Are Gifted Girls Motivationally Disadvantaged? Review, Reflection, and Redirection

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Over the past 2 decades, much research on gifted girls has revolved around the issue of whether they, compared to gifted boys, are motivationally disadvantaged in achievement settings. While research and anecdotal evidence seems to support this hypothesis, most recent educational statistics show the closing of the gender gap. In this article, the literature is reviewed and critiqued as to the existence of alleged gender differences, as well as task and social conditions, and putative internal motivational processes that potentially explain these differences. Then, several possible explanations for the apparently conflicting evidence are discussed, and a feminist critique of the gender-differences research and inherent biases and hidden assumptions is presented. In light of emergent evidence and new insights, several research strategies are suggested that can potentially address and redress some of the problems in research efforts to understand what are the motivational issues concerning gifted girls and how to help them achieve their potential in their educational and career development.

Amongst the half-human progenitors of man, and amongst savages, there have been struggles between the males during many generations for the possession of the females. But mere bodily strength and size would do little for victory, unless associated with courage, perseverance, and determined energy.... These various faculties will thus have been continually put to the test and selected during manhood; they will, moreover, have been strengthened by use during this same period of life.

—Charles Darwin (The Descent of Man and Selection in Relation to Sex, 1896/1972, p. 564)

[T]here was an enormous body of masculine opinion to the effect that nothing could be expected of women intellectually. Even if her father did not read out loud these opinions, any girl could read them for herself; and the reading, even in the nineteenth century, must have lowered her vitality, and told profoundly upon her work. There would always have been that

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Journal for the Education of the Gifted. Vol. 25, No. 4, 2002, pp. 315-358. Copyright ©2002 The Association for the Gifted, Reston, VA 20191-1589.

assertion—you cannot do this, you are incapable of doing that—to protest against, to overcome.

-Virginia Woolf (A Room of One's Own, 1929/1989, p. 54)

Rather than viewing her anatomy as destined to leave her with a scar of inferiority (Freud, 1931), one can see instead how it gives rise to experiences which illuminate a reality common to both of the sexes: the fact that in life you never see it all, that things unseen undergo change through time, that there is more than one path to gratification, and that the boundaries between self and other are less clear than they sometimes seem.

—Carol Gilligan (In a Different Voice, 1982, p. 172)

Introduction: Why Gifted Girls?

Are gifted girls motivationally disadvantaged? Before answering this question, some clarifications as to the meanings of the term disadvantaged seem in order. It can connote some fundamentally biological differences, as suggested by Darwin in the above quote. On the other hand, one can also argue that such a disadvantage, if it exists at all, should be understood in the context of the existing gender disparity in terms of power differential, gender-related biases (even prejudice), and gender-role expectations, as hinted in Woolf's comments. In this article, the term is used more descriptively to refer to any situation where gifted girls as a group compare unfavorably with gifted boys in achievement motivation as demonstrated in real life or experimental conditions. The question, then, is why do we make the assumption in the first place?

The issue of whether gifted girls are particularly prone to motivational problems that hamper the further development of their potential was brought up in 1980s by Eccles (1985) and Dweck (1986), two prominent American scholars in developmental psychology and motivation. Both expressed their concern over potential roadblocks, particularly internal ones, that lie ahead in gifted girls' educational and career development. These concerns parallel those of scholars in gifted education (e.g., Callahan, 1979; Kerr, 1985; Reis, 1998; Reis & Callahan, 1989, 1996). Callahan (1979) remarked 20-some years ago that "girls earn higher grades in school, yet men write more books, earn more degrees, produce more works of art, and make more contributions in all professional fields" (p. 402). The focus has been on gifted adolescent girls, because they are assumed to be particularly vulnerable in their social-emotional and academic development. The onset of puberty

and heightened self-consciousness, the emergence of peer culture, and presumably intensified gender-role stereotypes and expectations all conspire to put gifted girls at a disadvantage in their short-term and long-term achievement strivings. In folk beliefs, as well as in the mindset of many researchers, adolescent girls in general, and gifted girls in particular, are often thought to have vulnerable self-concepts and self-esteem and decreased educational and career aspirations, despite the fact they earn higher grades and are liked by teachers more than boys in school. Thus, the question was raised more or less in a developmental context, with potential biological as well as social-contextual explanations.

Legitimate and well intentioned as they may be, these concerns need to be put in a historical perspective. As Kerr (1997) put it nicely, our subjects, female populations, are changing right before our eyes. The target we are observing is moving; in fact, it is moving so fast that one can easily miss the target entirely, let alone lose the focus! There has been a drastic change in women's socioeconomic conditions, educational attainment, and creative contributions to the society in this country in the last three decades or so. With this historical change in mind, I organized this article into three parts. I first review the relevant research during this period. I then reflect on our assumptions in light of the changing landscape of the society and emergent evidence. And, finally, I suggest some directions and guidelines for future research.

Literature Review: A Social-Cognitive Lens

This review is organized with the aim of demonstrating both the conceptual and the methodological aspects of the inquiry. Table 1 presents a summary of the three theoretical perspectives and their conceptual and methodological ramifications in empirical inquiry.

The summary of conceptual frameworks and research paradigms presented in Table 1 can be seen as a scheme used by researchers to map out research designs on gender-related issues. At the descriptive level, one hypothesizes differential motivational responses and behaviors (effort, persistence, response to success or failure feedback, the need for achievement, etc.) by males and females in some real or simulated conditions. At a more inferential and explanatory level, one taps into certain internal processes (such as self-efficacy or causal attribution) that purportedly contribute to these differences. One can further vary task and social conditions to see whether differential responses and self-appraisals are sensi-

A Summary of Three Theoretical Perspectives and Related Empirical Observations

	Dispositional	·	Situational
The empirical		Differential Responses • efficacy/attributions/affect • the valence of stimuli Task Conditions • advanced, challenging • novelty/uncertainty • sex-typed domains or tasks Social Conditions • social-evaluative pressure • reference/comparison group	
The theoretical		Biological-Evolutionary • sexual selection pressure • innate behavioral tendencies Cognitive Developmental • internalization • gender identity Social Cognitive • enactive/vicarious learning • gender-based self-regulation • gender bifurcation in the culture • social feedback	
A	Distal Causes	Proximal	Causes

tive to these conditions. As these differences in responses become more constrained by situations, our theoretical propositions become more circumscribed and refined.

From a theoretical point of view, findings of dispositional nature (i.e., responses holding across situations) are more amenable to distal biological explanations, while findings of a situational nature lend themselves more readily to proximal social-contextual explanations. However, by placing self-efficacy and self-concept at the center of this review and highlighting the importance of social contexts, I am using a social-cognitive perspective (Dai, Moon, & Feldhusen, 1998), though competing models and explanations also exist (see Bussey & Bandura, 1999, for a review).1

Task Choice, Affect, Persistence, and Concerns About Success and Failure

Dweck (1986; Dweck & Leggett, 1988) observed in a series of experiments that girls are more likely to react to failure (setback) conditions in a maladaptive manner, being more upset, readily questioning one's own adequacy (e.g., inferring low ability), giving up prematurely. As an apparent attempt to prevent failure, they tend to choose easy tasks over challenging ones (e.g., Leggett, 1985, cited in Dweck & Leggett, 1988). Dweck described this behavioral syndrome as indicative of a maladaptive-helpless motivational pattern, in contrast to an adaptive-mastery pattern characterized by a focus on mastery and improvement, beliefs that effort can improve performance and ability, and persistence in the face of difficulties and setbacks.

Although her research focus has not been on the high end of the ability or achievement spectrum, several empirical observations have led Dweck (1999) to make the speculation that gifted girls may be especially vulnerable to the maladaptive syndrome. In one study (Licht & Dweck, 1984), a significant positive correlation was found for boys between their self-ratings of "smartness" and mastery in a confusion, but not nonconfusion, condition (inserting confusing, irrelevant materials in the initial sections of what is to be learned). For girls, however, only in the nonconfusion condition was there a positive correlation (r = .47); in fact, there was a negative correlation between their self-ratings of smartness and mastery (r = -.38) in the confusion condition. In another study (Licht & Shapiro, 1982), participants were categorized, based on achievement, as A, B, C, D students. The top-achieving boys ("A" students) showed the most mastery-oriented responses, while the top-achieving girls showed the most maladaptive pattern in a concept-formation task.

What does research say about identified gifted children? Roberts and Lovett (1994) found that academically gifted students, compared to unidentified high-achieving and average students, displayed more negative affective and physiological reactions to experimentally induced failure. No gender difference, however, was reported, possibly due to the small sample size (another study by Bogie & Buckhalt, 1987, did not report gender differences, either). Shucard and Hillman (1990) found that failure feedback reduced gifted girls', but not gifted boys', self-efficacy, but only under competitive conditions. Using a self-report measure of task persistence le.g., a negative item: "I easily get frustrated when I encounter some hard math and science problems"), Dai (2000) found a gender difference in favor of gifted adolescent boys (effect size d = .49). Also, supporting Dweck's theory, a performance goal (or ego) orientation was found to be associated with lacking persistence and choosing easy tasks that would ensure their success. But this relationship was particularly strong among gifted girls.

Unfortunately, there has been a paucity of research on intellectual risk taking (i.e., trying something new and difficult, not afraid of failure) among gifted children, let alone on gender differences in that regard. With scarce evidence, it is inconclusive, to say the least, as to whether gifted girls are motivationally disadvantaged in terms of manifested achievement behaviors. However, researchers have also proposed and investigated many constructs of a social-cognitive nature that purportedly constitute internal mechanisms or processes that lead to observed gender differences. They mainly involve gender-related self-concept and self-efficacy. In the following section, I examine evidence related to these internal mechanisms and their development.

Self-Beliefs and Self-Appraisals as Antecedents to Gender Differences in Motivation

Gender Identity and Fear of Success. Horner (1972) was probably the first person to deal head-on with the motivational problems facing gifted girls and women. The prevailing opinion in the mid-20th century, she felt, was that mastering intellectual problems, attacking difficulties, and competing with others were masculine qualities, incompatible with femininity. According to this view, women, particularly those who aspire to and are capable of achieving success in intellectual endeavors, are prone to anxiety about the negative consequences of success, such as feeling unfeminine and socially rejected. She coined the phrase fear of success to describe

such a state of anxiety that inhibits achievement aspirations. Using verbal cues of a successful woman (e.g., "After first-term finals, Anne finds herself at the top of medical school class"), she was able to demonstrate that young women are more likely to project imagery of negative consequences, whereas similar scenarios of a successful man tended to yield positive imagery among men (Horner). Although later empirical evidence portrays a more complex picture (e.g., Fogel & Paludi, 1984), Horner's theory points to a source of gender differences in achievement motivation that is not an inherent female deficit, such as lack of drive or the need for achievement, as Darwin (1896/1972) suggested; rather, it has to do with cognitively generated anxiety within a specific social context, a female psyche that has more to do with women's social position than with biology.

