bahrick, H., Fitts, P., & Rankin, R. (1952). Effects of incentive upon reactions to peripheral stimuli. *Journal of Experimental Psychology, 44*, 400-406.
- Bartis, S., Szymanski, K., & Harkins, S. (1988). Evaluation of performance: A two-edged knife. *Personality and Social Psychology Bulletin, 14*, 242-251.
- Bem, D. J. (1967). Self-perception: An alternative interpretation of cognitive dissonance phenomena. *Psychological Review, 74*, 183-200.
- Bem, D. (1972). Self-perception theory. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 6, pp. 1-62). San Diego, CA: Academic Press.
- Bentler, P. M., & Bonett, D. G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. *Psychological Bulletin, 88*, 588-606.
- Berlyne, D. (1971). *Aesthetics and psychobiology*. New York: Appleton-Century-Crofts.
- Bollen, K. (1989). *Structural equations with latent variables*. New York: Wiley.
- Cacioppo, J. T., & Petty, R. E. (1982). The need for cognition. *Journal of Personality and Social Psychology, 42*, 116-131.
- Calder, B., & Staw, B. (1975). Self-perception of intrinsic and extrinsic motivation. *Journal of Personality and Social Psychology, 31*, 599-605.
- Crowne, D. P., & Marlowe, D. (1964). *The approval motive*. New York: Wiley.
- Csikszentmihalyi, M. (1975). *Beyond boredom and anxiety*. San Francisco: Jossey-Bass.
- Csikszentmihalyi, M. (1978). Attention and the holistic approach to behavior. In K. S. Pope & J. L. Singer (Eds.), *The stream of consciousness* (pp. 335-358). New York: Plenum Press.
- deCharms, R. (1968). *Personal causation: The internal affective determinants of behavior*. San Diego, CA: Academic Press.
- deCharms, R. (1976). *Enhancing motivation: Change in the classroom*. New York: Irvington.
- Deci, E. L. (1971). Effects of externally mediated rewards on intrinsic motivation. *Journal of Personality and Social Psychology, 18*, 105-115.
- Deci, E. L., & Ryan, R. (1985a). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum Press.
- Deci, E. L., & Ryan, R. M. (1985b). The General Causality Orientations Scale: Self-determination in personality. *Journal of Research in Personality, 19*, 109-134.

