15 Ability Self-Perceptions and Subjective Task Values in Adolescents and Children

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Individual differences in school performance and other achievement-related behaviors have been a central concern of social and personality theory for more than 50 years. Various theoretical analyses of these differences have been proposed, and a variety of beliefs and perceptions about self and task have been proposed as mediators of achievement-related behavior. Many of these theories focus on individual differences in expectations for success and the subjective valuing of various achievement-related behaviors as the two major predictors of individual differences in achievement. Theorists predict, for example, that doing well in school is facilitated by having high confidence in one's academic abilities and by placing high value on doing well in school. Similar arguments have been proposed for other domains such as sports and instrumental music (see Eccles, Wigfield, & Schiefele, 1998).

Given that doing well and feeling competent in school, work, and other socially valued domains are important outcomes for success in our society and for good mental health, having measures of indicators that predict these outcomes during childhood and adolescence would be useful to policy makers and researchers. In this chapter, we describe the development of measures for two such indicators: *ability self-perceptions* and *subjective task values*. Measurement scales for both indicators, as well as for task difficulty, were initially developed for adolescents (grades 5 through 12). The scales for ability self-concepts and subjective task values were later adapted for use with younger children (grades 1 through 6).

Ability Self-Perceptions

The construct of ability self-perceptions evolved out of classic expectancy-value models of behavior and the work by theorists to operationalize a definition for *expectations for success*. Atkinson (1964) provided one of the first definitions of expectations for success on a task, defining expectancy as the proportion of individuals who have succeeded at the task in the past. Other researchers have argued for a more explicit operational distinction between subjective expectancy and task difficulty, arguing that task difficulty, as defined by Atkinson, is just one of several influences on subjective expectancy (e.g., Bandura, 1994; Eccles et al., 1983; Feather, 1986; Heckhausen, 1977; Weiner, 1974). In addition, all of these researchers have stressed the importance of domain-specific measures of expectancies.

In 1983, Eccles and her colleagues laid out a model of motivated task choice and performance that distinguished between one's self-concept of domain-specific abilities and perceived task difficulty. They predicted that these two beliefs would interact in predicting expectations for success in particular school subjects. Self-concept of domain-specific ability was predicted to relate positively to expectancies, whereas task difficulty perceptions were predicted to relate negatively to expectancies. Subsequently, Eccles and Wigfield (1995) demonstrated that domain-specific expectations for success and ability self-concepts load on the same factor and therefore can be treated empirically as the same construct.

Subjective Task Values

Similar discussions have arisen regarding the concept of task value. Atkinson (1964) defined task value in terms of the incentive value of anticipated success (the anticipated pride one would feel in accomplishment). Over the past 30 years, other individuals have offered broader definitions of task value. Crandall (1969), for example, defined task value in terms of the subjective attainment value (the importance of attaining a goal) and objective task difficulty. Rotter (1982) defined task value as the anticipated reward the individual will receive from engaging in the activity. Similarly, Raynor (1974) argued that the instrumentality of a particular task in allowing one to move along a contingent path toward a desired goal would increase the incentive value of the task.

Building on Rokeach's (1980) work on broader human values, Feather (1982) discussed task value in terms of systems that "capture the focal, abstracted qualities of past encounters, that have a normative or oughtness quality about them, and that function as criteria or frameworks against which present experience can be tested. They are tied to our feelings and can function as general motives" (p. 275). In terms of motivational consequences of these value systems, he assumed that values affect the valence of specific activities or situations for the individual and therefore are linked to action (e.g., approaching or avoiding the activity). The notion that the valence of an activity would affect action is similar to the Lewinian idea that activity choice would be influenced by the relative perceived valences of the options being considered (Lewin, 1938) and to Rokeach's suggestion that we engage in activities that create the effects we like and avoid those activities that create effects we do not like (Rokeach, 1980).

Eccles and her colleagues have offered a broad definition of subjective task value and have specified several components (Eccles et al., 1983). In general, these investigators assume that task value is determined by characteristics of the task itself; by the broader needs, goals, values, and motivational orientations of the individual; and by affective memories associated with similar tasks in the past. The degree to which a particular task is able to fulfill needs, confirm central aspects of one's self-schema, facilitate reaching goals, affirm personal values, and/or elicit positive versus negative affective associations and anticipated states is assumed to influence the value a person attaches to engaging in that task. The researchers therefore predicted that individuals would be more likely to engage in valued tasks. Thus, individuals' values are posited to have both motivational and behavioral consequences.