Most research on gender identity has used self-report instruments that purportedly measure two dimensions of gender identity: masculinity and femininity. Self-report measures are likely to contain two components, one reflecting a more or less natural inclination, the other a social desirability bias, that is, the prevailing view of what are desirable qualities for a woman or man in the society. Recent studies reveal more diversity regarding gifted girls' gender identity than Horner (1972) suggested three decades ago. A recent study (Mendez, 2000), using the Personal Attribute Questionnaire (PAC; Spence & Helmreich, 1978), found that gifted adolescent girls (ages 11-14) scored higher, on average, than other girls of comparable ages on the "instrumental" scale. Namely, they were more likely to endorse such adjectives as independent, active, competitive, and self-confident, which are typically perceived as masculine qualities (Spence, 1993). They were also more likely to be identified as androgynous. In another study using the same instrument, large variations were found in a group of adolescent gifted girls as to whether they identified with instrumental or expressive qualities (Hollinger & Fleming, 1988). Taken together, these findings may reflect the fact that the society has been more diverse and tolerant with respect to the desirability of traditional gender roles since Horner wrote about "fear of success." For example, using a case study approach, Callahan, Cunningham, and Plucker (1994) found that some parents encouraged independence in girls. However, they also found a tendency for teachers to value conformity in bright girls more than anything else in high school.

Self-Efficacy. Since motivational problems facing girls are mainly in math and science areas, more recent research has been focused

on self-efficacy in math and science as antecedents of gender differences in motivation and achievement. Self-efficacy refers to a situation-specific self-appraisal of competence for performing a specific task (Bandura, 1986). Its impact on effort expenditure, persistence, and interest, as well as levels of aspirations and long-term and short-term goals in educational and vocational development, has been well documented (see Multon, Brown, & Lent, 1991, for a meta-analysis; see also Bandura, 1997; Schunk, 1991). Numerous studies conducted to date have consistently found that boys tend to have higher self-efficacy and expectancy beliefs than girls about their performance in math and science (Eccles, Adler, & Meece, 1984; Meece, Parsons, Kaczala, Goff, & Futterman, 1982; Pajares, 1996a, 1996b), even though their performance does not warrant such differential appraisals. This pattern seems to hold across ability levels, including high-ability students (Dai et al., 1998).

Junge and Dretzke (1995) used the Mathematics Self-Efficacy Scale (MSES) developed by Betz and Hackett (1983) to assess related gender differences among gifted high school students. All seven math problems resulted in statistically significant differences in favor of boys, although Junge and Dretzke cautioned that the mean ratings of both boys and girls were relatively high. Ewers and Wood (1993) tested the effects of gender and ability on math self-efficacy and performance by including both gifted and average-ability fifthgrade students. They found that, regardless of ability level, boys tended to display higher confidence than girls. Gifted children had more accurate expectations of success than average-ability students, and they also tended to underestimate their chance of solving a particular problem (i.e., underconfidence). No gender-by-ability interaction was found in their study, suggesting that gender differences found in high-ability students simply reflect those existing in the general population. Pajares (1996a), on the other hand, found that gifted girls were the most underconfident (i.e., express uncertainty when their answer was, in fact, correct), while all the other groups were biased toward overconfidence (expressed high confidence when the answer was wrong). This finding echoes a study decades ago (Crandall, Dewey, Katkovsky, & Preston, 1960) that found that, when children were asked how well they could perform a new task, the correlation between IQ and expectation of success was positive for boys (r = .62) and negative for girls (r = .41). It is also consistent with findings discussed earlier (Licht & Dweck, 1984; Licht & Shapiro, 1982). Clearly, the pattern found for gifted girls does not indicate fear of success (Horner, 1972), rather, it seems to implicate fear of failure (Dweck, 1986, 1999).

Although evidence is not all consistent, it is safe to say that gifted girls' self-efficacy in math seems unduly low, if not lower than other girls. What led to such outcomes? One primary source of self-efficacy is direct (enactive) experience. One hypothesis is that mathematics, particularly at the secondary level, may introduce too much novelty, too frequently, for those bright girls who have been used to successes and rewards in a familiar, structured learning environment (Dweck, 1986, 1999).

Another source of self-efficacy appraisals is the existence of prevailing gender stereotypes regarding math. For example, Junge and Dretzke (1995) found that self-efficacy of gifted girls was the weakest with respect to math-related college coursework (e.g., computer science) and the strongest with respect to traditionally female activities (e.g., grocery shopping).

It is possible that these self-efficacy appraisals may be overshadowed by conventional gender schemas they have internalized over time. Supporting such an argument, Beyer and Bowden (1997) found that, on a masculine task (sports trivia), female college students significantly underestimated their overall performance, showed poorer calibration for individual questions, and had a more conservative response bias (i.e., they erred more toward underpredicting performance than overpredicting) than their male counterparts. Since none of these differences was found on feminine (show business trivia) and gender-neutral (common knowledge) tasks, self-efficacy judgment is not merely a reflection of general self-confidence level or disposition, but is influenced by gender schemas. Still another source of self-efficacy is the availability of role models and encouragement from significant others. Zeldin and Pajares (2000) interviewed 15 women with careers in math, science, or technology. Ten of the 15 women provided examples of individuals in their family who either had math-related careers or modeled mathrelated skills and motivation on a regular basis. Taken together, the self-efficacy research seems to suggest that gender differences exist among the gifted population, but these differences are domain specific and their origins multifaceted.

Causal Attributions and Ability/Effort Beliefs. One's self-efficacy appraisals can be influenced by causal attributions and whether success and failure are perceived as controllable by the self and changeable by effort. One possible reason why girls tend to have lower self-efficacy in math is that they may be influenced by the notion that, while one can do reasonably well in English with effort, it takes more ability to do well in math. Eccles and her col-

leagues' work (e.g., Eccles et al., 1984) provided some evidence for the impact of subject domains on attributional processes. If gifted girls are biased toward an ability attribution after failure in math performance, then they will naturally experience low self-efficacy when encountering difficulties. There is evidence suggesting that gifted girls do have such an attributional bias. Cramer and Oshima (1992), for example, found that, when presented with a failure scenario in math performance, there was a dramatic difference between gifted boys, who gravitated toward effort attributions, and gifted girls, who overwhelmingly inferred low ability. However, this was true only for ninth-grade gifted students, but not for third or sixth graders and not for ninth-grade average-ability students (Cramer & Oshima).

There is also some evidence that some gifted girls also sex-type math as a male domain. Using an ethnographic approach with a group of early adolescent girls, Kramer (1991) found that gifted girls in her study believed that boys had the ability and girls simply worked hard in math and science. Kramer also identified sources of social persuasion (parents and teachers) as an important contributing factor, which is consistent with the literature (Eccles, Adler, & Kaczala, 1982). For example, mothers of daughters were less likely to attribute their success to ability than mothers of sons (Yee & Eccles, 1988). Parents' or teachers' perceptions of their children or students' math ability were biased in favor of boys, regardless of actual achievement (Dai, in press; Frome & Eccles, 1998; Jussim & Eccles, 1992). Although evidence is too thin to afford any broad generalization about gifted girls, potential social contexts may underlie observed gender differences in achievement-related attributions.

Dweck (1999) proposed a more general explanation of apparent attributional biases demonstrated by some gifted girls. According to her theory, bright girls tend to be concerned about their intelligence and subscribe to an entity theory of intelligence, that is, seeing basic ability as fixed. However, empirical evidence seems to refute such a hypothesis. Adolescent girls across the board are more likely than boys to believe in the importance of effort and dedication and less likely to endorse the view that ability is fixed (Callahan et al., 1994; Schommer, 1993; Schommer, Calvert, Gariglietti, & Bajaj, 1997; Subotnik, 1988). In fact, gifted children, regardless of gender, tend to hold an incremental view of intelligence (Dai & Feldhusen, 1996; Feldhusen & Dai, 1997; Hsueh, 1997) and see effort and commitment as an important contributor to their success (see Dai et al., 1998, for a review). More controlled experiments have also failed to support the helplessness versus mastery model of gender differ-

ences in the general population (Eccles et al., 1984). The evidence seems to support a more domain-specific, rather than domain-general, account of self-perceptions and attributional biases. This argument is also supported by the self-concept research.

Self-Concept. Self-concept, compared to self-efficacy appraisal, represents a more reflective aspect of the self; it refers to one's self-perceptions and self-representations of personal strengths and weaknesses, personality, values, and other self-defining attributes, presumably represented in one's autobiographic memory. Self-concept often triggers arousal of achievement motives and intentions (Eccles et al., 1984) and exerts self-directive influences in terms of effort and task choice (Dai et al., 1998). Gender identity underlying fear of success (Horner, 1972) is also part of self-concept. But here the focus will be on self-perceptions of abilities.

As a group, gifted girls tend to have higher verbal self-concept and lower math and science self-concept than gifted boys (Dai, 2000; Eccles, Wigfield, Flanagan, Miller, Reuman, & Yee, 1989; Li & Adamson, 1995; Ziegler, Heller, & Broome, 1996). Besides ability attributions based on grades and test scores (Pyryt & Mendaglio, 1994) and social feedback from significant others (Harter, 1999), which have an impact on self-efficacy, as well, gender comparison. can also challenge gifted girls' math self-concept when they are placed in an intellectually and equally capable peer group (Marsh, Chessor, Craven, & Roche, 1995), particularly in light of the findings that gender differences in favor of boys in math performance are much more conspicuous at the high end of the achievement spectrum (Benbow & Stanley, 1980; Benbow & Wolins, 1996). In addition, even higher verbal self-concept presumably enjoyed by girls can become an unwitting accomplice and, in an internal comparison process (weighing one's relative strengths and weakness). depress girls' self-concept of math ability (Marsh, 1990).

Distinct patterns of gender differences in self-concept of ability, however, may emerge only when gender bifurcation is salient in social settings. For example, one study among Chinese adolescents (Dai, 2001) showed no gender differences in either math self-concept or math achievement in a gifted school in China. In fact, adolescent girls in this school had higher general academic self-concept than boys, which is at variance with most findings with North American samples of equivalent students (Pyryt & Richwein, 2000; but see Lewis & Knight, 2000). The fact that China has produced more female high achievers in math (e.g., medalists in the International Mathematical Olympiad) compared to other coun-

tries may be attributable to the less prevalent nature of gender stereotypes with respect to mathematical performance and ability (Stanley, 1990).

Developmental Trajectories. In order to show that motivational characteristics, such as fear of success or fear of failure, are not inherent attributes of gifted girls, but emergent properties as a result of their unique experiences, one has to provide empirical evidence that these gender differences, if any, have a tractable developmental history, that is, they are developmental in nature. In a meta-analysis of gender differences in risk taking, Byrnes, Miller, and Schafer (1999) found that adolescent girls are much less likely than boys to take intellectual risks on tasks that involve mathematical or spatial reasoning skills (i.e., they prefer easy rather than difficult tasks; effect size = .68). This finding is in sharp contrast to a statistically nonsignificant gender difference for preadolescent children (effect size = .10). Although this study did not single out gifted children as a target population, it nevertheless provides clues as to when this gender difference emerges and why. Given the limited evidence, one is tempted to speculate that the lack of intellectual risk taking should be more acute for gifted adolescent girls. For example, Cramer and Oshima (1992) provided crosssectional data suggesting developmental changes in attributions for math performance, with midadolescent girls being more likely than preadolescent and early adolescent girls to make ability attributions in response to a failure scenario. In another longitudinal study of high school students who participated in a math acceleration program, Terwilliger and Titus (1995) found that girls' efficacy expectancies, persistence, and interest regarding the math program underwent a sharp decline over a 2-year period (with the effect sizes of .84, 1.82, and 1.16, compared to .57, 1.12, and .59 for boys). Kline and Short (1991) also reported a steady decline in gifted girls' self-confidence and self-perceptions of abilities from elementary grades through high school (see Callahan & Reis, 1996, for a review).