- Garbarino, J. (1975). The impact of anticipated reward upon cross-age tutoring. *Journal of Personality and Social Psychology*, 32, 421-428.
- Glucksberg, S. (1962). The influence of strength of drive on functional fixedness and perceptual recognition. *Journal of Experimental Psychology*, 63, 36-41.
- Glynn, M. A., & Webster, J. (1992). The adult playfulness scale: An initial assessment. *Psychological Reports*, 71, 83-103.
- Glynn, M. A., & Webster, J. (1993). Refining the nomological network of the Adult Playfulness Scale: Personality, motivational, and attitudinal correlates for highly intelligent adults. *Psychological Reports*, 72, 1023-1026.
- Going for the gaps [Interview with A. Schawlow]. (1982, Fall). *Stanford Magazine*, p. 42.
- Gough, H. G. (1979). A creative personality scale for the Adjective Check List. *Journal of Personality and Social Psychology*, 37, 1398-1405.
- Hansen, J. C., & Campbell, D. P. (1985). *The Strong Manual*. Palo Alto, CA: Consulting Psychologists Press.
- Harlow, H., Harlow, M., & Meyer, D. (1950). Learning motivated by a manipulation drive. *Journal of Experimental Psychology*, 40, 228-234.
- Harter, S. (1981). A new self-report scale of intrinsic versus extrinsic orientation in the classroom: Motivational and informational components. *Developmental Psychology*, 17, 300-312.
- Hennessey, B. A., & Amabile, T. M. (in press). Product creativity: The consensual assessment technique. *Journal of the American Creativity Association*.
- Hennessey, B. A., Amabile, T. M., & Martinage, M. (1989). Immunizing children against the negative effects of reward. *Contemporary Educational Psychology*, 14, 212-227.
- Hennessey, B. A., & Zbikowski, S. M. (1993). Immunizing children against the negative effects of reward: A further examination of intrinsic motivation training techniques. *Creativity Research Journal*, 6, 297-308.
- Hill, K. (1991). *An ecological approach to creativity and motivation: Trait and environment influences in the college classroom*. Unpublished doctoral dissertation, Brandeis University.
- Hogan, R., & Cheek, J. M. (1983). Identity, authenticity, and maturity. In T. R. Sarbin & K. E. Scheibe (Eds.), *Studies in social identity* (pp. 339-357). New York: Praeger.
- Hughes, T., & McCullough, F. (Eds.). (1982). *The journals of Sylvia Plath*. New York: Dial.
- Hunt, J. (1965). Intrinsic motivation and its role in psychological development. In D. Levine (Ed.), *Nebraska Symposium on Motivation* (Vol. 13, pp. 189-282). Lincoln: University of Nebraska Press.
- Izard, C. (1977). *Human emotions*. New York: Plenum Press.
- Jöreskog, K. G., & Sörbom, D. (1986). *LISREL VI user's guide: Analysis of linear structural relationships by maximum likelihood, instrumental variables, and least squares methods*. Mooresville, IN: Scientific Software.
- Kirton, M. (1976). Adaptors and innovators: A description and measure. *Journal of Applied Psychology*, 61, 622-629.
- Koestner, R., Ryan, R., Bernieri, F., & Holt, K. (1984). Setting limits on children's behavior: The differential effects of controlling vs. informational styles on intrinsic motivation and creativity. *Journal of Personality*, 52, 233-248.
- Kruglanski, A. (1975). Endogenous attribution and intrinsic motivation. In M. Lepper & D. Greene (Eds.), *The hidden costs of reward* (pp. 85-108). Hillsdale, NJ: Erlbaum.
- Kruglanski, A., Friedman, I., & Zeevi, G. (1971). The effects of extrinsic incentive on some qualitative aspects of task performance. *Journal of Personality*, 39, 606-617.
- Lepper, M., & Greene, D. (1978). Overjustification research and beyond: Toward a means-ends analysis of intrinsic and extrinsic motivation. In M. Lepper & D. Greene (Eds.), *The hidden costs of reward* (pp. 109-148). Hillsdale, NJ: Erlbaum.
- Lepper, M., Greene, D., & Nisbett, R. (1973). Undermining children's intrinsic interest with extrinsic rewards: A test of the "overjustification" hypothesis. *Journal of Personality and Social Psychology*, 28, 129-137.
- Lim, R., & Carnevale, P. (1990). Contingencies in the mediation of disputes. *Journal of Personality and Social Psychology*, 58, 259-272.
- McCullers, J. C., & Martin, J. A. G. (1971). A reexamination of the role of incentive in children's discrimination learning. *Child Development*, 42, 827-837.
- McGraw, K., & McCullers, J. (1979). Evidence of a detrimental effect of extrinsic incentives on breaking a mental set. *Journal of Experimental Social Psychology*, 15, 285-294.
- Montgomery, K. (1954). The role of exploratory drive in learning. *Journal of Comparative and Physiological Psychology*, 47, 60-64.
- Moos, R. (1986). *Work Environment Scale manual* (2nd ed.). Palo Alto, CA: Consulting Psychologists Press.
- Myers, I. B. (1962). *The Myers-Briggs Type Indicator*. Palo Alto, CA: Consulting Psychologists Press.
- Myers, I. B., & McCaulley, M. H. (1988). *Manual: A guide to the development and use of the Myers-Briggs Type Indicator*. Palo Alto, CA: Consulting Psychologists Press.
- Pretty, G., & Seligman, C. (1983). Affect and the overjustification effect. *Journal of Personality and Social Psychology*, 46, 1241-1253.
- Reeve, J., Cole, S., & Olson, B. (1986). Adding excitement to intrinsic motivation research. *Journal of Social Behavior and Personality*, 1, 349-363.
- Sexton, L. G., & Ames, L. (1977). *Anne Sexton: A self-portrait in letters*. Boston: Houghton-Mifflin.
- Snyder, M. (1974). Self-monitoring of expressive behavior. *Journal of Personality and Social Psychology*, 30, 526-537.
- Snyder, M. (1979). Self-monitoring processes. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 12, pp. 85-128). San Diego, CA: Academic Press.
- Strong, E. K., Hansen, J. C., & Campbell, D. P. (1985). *Strong Interest Inventory*. Palo Alto, CA: Consulting Psychologists Press.
- Trickett, E., & Moos, R. (1973). The social environment of junior high and high school classrooms. *Journal of Educational Psychology*, 65, 93-102.
- Vallerand, R., & Richer, R. (1988). On the use of the Causal Dimension Scale in a field setting: A test with confirmatory factor analysis in success and failure situations. *Journal of Personality and Social Psychology*, 54, 704-712.
- Webster, J., & Martocchio, J. J. (1992). Microcomputer playfulness: Development of a measure with workplace implications. *MIS Quarterly*, 16, 201-226.
- White, R. (1959). Motivation reconsidered: The concept of competence. *Psychological Review*, 66, 297-323.
- Zimbardo, P. (1990). *The Stanford Time Inventory*. Unpublished instrument, Stanford, CA: Stanford University.

Received February 8, 1993

Revision received October 26, 1993

Accepted November 3, 1993 ■