Eccles and her colleagues argued further that task value should be conceptualized in terms of four major components: attainment value, intrinsic value or interest, utility value, and cost. Attainment value represents the importance of doing well on a task in terms of one's self-schema and core personal values. Intrinsic or interest value is the inherent enjoyment or pleasure one gets from engaging in an activity. Utility value is the value a task acquires because it is instrumental in reaching a variety of long- and short-range goals. Finally, cost is what is lost, given up, or suffered as a consequence of engaging in a particular activity (see Eccles et al., 1983). The first three components are best thought of as characteristics that affect the positive valence of the task. Cost, in contrast, is best thought of as those factors (such as anticipated anxiety and anticipated cost of failure) that affect the negative valence of the activity. It also includes the avoidance goals now emerging in achievement goal theory (Elliott & Church, 1997).

Thus, over time, conceptualizations of constructs linked to expectancy for success and task value have evolved greatly, as have refinements of the components of each construct. Below we summarize the development and confirmation of one set of measures for these two constructs at the domain-specific level, which in this chapter we refer to as ability self-perceptions (ability self-concepts, competence beliefs) and subjective task values.

Factor Analysis of Academic Scales

Data for confirmatory factor analysis of items to assess ability self-perceptions and subjective task values in the domains of mathematics and English come from a 2-year longitudinal study in which adolescents' domain-specific self-perceptions and task values were assessed once each year. The sample was drawn using the mathematics classroom as an intermediate sampling unit. Classrooms at each grade level were chosen randomly from among classrooms whose teachers volunteered to participate in the study. Within each classroom all adolescents were asked to participate. Project staff members supervised the students' completion of the self-report questionnaires. In Year 1, the sample consisted of 742 predominantly White, middle-class adolescents in grades 5 through 12, with approximately 90 adolescents at each grade level. The sample included 366 females and 376 males. In Year 2, the sample contained 575 adolescents in grades 6 through 12 (88% of the 5th through 11th graders from Year 1). In the analyses summarized here, only adolescents with complete data on all measures are included; $N = 707$ for Year 1, and $N = 545$ for Year 2.

The questionnaire given to these adolescents included 29 items grouped under the following nine domain-specific constructs: ability perceptions, performance perceptions, expectations for success, perceived task difficulty, amount of effort required to do well, actual amount of effort exerted, enjoyment in doing task, perceived importance of task, and perceptions of the extrinsic utility value of the subject area. All items focused on the domains of mathematics and English. Responses for all items were made on 7-point Likert scales anchored only at the end points but with numbers indicating 1 through 7.

The psychometric properties of the items and scales are quite good and have been reported elsewhere (see Eccles, Wigfield, Blumenfeld, & Harold, 1984; Eccles et al., 1983, for discussion of development of the questionnaire). Cronbach's alphas ranged from .62 to .92 (see Appendix). There were virtually no missing data on the responses to items. The items had good distributions, with some skewing to the positive end of the scale. These scales can be self-administered either on the computer or on a questionnaire.

Using the Year 1 data, we investigated the factor structure of the nine domain-specific constructs through exploratory factor analyses of the original 29 items. Based on the results, we eliminated 10 items (see Appendix for the final 19 items). To determine whether we could test the models on the whole sample, we assessed the invariance of the covariance matrices of the items for boys and girls, and for younger (5th through 7th grade) and older (8th through 12th grade) adolescents, following procedures described by Jöreskog and Sorbom (1981). Results of the analyses showed that the matrices were reasonably invariant across groups. Thus, the data were collapsed across age and gender.

Using the Year 2 data, we conducted a two-step confirmatory factor analysis of the final 19 items (see Eccles & Wigfield, 1995, for details). First we analyzed the three superordinate categories of ability beliefs, subjective task value beliefs, and task difficulty beliefs individually. The results confirmed a six-factor model. We next analyzed all 19 items simultaneously. As predicted, the six-factor model best fit the relations among all 19 items (see Appendix). This model fit our theoretical predictions regarding the likely factor structure, as well as the pattern of relations among the six factors themselves. We have replicated this factor structure in another sample of fifth through sixth graders that included both European American and African American students (see Eccles et al., 1989; Senior, 1989; Wigfield, Eccles, Mac Iver, Reuman, & Midgley, 1991).