At the college level, a study of a group of high school valedictorians (Arnold, 1994) found that, starting in the sophomore year, there was a sharp decline in self-perceptions of intellectual abilities among academically talented female students. In passing, there was also a higher attrition rate due to conflicts between career versus family priorities. Particularly striking about these findings are the recurrent themes of the impact of self-concept and gender role on gifted girls' achievement aspirations.

Summary. Although the research base on the issue is insufficient to

permit any conclusion, fear of failure seems to be more relevant than fear of success, and underlying causes have more to do with self-perceptions of efficacy than with the inhibition of achievement strivings due to incongruent gender-role identity. Although fear of success seems to be too strong a term to describe internal barriers to gifted girls' educational and career development, gender identity continues to play a role in gifted girls' educational and career aspirations, as we shall see later.

Self-efficacy appraisals and self-concepts should be properly understood in social contexts. A distinct feature of the social cognitive approach is to look at development not simply as an organism going through some invariant sequence of changes, but as a person in the making, in the midst of transactional experiences with tasks at hand, in his or her unique social contexts. In the next section, I will address the issue of how social contexts might figure in the psychological development of gifted girls and women: what psyches them up, so to speak, and, more relevant for this article, what psyches them out.

Social Conditions as Antecedents of Gender Differences in Achievement Behavior

Maccoby (1998) demonstrated in her recent book the powerful influence of social conditions. She provided evidence that gender differences are much greater in social behavior in groups than in individuals. For example, the mere presence of a peer, particularly of the opposite sex, makes it likely for a preschooler to conform to gender-role stereotypes. Most achievement settings are social in nature, that is, involving other people in one way or another. Understanding this social dimension of girls' achievement behaviors is particularly important because of girls' presumably high sensitivity to others' feelings, reactions, and interpersonal relations. The purpose of review in this section is to identify a set of social conditions that potentially disrupt or undermine their achievement motivation. Some of them have already been hinted at in previous sections as having an impact on girls' self-perceptions of competence or gender identity; others may interfere or inhibit girls' motivation and achievement simply by virtue of their presence.

Competition. Competition here refers to any social condition in which performances of people are compared and superiority determined. Competition not only triggers anxiety, but it induces performance goals (who is better or the best) and draws one's attention to

relative ability and capacity (Nicholls, 1984), which could potentially lead to ability attributions, positive when succeeding and negative when failing. Shucard and Hillman (1990) found that, under competitive conditions (try to do better than the one who supposedly performed earlier), but not under noncompetitive conditions (try to do one's best), gifted girls' self-efficacy, but not gifted boys', decreased after failure feedback. How do we explain this gender difference? One explanation is that, in competitive conditions, boys are more likely to activate their ego defense mechanisms (e.g., blaming the circumstances) and protect themselves from negative personal implications (i.e., low ability, loser) of unfavorable outcomes of comparison. Girls are likely to take failure feedback as informative of their actual capability and accept the outcome (Miller, 1986; Roberts, 1991).

Another explanation for the adversity of competition for girls is that boys prefer a more competitive style and girls prefer a more cooperative or individualistic learning style. However, the findings are equivocal (see Clinkenbeard, 1989; Feldhusen, Dai, & Clinkenbeard, 2000), with some evidence pointing in this direction (e.g., Li & Adamson, 1992). Empirical evidence aside, this explanation begs the question of why. In one study (Solmon, 1996), a teacher's comments provide some insights: "It seemed like the girls at the top of the ladder did not really want to compete, and the ones at the bottom of the ladder were more frustrated than the boys at the bottom" (p. 736). Whether socialized or innate, gifted boys may be more "competitive" and find competition exciting and energizing, while gifted girls are more ambivalent for several reasons.

Not only are their aggressive and competitive impulses more likely inhibited as a result of gender-role expectations (which, incidentally, may not be shown in self-report measures), but they may also be more sensitive to sufferings of those who compare unfavorably and, therefore, experience empathic distress (Gilligan, 1982). Competition may also generate more self-focused concerns, such as becoming the target of hostility by those who compare unfavorably and alienating peers, especially if peer approval and acceptance are important (Exline & Lobel, 1999). In addition, competition can potentially disrupt harmony and stability of interpersonal relations, which is presumably more of a concern to females than males (see Geary, 1998, for an evolutionary explanation).

A highly pertinent issue concerning competition in the most general sense is that women's success in traditionally male domains, such as mathematics and exact sciences, violates gender-role expectations and threatens the male ego, as well as male status. A revealing study by Paludi (1979) in the tradition of Horner's fear of success

theory shows that a cue of a top female medical student prompted much more negative imagery from both men and women than a cue of an equally superior male student. Such a social environment inhibits gifted and talented girls' motivation to excel in male-dominated domains. In other words, whether competition induces debilitating feelings may depend on perceptions of the appropriateness of competition in a specific context. A gifted girl at Julliard would not mind competing with others if she perceived the competition as an integral part of her music professional development.

Social-Evaluation Pressure and Self-Presentation Burden. Competition naturally increases social-evaluative pressure. However, even without competition, mere anticipation of evaluation can have a negative impact on girls. In one experiment (Baer, 1997), eighth-grade students were asked to write a poem and a story. The creativity or the quality of a poem and a story written by girls decreased markedly when they were told that "the assignments will be evaluated by experts from the State Department of Education" (p. 28). In contrast, boys' performance showed no such change. Baer noted a developmental trend in such a gender difference, with older (i.e., adolescent) girls' creativity suffering more under this condition of anticipated evaluation. Although the general rather than gifted population was used, one can extrapolate that the negative effects of such a high-stakes test could be even greater for gifted girls because they have the extra burden of proof that the levels of their performance are indeed worthy of the label "gifted." This is a particularly prominent theme emergent from interviews with gifted girls reported in the ethnographic study cited earlier (Kramer, 1991).

Do gifted boys experience the same social-evaluative pressure as gifted girls? In one study (Dai, 2000), gifted adolescents were asked to rate such statements as "My teachers (or my peers) always expect me to know the right answers." It was found that the ratings of these statements were positively correlated with the measures of intellectual self-confidence (r = .35) and perceived competence in math and science (r = .40) for boys. But, for gifted girls, these correlations were close to zero. The correlation between this measure of perceived teacher and peer expectations and a self-report measure of task persistence was positive for boys (r = .38), but in the negative direction for girls (r = .12). These results suggest that boys and girls had very different takes in terms of the valence of these statements. Boys perceive these statements more positively as self-affirming than girls. In the same study (Dai), ratings of statements like "I am worried about what other students will say if I don't get

the right answers" were highly correlated with task persistence for girls (b = -.50), but not for boys (b = -.05).

Why do gifted girls feel more social-evaluative pressure than gifted boys? One reason may be that intellectual competence of boys is often taken for granted in society's collective memory of gender stereotypes, but the claims that a girl is gifted often evoke more suspicion and public scrutiny as to the validity of the claims, from both peers and teachers, as suggested by the quoted remarks in Woolf's (1929/1989) essay, A Room of One's Own, and anecdotal reports (Kramer, 1991, pp. 351–352; see also Silverman, 1996, for a historical review). The possible differential treatments lead to the topic of stereotype threat.

Stereotype Threat. Claude Steele and his colleagues (Steele, 1997) have argued that the influence of gender roles does not have to be internalized, as in the case of gender-saturated self-concept. They maintain that simply being put in a category of people perceived as weak or unfavorable in some aspects of life (i.e., stereotype threat) is enough to interfere with effort and depress performance. Thus, stereotype threat, as a subtle but significant form of situational influence, can negatively affect women's performance and motivation in sex-typed masculine domains, such as math. They showed that the presence and absence of gender differences in performance on advanced, difficult math tests can be simply manipulated by instruction as to whether the math tasks students would perform had previously indicated gender differences or not. They further demonstrated that activating these stereotypes can create solo status for those who do well and undermine their positive self-expectations (Stangor, Carr, & Kiang, 1998).

Like the theory and research on fear of success, this emergent research program has high relevance and significance to understanding gifted girls. First of all, the theory states that women who are most likely influenced by stereotype threat are those who are talented in math and science and who care about doing well. Indeed, in one study, participants were those undergraduates in a highly prestigious university whose scores on the math section of SAT or ACT were above the 85th percentile (Spencer, Steele, & Quinn, 1999). Second, they specified an interference effect of stereotype threat on performers by creating discomfort, evaluative anxiety, lowered expectations, and otherwise distracting feelings and thoughts. These effects are quite like those of the social-evaluative pressure and self-presentation burden due to being gifted, as discussed earlier. The only difference is that, once labeled gifted, one has to live up to

stereotypical expectations associated with being gifted (e.g., "You are supposed to know the answer"; see Dai, 2000; Kramer, 1991). On the other hand, as a girl, one bears the burden of proof of being talented in math and science, or intelligent in general, given the findings that teachers and parents are often not convinced their girls are intelligent (Kramer, Sadker & Sadker, 1994). Third, the theory suggests that the impact of stereotype threat on performance should be the most salient with advanced, challenging materials, in which the greatest gender differences in math performance emerge (Benbow & Stanley, 1980; Benbow & Wolins, 1996; Kimball, 1989; see also Halpern, 2000). Fourth, they not only identified a situational, proximal impact on performance, but also postulated a long-term negative impact on motivation; that is, women and girls under stereotype threat are likely to disidentify with domains that are stereotyped as masculine or male domains. In other words, they will downplay the personal importance of these domains over time (Steele, 1997). In short, the research program on stereotype threat concerns gifted girls par excellence. Different from the research programs on self-efficacy and selfconcept, the stereotype-threat paradigm does not postulate any internalized processes or mechanisms and thus constitutes a quite parsimonious account of gender differences in math performance. Besides stereotype threat, an additional reason why gifted girls feel more social-evaluative pressure may have to do with gender differences in reaction to social feedback, to which we now turn.

Sensitivity to Social Feedback. The vulnerability of gifted girls under social-evaluative pressure may be further exacerbated by their susceptibility to others' competence evaluation. Roberts (1991) conducted an extensive review and concluded that women are more responsive to the valence, positive or negative, of others' evaluative feedback, while men display a self-enhancing bias in processing social-evaluative feedback; that is, men are less influenced by negative feedback than women. Dweck found, in a series of studies on gender differences in learned helpless (Dweck & Bush, 1976; Dweck, Davidson, Nelson, & Enna, 1978), that elementary school teachers were more likely to ascribe lack of motivation to boys and intellectual inadequacies to girls, thereby inducing low-ability attributions in girls. She also found that failure feedback from adults had a more negative impact on girls than on boys in terms of attribution and persistence. One research study on gifted girls (Kramer, 1991) showed exactly such an inclination of some gifted girls in early adolescent years to rely on others' opinions rather than internal standards for self-assessment of competence. Failure feedback, coupled

with social-evaluative pressure, diminishes gifted girls' self-perceptions of competence (Shucard & Hillman, 1990). In general, this sensitivity to social feedback, particularly negative feedback, interferes with motivation and performance.

Being "Gifted" as a Social Liability. In the peer culture, gifted boys can be popular, but gifted girls are more likely to face peer rejection (Bell, 1989; Gottfried, Gottfried, Bathurst, & Guerin, 1994). It is possible for a boy to be the brain and still be popular, for smartness is perceived as an attribute congruent with masculinity and can win respect for boys. Even a little eccentricity, such as "nerdiness" or "weirdness," associated with being gifted is likely to be more acceptable for boys than for girls. In contrast, gifted girls are often ridiculed for being so labeled (Kramer, 1991), and their intellectual and academic success is not appreciated as much as their looks in the peer culture. Instead, the brilliance of a girl, particularly if she is highly successful, may make her more intimidating and less attractive to boys while inviting jealousy and hostility in other girls (Bell, 1989; Holland & Eisenhart, 1990; see also Exline & Lobel, 1999, for a theory of threatening upward comparison). Attempts to hide abilities have been reported frequently by gifted girls (Callahan & Reis, 1996). It is all too natural that the adolescent years of many successful and eminent women, in retrospect, were unhappy and difficult because they were not like others and felt isolated (Kerr, 1985; Noble, 1989). Ironically, it might be precisely such social isolation or alienation that gave them the freedom to explore their unique intellectual prowess (Kerr, 1997).

Summary. Both theoretical analysis and empirical evidence suggest that a motivational disadvantage for gifted girls, if any, should be understood in dynamic social contexts rather than as isolated, intrapersonal occurrences. Peer groups, parents, and teachers can have significant influences on gifted girls' achievement behaviors in social settings. It is also possible that girls and boys react to socialevaluative conditions differently, creating a gender-by-situation interaction effect. Although the research reviewed in the previous section seems to suggest that fear of failure, rather than fear of success, is characteristic of at least some gifted girls, a further look at the literature on social conditions that hamper their achievement strivings shows that both warrant attention. However, if social contexts change dramatically in terms of stereotypes and social expectations, could there be a dramatic change in girls' achievement strivings to the point of putting the very motivational disadvantage hypothesis on trial? This issue is discussed in the next section.

Emergent Evidence Against the Motivational Disadvantage Hypothesis

Recent educational statistics depict a much more encouraging picture than portrayed in the above review. If one uses educational achievement as an indirect indicator of achievement motivation (Pintrich & Schunk, 1996), then the very assumption of a female motivational disadvantage should be seriously challenged in light of the new evidence.

In the last three decades or so, women have made enormous progress in educational attainment. Between 1989 and 1999, the number of female full-time graduate students increased by 59%, compared to 18% for their male counterparts (National Center for Educational Statistics, 2002). At the doctoral level, women earned 42% of all degrees in 1997–1998, compared with 14% in 1970–1971. At the undergraduate level, about the same proportions of girls and boys scoring at the 95th percentile and above on the ACT chose majors in premedicine, prelaw, and mathematics (Kerr, 1997). Girls are also catching up at the high school level. The number of female finalists for the Westinghouse Science Talent Search has increased steadily since the 1970s and was close to gender parity in late 1990s (Science Service, 1997, as cited in Kleinfeld, 2000). The gap between males and females in science and math AP course taking has also closed (Bae & Smith, 1997)

Most noticeable is the increase in the number of women in college from economically disadvantaged groups. In fact, they have surpassed men in the number of college degrees they have obtained in the 1990s. For example, African American women earned 64% of the college degrees awarded to African American students in 1995 (Chronicle of Higher Education, 1997, August 29, cited in Kleinfeld, 2000). Although the reasons for these gender differences are still not well understood (an antischool achievement sentiment among males?) and warrant research, women seem to be more resilient than what has been portrayed in the research.

Discussion: Weighing the Evidence and Rethinking the Question

Several observations can be made about the empirical evidence. First, the research data, although consistently in the direction predicted by the disadvantage hypothesis, are far from conclusive and are subject to alternative interpretations. Second, the data supporting the disadvantage hypothesis tend to be quite old and, thus, may

not reflect current situations. Third, the diminishing male advantage in academic achievement, sometimes even an advantage in favor of females, is too compelling to ignore. How should we reconcile the seemingly conflicting sets of evidence?

It goes without saying that the social and economic-political status of women has undergone profound changes in the past three decades. These changes have meant not only more educational and career opportunities for girls to develop their talents, but also changes in the way girls and women perceive themselves, their potential, and their gender identity. From this perspective, the recent data do not refute the hypothesis per se, but simply indicate that social conditions that gave rise to the putative motivational disadvantage have drastically changed.

This said, the evidence presented above may not be as contradictory as it appears to be. First, most evidence pointing to a female disadvantage tends to be confined to math and physical science areas in which gender differences in abilities and achievement favoring males still exist, particularly at the high end of the distribution (Benbow & Wolins, 1996; Swiatek, Lupkowski, & O'Donoghue, 2000). Second, the stronger showing of academic achievement does not mean that all conditions that put girls at a disadvantage have disappeared, particularly when sustained talent development is concerned, not merely obtaining a degree, even a doctorate. For example, the gender gap still seems to exist in various knowledge domains among freshmen in major U.S. universities (Ackerman, Bowen, Beier, & Kanfer, 2001). Third, national educational statistics have limited representations of creative productivity and real-world accomplishments that are particularly germane to giftedness. In the following section; both biological and social-cultural explanations are discussed. Furthermore, the way the research question was framed is scrutinized from feminist points of view.

A Variability or Distribution Hypothesis

A more traditional explanation for the apparent discrepancies in research and national statistics is that males tend to show more variations in cognitive abilities and motivational characteristics. A cased in point is the overrepresentation of boys at the high end of SAT-Math score distributions of out-of-level testing for seventh and eighth graders (Benbow & Stanley, 1980). On the other end is the phenomenon of male underachievement and the disproportional overrepresentation of disabilities, from dyslexia to learning disability (Kleinfeld, 2000). By the same token, motivational char-

acteristics, such as achievement drive, perseverance, competitiveness, and intellectual curiosity, can also demonstrate differential variability. In an interesting footnote, Darwin (1896/1972) cited Stuart Mill's remarks that "the things in which man most excels women are those which require most plodding, and long hammering at single thoughts." Darwin added his own comment: "What is this but energy and perseverance?" (p. 564). Thus, the variability hypothesis will lead to the argument that, even in the general population, where women have gained grounds in large measure in academic achievement, the same thing cannot be said when gifted potential and eminent achievement are concerned.

Darwin (1896/1972) first developed this variability hypothesis from an evolutionary point of view and claimed the existence of a biological basis for "man's attaining to a higher eminence" (p. 564). According to him, greater variations not only manifest themselves in secondary sex characteristics but also in mental capacities and eminent achievement (see Silverman, 1996, for a discussion). Darwin further speculated about a sexual selection process whereby males and females develop their unique physical and psychological characteristics that enhance their respective reproductive advantages (see the opening quote from Darwin; see also Buss, 1995, for an account of gender differences from an evolutionary psychology point of view).

Although biologically based dispositions may underlie some gender-differentiated behavior, from early play preferences (Lytton & Romney, 1991) and egoistic versus helpless reactions to failure (Miller, 1986), to sensitivity to others' feelings (Gilligan, 1982), it is important to keep in mind that, unlike most other biological beings, very few human behaviors are biologically preprogrammed or predetermined. Homo sapiens is uniquely endowed by its biology with the great potential to learn from experiences and shape its own course of life if given ample opportunities. Human behaviors have many, many more degrees of freedom than Darwin or Freud allowed. Recent progress in women's achievement speaks eloquently to social, rather than biological, forces in achievement behavior. If societal changes can so drastically change the landscape of talent achievements and accomplishments, the variability hypothesis, in its highly generalized form, will not hold up well, nor will the generalized motivational disadvantage hypothesis.

Schoolhouse Gifted and Creative Productive Giftedness

An alternative explanation would make a distinction between schoolhouse giftedness, which is clearly well represented in recent

national statistics, and creative productive giftedness, which rarely shows through in such gross measures, but must be demonstrated in authentic problem-solving activities (Renzulli, 1986). To illustrate this point, Bill Gates would not show up in honor rolls, just as honor roll students are not necessarily future stars.

There are some theoretical grounds for why gross national statistics of academic achievement are not a good index of gifted potential and talent achievement. Consistent with earlier researchers (Steinkamp, 1984; Walberg, 1969), Dweck (1999) reasoned that, since bright girls can do everything right and get As all the time in grade school (plus being liked by teachers), they may develop perfectionist standards (i.e., being intelligent means being perfect and not making errors) and are, therefore, ill-prepared for real intellectual challenges that lie ahead. This explanation is in line with the literature on gender differences in intellectual risk taking (e.g., Byrnes et al., 1999; Licht & Dweck, 1984). It can also explain why girls earn good grades in math classes but do not do as well on standardized tests, such as the SAT-M (Kimball, 1989).

Two conclusions follow. First, the recent educational statistics, as indices of academic achievements, can be interpreted as indicating gross gains in female youths' achievement motivation, which has been facilitated by increasing educational and career opportunities for women and societal changes in gender-role stereotypes and expectations. Significant changes may indeed have occurred in terms of gifted girls' educational and career aspirations and their commitment to talent development. Research is slow to keep up with these changes.

Another, perhaps complementary, conclusion is that we cannot be complacent with the recent statistics that show the closing of the gender gap in academic performance and achievement, because they are not a good indicator of achievement motivation from a creative productivity perspective. Indeed, studies of eminent individuals show that models of regular or gifted education programs in formal schooling do not fit well with patterns of talent development among eminent achievers (Subotnik & Olszewski-Kubilius, 1997). Much remains to be desired in terms of intellectual risk taking and single-minded pursuits of one's passions and goals.

A Domain-Specificity Explanation

A third explanation, domain specificity, would simply acknowledge that men and women have their relative strengths, weaknesses, and preferences, depending on specific domains of performance and task

demands, and generate their performance expectancies, self-concepts, and even career aspirations accordingly. Since most evidence pointing to a motivational disadvantage for girls is often related to math and science (particularly physical science), motivational disadvantages for gifted girls may be local rather than general. Such an argument is consistent with the fact that gender gaps on cognitive and achievement tests have been narrowed, even disappeared, except on some subtests of mathematics and physics. For example, out of the top 10% of high school performers in writing, seven are girls, while boys have an advantage in mathematics by the same margin (Willingham & Cole, 1997). More specifically, Halpern (2000, p. 123) found that girls excel at language production, synonym generation, word fluency, anagram, and computation. All these tasks seem to require rapid access to and retrieval of information in long-term memory. In contrast, boys excel at mathematical problem solving. verbal analogy, mental rotation, and spatial perception. These tasks involve the ability to hold and manipulate mental representations. Lohman (1994) also speculated about the implications of a relative female strength in phonological-sequential-string processing and a relative male strength in analog-image processing:

If young women generally find it easier to remember formulae than to construct mental models, and if instruction is structured in a way that makes it possible to get good grades by doing so, and if knowledge thus assembled becomes increasingly unwieldy over time compared to knowledge represented in mental models (as research suggests), then some part of the cumulative female deficit in math and science and the even larger sex differences in career choices may be more a product of the within-person pattern of specific abilities than their absolute levels. (p. 129)

As suggested in the above quote, although the domain-specific argument focuses on a more task-intrinsic aspect of motivational problems, it does not exclude the effects of the sex typing of academic subjects and poor self-perceptions. Very likely, the task-intrinsic problems and the self-perception problems propagate each other. Thus, the domain-specificity explanation contains a dispositional component (i.e., different approaches to a given task); but it can also take into account social-contextual influences, though in a more circumscribed way. A more parsimonious explanation, of course, is gender stereotype threat (Steele, 1997). However, it is untenable to attribute all gender differences found in the out-of-level testing to stereotype threat.