We then used a higher order factor analysis to determine whether these factors could be aggregated into three major higher order constructs: ability/expectancy, subjective task value, and perceived task difficulty. Each item loaded strongly on the appropriate individual factor, and each individual factor loaded strongly on the higher order factor posited to underlie them (see Appendix). The higher order factors are related negatively, as predicted in the Eccles et al. (1983) model. As with the other models, this higher order factor model also provided an excellent fit in the Year 2 data. The pattern of factor loadings and relation between the two higher order factors showed great similarity across the two years. Again, the covariance invariance test shows that the matrices are quite similar each year.

Although the math and English constructs do factor separately, they are highly related and can be collapsed into scales that provide more global school-related constructs for researchers interested in these more general school-related beliefs and their relation to general school achievement. We have used the Michigan Study of Adolescent Life Transitions (MSALT) data to create such scales, and they are relatively reliable (Cronbach's alpha = .68 to .77). These more global scales, however, would not be good for studying the differential performance and course enrollment decisions across the domains of mathematics and English. However, we have now replicated the factor structure for physical science, biological science, computer science, sports, and instrumental music, and are therefore comfortable recommending adaptation of the items for other achievement-related activity domains.

Validity of the Academic Scales

The validity of the academic scales was assessed in three ways: discriminant validity, face validity, and predictive validity. Face validity reflects the logical correspondence between the items themselves and the constructs presumably being measured. As can be seen, there is very close linguistic correspondence between the items themselves and the construct they indicate (see Appendix). Discriminant validity is confirmed by the factor analyses described above.

Predictive validity is confirmed by analyses testing the extent to which these scales relate in the predicated directions to other achievement outcomes. Using the 2-year sample, we assessed the extent to which these scales related to teachers' ratings of the students' prior achievement, to parents' ratings of their children's abilities and interests, and to the courses chosen and grades received later in high school in the domains of math and English (see Eccles, 1984; Eccles et al., 1983; Eccles et al., 1990; Eccles, Meece, Adler, & Kaczala, 1982).

We also conducted similar analyses of predictive validity with a demographically and ethnically more diverse sample that is part MSALT (see Eccles et al., 1989; Wigfield et al., 1997). The MSALT sample was drawn from sixth-grade classrooms in 10 school districts in southeastern Michigan. Eight of the districts were 90% or more European American; 2 of the districts had between 30% and 40% African American students. The full sample included approximately

10% African American students and 85% European American students who came from predominantly working-class and middle-class families. The gender distribution was approximately even. The self-report questionnaires were administered in mathematics classrooms. School record data, teacher reports, parent reports, and classroom observations were also collected.

In both the 2-year and the MSALT samples, there is very high predictive validity, and the scales do an excellent job of explaining the links between gender and differential achievement in mathematics and English. For example, the gender difference in plans to enroll and actual enrollment in advanced mathematics courses in high school is completely explained by the gender difference in the subjective task value attached to advanced mathematical courses, even after family background, prior achievement, and mathematical aptitude are controlled (Eccles, Adler, & Meece, 1984, 1993; Eccles et al., 1983; Eccles et al., 1984; Eccles, Wigfield, Harold, & Blumenfeld, 1993). These associations have been replicated in subsequent samples and hold true for African American youth as well as European American youth (Updegraff, Eccles, Barber, & O'Brien, 1996; Winston, Eccles, Senior, & Vida, 1997), as well as for sports and instrumental music (Eccles & Harold, 1991; O'Neill, in press; O'Neill, Ryan, Boulton, & Sloboda, 2000; Wigfield, O'Neill, & Eccles, 1999).

Most interestingly, the ability self-concept construct and the subjective task value construct sometimes relate differently to performance (course grades) and choice behaviors (the decision to enroll in particular courses). When there is a difference in the pattern of associations, ability self-concept relates most strongly to subsequent performance, and the subjective task value construct relates most strongly to enrollment decisions. For example, in the 2-year sample, only self-concept of math ability predicted subsequent math courses grades (Eccles, Adler, et al., 1984). In contrast, the subjective task values indicators predicted to future course enrollment plans and actual enrollment decisions. We have also found similar patterns for predicting adolescents' participation in sports, enrollment in advanced math courses, and enrollment in advanced physical science courses in the MSALT sample (e.g., Eccles & Barber, 1999).