To summarize the above three explanations, since the controversy about gender differences often revolves around the issue of whether gender differences should be understood as socially engendered or biologically innate, it should be noted that they are not mutually exclusive. The socialization process can simply reinforce existing innate tendencies in boys and girls (see Lytton & Romney, 1991). On the other hand, an empirical demonstration of effects of classroom practices (Carpenter, Huston, & Holt, 1986) on the way preschool boys and girls engage in play activities only says that gender-differentiated behaviors can be modified by interventions. A further reasoning that modifiability of these behaviors means they must be socialized by care givers is a stretch not warranted by the evidence. The opposite argument, that if something is shown to be biological then it cannot be changed by experience, is also a misconception (Buss, 1995). To the extent that the recent statistics show progress in women's achievement, it demonstrates the malleability of human potential and powerful social forces, rather than nullifies the possible existence of biologically based gender differences.

The Ideology of Comparing the Two Sexes

If the above three explanations all attempt to resolve the disparities in data, a more sociological approach looks at research efforts to find gender differences as serving specific social purposes (Marecek, 1995). In other words, the way we ask those research questions reflects some fundamental assumptions about gender differences or lack thereof. A sociological view rejects any essentialist construal of gender differences (i.e., viewing these differences as an objective reality separate from the observer) and instead sees them as social constructions. As an interpretive strategy, one can either exaggerate them (call it *alpha bias*) or minimize them (call it *beta bias*; Hare-Mustin & Marecek, 1988). Thus, even though one can always find vast variations within both the gender and between-gender differences, it is where one chooses to look that makes up his or her views and beliefs.

Some feminists seem to believe that gender differences in which psychologists are so keenly interested are nothing but artifacts reflecting the power and status differential in a society (e.g., Tavris, 1992). "Generic" men and women were fabricated as having certain fixed qualities (e.g., men are more task oriented and women are more relationship and feeling oriented), as if other social characteristics, such as race, ethnicity, and social class, have nothing to do

with their gender identity (Marecek, 1995). According to this view, an examination of the alleged motivational disadvantage reported in this review is but one of many attempts to construct a social reality that could be deconstructed by a careful critical analysis of its underlying cultural concerns, agendas, and semantics of biological and social-cultural theories. In short, the question "Are gifted girls motivationally disadvantaged?" cannot be answered veridically (i.e., true or false) because the answer is already embedded in and preempted by the underlying assumptions either in Darwin's line of thinking or Woolf's mindset. To be sure, these feminists are in line with Woolf's view of cultural suppression and completely against Darwin's theory of sexual selection. Feminists would agree in principle with the premises of the social-cognitive approach used in this review. Indeed, it is partly to their credit that so much progress has been made in women's achievement on all fronts of our life in the past three decades.

However, a purely social constructivist view ignores the very fact that gender is a potent social category with a distinct biological component. The task for psychologists is to understand the various ways in which biologically based dispositions contribute to gender-differentiated behaviors and in which people use gender, consciously or unconsciously, to guide their behavior, organize their experience, and make sense of their world and themselves (Maccoby, 1998). Thus, the main charge of psychologists is not to advance their personal agendas, but to orchestrate the best explanation possible in light of the available evidence. Such a task is certainly difficult (after all, psychologists have their own political and ideological sympathies and biases), but not impossible.

The Issue of Values

In contrast to those who see gender differences as nothing but social constructions, some feminists (e.g., Eisler, 1987; Gilligan, 1982) believe that some gender differences are indicative of essential elements of being a woman and, thus, need to be preserved and celebrated. They would challenge the motivational disadvantage hypothesis in a different way.

Most research reviewed in this article was conducted with a mindset that somehow being girls and being gifted constitutes a liability. In this mode of operation, we are predisposed to finding girls' "deficits" rather than their strengths. By so doing, we are running the risk of implicitly judging the adequacy of girls by using boys as standards of comparison. By default, the motivational disadvantage

hypothesis already determines what is worth considering as motivational advantages (e.g., masculine characteristics). The assumption that girls function (or ought to function) in the same way as boys do is typically taken for granted and not explicitly tested. Such an assumption is now under scrutiny. A distinct example is Gilligan's (1982) challenge to Kohlberg's (1966) theory of moral reasoning. Interestingly, Horner's (1972) "fear of success" theory was a direct reaction to the failure of early motivation researchers to assess adequately women's achievement motivation [McCelland, Atkinson, Clark, & Lowell, 1953].

The consequence of various omissions or commissions may be that we misread the data to mean a motivational advantage for boys and a motivational disadvantage for girls when, in fact, it is simply a result of inherent measurement and interpretation biases based on one set of values over another. For example, instrumentality or agency (recall that most self-constructs reviewed above are agency constructs), rather than expressiveness or communion, is considered essential for ultimate success and eminence. However, it is argued that there are additional reasons other than opportunity, sex-role stereotypes, and ignorance for why there are fewer eminent women than men. Lovecky (1999) suggested that women's giftedness follows unique patterns of development, more likely characterized by empathic relationships and creative connections with others, compared to giftedness demonstrated by men. Research has consistently found that gifted and talented girls and young women tend to choose life rather than physical sciences (Benbow, Lubinski, Shea, & Eftekhari-Sanjani, 2000; Lubinski & Benbow, 1992; Subotnik, 1988). In 1997-1998, women earned 68% of doctoral degrees awarded in psychology, compared to 12% in engineering (National Center for Educational Statistics, 2001). To the extent that prestige and eminence is more likely to be achieved through hard sciences and engineering than through psychology, education, and physical and mental health professions, a fair comparison cannot be achieved.

Research has also consistently found that gifted girls in their adult lives tend to choose a more balanced than a career-focused life in their negotiation of career, relationships, and family responsibilities (Arnold, 1994; Benbow et al., 2000; Subotnik & Arnold, 1996). If there are, indeed, women's ways of carving out their own world (Chodorow, 1978), of knowing (Belenky, Clinchy, Goldberger, Tarule, 1986), of self-construal (Cross & Madson, 1997), of developing their unique perspectives and values (Gilligan, 1982), of creating distinct cultures (Eisler, 1987), then the disadvantage

hypothesis is fundamentally biased by wittingly or unwittingly imposing male standards instead of doing justice to females' unique ways and views of life.

There are two ways of thinking about value issues. One holds that the same set of values should apply to everyone. For example, Tavris (1992) envisioned a gender-free society where important skills and abilities are cultivated to lead a fulfilling life, regardless of gender (see Bem, 1981, for a similar view). In addition to domain-specific and domain-general abilities, qualities that are often associated with giftedness, such as rage to master (Winner, 1996), the capacity to fall in love with an idea (Kerr, 1997), resilience in the face of adversity (Noble, 1996), and risk taking (Reis, 1998), should be equally important for males and females. It does not make sense to see these as belonging to one sex or the other. The other way of thinking is to see men and women as having qualitatively different canonical experiences, developmental trajectories, and ways of life beyond superficial stereotypes and gender roles (Gilligan, 1982).

These two views are associated with alpha and beta biases mentioned earlier in the feminist movement. They have profound implications for educational practices. For example, should we develop "mental toughness" in girls by introducing more competitive challenges (Subotnik, Kassan, Summers, & Wasser, 1993), or should we avoid competition and social comparison altogether and instead focus on personal growth (Dweck, 1999)? The issue is whether we, as educators, should provide more congenial environments for girls who might have aversive reactions to competition or otherwise high-evaluative-pressure situations or develop their "masculine" potential or competitive edge to meet the demands of a predominantly competitive society. Although the conception of male competitiveness based on the principle of sexual selection is intuitively appealing, there is ample evidence that females can be highly competitive, as well (e.g., in athletic and artistic endeavors). The question, then, is are we willing to pay emotional costs one way or another that naturally accompany competition? Or, more generally, should we encourage girls to succeed in their own ways or should we encourage achievements that most likely lead to eminence? Are we overselling recognized achievement at the cost of neglecting the inner life of gifted children (Grant & Piechowski, 1999)? Are we putting too much of a premium on eminence in our definition of giftedness, which presumably reflects a male value (Silverman, 1996)? Should the community of gifted education balance emphases on personal growth and talent achievement (Dai & Renzulli, 2000)? In the broader social context, should the culture

value and reward contributions to human welfare by way of enhancing social harmony, peace, mental health, and personal fulfillment equally as it values and rewards eminent contributions in science and technology, which tend to produce more tangible gains for human welfare and civilization?

Summary

There is no single answer to the question "Are gifted girls motivationally disadvantaged?," just as there is no simple explanation for the apparently conflicting evidence about girls' achievement motivation and their ultimate success. A general assumption of a motivational disadvantage based on either biological or socialization premises should be rejected. However, a more circumscribed, or localized, version may still be legitimate. It is important to keep in mind the value-laden nature of the question. To the extent that the question reflects values, it cannot be answered in a veridical way. In light of the new evidence, a better strategy is to restructure the question so that girls' strengths and weaknesses can be studied in a more sensible, tractable, and productive manner.

Redirection: Changing the Way We Study Gifted Girls and Women

At least the following lessons have been learned about the way we have studied gifted girls and gender differences in general:

1. Most research has been done with an assumption of deficits of some sort on the part of gifted girls; these alleged deficits may not be as self-evident as they appear.

 Empirical inquiry into gender differences is often guided by an assumption of fixed psychological characteristics of males and females, which is problematic when depleted of their social contexts.

- Most research on gender differences has been descriptive in nature; thus, strong causal inferences as to the nature of these differences, biological or environmental, are not warranted.
- 4. Gender differences should be construed not solely as quantitative in nature, reflected as mean differences in statistical analysis, but as potentially qualitative, as unique patterns of behaviors and developmental trajectories (Maccoby, 1998).

5. It is naïve to assume that, because of the recent improvement in women's academic achievement, traditional internal or external barriers and obstacles no longer exist; for all the improvements one witnesses, there is always abundant evidence of potentialities unrealized or otherwise wasted and dreams unfulfilled.

In light of lessons learned, what can we do differently in future research efforts to advance the cause of better understanding the nature and nurture of gifts and talents in girls? In general, we can still conduct research on gender differences by using traditional experimental and correlational methods, but with more thoughtful designs, and more disciplined inferences and interpretations. Besides research of quantitative, nomothetic nature (i.e., studying the population and making assumptions about the population parameters), more ideographic or qualitative research needs to be done that focuses on unique, individual experiences of being a girl and being gifted and talented (or so labeled). It can be expected that the issue of the definition of giftedness will still plague researchers in the field and make comparison of different studies difficult (Renzulli & Dai, in press). Who is gifted? Is giftedness an inherent trait (or a constellation of traits), a fluid state of mind, or something that can only be confirmed by highlevel achievement? Since no consensus regarding these questions can be easily reached, diverse approaches will still have their place, as long as one's view of giftedness is articulated and consistent. Given this current condition, the following strategies to address and redress some of the problems in previous research are suggested.

1. Compute Effect Sizes When Statistically Significant Mean Differences Are Found

Do not take all statistically significant differences to automatically indicate meaningful differences. Too often, sweeping, unqualified generalizations about gender differences were made based on marginally significant effects. Sometimes we make too much out of too little. There will always be within-gender variations and betweengender overlaps. Thus, effect sizes allow us to estimate exactly what proportions of girls, compared to those of boys, fit specific descriptions. Several effect-size indices can be calculated. Most relevant to the target population in this article is the Binomial Effect Size Display, which compares the percentage distributions of boys and girls above and below the median (see Eagly, 1995, pp. 150–152, for a discussion of various methods of computing and presenting effect sizes).

2. Determine Whether Observed Differences Reflect Methodological Artifacts and Stylistic Differences or Differences That Indicate Real Deficits

This point concerns how we determine the functional significance of gender differences. For example, a generally more modest self-presentation style among girls (e.g., Daubman, Heatherington, & Ahn, 1992) will predispose them to give lower self-ratings of strengths and weaknesses or make more modest attributions (e.g., giving more credit to teachers, rather than bragging of one's ability or talent), particularly when measurement occasions are public, rather than private, thus inducing undue reactivity.

As another example, we often highlight the findings of low self-efficacy of girls compared to boys (Pajares, 1996b). However, we rarely mention that part of "higher" self-efficacy displayed by boys is due to their overconfidence, that is, boys are especially confident when they are wrong! (see Lundeberg, Paul, & Puncochar, 1994). This example does not nullify the motivational importance of self-efficacy or self-confidence. It does suggest, however, that sources and functional meanings of between-group differences and withingroup variations may be different. Careful reading of data will increase the validity of our claims about the nature of observed gender differences.

3. Testing Alternative Hypotheses Regarding Gender Differences Rather Than Relying on Post Hoc Explanations

From the research point of view, in most studies gender differences are often peripheral to central hypotheses and not a major focus, and many explanations are constructed in a post hoc fashion (Eagly, 1995). This practice becomes problematic in that we are likely to give more weight to studies that found gender differences than to studies that either report no difference or did not report it at all. In other words, we are liable to take chance events to indicate moments of truth. Another problem is making knowledge claims based purely on statistical results that might well be methodological artifacts (e.g., using a particular measure or procedure) rather than reflecting real, meaningful patterns of thought and action. There are many advantages of formulating working hypotheses, for example, as to what task, social conditions, or both will induce what kind of gender differences and why (see Table 1). In this way, we are less likely to take advantage of chance findings and make random speculations purely based on what shows up. We are also less likely to experience regret over not including

some important variables that would enhance certain interpretations while weakening the viability of others. As a rule, experimental research tends to accentuate environmental forces and view human behavior as reactive to these forces. Naturalistic research tends to focus on more spontaneous behavior in a less constrained or structured environment and, thus, more likely observes dispositional differences (Buss, 1989). A quantitative study will do well to include at least one contextual variable (e.g., variations in task or social condition); one internal, mediator variable (e.g., self-efficacy, attributions); and one performance or behavioral measure (e.g., persistence, choice), with gender serving as a potential moderator. For example, a recent study of motivational and gender differences in mathematical problem-solving behavior (Vermeer, Boekaerts, & Seegers, 2000), by including both self-report and behavioral measures, was able to find, to the researchers' surprise, that, although sixth-grade girls rated themselves lower on confidence than boys and attributed bad results more often to lack of capacity, they nevertheless demonstrated higher persistence (gave more tries after failure) than boys.

4. Examining Within-Gender Variation and Covariation Patterns for Boys and Girls

Group mean comparison can quickly reach a point of diminishing returns if that is the only focus of a study, particularly in light of the descriptive nature of the psychometric measures. A more productive way is to look at within-group variations and how they relate to other relevant variables. If the patterns of relationship are similar across the genders, we can argue that constructs under investigation have conceptual and functional equivalence across the genders. If patterns are different, then we can formulate further hypotheses about the nature of differing patterns, which typically indicate qualitative, rather than quantitative, gender differences (e.g., Dai, 2000).

5. Studying Gifted Girls on Their Own Terms

If there is any truth that girls have unique canonical experiences due to the interaction of biology and environment, we need to capture them with keen observations and systemic inquiry. An exclusive focus on gifted girls, using experimental and correlational designs, is also a good research strategy to map out important relationships (e.g., Spencer et al., 1999, on stereotype threat; Dickens & Cornell,

1993, on child-parent identification), not for comparison purposes, but for a closer look at the effects of different social conditions, within-gender variations, and sources thereof. Ethnographic and phenomenological inquiry also has the great advantage of reaching unique insights and deeper understanding otherwise difficult to achieve (e.g., Kramer, 1991).

Maccoby (1998) recently pointed out that gender differences would be better understood in the context of interpersonal and social interactions and gender-related interactive styles. If this is true, then static psychometric measures of motivation in terms of self-concept and gender identity may be less productive than a more dynamic assessment of motivation in terms of thought and action in a functional context that involves peers of the same or opposite sex. Particularly relevant to the topic of this article is how gifted girls self-socialize themselves and find their unique niches in the social fabric of their life. What makes some more successful than others? Unique insights can be achieved through controlled or field research.

6. Studying Successful Women

Such research will provide clues as to what made some women stand out while most others fell into obscurity and what barriers and dilemmas they have encountered in their lives and how they cope (e.g., Arnold, Noble, & Subotnik, 1996; Kerr, 1994; Kitano & Perkins, 2000; Reis, 1996). Kerr (1997) found that the single most important commonality in the lives of eminent women is that they "fell in love with an idea" (p. 494; see also Kerr, 1994, pp. 87-88), which resulted in a lifelong, absorbing pursuit that, in turn, led to an expansion of the idea or subject. Another interesting characteristic Kerr (1994) identified among eminent women is how they develop "thorns and shells" (p. 86), probably as a result of the interaction between their personality and surrounding environments. Although trivial at first blush, these thorns and shells may prove quite crucial as adaptations for the development and expression of their talents (e.g., Woolf's, 1929/1989, A Room of One's Own comes to mind). From these psycho-biographic studies of successful women, we have gained an appreciation of the rich texture of the meaning of the development of gifted potential, not only in terms of being exceptional in some aspects of human endeavor, but also in terms of their ability to find a way of life that is most productive and personally rewarding (Sternberg & Spear-Swerling, 1998).

Conclusion: A Glimpse Into the Future

Readers who have followed this intellectual journey may feel perplexed rather than enlightened. How can we ever achieve a coherent view of the matter when there are so many legitimate, yet competing, concerns and viewpoints? Coherence can be found not in the single piece of evidence or argument, but in the historical changes over the past century. Recall (or reread) the three quotes preceding this article. They arguably epitomize three phases of the changing intellectual consciousness concerning gender. They implicitly or explicitly address the key question of concern to this article. For Darwin, it is the question of "Why are women motivationally inferior" as far as achievement is concerned? For Woolf, it is the question of "Why are women motivationally disadvantaged" in terms of social prejudice and stereotype threat? For Gilligan, it is the question of "why are women motivationally unique?" If Woolf still lived in the shadow of "masculine opinions" expressed by Darwin, Gilligan was affirming the value of femininity with unprecedented confidence. While Woolf reminds us of the historical legacy of sexism and gender inequality for which our forefathers (Darwin included) were partly responsible, Gilligan's argument represents a vision of a new era where women's unique strengths and ways of life will be redeemed. Whether one feels that gender differences should be played up or down (see Tavris, 1992, for an alternative approach), one could envision, with Gilligan, a new culture where a balance could be reached between masculinity and femininity, instrumentality and expressiveness, and agency and communion (ying and yang, if you will), regardless of the sex of a person and where all manifestations of humanity, including the development and expressions of gifts and talents, would be celebrated. The coherence of our view can finally be achieved when we understand that we are not merely impartial witnesses of a history in the making, but part of this history-making process.

References

Ackerman, P. L., Bowen, K. R., Beier, M. E., & Kanfer, R. (2001). Determinants of individual differences and gender differences in knowledge. *Journal of Educational Psychology*, 93, 797–825.

Arnold, K. (1994). Academically talented women in the 1980s: The Illinois Valedictorian Project. In K. D. Hulbert & D. T. Schuster (Eds.), Women's lives through time: Educated women in the twentieth century. San Francisco: Jossey-Bass.

- Arnold, K. D., Noble, K. D., & Subotnik, R. F. E. (1996). Remarkable women: Perspectives on female talent development. Cresskill, NJ: Hampton Press.
- Bae, Y., & Smith, T. M. (1997). Women in mathematics and science. In National Center for Educational Statistics, *The condition of education*, 1997 (pp. 14-21). Washington, DC: Department of Education, Office of Research and Improvement.
- Baer, J. (1997). Gender differences in the effects of anticipated evaluation on creativity. *Creativity Research Journal*, 10, 25–31.
- Bandura, A. (1986). Social foundations of thought and action: A social cognitive theory. Englewood Cliffs, NJ: Prentice Hall.
- Bandura, A. (1997). Self-efficacy: The exercise of control. New York: Freeman.
- Belenky, M. F., Clinchy, B. M., Goldberger, N. R., & Tarule, J. M. (1986). Women's ways of knowing. New York: BasicBooks.
- Bell, L. A. (1989). Something's wrong here and it's not me: Challenging the dilemmas that block girls' success. *Journal for the Education of the Gifted*, 12, 118–130.
- Bem, S. (1981). Gender schema theory: A cognitive account of sex typing. *Psychological Review*, 88, 354–364.
- Benbow, C. P., Lubinski, D., Shea, D. L., & Eftekhari-Sanjani, H. (2000). Sex differences in mathematical reasoning ability at age 13: Their status 20 years later. *Psychological Science*, 11, 474–480.
- Benbow, C. P., & Stanley, J. C. (1980). Sex differences in mathematical ability: Fact or artifact? *Science*, 210, 1262-1264.
- Benbow, C. P., & Wolins, L. (1996). The utility of out-of-level testing for gifted seventh and eighth graders using SAT-M. In C. P. Benbow & D. Lubinski (Eds.), *Intellectual talent* (pp. 333–346). Baltimore: Johns Hopkins University Press.
- Betz, N., & Hackett, G. (1983). The relationship of mathematical self-efficacy expectations to the selection of science-based college majors. *Journal of Vocational Behavior*, 23, 329–345.
- Beyer, S., & Bowden, E. M. (1997). Gender differences in self-perceptions: Convergent evidence from three measures of accuracy and bias. *Personality and Social Psychology Bulletin*, 23, 157-172.
- Bogie, C. E., & Buckhalt, J. A. (1987). Reactions to failure and success among gifted, average, and EMR students. *Gifted Child Quarterly*, 31, 70–74.
- Buss, A. H. (1989). Personality as traits. *American Psychologist*, 44, 1378–1388.