These differential effects, however, are not always found. In the MSALT sample, math ability self-concept did not predict changes in math grades from one term to the next, once indicators of prior performance were controlled. In contrast, math value did predict increases in math grades. This was truer for the European American than for the African American students (unstandardized coefficients = .22 and .13, respectively; ethnic difference was significant at $p < .10$). In regard to course plans, as predicated by the expectancy-value models, both math value and math ability self-concept significantly predicted plans to take more math courses, and this was equally true for the African American and European American students.

In summary, our first study demonstrates that we can reliably measure the three constructs associated with expectancy value models of achievement behavior: ability self-perceptions, subjective task values, and perceived task difficulty. The six scales (see Appendix) are equally appropriate for boys and girls and for youth from 5th through 12th grade. The scales can be further collapsed into three superordinate scales that relate to each other in the theoretically expected direction. We have replicated this factor structure in subsequent Black and White samples in other school districts in southeastern Michigan. Additional analyses in other data sets have also shown that comparable factor solutions emerge when other domain names are substituted for mathematics. The most powerful scales for predicting subsequent achievement behaviors are the ability/expectancy scale and the three subjective task value scales (interest, importance, utility), which can be used independently or together as a superordinate scale. We believe that these scales are ready for use on national data sets of youth in grades 5 and above.

Scales for Younger Children

Having developed reliable and valid scales to assess self-concepts of abilities and subjective task values for achievement-related domains (particularly school achievement domains), we wanted to determine whether we could assess these same constructs in elementary school–age children and whether we could extend the work to the domains of sports and instrumental music. Data for this effort are part of the longitudinal Michigan Childhood and Beyond Study (Eccles, Wigfield, et al., 1984) investigating the development and socialization of children's beliefs and values about self and tasks, as well as their activity choices. The findings summarized here come from Years 2, 3, and 4 of the study.

The children in this sample are from lower-middle-class to middle-class backgrounds, and more than 95% are White. Children, parents, and teachers were recruited through four school districts in the suburbs of Detroit, and 75% of children solicited agreed to participate and obtained parental permission. In Year 2, the participants included 865 children in first, second, and fourth grades. Thus, over the 3 years of data collection, the sample includes children from grades one through six, as well as three overlapping cohorts of children. The longitudinal sample used in the analyses summarized here includes approximately 615 children (females = 325, males = 290) divided about equally among the three cohorts. The 615 children represent 71% of the original sample. Attrition in the sample was mostly due to children moving far away from the school districts sampled. Every effort was made to relocate children each year, and children continuing to live in the same general area but not attending participating schools are included in the longitudinal sample.

In three consecutive springs, the children completed questionnaires tapping their beliefs about mathematics, reading, instrumental music, and sports, as well as other constructs. Within each of these domains, children answered questions about specific activities. In the academic area, children were asked about mathematics and reading. The music questions concentrated on instrumental music. The sports questions focused on sports in general and included sex-typed sports activities more often done by girls (tumbling) and by boys (throwing and catching a ball).

In the math, reading, and sports activity domains, the five items designed to tap competence beliefs asked the children how good they are at each activity, how good they are relative to the other things they do, how good they are relative to other children, how well they expect to do at each activity, and how good they thought they would be at learning something new in each domain. The four items tapping subjective task values in Year 2 included one item assessing importance, one assessing usefulness, and two assessing interest. At Years 3 and 4, two new values items were added: one asking children how important doing well on the activity is to them compared to other activities they do, and another asking how useful the activity is compared to the other activities they do. For instrumental music, fewer items were included on the questionnaires as follows: three items were used to tap competence beliefs in Year 2, asking the children how good they are, how good they are relative to the other things they do, and how good they thought they would be at learning a new musical instrument. Three items were used to tap subjective task values, one item assessing importance, and two assessing interest. In Years 3 and 4, another item was added for competence beliefs in instrumental music, asking how good they are relative to other children. The wording of these items was essentially the same in each domain. All items in all domains were answered using response scales ranging from 1 to 7. The items have excellent psychometric properties, and the scales themselves have very good reliability and validity (see Eccles, 1984; Eccles et al., 1982; Eccles et al., 1983; Eccles, Wigfield, et al., 1984; Eccles & Wigfield, 1995; Updegraff et al., 1996).