- Buss, D. M. (1995). Psychological sex differences: Origins through sexual selection. *American Psychologist*, 50, 164–168.
- Bussey, K., & Bandura, A. (1999). Social cognitive theory of gender development and differentiation. *Psychological Review*, 106, 676-713.
- Byrnes, J. P., Miller, D. C., & Schafer, W. D. (1999). Gender differences in risk taking: A meta-analysis. *Psychological Bulletin*, 125, 367–383.
- Callahan, C. M. (1979). The gifted and talented women. In A. H. Passow (Ed.), The gifted and talented: Their development and education. The 78th Yearbook of the National Society of the Study of Education: Part I (pp. 401–423). Chicago: University of Chicago.
- Callahan, C. M., Cunningham, C. M., & Plucker, J. A. (1994). Foundations for the future: The socio-emotional development of gifted, adolescent women. *Roeper Review*, 17, 99–105.
- Callahan, C. M., & Reis, S. M. (1996). Gifted girls, remarkable women. In K. D. Arnold, K. D. Noble, & R. F. Subotnik (Eds.), Remarkable women: Perspectives on female talent development (pp. 171–192). Cresskill, NJ: Hampton Press.
- Carpenter, C. J., Huston, A. C., & Holt, W. (1986). Modification of preschool sex-typed behaviors by participation in adult-structured activities. Sex Roles, 14, 603-615.
- Chodorow, N. (1978). The reproduction of mothering: Psychoanalysis and the sociology of gender. Berkeley: University of California Press.
- Clinkenbeard, P. R. (1989). The motivation to win: Negative aspects of success at competition. *Journal for the Education of the Gifted*, 12, 293–305.
- Cramer, J., & Oshima, T. C. (1992). Do gifted females attribute their math performance differently than other students? *Journal for the Education of the Gifted*, 16, 18–35.
- Crandall, V. J., Dewey, R., Katkovsky, W., & Preston, A. (1960). Parents 'attitudes and behaviors and grade school children's academic achievement. *Journal of Genetic Psychology*, 104, 53-66.
- Cross, S. E., & Madson, L. (1997). Models of the self: Self-construals and gender. *Psychological Bulletin*, 122, 5–37.
- Dai, D. Y. (2000). To be or not to be (challenged), that is the question: Task and ego orientations among high-ability, high-achieving adolescents. *Journal of Experimental Education*, 68, 247–251.
- Dai, D. Y. (2001). A comparison of gender differences in academic self-concept and motivation between high-ability and average Chinese adolescents. *Journal of Secondary Gifted Education*, 13, 22–32.

- Dai, D. Y. (in press). Incorporating parent perceptions: A replication and extension study of the internal/external frame of reference model of self-concept development. *Journal of Adolescent Research*.
- Dai, D. Y., & Feldhusen, J. F. (1996). Goal orientations of gifted students. Gifted and Talented International, 11, 84-88.
- Dai, D. Y., Moon, S. M., & Feldhusen, J. F. (1998). Achievement motivation and gifted students: A social cognitive perspective. *Educational Psychologist*, 33, 45-63.
- Dai, D. Y., & Renzulli, J. S. (2000). Dissociation and integration of talent development and personal growth: Comments and suggestions. *Gifted Child Quarterly*, 44, 247–251.
- Darwin, C. (1972). The descent of man, and selection in relation to sex. New York: Appleton. (Original work published 1896)
- Daubman, K. A., Heatherington, L., & Ahn, A. (1992). Gender and the self-presentation of academic achievement. Sex Roles, 27, 187-204.
- Dickens, M. N., & Cornell, D. G. (1993). Parent influences on the mathematics self-concept of high-ability adolescent girls. *Journal for the Education of the Gifted*, 17, 53-73.
- Dweck, C. S. (1986). Motivational processes affecting learning. *American Psychologist*, 41, 1040–1048.
- Dweck, C. S. (1999). Self theories: Their role in motivation, personality, and child development. Philadelphia: Psychology Press.
- Dweck, C. S., & Bush, E. S. (1976). Sex differences in learned help-lessness: I. Differential debilitation with peer and adult evaluators. *Developmental Psychology*, 2, 147–156.
- Dweck, C. S., Davidson, W., Nelson, S., & Enna, B. (1978). Sex differences in learned helplessness: II. The contigencies of evaluative feedback in the classroom and III. An experimental analysis. Developmental Psychology, 14, 268–276.
- Dweck, C. S., & Leggett, E. L. (1988). A social-cognitive approach to motivation and personality. *Psychological Review*, 95, 256–273.
- Eagly, A. H. (1995). The science and politics of comparing women and men. *American Psychologist*, 50, 145–158.
- Eccles, J. S. (1985). Why doesn't Jane run? Sex differences in educational and occupational patterns. In F. D. Horowitz & M. O'Brien (Eds.), The gifted and talented: Developmental perspectives (pp. 251–295). Washington, DC: American Psychological Association.
- Eccles (Parsons), J., Adler, T. F., & Kaczala, C. M. (1982). Socialization of achievement attitudes and beliefs: Parental influences. *Child Development*, 53, 310–321.

- Eccles (Parsons), J., Adler, T., & Meece, J. L. (1984). Sex differences in achievement: A test of alternate theories. *Journal of Personality and Social Psychology*, 46, 26-43.
- Eccles, J. S., Wigfield, A., Flanagan, C. A., Miller, C., Reuman, D. A., & Yee, D. (1989). Self-concepts, domain values, and self-esteem: Relations and changes at early adolescence. *Journal of Personality*, 57, 283-310.
- Eisler, R. (1987). The chalice and the blade: Our history, our future. San Francisco: Harper & Row.
- Ewers, C. A., & Wood, N. L. (1993). Sex and ability differences in children's math self-efficacy and prediction accuracy. *Learning and Individual Differences*, 5, 259–267.
- Exline, J. J., & Lobel, M. (1999). The perils of outperformance: Sensitivity about being the target of a threatening upward comparison. *Psychological Bulletin*, 125, 307–337.
- Feldhusen, J. F., & Dai, D. Y. (1997). Gifted students' attitudes and perceptions of the gifted label, special programs, and peer relations. *Journal of Secondary Gifted Education*, 9, 15–20.
- Feldhusen, J. F., Dai, D. Y., & Clinkenbeard, P. R. (2000). Dimensions of competitive and cooperative learning among gifted learners. *Journal for the Education of the Gifted*, 23, 328–342.
- Fogel, R., & Paludi, M. A. (1984). Fear of success and failure or norms for achievement? Sex Roles, 10, 431-434.
- Frome, P. M., & Eccles, J. S. (1998). Parents' influence on children's achievement-related perceptions. *Journal of Personality and Social Psychology*, 74, 435-452.
- Geary, D. C. (1998). Male, female: The evolution of human sex differences. Washington, DC: American Psychological Association.
- Gilligan, C. (1982). In a different voice: Psychological theory and women's development. Cambridge, MA: Harvard University Press.
- Gottfried, A. W., Gottfried, A. E., Bathurst, K., & Guerin, D. W. (1994). Gifted IQ: Early developmental aspects: The Fullerton Longitudinal Study. New York: Plenum.
- Grant, B. A., & Piechowski, M. M. (1999). Theories and the good: Toward child-centered gifted education. *Gifted Child Quarterly*, 43, 4-12.
- Halpern, D. F. (2000). Sex differences in cognitive abilities (3rd ed.). Mawhaw, NJ: Erlbaum.
- Hare-Mustin, R. T., & Marecek, J. (1988). The meaning of difference: Gender theory, postmodernism, and psychology. *American Psychologist*, 43, 455-464.
- Harter, S. (1999). The construction of the self: A developmental perspective. New York: Guilford.

Holland, D. C., & Eisenhart, M. A. (1990). Educated in romance: Women, achievement, and college culture. Chicago: University of Chicago Press.

Hollinger, C. L., & Fleming, E. S. (1988). Gifted and talented young women: Antecedents and correlates of life satisfaction. Gifted

Child Quarterly, 32, 254-259.

- Horner, M. S. (1972). Toward an understanding of achievement-related conflicts in women. *Journal of Social Issues*, 28, 157–175.
- Hsueh, W. (1997). A cross-cultural comparison of gifted children's theories of intelligence, goal orientations, and response to challenge. Unpublished doctoral dissertation, Purdue University, West Lafayette, IN.
- Junge, M. E., & Dretzke, B. J. (1995). Mathematical self-efficacy gender differences in gifted/talented adolescents. *Gifted Child Quarterly*, 39, 22–26.
- Jussim, L., & Eccles, J. (1992). Teacher expectations II: Construction and reflection of student achievement. *Journal of Personality and Social Psychology*, 63, 947–961.
- Kerr, B. A. (1985). Smart girls, gifted women. Columbus: Ohio Psychology Press.
- Kerr, B. A. (1994). Smart girls two. Dayton: Ohio Psychology Press.
- Kerr, B. A. (1997). Developing talents in girls and young women. In N. Colangelo & G. A. Davis (Eds.), Handbook of gifted education (pp. 483–497). Boston: Allyn and Bacon.
- Kimball, M. M. (1989). A new perspective on women's math achievement. *Psychological Bulletin*, 105, 198-214.
- Kitano, M. K., & Perkins, C. O. (2000). Gifted European American women. Journal for the Education of the Gifted, 23, 287–313.
- Kleinfeld, J. (2000). Why smart people believe that schools short-change girls: What you see when you live in a tail. In D. M. Podell (Ed.), Educational Psychology: Contending ideas and opnions (pp. 72–80). St. Paul, MN: Coursewise.
- Kline, B. E., & Short, E. B. (1991). Changes in emotional resilience: Gifted adolescent females. *Roeper Review*. 13, 118–121.
- Kohlberg, L. (1966). A cognitive-developmental analysis of children's sex-role concepts and attitudes. In E. E. Maccoby (Ed.), *The development of sex differences* (pp. 82–173). Stanford, CA: Stanford University Press.
- Kramer, L. R. (1991). The social construction of ability perceptions: An ethnographic study of gifted adolescent girls. *Journal of Early Adolescence*, 11, 340–362.

- Lewis, J. D., & Knight, H. V. (2000). Self-concept in gifted youth: An investigation employing the Piers-Harris subscales. *Gifted Child Quarterly*, 44, 45–53.
- Li, A. K. F., & Adamson, G. (1992). Gifted secondary students' preferred learning style: Cooperative, competitive, or individualistic? *Journal for the Education of the Gifted*, 16, 46–54.
- Li, A. K. F., & Adamson, G. (1995). Motivational patterns related to gifted students' learning of mathematics, science, and English: An examination of gender differences. *Journal for the Education of the Gifted*. 18, 284–297.
- Licht, B. G., & Dweck, C. S. (1984). Determinants of academic achievement: The interaction of children's achievement orientations with skill area. *Developmental Psychology*, 20, 628–636.
- Licht, B. G., & Shapiro, S. H. (1982). Sex differences in attributions among high achievers. Paper presented at the annual meeting of the American Psychological Association, Washington, DC.
- Lohman, D. F. (1994). Spatially gifted, verbally inconvenienced. In N. Colangelo, S. G. Assouline, & D. L. Ambroson (Eds.), *Talent development: Vol. II* (pp. 251–263). Dayton: Ohio Psychology Press.
- Lovecky, D. V. (1999). Creative connections: Perspectives on female giftedness. *Advanced Development, Special Issue*, 95–106.
- Lubinski, D., & Benbow, C. P. (1992). Gender differences in abilities and preferences among the gifted. Current Directions in Psychological Science, 1, 61–66.
- Lundeberg, M. A., Paul, W. F., & Puncochar, J. (1994). Highly confident but wrong: Gender differences and similarities in confidence judgments. *Journal of Educational Psychology*, 86, 114-121.
- Lytton, H., & Romney, D. M. (1991). Parents' differential socialization of boys and girls. *Psychological Bulletin*, 46, 267–296.
- Maccoby, E. E. (1998). The two sexes: Growing up apart, coming together. Cambridge, MA: Harvard University Press.
- Marecek, J. (1995). Gender, politics, and psychology's ways of knowing. *American Psychologist*, 50, 162–163.
- Marsh, H. W. (1990). Influences of internal and external frames of reference on the formation of math and English self-concepts: A multiwave, longitudinal panel analysis. *Journal of Educational Psychology*, 82, 107–116.
- Marsh, H. W., Chessor, D., Craven, R., & Roche, L. (1995). The effects of gifted and talented programs on academic self-concept: The big fish strikes again. *American Educational Research Journal*, 32, 285–319.

- McClelland, D. C., Atkinson, J. W., Clark, R. A., & Lowell, E. L. (1953). The achievement motive. New York: Appleton-Century-Crofts.
- Meece, J. L., Parsons, J. E., Kaczala, C. M., Goff, S. B., & Futterman, R. (1982). Sex differences in math achievement: Toward a model of academic choice. *Psychological Bulletin*, 91, 324–348.
- Mendez, L. M. R. (2000). Gender roles and achievement-related choices: A comparison of early adolescent girls in gifted and general education programs. *Journal for the Education of the Gifted*, 24, 149–169.
- Miller, A. (1986). Performance impairment after failure: Mechanism and sex differences. *Journal of Educational Psychology*, 78, 486–491.
- Multon, K. D., Brown, S. D., & Lent, R. W. (1991). Relation of self-efficacy beliefs to academic outcomes: A meta-analytic investigation. *Journal of Counseling Psychology*, 38, 30–38.
- National Center for Educational Statistics. (2001). Student effort and academic progress. Retrived from http://nces.ed.gov/programs/coe/2001/section3/indicator30.html
- National Center for Educational Statistics. (2002). Digest of educational statistics 2001. Washington, DC: U.S. Department of Education, Office of Educational Research and Improvement, NCES, No. 130.
- Nicholls, J. G. (1984). Achievement motivation: Conceptions of ability, subjective experiences, task choice, and performance. *Psychological Review*, 91, 328–346.
- Noble, K. D. (1989). Living out the promise of high potential: Perceptions of 100 gifted women. *Advanced Development*, 1, 57–75.
- Noble, K. D. (1996). Resilience, resistence, and responsibility: Resolving the dilemma of the gifted woman. In K. D. Arnold, K. D. Noble, & R. F. Subotnik (Eds.), Remarkable women: Perspectives on female talent development (pp. 413-423). Cresskill, NJ: Hampton Press.
- Pajares, F. (1996a). Self-efficacy beliefs and mathematical problemsolving of gifted students. *Contemporary Educational Psychology*, 21, 325–344.
- Pajares, F. (1996b). Self-efficacy beliefs in academic settings. Review of Educational Research, 66, 543–578.
- Paludi, M. (1979). Horner revisited: How successful must Anne and John be before fear of success sets in? *Psychological Reports*, 44, 1319–1322.
- Pintrich, P. R., & Schunk, D. H. (1996). Motivation in education: Theory, research, and applications. Englewood Cliff, NJ: Prentice Hall.

- Pyryt, M. C., & Mendaglio, S. (1994). The multidimensional self-concept: A comparison of gifted and average-ability adolescents. *Journal for the Education of the Gifted*, 17, 299–305.
- Pyryt, M. C., & Richwein, M. (2000, May). Self-concept comparisons between gifted males and females: A meta-analysis review. Paper presented at the fifth annual Wallace National Research Symposium on Talent Development, Iowa City, IA.
- Reis, S. M. (1996). Older women's reflections on eminence: Obstacles and opportunities. In K. D. Arnold, K. D. Noble, & R. F. Subotnik (Eds.), Remarkable women: Perspectives on female talent development (pp. 149-168). Cresskill, NJ: Hampton Press.
- Reis, S. M. (1998). Work left undone: Choices and compromises of talented females. Mansfield Center, CT: Creative Learning Press.
- Reis, S. M., & Callahan, C. M. (1989). Gifted females: They've come a long way—or have they? Journal for the Education of the Gifted, 12, 99-117.
- Reis, S. M., & Callahan, C. M. (1996). My boyfriend, my girlfriend, or me: The dilemma of talented teenaged girls. *Journal of Secondary Gifted Education*, 17, 434-446.
- Renzulli, J. S. [1986]. The three-ring conception of giftedness: A developmental model for creative productivity. In R. J. Sternberg & J. E. Davidson [Eds.], *Conceptions of giftedness* (pp. 53–92). Cambridge, England: Cambridge University Press.
- Renzulli, J. S., & Dai, D. Y. (in press). Education of the gifted and talented. In J. W. Guthrie (Ed.), *Encyclopedia of education* (2nd ed.). New York: Macmillan Reference.
- Roberts, S., & Lovett, S. (1994). Examing the "F" in gifted: Academically gifted adolescents' physiological and affective responses to scholastic failure. *Journal for the Education of the Gifted*, 17, 241–259.
- Roberts, T.-A. (1991). Gender and influence of others' evaluations on self-assessments in achievement settings. *Psychological Bulletin*, 109, 297–308.
- Sadker, M., & Sadker, D. (1994). Failing at fairness: How America's schools cheat girls. New York: Charles Scribner's Sons.
- Schommer, M. (1993). Epistemological development and academic performance among secondary students. *Journal of Educational Psychology*, 85, 406–411.
- Schommer, M., Calvert, C., Gariglietti, G., & Bajaj, A. (1997). The development of epistemological beliefs among secondary students: A longitudinal study. *Journal of Educational Psychology*, 89, 37–40.
- Schunk, D. H. (1991). Self-efficacy and academic motivation. *Educational Psychologist*, 26, 207–231.

- Shucard, S. B., & Hillman, S. B. (1990, August). Feedback and goal conditions: Effects on attributions of gifted adolescents. Paper presented at the annual meeting of the American Psychological Association, Boston.
- Silverman, L. K. (1996). Giftedness and gender in historical context. In K. D. Arnold, K. D. Noble, & R. F. Subotnik (Eds.), Remarkable women: Perspectives on female talent development (pp. 23-48). Cresskill, NJ: Hampton Press.
- Solmon, M. A. (1996). Impact of motivational climate on students' behaviors and perceptions in a physical education setting. *Journal of Educational Psychology*, 88, 731–738.
- Spence, J. T. (1993). Gender-related traits and gender ideology: Evidence for a multifactorial theory. *Journal of Personality and Social Psychology*, 4, 624–635.
- Spence, J. T., & Helmreich, R. L. (1978). Masculinity and femininity: Their psychological dimensions, correlates, and antecedents. Austin: University of Texas Press.
- Spencer, S. J., Steele, C. M., & Quinn, D. M. (1999). Stereotype threat and women's math performance. *Journal of Experimental Social Psychology*, 35, 4–28.
- Stangor, C., Carr, C., & Kiang, L. (1998). Activating stereotypes undermines task performance expectations. *Journal of Personality and Social Psychology*, 75, 1191–1197.
- Stanley, J. C. (1990, January). We need to know why women falter in math. Chronicle of Higher Education, p. B4.
- Steele, C. M. (1997). A threat in the air: How stereotypes shape intellectual identity and performance. *American Psychologist*, 52, 613–629.
- Steinkamp, M. W. (1984). Motivational style as a mediator of adult achievement in science. In M. W. Steinkamp & M. L. Maehr (Eds.), Advances in motivation and achievement: Women in science (pp. 281–317). New York: JAI Press.
- Sternberg, R. J., & Spear-Swerling, L. (1998). Personal navigation. In M. Ferrari & R. J. Sternberg (Eds.), Self-awareness: Its nature and development (pp. 219–245). New York: The Guilford Press.
- Subotnik, R. F. (1988). The motivation to experiment: A study of gifted adolescents' attitudes toward scientific research. *Journal for the Education of the Gifted*, 11, 19–35.
- Subotnik, R. F., & Arnold, K. D. (1996). Success and sacrifice: The costs of talent fulfillment for women in science. In K. D. Arnold, K. D. Noble, & R. F. Subotnik (Eds.), Remarkable women: Perspectives on female talent development (pp. 263-280). Cresskill, NJ: Hampton Press.

- Subotnik, R., Kassan, L., Summers, E., & Wasser, A. (1993). Genius revisited: High-IQ children grown up. Norwood, NJ: Ablex.
- Subotnik, R. F., & Olszewski-Kubilius, P. (1997). Restructuring special programs to reflect distinctions between children's and adults' experiences with giftedness. *Peabody Journal of Education*, 72, 101–116.
- Swiatek, M. A., Lupkowski, S. A., & O'Donoghue, C. C. (2000). Gender differences in above-level EXPLORE scores of gifted third through sixth graders. *Journal of Educational Psychology*, 92, 718–723.
- Tavris, C. (1992). The mismeasure of women: Why women are not the better sex, the inferior sex, or the opposite sex. New York: BasicBooks.
- Taylor, C. W., & Barron, F. A. (1963). A look ahead. In C. W. Taylor & F. A. Barron (Eds.), Scientific creativity: Its recognition and development. New York: Wiley.
- Terwilliger, J. S., & Titus, J. C. (1995). Gender differences in attitudes and attitude changes among mathematically talented youth. *Gifted Child Quarterly*, 39, 29–35.
- Vermeer, H. J., Boekaerts, M., & Seegers, G. (2000). Motivational and gender differences: Sixth-grade students' mathematical problem-solving behavior. *Journal of Educational Psychology*, 92, 308–315.
- Walberg, H. J. (1969). Physics, femininity, and creativity. *Developmental Psychology*, 1, 47–54.
- Willingham, W. W., & Cole, N. S. (1997). Gender and fair assessment. Mahwah, NJ: Erlbaum.
- Winner, E. (1996). Gifted children. New York: BasicBooks.
- Woolf, V. (1989). A room of one's own. San Diego, CA: Harvest Book/Harcourt. (Original work published 1929)
- Yee, D. K., & Eccles, J. S. (1988). Parent perceptions and attributions for children's math achievement. Sex Roles, 19, 317-333.
- Zeldin, A. Y., & Pajares, F. (2000). Against the odds: Self-efficacy beliefs of women in mathematical, scientific, and technological careers. *American Educational Research Journal*, 37, 215–246.
- Ziegler, A., Heller, K. A., & Broome, P. (1996). Motivational preconditions for girls gifted and highly gifted in physics. *High-Ability Studies*, 7, 129–143.

Acknowledgments

Special thanks are due to Nancy Robinson, Françoys Gagné, and Rena Subotnik for providing insightful feedback on earlier versions of the article. I thank Larry Coleman and anonymous reviewers for their helpful comments. I also thank Charlotte Duncan and Xiaolei Wang for their editorial assistance.

Endnote

In this paper, the term *gender*, rather than *sex*, differences will be used, descriptively, to refer to any observed differences between males and females, with no further inference as to whether the differences are of biological or social-cultural nature.



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TITLE: Are Gifted Girls Motivationally Disadvantaged? Review,

Reflection, and Redirection

SOURCE: Journal for the Education of the Gifted 25 no4 Summ

2002

WN: 0219605876001

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