To ensure that these young children understood the constructs being assessed, the items were pilot-tested on 100 children, and the answer scales were illustrated to foster children's understanding of how to use them (see Eccles et al., 1993). All questions were read aloud to the children in Years 2 and 3. In Year 4, the oldest two groups (in grades four and six) did the questionnaires on their own. The distribution of responses was good, with some skewing to the positive end of the scale. In grades one to three, the children did not use all 7 points of the scale with equal frequency; instead their responses clustered around the end and mid points. This, however, did not affect the factor analyses and scale reliability estimates.

Factor Analyses of Children's Scales

Initially, we did factor analyses of the items assessed at Year 2 to determine whether young children's responses had good psychometric properties and yielded the same factors we had obtained on adolescents (Eccles et al., 1993). Within the domains of math, reading, and sports, distinct competence beliefs and task values factors were apparent even among the first graders. The items loading on the competence and values factors were similar, both in the different domains and in the different age groups. Based on these factor analyses, scales defining these constructs were created. The competence belief scales in the domains of math, reading, and sports contained the five items discussed above, and the subjective task values scale contained four items (two items assessing interest, one assessing perceived importance, and one assessing perceived usefulness). Internal consistency reliabilities for these scales ranged from good to excellent, with Cronbach's alphas ranging from .53 to .82. In instrumental music, the competence beliefs scales contained four items, and the subjective task values scale contained three items (one assessing importance and two assessing interest), with Cronbach's alphas ranging from .67 to .86.

We next performed exploratory and confirmatory factor analyses of the items given during Years 3 and 4. In the exploratory factor analyses, Cattell's scree test was used to determine the number of factors that best describe the data. As with the Year 2 data, the analyses at Years 3 and 4 yielded clear competence beliefs and task values factors in each of the domains. In some of the domains (especially the academic domains), there was evidence that the values items formed two factors: usefulness/importance and interest.

Although the items assessing task values did not always factor into separate usefulness/importance and interest factors, we created scales for both of these constructs and analyzed them separately, for three main reasons. First, Eccles et al.'s (1983) theoretical model specifies these as different components, and factor analytic work with older children and adolescents suggests the emergence of these constructs as separate factors (Eccles & Wigfield, 1995). Earlier work with older students (e.g., Eccles et al., 1989; Wigfield et al., 1991) has examined change in the separate values constructs, and we wish to compare results of the present study to that work. Second, our interest construct is somewhat similar to Harter's (1981) curiosity component of intrinsic motivation, and so comparisons to her work are relevant as well. Third, the separate scales were reliable (with the exception of the usefulness and importance scales at Year 2).

Validity of the Children's Scales

We assessed the validity of the children's scales by looking at face, discriminant, and predictive validity. Based on the linguistic overlap between the items and the constructs being assessed, we concluded that the face validity of the scales is quite high. The factor analytic results reported above demonstrate the discriminant validity of the scales.

Predictive validity is provided by the expected gender differences and developmental declines in each scale, the expected relations of the scales to both parent and teacher ratings, and the expected relations of the scales to each other (see further, Wigfield et al., 1997). As predicted, boys had more positive self-perceptions and values than girls for sports and mathematics, and girls had more positive self-perceptions and values than boys in reading and instrumental music. Basically, the self-perceptions and values for all four domains declined over time. The one exception was sports, where interest did not decline. In another set of analyses, we have also found that these developmental declines continue through high school and are related in the expected direction to both gender and parents' ratings of their children's abilities and interests in these domains (Fredricks & Eccles, 2002; Jacobs, Hyatt, Osgood, Eccles, & Wigfield, 2002).

In summary, these scales are quite reliable and have excellent validity. The math and reading scales are also currently being used with 8- to 12-year-olds in the Child Development Supplement of the Panel Study of Income Dynamics (CDS/PSID, a nationally representative sample of adults and their children, and with the upper-elementary school-aged children in the National Institute of Child Health and Human Development's National Child Care Study. Cronbach's alphas for the CDS/PSID sample were .80 or higher for all subgroups and ages.

The instrumental music scales have also been used with a sample of approximately 1,500 elementary and secondary school children in the United Kingdom as part of the 4-year longitudinal Youth Participation in Music Activities study (see further O'Neill et al., 2000; Wigfield et al., 1999). The results confirmed a two-factor model, measuring distinct competence beliefs (Cronbach's alpha = .84) and task values factors (Cronbach's alpha = .95). Predictive validity of the scales has been confirmed by testing the extent to which the scales relate in the predicted direction to measures of participation in instrumental music. Children who reported playing instruments also reported higher ability beliefs and value beliefs than children who had given up playing instruments or considered themselves to be nonplayers. Girls reported higher ability and value beliefs than boys. All groups reported higher value beliefs for instrumental music than ability beliefs. Ability beliefs correlated similarly with both formal (in school) and informal (outside school) instrumental playing, whereas value beliefs correlated higher with informal than formal instrumental playing (see further O'Neill, in press). These results support similar findings obtained with children in the United States (Wigfield et al., 1997).

In conclusion, we have demonstrated that one can create reliable and valid measures of ability self-perceptions and subjective task values in various domains and that these beliefs predict subsequent achievement-related behaviors. As such, these indicators are both useful and important in the area of positive youth development, as researchers and policy makers strive to understand the multiple pathways that lead to positive outcomes for youth.

Appendix

The following items assess adolescents' ability self-perceptions and subjective task values in the domain of mathematics. English, sports, instrumental music, or another achievement-related domain can be substituted for "math" in these items. All items were answered on scales ranging from 1 to 7.

Ability/Expectancy[a]

1. Compared to other students, how well do you expect to do in math this year? (much worse than other students, much better than other students)
2. How well do you think you will do in your math course this year? (very poorly, very well)
3. How good at math are you? (not at all good, very good)

4. If you were to order all the students in your math class from the worst to the best in math, where would you put yourself? (the worst, the best)
5. How have you been doing in math this year? (very poorly, very well)

Perceived Task Difficulty

Task Difficulty[b]

6. In general, how hard is math for you? (very easy, very hard)
7. Compared to most other students in your class, how hard is math for you? (much easier, much harder)
8. Compared to most other school subjects that you take, how hard is math for you? (my easiest course, my hardest course)

Required Effort[c]

9. How hard would you have to try to do well in an advanced high school math course? (not very hard, very hard)
10. How hard do you have to try to get good grades in math? (a little, a lot)
11. How hard do you have to study for math tests to get a good grade? (a little, a lot)
12. To do well in math I have to work (much harder in math than in other subjects, much harder in other subjects than in math).

Perceived Task Value

Intrinsic Interest Value[d]

13. In general, I find working on math assignments (very boring, very interesting).
14. How much do you like doing math? (not very much, very much)

Attainment Value/Importance[e]

15. Is the amount of effort it will take to do well in advanced high school math courses worthwhile to you? (not very worthwhile, very worthwhile)
16. I feel that, to me, being good at solving problems which involve math or reasoning mathematically is (not at all important, very important).
17. How important is it to you to get good grades in math? (not at all important, very important)

Extrinsic Utility Value[f]

18. How useful is learning advanced high school math for what you want to do after you graduate and go to work? (not very useful, very useful)
19. How useful is what you learn in advanced high school math for your daily life outside school? (not at all useful, very useful)

[a]Alpha coefficient = .92
[b]Alpha coefficient = .80
[c]Alpha coefficient = .78
[d]Alpha coefficient = .76
[e]Alpha coefficient = .70
[f]Alpha coefficient = .62

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Edited by

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Child Trends
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Springer

Library of Congress Cataloging-in-Publication Data

What do children need to flourish? : conceptualizing and measuring indicators of positive development/edited by Kristin A. Moore and Laura Lippman.
p. cm.
Papers presented at a conference held in Washington, D.C. in March 2003.
Includes bibliographical references and index.
ISBN 0-387-23061-0
1. Child development–Evaluation–Congresses. I. Moore, Kristin A. II. Lippman, Laura.

HQ767.82.W43 2005
305.231–dc22

2004059116

ISBN 0-387-23061-0 ISBN 13: 978-038-723061-0 Printed on acid-free paper.

233 Spring Street, New York, New York 10013

Printed in the United States of America. (TB/EB)

9 8 7 6 5 4 3 2 1 SPIN 150043

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